a: *Abbreviation for* **atto** (10^{-18}). *See* **metric system.**

abandoned call: A call in which the call originator disconnects or cancels the call after a connection has been made, but before the call is established.

abandonment: Network replacement of a connect signal with an on-hook signal (network) prior to receiving a CI (customer installation) answer signal; abandonment is the only way to end an unanswered call attempt. [T1.405-1989]

abbreviated address: An address that has fewer characters than the full address, usually for special communications and other services or for certain users. *Note:* Examples of abbreviated addresses are (a) a four-digit telephone number for a user calling another user connected to the same switching exchange, and (b) message addresses that have only the addressee name and station code or number. [After Weik '96]

abbreviated address calling: Calling that enables a user to employ an address having fewer characters than the full address when initiating a call. *Note:* Communications network users may be allowed to designate a given number of abbreviated address codes. The allocation of the abbreviated address codes to a destination or group of destinations may be changed as required, by means of a suitable procedure. [After Weik '96]

abbreviated dialing: A telephone service feature that (a) permits the user to dial fewer digits to access a network than are required under the nominal numbering plan, and (b) is limited to a subscriber-selected set of frequently dialed numbers. *Synonym* **speed dialing.**

abort: 1. In a computer or data transmission system, to terminate, usually in a controlled manner, a processing activity because it is impossible or undesirable for the activity to proceed. **2.** In data transmission, a function invoked by a sending station to cause the recipient to discard or ignore all bit sequences transmitted by the sender since the preceding flag sequence.

abrasive: Any of a number of hard materials, such as aluminum oxide, silicon carbide, and diamond, that are powdered and carefully graded according to particle size, and used to shape and/or finish optical elements, including the endfaces of optical fibers and connectors. *Note:* For finishing the endfaces of optical fiber connectors, abrasive particles are adhered to a substrate of plastic film, in a fashion after that of sandpaper. The film is in turn supported by a hard, flat plate. The connector is supported by a fixture that holds it securely in the proper position for finishing. The grinding motion may be performed manually or by a machine. [After FAA]

absolute address: In communications, computer, and data processing systems, an address that directly identifies a storage location without the use of an intermediate reference, *e.g.,* a base address or a relative address. [After Weik '96]

absolute delay: 1. The time interval or phase difference between transmission and reception of a signal. **2.** The total time between the instant a bit enters the network and the instant a corresponding bit exists the network.[T1.503-1989] [T1.507-1996]

absolute gain: 1. Of an antenna, for a given direction and polarization, the ratio of (a) the power that would be required at the input of an ideal isotropic radiator to (b) the power actually supplied to the given antenna, to produce the same radiation intensity in the far-field region. *Note 1:* If no direction is given, the absolute gain of an antenna corresponds to the direction of maximum effective radiated power. *Note 2:* Absolute gain is usually expressed in dB. *Synonym* **isotropic gain. 2.** Of a device, the ratio of (a) the signal level at the output of the device to (b) that of its input under a specified set of operating conditions. *Note 1:* Examples of absolute gain are no-load gain, full-load gain, and small-signal gain. *Note 2:* Absolute gain is usually expressed in dB.

absolute temperature: *See* **thermodynamic temperature.**

absorptance: The ratio of the luminous flux or absorbed radiant flux to the incident flux.

absorption: In the transmission of electrical, electromagnetic, or acoustic signals, the conversion of the transmitted energy into another form, usually thermal. [After 2196] *Note 1:* Absorption is one cause of signal attenuation. *Note 2:* The conversion takes place as a result of interaction between the incident energy and the material medium, at the molecular or atomic level.

absorption band: A spectral region in which the absorption coefficient reaches a relative maximum, by virtue of the physical properties of the matter in which the absorption process takes place. [FAA]

absorption coefficient: A measure of the attenuation caused by absorption of energy that results from its passage through a medium. [After 2196] *Note 1:* Absorption coefficients are usually expressed in units of reciprocal distance. *Note 2:* The sum of the absorption coefficient and the scattering coefficient is the attenuation coefficient.

absorption index: 1. A measure of the attenuation caused by absorption of energy per unit of distance that occurs in an electromagnetic wave of given wavelength propagating in a material medium of given refractive index. *Note:* The value of the absorption index K' is given by the relation

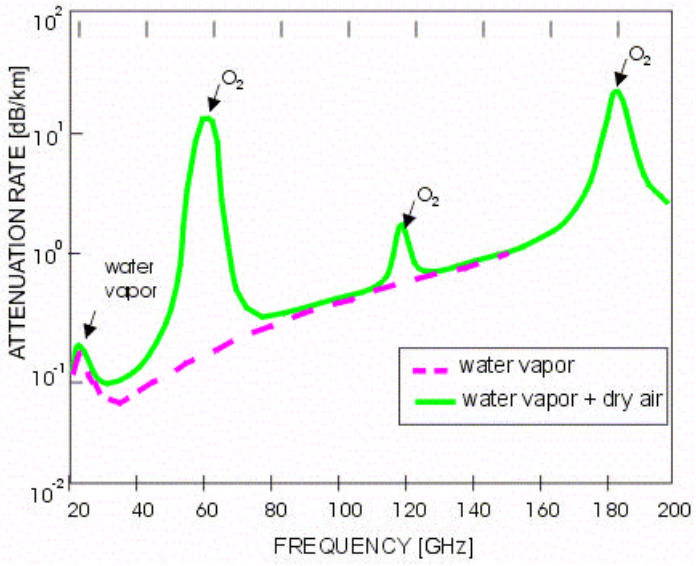
$$K' = \frac{K\lambda}{4\pi n} \quad ,$$

where K is the absorption coefficient, λ is the wavelength in vacuum, and n is the refractive index of the absorptive material medium. [After 2196] **2.** The functional relationship between the Sun angle--at any latitude and local time--and the ionospheric absorption.

absorption loss: That part of the transmission loss caused by the dissipation or conversion of electrical, electromagnetic, or acoustic energy into other forms of energy as a result of its interaction with a material medium.

absorption modulation: Amplitude modulation of the output of a radio transmitter by means of a variable-impedance circuit that is caused to absorb carrier power in accordance with the modulating wave.

absorption peak: 1. The wavelength or frequency at which a particular substance absorbs the most power (or, where the attenuation of the propagated signal is the greatest) whenever the substance is bombarded or irradiated with audio, electromagnetic, or light waves. *Note:* Whenever a material is thus bombarded, there is reflection, transmission through the material, and absorption within the material. In the case of air, O^2 has multiple absorption peaks. *See figure.* **2.** In optical communications media, the specific wavelength at which a particular impurity absorbs the most power, *i.e.,* causes a maximum attenuation of propagated lightwaves. *Note:* Absorption by these impurities at other wavelengths is less than that of the absorption peak. Glass quartz silica, and plastics used in optical fibers, slab dielectric waveguides, optical integrated circuits (OICs), and similar media, usually display absorption peaks. Impurities that cause absorption peaks include copper, iron, nickel, chromium, manganese, and hydroxyl ions. [From Weik]



absorptivity: Of a material propagation medium, absorptance per unit path length.

abstraction: 1. Broadly, the use of specialized software, such as an application programming interface (API), as a means of shielding software from device dependencies or the complexities of underlying software. *Note:* For instance, hardware abstraction enables programs to focus on a task, such as communications, instead of on individual differences between communications devices. **2.** In object-oriented programming, the process of reducing an object to its essence so that only the necessary elements are represented. Abstraction defines an object in terms of its properties (attributes), behaviors (functionality), and interface (means of communicating with other objects). [MS]

abstract syntax: In open systems architecture, the specification of application-layer data or application-protocol control information by using notation rules that are independent of the encoding technique used to represent the information.

abstract syntax notation one (ASN.1): A standard, flexible method that (a) describes data structures for representing, encoding, transmitting, and decoding data, (b) provides a set of formal rules for describing the structure of objects independent of machine-specific encoding techniques, (c) is a formal network-management Transmission Control Protocol/Internet Protocol (TCP/IP) language that uses human-readable notation and a compact, encoded representation of the same information used in communications protocols, and (d) is a precise, formal notation that removes ambiguities.

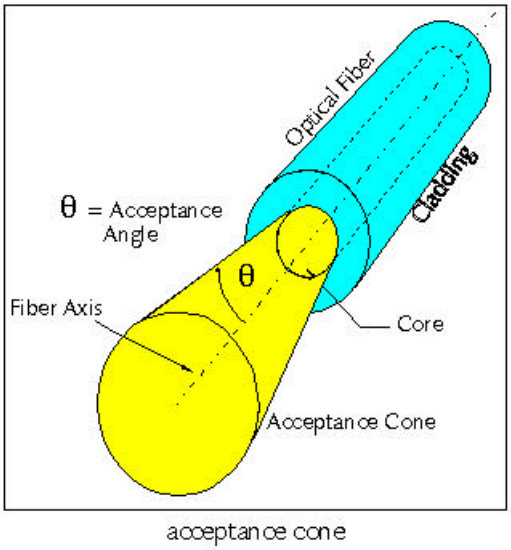
ac: *Abbreviation for* **alternating current.**

accept: In data transmission, the condition assumed by a primary or secondary station upon correct receipt of a frame for processing.

acceptance: The condition that exists when a system or functional unit meets the specified performance and security requirements.

acceptance angle: In fiber optics, half the vertex angle of that cone within which optical power may be coupled into bound modes of an optical fiber. *Note 1:* The axis of the cone is collinear with the fiber axis, the vertex of the cone is on the fiber end-face, and the base of the cone faces the optical power source. *Note 2:* The acceptance angle is measured with respect to the fiber axis. *Note 3:* Rays entering an optical fiber at angles greater than the acceptance angle are coupled into unbound modes. [After 2196]

acceptance cone: In fiber optics, the cone within which optical power may be coupled into the bound modes of an optical fiber. *Note:* The acceptance cone is derived by rotating the acceptance angle about the fiber axis. [After 2196]



acceptance cone

acceptance criterion: *See* **acceptance test.**

acceptance limit (AL): The bound on performance that is allowed at service turnup or interexchange carrier (IC) acceptance of a circuit or connection, or when corrective action is taken to restore a parameter after an immediate action limit (IAL) failure. Performance as measured by a parameter is satisfactory if the value of the parameter is equal to or better

than the limit. [T1.208-1989]

acceptance pattern: 1. Of an antenna, for a given plane, a distribution plot of the off-axis power relative to the on-axis power as a function of angle or position. [After 2196] *Note:* The acceptance pattern is the equivalent of a horizontal or vertical antenna pattern. **2.** Of an optical fiber or fiber bundle, a curve of total transmitted power plotted against the launch angle.

acceptance test: A test of a system or functional unit to ensure that contractual requirements are met. *Note:* An acceptance test may be performed at the factory or user premises by the user, vendor, or a third party.

acceptance testing: Operating and testing of a communication system, subsystem, or component, to ensure that the specified performance characteristics have been met.

acceptance trial: A trial carried out by nominated representatives of the eventual military users of the weapon or equipment to determine if the specified performance and characteristics have been met.

accepted interference: Interference at a higher level than that defined as permissible interference and which has been agreed upon between two or more administrations without prejudice to other administrations. [NTIA] [RR]

access: 1. The ability and means necessary to store data in, to retrieve data from, to communicate with, or to make use of any resource of a system. **2.** To obtain the use of a resource. **3.** (COMSEC) [The] capability and opportunity to gain detailed knowledge of or to alter information or material. [NIS] **4.** (AIS) [The] ability and means to communicate with (*i.e.* , input to or receive output from), or otherwise make use of any information, resource, or component in an AIS. *Note [for 3 and 4]:* An individual does not have "access" if the proper authority or a physical, technical, or procedural measure prevents him/her from obtaining knowledge or having an opportunity to alter information, material, resources, or components. [NIS] **5.** An assigned portion of system resources for one data stream of user communications or signaling. **6.** [An] opportunity to make use of an information-system (IS) resource. [INFOSEC-99]

access arrangement: An arrangement to transport access traffic between an end office and an IC POT (interexchange carrier point of termination) and may be either direct routed, tandem routed, or a combination of direct and tandem routed. (In the case of direct routed only, the access arrangement and access connection are synonymous.) [T1.Rpt 11-1991]

access attempt: The process by which one or more users interact with a telecommunications system to enable initiation of user information transfer. *Note:* An access attempt begins with an issuance of an access request by an access originator. An access attempt ends either in successful access or in access failure.

access barred signal: In a communications system, a signal sent in the backward direction to indicate that a call will not be completed because of a call-originator or a call-receiver facility requirement. *Note:* An access barred signal may occur for many reasons, such as the failure of a closed user group validation check on an incoming calls-barred facility. [After Weik '96]

access category: A class to which a user, such as a person, program, process, or equipment, of a system may be assigned, based on the resources each user is authorized to use.

access channel: A designated part of the information transfer capability having specified characteristics, provided at the user-network interface. [T1.667-1999]

access charge: 1. A fee charged by a local exchange carrier for the use of its local exchange networks. [FCC] **2.** A charge made by a local exchange carrier for use of its local exchange facilities for a purpose such as the origination or termination of traffic that is carried to or from a distant exchange by an interexchange carrier.

access code: 1. The preliminary digits that a user must dial to be connected to a particular outgoing trunk group or line. **2.** A uniform code assigned by the telephone company to an individual customer in the form 101xx and 950-xx. [NECA/FCC-5]

access connection: In ISDN technology, a connection (using either the B-Channel or a logical link on the D-Channel) established between the user equipment and a packet-mode handier function, over which packet-mode calls (incoming and outgoing) are established. [After T1.615-1992]

access contention: In ISDN applications, *synonym* **contention.**

access control: 1. A service feature or technique used to permit or deny use of the components of a communication system. **2.** A technique used to define or restrict the rights of individuals or application programs to obtain data from, or place data onto, a storage device. **3.** The definition or restriction of the rights of individuals or application programs to obtain data from, or place data into, a storage device. **4.** Limiting access to information system resources only to authorized users, programs, processes, or other systems. [INFOSEC-99] **5.** That function performed by the resource controller that allocates system resources to satisfy user requests.

access control list: 1. In security, a list of entities, together with their access rights, that are authorized to access a resource. **2.** [A] mechanism implementing discretionary and/or mandatory access control between subjects and objects. [INFOSEC-99]

access control mechanism: 1. In security, a hardware, software, or firmware feature, operating procedure, or management procedure that (a) permits authorized access to a system, such as a communications, computer, and data processing system, (b) prevents unauthorized access to the system, and (c) is considered to have failed when unauthorized access is permitted or when authorized access is prevented. [From Weik '96] **2.** [A] Security safeguard designed to detect and deny unauthorized access and permit authorized access in an information system (IS). [INFOSEC-99]

access control message: A message that is a user request, a resource controller response, or a request/response between resource controllers.

access coupler: *Deprecated term. See* **directional coupler.**

access denial: 1. Access failure caused by the issuing of a system blocking signal by a communications system that does not have a call-originator camp-on feature. **2.** Access failure caused by exceeding the maximum access time and nominal system access time fraction during an access attempt. *Synonym* **system blocking.**

access-denial time: The time between the start of an access attempt and access failure caused by access denial, *i.e.,* system blocking. *Note:* Access denial times are measured only on access attempts that result in access denial.

access digit: In automatic direct outward telephone dialing, a digit, often a 1, or a 9, that (a) enables access to an outside facility, *e.g.* , a PBX or local exchange, and (b) is prefixed to the specific number being dialed. *Note 1:* Throughout the United States, an access digit, usually 1, must be prefixed to an area code before dialing the area code and the specific number to which a connection is desired. *Note 2:* The access digit 9 is often used to establish a connection between a PBX and a local exchange.

access failure: In a communications system, an unsuccessful access that results in termination of an access attempt in any manner other than initiation of user information transfer between the intended source and destination (sink) within the specified maximum access time. *Note:* Access failure can be the result of access denial, access outage, user blocking, or incorrect access.

access function: A set of processes in a network that provides for interaction between the user and a network. [T1.667-1999]

access group: A group of one or more stations having identical rights to use the available resources on a PBX, network or host computer.

accessibility: With reference to point code, the ability of a local MTP (message transfer part) to send a message to the MTP at the remote signaling point. [T1.110.2-1999]

access level: 1. In security, the level of authority required from an entity to access a protected resource. *Note:* An example of access level is the authority to access information at a particular security level. [2382-pt.8] **2.** [The] hierarchical portion of the security level used to identify sensitivity of information-system (IS) data and the clearance or authorization of users. Access level, in conjunction with the nonhierarchical categories, forms the sensitivity label of an object. [INFOSEC-99]

access line: 1. A transmission path between end user terminal equipment and a switching center. **2.** A channel between an end user's network interface and local end office. [T1.506-1989] *Synonym [loosely]* **loop. 3.** A communications facility extending from a customer's premises to a serving central office comprising a subscriber line and, if necessary, a trunk facility, *e.g.,* a WATS access line, TWX access line. [47 CFR Pt.36-A]

access list: 1. In information systems (IS), a compilation of users, programs, or processes and the access levels and types to which each is authorized. [INFOSEC-99] **2.** In COMSEC, a roster of persons authorized admittance to a controlled area. [INFOSEC-99]

access loop: *See* **attendant access loop.**

access node: In switching systems, the point where user traffic enters and exits a communications network. *Note:* Access node operations may include various operations, such as protocol conversion and code conversion.

access originator: The functional entity responsible for initiating a particular access attempt. *Note:* An access attempt can be initiated by a source user, a destination user, or the telecommunications system.

access path: The steps required to obtain the use of a system or device. *Note:* Examples of access paths are (a) the operations required of a database management system to obtain access to a database and (b) the sequence of steps required to reach a file. [From Weik '96]

access period: In security, a segment of time, generally expressed in days or weeks, during which specified access rights prevail. [INFOSEC-99]

access permission: All of a subject's access rights with respect to some object. [2382-pt.8]

access phase: In an information-transfer transaction, the phase during which an access attempt is made. *Note:* The access phase is the first phase of an information-transfer transaction.

access point: 1. A point where connections may be made for testing or using particular communications circuits. **2.** In telephony, a junction point in outside plant consisting of a splice at a junction between a branch feeder cable and distribution cables.

access profile: 1. In security, a profile that associates each user with a list of protected objects that the user may access. **2.** [An itemization that] associates each user with a list of protected objects the user may access. [INFOSEC-99]

access provider: 1. An organization that provides users with access to a computer network. [2385-35] **2.** A party responsible for traffic originating and terminating in jurisdictional areas defined by regulatory agencies. [T1.246-1998]

access request: 1. A control message issued by an access originator for the purpose of initiating an access attempt. **2.** A signal sent to a network for the purpose of initiating the establishment of a network connection. In this definition, a signal may take the form of a message. [T1.507-1996]

access right: Permission for a subject to access a particular object for a specific type of operation. *Note:* An example of an access right is the permission for a process to read a file but not write to it. [2382-pt.8]

access service area: A geographic area established for the provisioning and administration of telecommunications service. An access service area encompasses one or more exchanges, which are grouped in access service areas to serve common social, economic, and other purposes. *Contrast with* **LATA.** [After T1.104-1988]

access system: In communications, computer, and data processing systems, a program that (a) allows an operator to call up different parts of the program package and (b) usually allows functions to be selected from menus in the same way as other commands. *Note:* An example of an access system is the program supplied with a common spreadsheet program that (a) allows the computer to shift between the spreadsheet program and a graph-printing facility and (b) provides access to various support functions. [From Weik '96]

access tandem: 1. A telephone company or centralized equal access provider switching system that provides a concentration and distribution function for originating or terminating traffic between end offices and a customer-designated premises. [NECA/FCC-5] **2.** An exchange carrier switching system that provides a traffic concentration and distribution function for inter-LATA traffic originating/terminating within a LATA. [T1.506-1989]

access time: 1. In a telecommunication system, the elapsed time between the start of an access attempt and successful access. *Note:* Access time values are measured only on access attempts that result in successful access. **2.** In a computer, the time interval between the instant at which an instruction control unit initiates a call for data and the instant at which delivery of the data is completed. **3.** The time interval between the instant at which storage of data is requested and the instant at which storage is started. **4.** In magnetic disk devices, the time for the access arm to reach the desired track and the delay for the rotation of the disk to bring the required sector under the read-write mechanism.

access type: 1. In computer security, a type of operation specified by an access right. *Note:* Examples of access type are "read," "write," "execute," "append," "modify," "delete," and "create." [2382-pt.8] **2.** [The] privilege to perform action on an object. Read, write, execute, append modify, delete, and create are examples of access types. [INFOSEC-99]

access unit: *See* **medium access unit (MAU).**

access unit interface: *Synonym* **attachment unit interface.**

accountability: 1. The property that ensures that the actions of an individual or an institution may be traced uniquely to that individual or institution. [After X9.57] **2.** In information systems (IS), the process of tracing IS activities to a responsible source. [INFOSEC-99] **3.** In COMSEC, the principle that an individual is entrusted to safeguard and control equipment, keying material, and information and is answerable to proper authority for the loss or misuse of that equipment or information. [INFOSEC-99]

accounting management: In network management, a set of functions that (a) enables network service use to be measured and the costs for such use to be determined and (b) includes all the resources consumed, the facilities used to collect accounting data, the facilities used to set billing parameters for the services used by customers, maintenance of the data bases used for billing purposes, and the preparation of resource usage and billing reports. [After ANSI T1.210]

accreditation: 1. In computer security, the authorization and approval--granted by a designated authority to a data processing system, computer network, organization, or individual--to process sensitive information or data. [2382-pt.8] **2.** Formal declaration by a designated approving authority that an information system (IS) is approved to operate in a particular security mode using a prescribed set of safeguards at an acceptable level of risk. [INFOSEC-99]

accrediting authority: *Synonym* **designated approving authority.**

accumulator: 1. A register in which one operand can be stored and subsequently replaced by the result of an arithmetic or logic operation. **2.** A storage register. **3.** A storage battery.

accuracy: The degree of conformity of a measured or calculated value to its actual or specified value.

ACD: *Abbreviation for* **automatic call distributor.**

ac-dc ringing: Telephone ringing that makes use of both ac and dc voltages and currents. *Note:* An alternating current may be used to operate a ringer and direct current to aid the relay action that stops the ringing when the called telephone is answered.

achromat: A usually two-element lens that is corrected to bring two specified or distinct wavelengths to a common focal point. *Note 1:* The term *"achromatic"* literally means "without color." This is not strictly true, however. Early lenses consisted of only a single element, and therefore could bring only a single wavelength to a given focal point; *i.e.* , they suffered from what is termed *"chromatic aberration."* The invention of lenses with two elements meant that two distinct wavelengths could be brought to a common focus. This represented a vast improvement over the single-element lens; hence the designation *"achromat(ic)." Note 2:* The residual chromatic aberration manifested in the image produced by an achromat (and other multi-element lenses) is usually referred to as the *"secondary spectrum." Synonyms* **achromatic doublet, achromatic lens.**

achromatic doublet: *Synonym* **achromat.**

achromatic lens: *Synonym* **achromat.**

ACK: *Abbreviation for* **acknowledge character.**

acknowledge character (ACK): A transmission control character transmitted by the receiving station as an affirmative response to the sending station. *Note:* An acknowledge character may also be used as an accuracy control character.

acknowledgement: 1. A response sent by a receiver to indicate successful receipt of a transmission. *Note:* An example of an acknowledgement is a protocol data unit, or element thereof, between peer entities, to indicate the status of data units that have been successfully received. **2.** A message from the addressee informing the originator that the originator's communication has been received and understood. [After JP1]

acknowledgement delay period: *Synonym [loosely]* **sliding window.**

A-condition: In a start-stop teletypewriter system, the significant condition of the signal element that immediately precedes a character signal or block signal and prepares the receiving equipment for the reception of the code elements.

acoustic coupler: 1. An interface device for coupling electrical signals by acoustical means--usually into and out of a telephone instrument. **2.** A terminal device used to link data terminals and radio sets with the telephone network. *Note:* The link is achieved through acoustic (sound) signals rather than through direct electrical connection.

acoustic delay line: A device that introduces a delay in the propagation of an electrical signal by (a) employing a transducer to convert the signal into an acoustic wave, (b) propagating the acoustic wave through a medium such as a column of mercury or a carbon or ferrite rod, and (c) by means of another transducer, converting the acoustic wave back to an electrical signal. *Note:* An acoustic delay line may be used for temporary storage of information, *e.g.* , a digital data stream.

acoustic noise: 1. An undesired audible disturbance in the audio frequency range. **2.** Any undesired acoustic wave or signal, or undesired component of a desired acoustic signal, whether or not audible to the human ear; *e.g.,* interference accompanying a sonar echo.

acoustics: The branch of science and technology that is devoted to the production, transmission, control, processing, transformation, reception, and effects of sound, longitudinal waves, particularly as vibration, pressure, or elastic waves and shock phenomena in material media. [After Weik '96]

acoustic wave: A longitudinal wave that (a) consists of a sequence of pressure pulses or elastic displacements of the material, whether gas, liquid, or solid, in which the wave propagates, (b) in gases, consists of a sequence of compressions (dense gas) and rarefactions (less dense gas) that travel through the gas, (c) in liquids, consists of a sequence of combined elastic deformation and compression waves that travel though the liquid, and (d) in solids, consists of a sequence of elastic compression and expansion waves that travel though the solid. *Note 1:* The speed of an acoustic wave in a material medium is determined by the temperature, pressure, and elastic properties of the medium. In air, acoustic waves propagate at 332 m/s (1087 ft/s) at 0°C, at sea level. In air, sound-wave speed increases approximately 0.6 m/s (2 ft/s) for each kelvin above 0°C. *Note 2:* Acoustic waves audible to the normal human ear are termed *sound waves* . [From Weik '89]

acousto-optic effect: A variation of the refractive index of a material caused by interaction with acoustic energy in the form of a wave or pulse. *Note:* The acousto-optic effect is used in devices that modulate or deflect light.

acousto-optics: The discipline devoted to the interactions between acoustic waves and light waves in a material medium. [After 2196] *Note:* Acoustic waves can be made to modulate, deflect, and/or focus light waves by causing a variation in the refractive index of the medium.

acquisition: 1. In satellite communications, the process of locking tracking equipment on a signal from a communications satellite. **2.** The process of achieving synchronization. **3.** In servo systems, the process of entering the boundary conditions that will allow the loop to capture the signal and achieve lock-on.

acquisition and tracking orderwire: *See* **ATOW.**

acquisition time: 1. In a communications system, the time interval required to attain synchronism. **2.** In satellite control communications, the time interval required for locking tracking equipment on a signal from a communications satellite.

ACR: *Abbreviation for* **alternate carrier routing.**

active device: A device that requires a source of energy for its operation and has an output that is a function of present and past input signals. *Note:* Examples of active devices include controlled power supplies, transistors, LEDs, amplifiers, and transmitters.

active key state: A condition of readiness for a key to be used to secure information from the originator, and to process received secure information. [After X9.17]

active laser medium: Within a laser, the material that emits coherent radiation or exhibits gain as the result of electronic or molecular transitions to a lower energy state or states, from a higher energy state or states to which it had been previously stimulated. *Note:* Examples of active laser media include certain crystals, gases, glasses, liquids, and semiconductors. *Synonym* **laser medium.**

active satellite: 1. A satellite carrying a station intended to transmit or retransmit radio communication signals. [NTIA] [RR] *Note:* An active satellite may perform signal processing functions such as amplification, regeneration, frequency translation, and link switching, to make the signals suitable for retransmission. **2.** An Earth satellite carrying a station intended to transmit or re-transmit radiocommunication signals. [47CFR]

active sensor: 1. A detection device that requires input energy from a source other than that which is being sensed. *Note:* An example of an active sensor is a photoconductive cell. **2.** In surveillance, a detection device that emits energy capable of being detected by itself. *Note:* An example of an active sensor is a measuring instrument that generates a signal, transmits it to a target, and receives a reflected signal from the target. Information concerning the target is obtained by comparison of the received signal with the transmitted signal.

3. A measuring instrument in the Earth exploration-satellite service or in the space research service by means of which information is obtained by transmission and reception of radio waves. [NTIA] [RR]

active signaling link: A signaling link that has successfully completed the initial alignment procedures and carries (or is ready to carry) signaling traffic. [T1.226-1992]

active star: *See* **star coupler, multiport repeater.**

active threat: Any threat of a deliberate unauthorized change to the state of a data processing system. *Note:* For example, an active threat that would result in modification of messages, insertion of spurious messages, masquerade, or denial of service. [2382-pt.8]

active video frame identification: The process of comparing each output video frame with its preceding frame(s) in sequence and quantifying the extent of correspondence between each pair; when there is limited correspondence between a pair of frames (such that the differences measured are distinguishable from the measurement noise), and the corresponding input sequence of frames possesses distinguishable differences, then the current frame is categorized as an active frame. [T1.801.04-1997]

activity factor: For a communications channel during a specified time interval, such as the busy hour, the percentage of time that a signal is present in the channel in either direction.

ACU: *Abbreviation for* **automatic calling unit.**

A-D: *Abbreviation for* **analog-to-digital.** *See* **analog transmission.**

adaptive compression: In computer science, a software-oriented compression process based on continuous analysis of the data stream, and depending on the type and content of the data and the storage medium, corresponding compensation of the compression algorithm.

adaptive prediction: In ADPCM coding, a time-varying process that computes an estimate of the input signal from the quantized difference signal. [T1.310-1991]

adaptive quantization: In ADPCM (adaptive differential pulse code modulation) coding, a process in which the quantizer step size varies as a function of the quantized input signal's variance. [T1.310-1991]

Ada®: The official, high-level computer language of DOD for embedded-computer, real-time applications as defined in MIL-STD-1815. *Note:* Ada® is a registered trademark of the U.S. Government (Ada Joint Program Office).

adaptive channel allocation: In communications system traffic flow control, channel allocation in which information-handling capacities of channels are not predetermined but are assigned on demand. *Note:* Adaptive channel allocation is usually accomplished by means of a multiplexing scheme.

adaptive communications: Any communications system, or portion thereof, that automatically uses feedback information obtained from the system itself or from the signals carried by the system to modify dynamically one or more of the system operational parameters to improve system performance or to resist degradation. *Note:* The modification of a system parameter may be discrete, as in hard-switched diversity reception, or may be continuous, as in a predetection combining algorithm.

adaptive differential pulse-code modulation (ADPCM): Differential pulse-code modulation in which the prediction algorithm is adjusted in accordance with specific characteristics of the input signal.

adaptive equalization: Equalization (a) that is automatically accomplished while traffic is being transmitted and (b) in which signal characteristics are dynamically adjusted to compensate for changing transmission path characteristics.

adaptive predictive coding (APC): Narrowband analog-to-digital conversion that uses a one-level or multilevel sampling system in which the value of the signal at each sampling instant is predicted according to a linear function of the past values of the quantized signals. *Note:* APC is related to linear predictive coding (LPC) in that both use adaptive predictors. However, APC uses fewer prediction coefficients, thus requiring a higher sampling rate than LPC.

adaptive radio: A radio that (a) monitors its own performance, (b) monitors the path quality through sounding or polling, (c) varies operating characteristics, such as frequency, power, or data rate, and (d) uses closed-loop action to optimize its performance by automatically selecting frequencies or channels.

adaptive routing: Routing that is automatically adjusted to compensate for network changes such as traffic patterns, channel availability, or equipment failures. *Note:* The experience used for adaptation comes from the traffic being carried.

adaptive system: A system that has a means of monitoring its own performance, a means of varying its own parameters, and uses closed-loop action to improve its performance or to optimize traffic.

ADC: *Abbreviation for* **analog-to-digital converter, analog-to-digital conversion.**

ADCCP: *Abbreviation for* **Advanced Data Communication Control Procedures.**

ad clicks: *Synonym* **click-through.**

add/drop multiplexing: A multiplexing function offered in connection with SONET that allows lower level signals to be added or dropped from a high-speed optical carrier channel in a wire center. The connection to the add/drop multiplexer is via a channel to a central office port at a specific digital speed (*i.e.,* DS3, DS1, *etc.*). [NECA/FCC-5]

added bit: A bit delivered to the intended destination user in addition to intended user information bits and delivered overhead bits. *Synonym* **extra bit.**

added block: Any block, or other delimited bit group, delivered to the intended destination user in addition to intended user information bits and delivered overhead bits. *Synonym* **extra block.**

adder: 1. A device whose output data are a representation of the sum of the numbers represented by its input data. *Note:* An adder may be serial or parallel, digital or analog. **2.** A device whose output data are a representation of the sum of the quantities represented by its input data. *Note:* An adder can add things other than representations of numbers. It can add voltages, *etc.* Analog adders are not limited to summing representations of numbers. An adder may operate on digital or analog data.

adder-subtracter: A device that acts as an adder or subtracter depending upon the control signal received; the adder-subtracter may be constructed so as to yield a sum and a difference at the same time. *Note:* An arithmetic adder-subtracter yields arithmetic sums and differences, whereas a logical adder-subtracter yields logical sums and differences.

additive white gaussian noise (AWGN): *Synonym* **white noise.**

add mode: In addition and subtraction operations, a mode in which the decimal marker is placed at a predetermined location with respect to the last digit entered.

add-on conference: A service feature that allows an additional party to be added to an established call without attendant assistance. *Note:* A common implementation provides a progressive method that allows a call originator or a call receiver to add at least one additional party.

address: 1. In communications, the coded representation of the source or destination of a message. **2.** In data processing, a character or group of characters that identifies a register, a particular part of storage, or some other data source or destination. **3.** To assign to a device or item of data a label to identify its location. **4.** The part of a selection signal that indicates the destination of a call. **5.** To refer to a device or data item by its address.

addressability: 1. In computer graphics, the capability of a display surface or storage device to accommodate a specified number of uniquely identifiable points. **2.** In micrographics, the capability of a specified field frame to contain a specific number of uniquely identifiable points. *Note:* The addressability is usually specified as the number of identifiable horizontal points by the number of identifiable vertical points, such as 3000 by 4000.

addressable point: In computer graphics, any point of a device that can be addressed.

address field: The portion of a message that contains the source-user address and the destination-user addresses. *Note:* In a communications network, the address field is usually contained within the message header portion of the message. A message usually consists of the message header, the user data, and a trailer.

address-indicating group (AIG): A station or address designator, used to represent a set of specific and frequently recurring combinations of action or information addresses. *Note:* The identity of the message originator may also be included in the AIG. An address group is assigned to each AIG for use as an address designator.

address message: A message sent in the forward direction that contains (a) address information, (b) the signaling information required to route and connect a call to the called line, (c) service-class information, (d) information relating to user and network facilities, and (e) call-originator identity or call-receiver identity.

address message sequencing: In common-channel signaling, a procedure for ensuring that address messages are processed in the correct order when the order in which they are received is incorrect.

address part: A part of an instruction that usually contains only an address or part of an address.

address pattern: A prescribed structure of data used to represent the destination(s) of a block, message, packet, or other formalized data structure.

address resolution protocol (ARP): A Transmission Control Protocol/Internet Protocol (TCP/IP) protocol that dynamically binds a Network-Layer IP address to a Data-Link-Layer physical hardware address, *e.g.,* Ethernet address.

address separator: A character that separates the different addresses in a selection signal.

address signaling: A process used to convey address information; two address signaling methods, dial pulse (DP) and dual tone multifrequency (DTMF), are used in telephone systems. [After T1.401-1988]

ADH: *Abbreviation for* **automatic data handling.**

adiabatic computer circuit: A circuit that avoids loss or gain of heat. For example, a computer could clear a "1" in a register by subtracting the "1" instead of erasing it, thereby expending less heat.

adjacent-channel interference: Extraneous power from a signal in an adjacent channel. *Note 1:* Adjacent channel interference may be caused by inadequate filtering, such as incomplete filtering of unwanted modulation products in frequency modulation (FM) systems, improper tuning, or poor frequency control, in either the reference channel or the interfering channel, or both. *Note 2:* Adjacent-channel interference is distinguished from crosstalk.

adjacent signaling points: Two signaling points that are directly interconnected by one or more signaling links. [T1.226-1992]

adjunct service point (ASP): An intelligent-network feature that resides at the intelligent peripheral equipment and responds to service logic interpreter requests for service processing.

administration: 1. Any governmental department or service responsible for discharging the obligations undertaken in the convention of the International Telecommunication Union and the *Regulations.* [RR] **2.** Internal management of units. [JP1] **3.** The management and execution of all military matters not included in strategy and tactics. [JP1] **4.** In international telecommunications for a given country, the government agency assigned responsibility for the implementation of telecommunications standards, regulations, recommendations, practices, and procedures. **5.** In network management, network support functions that ensure that (a) services are performed, (b) the network is used efficiently, and (c) prescribed service-quality objectives are met.

administrative management complex (AMC): In network management, a complex that is controlled by a network provider, and is responsible for and performs network management functions such as network maintenance. [After T1.218-1991]

ADP: *Abbreviation for* **automatic data processing.**

ADPCM: *Abbreviation for* **adaptive differential pulse-code modulation.**

ADPE: *Abbreviation for* **automatic data processing equipment.**

ADP system: *Synonym* **computer system.**

Advanced Data Communication Control Procedures (ADCCP): A bit-oriented Data-Link-Layer protocol used to provide point-to-point and point-to-multipoint transmission of data frames that contain error-control information. *Note:* ADCCP closely resembles high-level data link control (HDLC) and synchronous data link control (SDLC).

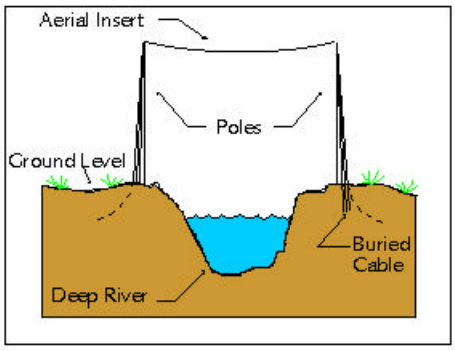
advanced intelligent network (AIN): 1. A telecommunications network architecture that uses databases to facilitate call processing, call routing, and network management, allowing carriers to change the routing of both inbound and outbound calls from moment to moment. [FCC-5] **2.** A proposed intelligent-network (IN) architecture that includes both IN/1+ and IN/2 concepts.

advanced television (ATV): A family of television systems that is intended to be improvements over current commercial-quality television. *Note:* The ATV family includes improved-definition television (IDTV), extended-definition television (EDTV), and high-definition television (HDTV).

AECS: *Abbreviation for* **Aeronautical Emergency Communications System.** *See* **Aeronautical Emergency Communications System Plan.**

aerial cable: A communications cable designed for installation on, or suspension from, a pole or other overhead structure.

aerial insert: In a direct-buried or underground cable run, a cable rise to a point above ground, followed by an overhead run, *e.g.* , on poles, followed by a drop back into the ground. *Note:* An aerial insert is used in places where it is not possible or practical to remain underground, such as might be encountered in crossing a deep ditch, canal, river, or subway line.



aerial insert

aeronautical advisory station: An aeronautical station used for advisory and civil defense communications primarily with private aircraft stations. *Synonym* **UNICOM station.** [NTIA]

aeronautical broadcast station: An aeronautical station which makes scheduled broadcasts of meteorological information and notices to airmen. (In certain instances, an aeronautical broadcast station may be placed on board a ship.) [NTIA]

aeronautical Earth station: An Earth station in the fixed-satellite service, or, in some cases, in the aeronautical mobile-satellite service, located at a specified fixed point on land to provide a feeder link for the aeronautical mobile-satellite service. [NTIA] [RR]

Aeronautical Emergency Communications System (AECS) Plan: The AECS Plan provides for the operation of aeronautical communications stations, on a voluntary, organized basis, to provide the President and the Federal Government, as well as heads of state and local governments, or their designated representatives, and the aeronautical industry with an expeditious means of communications during an emergency situation. [47CFR]

aeronautical fixed service: A radiocommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air transport. [NTIA] [RR]

aeronautical fixed station: A station in the aeronautical fixed service. [NTIA][RR]

aeronautical mobile (OR) [off-route] service: An aeronautical mobile service intended for communications, including those relating to flight coordination, primarily outside national or international civil air routes. [NTIA] [RR]

aeronautical mobile (R) [route] service: An aeronautical mobile service reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes. [NTIA] [RR]

aeronautical mobile-satellite service: A mobile-satellite service in which mobile Earth stations are located on board aircraft; survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service. [NTIA] [RR]

aeronautical mobile-satellite (OR) [off-route] service: An aeronautical mobile-satellite service intended for communications, including those relating to flight coordination, primarily outside national and international civil air routes. [NTIA] [RR]

aeronautical mobile-satellite (R) [route] service: An aeronautical mobile-satellite service reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes. [NTIA] [RR]

aeronautical mobile service: A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radiobeacon stations may also participate in this service on designated distress and emergency frequencies. [NTIA]

aeronautical multicom service: A mobile service not open to public correspondence, used to provide communications essential to conduct activities being performed by or directed from private aircraft. [NTIA]

aeronautical radionavigation-satellite service: A radionavigation-satellite service in which Earth stations are located on board aircraft. [NTIA] [RR]

aeronautical radionavigation service: A radionavigation service intended for the benefit and for the safe operation of aircraft. [NTIA] [RR]

aeronautical station: A land station in the aeronautical mobile service. In certain instances, an aeronautical station may be located, for example, on board ship or on a platform at sea. [NTIA] [RR]

AF: *Abbreviation for* **audio frequency.**

AFNOR: *Acronym for* **Association Francaise de Normalisation.** France's national standards-setting organization.

AGC: *Abbreviation for* **automatic gain control.**

agent: *Synonym* **droid.**

aggregation: In security, the acquisition of sensitive information by collecting and correlating information of lesser sensitivity. [2382-pt.8]

aggregator: Any entity that, in the ordinary course of its operations, makes telephones available to the public or to transient users of its premises, for interstate telephone calls using a provider of operator services. [NECA/FCC-5]

AI: *Abbreviation for* **artificial intelligence.**

AIM: *Abbreviation for* **amplitude intensity modulation.** *See* **intensity modulation.**

AIN: *Abbreviation for* **advanced intelligent network.**

AIOD: *Abbreviation for* **automatic identified outward dialing.**

AIOD leads: Terminal equipment leads used solely to transmit automatic identified outward dialing (AIOD) data from a PBX to the public switched telephone network or to switched service networks (*e.g.,* EPSCS), so that a vendor can provide a detailed monthly bill identifying long-distance usage by individual PBX stations, tie trunks, or the attendant. . . . [47CFR]

airborne radio relay: 1. Airborne equipment used to relay radio transmission from selected originating transmitters. [JP1] **2.** A technique employing aircraft fitted with radio relay stations for the purpose of increasing the range, flexibility, or physical security of communications systems.

air-conditioning: The simultaneous controlling of the characteristics of air, such as temperature, humidity, cleanliness, motion, and pollutant concentration, in a space to meet the requirements of the occupants, a process, or equipment. *Synonym* **environmental control.**

aircraft Earth station: A mobile Earth station in the aeronautical mobile-satellite service located on board an aircraft. [NTIA] [RR]

aircraft emergency frequency: An international aeronautical emergency frequency, such as 121.5 MHz (civil) and 243.0 MHz (military), for aircraft stations and stations concerned with safety and regulation of flight along national or international civil air routes and maritime mobile service stations authorized to communicate for safety purposes.

aircraft station: A mobile station in the aeronautical mobile service, other than a survival craft station, located on board an aircraft. [RR]

airdrome control station: An aeronautical station providing communication between an airdrome control tower and aircraft. [NTIA] *Synonym* **airport control station.**

air-floating head: *Synonym* **floating head.**

air-ground radiotelephone service: A radio service in which common carriers are authorized to offer and provide radio telecommunications service for hire to subscribers in aircraft. [47CFR]

air-ground worldwide communications system: A worldwide military network of ground stations that (a) provides two-way communications links between aircraft and ground stations for navigation and control, including air route traffic control and (b) may also provide support for special functions, such as for civil aircraft providing assistance to military missions and for meeting communications requirements for aircraft flying distinguished visitors.

air portable: Denotes materiel that is suitable for transport by an aircraft loaded internally or externally, with no more than minor dismantling and reassembling within the capabilities of user units. This term must be qualified to show the extent of air portability. [JP1]

airport control station: *Synonym* **airdrome control station.**

air sounding: Measuring atmospheric phenomena or determining atmospheric conditions, especially by means of apparatus carried by balloons, rockets, or satellites.

air-spaced coaxial cable: A coaxial cable in which air is the primary dielectric (insulator) between the inner and outer conductors. *Note:* Proper separation between the inner and outer conductors is maintained by a continuous helical insulator or a series of insulating washers spaced at regular intervals.

air terminal: In grounding systems, the lightning rod or conductor placed on or above a building, structure, or external conductors for the purpose of intercepting lightning.

AIS: *Abbreviation for* **alarm indication signal, automated information system.**

alarm: An alerting indication to a condition that may have immediate or potential negative impact on the state of the monitored network element (NE). [T1.226-1992]

alarm center: A location that receives local and remote alarms. *Note:* An alarm center is usually in a technical control facility.

alarm event: An instantaneous occurrence that changes at least one of the attributes of the alarm status of an object. This status change may be persistent or temporary, thus allowing for surveillance, monitoring, and performance measurement functionality, *etc.* Alarm events may or may not generate alarm reports; they may trigger other events or may be triggered by one or more other events. [T1.215-1994]

alarm indication signal (AIS): 1. A signal transmitted in lieu of the normal signal to maintain transmission continuity and to indicate to the receiving equipment that there is a transmission interruption located either at the equipment originating the AIS signal or upstream of that equipment. [T1.231-1997] **2.** A signal transmitted in lieu of the normal signal to maintain transmission continuity and indicate to the receiving terminal that there is a transmission fault located either at the transmitting terminal or upstream of the transmitting terminal. [T1.Rpt25-1993]

alarm indicator: A device that responds to a signal from an alarm sensor. *Note:* Examples of alarm indicators include bells, lamps, horns, gongs, and buzzers.

alarm sensor: 1. In communications systems, any device that (a) can sense an abnormal condition within the system and provide a signal indicating the presence or nature of the abnormality to either a local or remote alarm indicator, and (b) may detect events ranging from a simple contact opening or closure to a time-phased automatic shutdown and restart cycle. **2.** In a physical security system, an approved device used to indicate a change in the physical environment of a facility or a part thereof. *Note:* Alarm sensors may also be redundant or chained, such as when one alarm sensor is used to protect the housing, cabling, or power protected by another alarm sensor.

alarm status: A set of attributes that describes the alarms currently defined for an object, for example, perceived severity, alarm state, *etc.* The alarm status of an object is a subset of the global status of that object. [T1.215-1990]

alarm surveillance: A set of functions that enables the monitoring or interrogation (or both) of the telecommunications network concerning alarm-related events or conditions. [T1.215-1994]

a-law: *See* **a-law algorithm.**

a-law algorithm: A standard compression algorithm, used in digital communications systems of the European digital hierarchy, to optimize, *i.e.,* modify, the dynamic range of an analog signal for digitizing. *Note:* The wide dynamic range of speech does not lend itself well to efficient linear digital encoding. A-law encoding effectively reduces the dynamic range of the signal, thereby increasing the coding efficiency and resulting in a signal-to-distortion ratio that is superior to that obtained by linear encoding for a given number of bits.

ALE: *Abbreviation for* **automatic link establishment.**

alerting signal: A signal used by the network to indicate the presence of an incoming call. It consists of a ringing signal periodically interrupted by silent (no ringing signal) intervals. [T1.401-1988]

algorithmic language: An artificial language established for expressing a given class of algorithms.

algorithm identifier: In encryption, a unique identifier or recognizer for a given encryption or hash algorithm, together with any required parameters. [After X9.31-1]

alias: 1. *See* **aliasing. 2.** In networking, one of a set of domain names of an Internet resource. [2382-pt.35] **3.** *Synonyms* **personal number, UPT number.**

aliasing: In any technology or process involving (a) sampling a signal, *e.g.* , an electrical signal or (a series of images of) a moving subject; (b) processing, storing, or transmitting representations of the samples; and (c) replicating the original signal from the representations: the production of artifacts as a result of sampling at intervals too great to permit faithful replication of the original signal. *Note 1:* A common example of aliasing in video or motion picture technology is the apparent slowing, freezing, or even reversing of direction of, the motion of spokes in the wheels on a moving vehicle. *Note 2:* In the sampling and replication of electrical signals, if the sampling interval is too great, high-frequency components may, for example, be replicated as low-frequency components, distorting the replicated signal. *Note 3:* Faithful reproduction of a sampled electrical signal requires a theoretical sampling interval not greater than one-half the inverse of the highest Fourier frequency component in the sampled signal (Nyquist interval). In practice, to achieve a given level of fidelity in the replicated signal, the sampling interval must usually be somewhat shorter than the theoretical (Nyquist) interval, because the samples are usually processed, stored, or transmitted in digital form, and quantization errors in the digitizing process will also result in distortion of the (waveform of the) replicated signal. *Note 4:* The effects of aliasing in the replicated signal may be avoided by filtering the original signal to remove frequency components that are higher than those desired in the replicated signal. *Note 5 (from SMPTE):* Video images are sampled in two or three dimensions, and computer graphics are sampled in three. In a composite (complex) spectral channel, any crosstalk of the information cannot be eliminated by filtering, and will produce aliasing, for example as cross-color and/or cross-luminance. In a rectilinearly sampled system, lines not parallel to a sampling axis will appear stepped unless anti-aliasing processing algorithms have been applied.

alias point code: 1. A Signaling System No. 7 (SS7) address that is shared by more than one system supporting the same GTT (global title translation) function (or other SS7 function). It allows other systems to address the function instead of maintaining the status of multiple point codes. [T1.711-1999] **2.** A point code that may be assigned to more than one signaling point, each of which is also assigned a "real" point code. *Note:* Each of the signaling points having the same "alias" point code is capable of providing a predefined functionality (capability) in the network. As an example for management of global translation capability, an STP (signaling transition point) and its mate can be assigned the same "alias" point code. This provides the capability such that if a message that requires global title translation is routed based on "alias" point code, then either STP answering to the "alias" point code can provide the global title translation functionality. *Synonym* **capability code.** [T1.226-1992]

aligned bundle: A bundle of optical fibers in which the relative spatial coordinates of each fiber are the same at the two ends of the bundle. *Note:* Such a bundle may be used for the transmission of images. *Synonym* **coherent bundle.**

alignment error rate monitoring: A procedure by which the error rate of a signaling link is measured during the initial alignment process. [After T1.110.2-1992] [After T1.226-1992]

alignment jitter: The short-term variations between the optimum sampling instants of a digital signal and the sampling clock derived from it. [T1.Rpt17-1993]

Allan variance: One half of the time average over the sum of the squares of the differences between successive readings of the frequency deviation sampled over the sampling period. *Note:* The Allan variance is conventionally expressed by $\sigma_y^2(\tau)$**.** The samples are taken with no dead-time between them. *Synonym* **two-sample variance.**

allcall: In adaptive high-frequency (HF) radio automatic link establishment (ALE), a general broadcast that does not request responses and does not designate any specific addresses. *Note:* This essential function is required for emergencies ("HELP"), sounding-type data exchanges, and propagation and connectivity tracking. [After FED-STD-1045A]

all-glass fiber: *Synonym* **all-silica fiber.**

allocation (of a frequency band): 1. Entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by one or more (terrestrial or space) radiocommunication services or the radio astronomy service under specified conditions. This term shall also be applied to the frequency band concerned. [NTIA] [RR] **2.** The process of designating radio-frequency bands for use by specific radio services.

allotment (of a radio frequency or radio frequency channel): Entry of a designated frequency channel in an agreed plan, adopted by a component Conference, for use by one or more administrations for a (terrestrial or space) radiocommunication service in one or more identified countries or geographical areas and under specified conditions. [NTIA]

all-silica fiber: An optical fiber composed of a silica-based core and cladding. *Note:* The presence of a protective polymer overcoat does not disqualify a fiber as an all-silica fiber, nor does the presence of a tight buffer. [FAA] *Synonym* **all-glass fiber.**

all trunks busy (ATB): An equipment condition in which all trunks (paths) in a given trunk group are busy. *Note:* All-trunks-busy registers do not indicate subsequent attempts to reach trunk groups.

alphabet: 1. An ordered set of all the letters used in a language, including letters with diacritical signs where appropriate, but not including punctuation marks. **2.** An ordered set of all the symbols used in a language, including punctuation marks, numeric digits, nonprinting control characters, and other symbols. *Note:* Examples of alphabets include the Roman alphabet, the Greek alphabet, the Morse Code, and the 128 characters of the American Standard Code for Information Interchange (ASCII) [IA No. 5].

alphabetic character set: A character set that contains letters and may contain control characters, special characters, and the space character, but not digits.

alphabetic code: A code according to which data are represented through the use of an alphabetic character set.

alphabetic string: 1. A string consisting solely of letters from the same alphabet. **2.** A character string consisting solely of letters and associated special characters from the same alphabet.

alphabetic word: 1. A word consisting solely of letters from the same alphabet. **2.** A word that consists of letters and associated special characters, but not digits.

alphabet translation: *Deprecated synonym for* **alphabet transliteration.** *See* **alphabet transliteration.**

alphabet transliteration: The substitution of the characters of one alphabet for the corresponding characters of a different alphabet, usually accomplished on a character-by-character basis. *Note 1:* An example of alphabet transliteration is the substitution of the Roman letters a, b, and p for the Greek letters α, β, and π, respectively. *Note 2:* Alphabet transliteration is reversible. *Note 3:* Alphabet transliteration often becomes necessary in telecommunications systems because of the different alphabets and codes used worldwide. *Note 4:* In alphabet transliteration, no consideration is given to the meaning of the characters or their combinations.

alphanumeric: 1. Pertaining to a character set that contains letters, digits, and sometimes other characters, such as punctuation marks. **2.** Pertaining to a set of unique bit patterns that are used to represent letters of an alphabet, decimal digits, punctuation marks, and other special signs and symbols used in grammar, business, and science, such as those displayed on conventional typewriter keyboards.

alphanumeric character set: A character set that contains both letters and digits, special characters, and the space character.

alphanumeric code: 1. A code derived from an alphanumeric character set. **2.** A code that, when used, results in a code set that consists of alphanumeric characters.

alphanumeric data: Data represented by letters, digits, and sometimes by special characters and the space character.

alpha profile: *See* **power-law index profile.**

altazimuth mount: A mounting, *e.g.* , for a directional antenna, in which slewing takes place in (a) the plane tangent to the surface of the Earth or other frame of reference and (b) elevation about, *i.e.,* above or below, that plane. *Synonym* **x-y mount.**

alteration: In encryption, the process of changing one or more message elements in a message as a means of committing a fraud. [After X9.19]

alternate access provider: A company that enters a market area as a competitive service provider (CAP) to provide exchange service in competition with one or more existing exchange carrier(s) in the same market area. [After T1.251-1996]

alternate carrier routing (ACR): A special advanced intelligent network (AIN) feature supporting Government Emergency Telecommunications Service (GETS) calls. The feature automatically routes GETS calls to selected carriers to provide improved call completion probability during times of network congestion or damage during disasters or crises.

alternate mark inversion (AMI) signal: A pseudoternary signal, representing binary digits, in which (a) successive *"marks"* are of alternately positive and negative polarity and the absolute values of their amplitudes are normally equal and (b) *"spaces"* are of zero amplitude. *Synonym* **bipolar signal.**

alternate party: In multilevel precedence and preemption, the call receiver, *i.e.* , the destination user, to which a precedence call will be diverted. *Note 1:* Diversion will occur when the response timer expires, when the call receiver is busy on a call of equal or higher precedence, or when the call receiver is busy with access resources that are non-preemptable. *Note 2:* Alternate party diversion is an optional terminating feature that is subscribed to by the call receiver. Thus, the alternate party is specified by the call receiver at the time of subscription.

alternate route: A second or subsequent choice path between two points. [T1.Rpt24-1993]

alternate routing: 1. The routing of a call or message over a substitute route when a primary route is unavailable for immediate use. **2.** In signaling, the process of allocating substitute routes for a given signaling traffic stream in case of failure(s) affecting the signaling links or routes involved in the normal routing of that signaling traffic stream. [T1.226-1992] **3.** In signaling, the routing of a given signaling traffic flow in case of failures affecting the signaling link(s), or route(s), involved in the normal routing of that signaling traffic flow. [T1.110-1999] *Synonym* **alternative routing.**

alternating mode: *Synonym* **half-duplex (HDX) operation.**

alternative routing: 1. In signaling, the process of allocating substitute routes for a given signaling traffic stream in case of failure(s) affecting the signaling links or routes involved in the normal routing of that signaling traffic stream. [T1.226-1992] **2.** In signaling, the routing of a given signaling traffic flow in case of failures affecting the signaling link(s), or route(s), involved in the normal routing of that signaling traffic flow. [T1.110-1999] *Synonym* **alternate routing.**

altitude of the apogee or of the perigee: The altitude of the apogee or perigee above a specified reference surface serving to represent the surface of the Earth. [NTIA] [RR] *Note:* In technical usage, the definite article is not used with the term *apogee* or *perigee* alone. A body orbiting the Earth is said simply to be *"at apogee"* or *"at perigee."* It may, however, properly be said to be *"at the point of apogee"* or *"at the point of perigee."*

ALU: *Abbreviation for* **arithmetic and logic unit.**

AM: *Abbreviation for* **amplitude modulation.**

AMA: *Abbreviation for* **automatic message accounting.**

amateur-satellite service: A radiocommunication service using space stations on Earth satellites for the same purposes as those of the amateur service. [NTIA] [RR]

amateur service: A radiocommunication service for the purpose of self-training, intercommunication and technical investigation carried out by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest. [NTIA] [RR]

amateur station: A station in the amateur service. [NTIA] [RR]

ambient noise level: The level of acoustic noise existing at a given location, such as in a room, in a compartment, or at a place out of doors. *Note 1:* Ambient noise level is measured with a sound level meter. *Note 2:* Ambient noise level is usually measured in dB above a reference pressure level of 0.00002 Pa, *i.e.,* 20 μPa (micropascals) in SI units. A pascal is a newton per square meter. *Note 3:* In the centimeter-gram-second system of units, the reference level for measuring ambient noise level is 0.0002 dyn/cm^2. *Synonym* **room noise level.**

ambient temperature: The temperature of air or other media in a designated area, particularly the area surrounding equipment.

AME: *Abbreviation for* **amplitude modulation equivalent, automatic message exchange.** *See* **compatible sideband transmission.**

American National Standards Institute (ANSI): The U.S. standards organization that establishes procedures for the development and coordination of voluntary American National Standards.

American Standard Code for Information Interchange (ASCII): *See* **ASCII.**

AMI: *Abbreviation for* **alternate mark inversion.** *See* **alternate mark inversion signal.**

AMI violation: A *"mark"* that has the same polarity as the previous *"mark"* in the transmission of alternate mark inversion (AMI) signals. *Note:* In some transmission protocols, AMI violations are deliberately introduced to facilitate synchronization or to signal a special event.

amplifier: 1. An electronic component that boosts the voltage or power level of a signal that is a linear replica of the input signal, but with greater power or voltage level, and sometimes with an impedance transformation. The output may also be a nonlinear analog function of the input signal, as in a signal compression device. **2.** *See* **fiber amplifier, optical repeater.**

amplitude compression: 1. *See* **signal compression. 2.** In video production, the imposition of a nonlinear transfer function on (*i.e.* , the nonlinear processing of, to reduce the dynamic range of) signal amplitude values (*e.g.* , as in gamma correction). [After SMPTE]

amplitude distortion: Distortion occurring in a system, subsystem, or device when the output amplitude is not a linear function of the input amplitude under specified conditions. *Note:* Amplitude distortion is measured with the system operating under steady-state conditions with a sinusoidal input signal. When other frequencies are present, the term *"amplitude"* refers to that of the fundamental only.

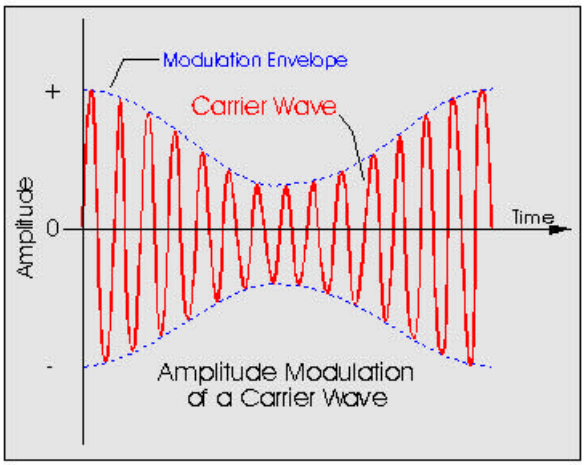
amplitude equalizer: A corrective network that is designed to modify the amplitude characteristics of a circuit or system over a desired frequency range. *Note:* Such devices may be fixed, manually adjustable, or automatic.

amplitude hit: *See* **hit.**

amplitude intensity modulation (AIM): *Deprecated term. See* **intensity modulation.**

amplitude keying: Keying in which the amplitude of a signal is varied among the members of a set of discrete values.

amplitude modulation (AM): Modulation in which the amplitude of a carrier wave is varied in accordance with some characteristic of the modulating signal. *Note:* Amplitude modulation implies the modulation of a coherent carrier wave by mixing it in a nonlinear device with the modulating signal to produce discrete upper and lower sidebands, which are the sum and difference frequencies of the carrier and signal. The envelope of the resultant modulated wave is an analog of the modulating signal. The instantaneous value of the resultant modulated wave is the vector sum of the corresponding instantaneous values of the carrier wave, upper sideband, and lower sideband. Recovery of the modulating signal may be by direct detection or by heterodyning.



amplitude modulation

amplitude modulation equivalent (AME): *Synonym* **compatible sideband transmission.**

amplitude-vs.-frequency distortion: Distortion in a transmission system caused by nonuniform attenuation, or gain, in the system with respect to frequency under specified operating conditions. *Synonym* **frequency distortion.**

AMPS: *Abbreviation for* **automatic message processing system.**

AMTS: *Abbreviation for* **automated maritime telecommunications system.**

analog component: *Synonym* **CAV.**

analog computer: A device that performs operations on data that are represented within the device by continuous variables having a physical resemblance to the quantities being represented. *Note:* The earliest analog computers were constructed with purely mechanical components, such as levers, cogs, cams, discs, and gears. These components represented the quantities being manipulated or the operator-inserted values. Modern analog computers usually employ electrical parameters, such as voltages, resistances, or currents to represent the quantities being manipulated.

analog data: Data represented by a physical quantity that is considered to be continuously variable and has a magnitude directly proportional to the data or to a suitable function of the data.

analog decoding: The portion of the digital-to-analog conversion process that generates an analog signal value from the digital signal that resulted from analog encoding. *Note:* Further action is required to integrate these samples to obtain a continuous approximation of the original signal, because analog decoding does not smooth the signal.

analog encoding: The portion of the analog-to-digital conversion process that samples an analog signal and creates a digital signal that represents the value of the sample. *Note:* Multiple samples are needed to digitize a waveform over a time interval.

analog facsimile equipment: Facsimile equipment in which (a) analog techniques are used to encode the image detected by the scanner and (b) the output is an analog signal. *Note:* Examples of analog facsimile equipment are CCITT Group 1 and CCITT Group 2 facsimile equipment.

analog signal: 1. A signal that has a continuous nature rather than a pulsed or discrete nature. *Note:* Electrical or physical analogies, such as continuously varying voltages, frequencies, or phases, may be used as analog signals. **2.** A nominally continuous electrical signal that varies in some direct correlation with another signal impressed on a transducer. *Note:* For example, an analog signal may vary in frequency, phase, or amplitude in response to changes in physical phenomena, such as sound, light, heat, position, or pressure.

analog signaling data link: The data link that provides an interface to signaling terminals and is made up of voice-frequency analog transmission channels and modems. [T1.110.2-1992]

analog switch: Switching equipment designed, designated, or used to connect circuits between users for real-time transmission of analog signals.

analog-to-digital (A-D) coder: *Synonym* **analog-to-digital converter (ADC).**

analog-to-digital converter (ADC): A device that converts an analog signal to a digital signal that represents equivalent information. *Synonyms* **analog-to-digital (A-D) coder, analog-to-digital (A-D) encoder.**

analog-to-digital (A-D) encoder: *Synonym* **analog-to-digital converter (ADC).**

analog transmission: Transmission of a continuously varying signal as opposed to transmission of a discretely varying signal.

analytical attack: An attempt to break a code or to find a key using analytical methods. *Note:* Examples of an analytical attack are: a statistical analysis of patterns; a search for flaws in an encryption algorithm. [2382-pt.8] *Synonym* **cryptanalytical attack.**

angle modulation: Modulation in which the phase or frequency of a sinusoidal carrier is varied. *Note:* Phase and frequency modulation are particular forms of angle modulation.

angle of deviation: In optics, the net angular deflection experienced by a light ray after one or more refractions or reflections.

angle of incidence: The angle between an incident ray and the normal to a reflecting or refracting surface.

angstrom (Å): A unit of length equal to 10^{-10} m. *Note 1:* The angstrom is not an SI (International System) unit, and it is not accepted for government use (Fed. Std. 376B). *Note 2:* The angstrom is, and historically has been, used in the fields of optics, spectroscopy, and microscopy.

angular misalignment loss: Power loss caused by the deviation from optimum angular alignment of the axes of source to waveguide, waveguide to waveguide, or waveguide to detector. *Note 1:* The waveguide may be dielectric (an optical fiber) or metallic. *Note 2:* Angular misalignment loss does not include lateral offset loss and longitudinal offset loss.

ANI: *Abbreviation for* **automatic number identification.**

anisochronous: Pertaining to transmission in which the time interval separating any two significant instants in sequential signals is not necessarily related to the time interval separating any other two significant instants. *Note:* Isochronous and anisochronous are characteristics, while synchronous and asynchronous are relationships.

anisochronous transmission: *See* **asynchronous transmission.**

anisotropic: Pertaining to a material whose electrical or optical properties vary with (a) the direction of propagation of a traveling wave or with (b) different polarizations of a traveling wave. *Note 1:* Anisotropy is exhibited by non-cubic crystals, which have different refractive indices for lightwaves propagating in different directions or with different polarizations. *Note 2:* Anisotropy may be induced in certain materials under mechanical strain.

anomalous propagation (AP): Abnormal propagation caused by fluctuations in the properties (such as density and refractive index) of the propagation medium. *Note:* AP may result in the reception of signals well beyond the distances usually expected.

anonymous call: A 7- or 10-digit call to the directory number of the public service answering point (PSAP) (where applicable) causing the E911 system (emergency 9-1-1 system) to send to the PSAP a multifrequency (MF) pulse train devoid of the caller's emergency service identification. [T1.414-1998]

anonymous FTP: The name of a file-transfer protocol that allows a user on one host to access and transfer files to and from another host over a network. [After 2382-pt.35]

ANS: *Abbreviation for* **American National Standard.**

ANSI: *Abbreviation for* **American National Standards Institute.**

ANSI/EIA/TIA-568: A U.S. industry standard that specifies a generic telecommunications cabling system, which will support a multiproduct, multivendor environment, for commercial buildings. *Note 1:* The standard specifies performance characteristics for unshielded twisted pair telecommunications cabling, including categories allowing data communications up to 100 Mb/s. These categories are designated 3, 4, and 5. Categories 1 and 2 have not been defined. *Note 2:* The standard has been adopted as FIPS PUB 174.

answer back: A signal sent by receiving equipment to the sending station to indicate that the receiver is ready to accept transmission.

answer indicator: A signal indicating acceptance of the call by the addressed user. [T1.507-1996]

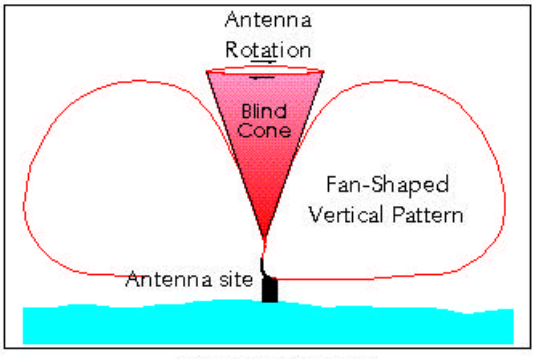
answer signal: 1. A supervisory signal returned from the called telephone to the originating switch when the call receiver answers. *Note 1:* The answer signal stops the ringback signal from being returned to the caller. *Note 2:* The answer signal is returned by means of a closed loop. **2.** An off-hook signal transmitted towards the network when the called party answers. **3.** An off-hook signal transmitted towards the network to indicate when the customer installation (CI) equipment has changed to the communication state. [T1.405-1989]

antenna: 1. Any structure or device used to collect or radiate electromagnetic waves. **2.** A device that converts radio frequency electrical energy to radiated electromagnetic energy and vice versa; in a transmitting station, the device from which radio waves are emitted. [47CFR]

antenna aperture: *See* **aperture.**

antenna array: An assembly of antenna elements with dimensions, spacing, and illumination sequence such that the fields for the individual elements combine to produce a maximum intensity in a particular direction and minimum field intensities in other directions.

antenna blind cone: The volume of space, usually approximately conical with its vertex at the antenna, that cannot be scanned by an antenna because of limitations of the antenna radiation pattern and mount. *Note:* An example of an antenna blind cone is that of an air route surveillance radar (ARSR). The horizontal radiation pattern of an ARSR antenna is very narrow. The vertical radiation pattern is fan-shaped, reaching approximately 70° of elevation above the horizontal plane. As the antenna is rotated about a vertical axis, it can illuminate targets only if they are 70° or less from the horizontal plane. Above that elevation, they are in the antenna blind cone. *Synonym* **cone of silence.**



antenna blind cone

antenna coupler: A device used to match the impedance of a transmitter and/or receiver to an antenna to provide maximum power transfer.

antenna dissipative loss: A power loss resulting from changes in the measurable impedance of a practical antenna from a value theoretically calculated for a perfect antenna.

antenna effective area: The functionally equivalent area from which an antenna directed toward the source of the received signal gathers or absorbs the energy of an incident electromagnetic wave. *Note 1:* Antenna effective area is usually expressed in square meters. *Note 2:* In the case of parabolic and horn-parabolic antennas, the antenna effective area is

about 0.35 to 0.55 of the geometric area of the antenna aperture.

antenna efficiency: The ratio of the total radiated power to the total input power. *Note:* The total radiated power is the total input power less antenna dissipative losses.

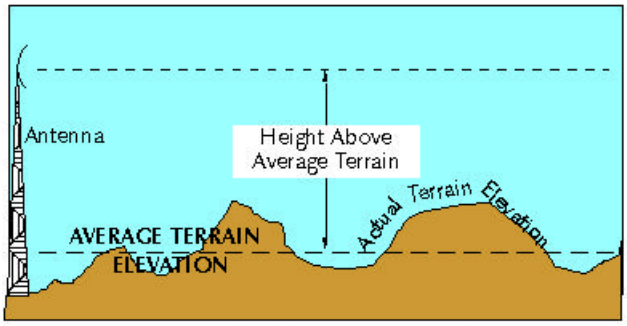
antenna electrical beam tilt: The shaping of the radiation pattern in the vertical plane of a transmitting antenna by electrical means so that maximum radiation occurs at an angle below the horizontal plane. [47CFR]

antenna gain: The ratio of the power required at the input of a loss-free reference antenna to the power supplied to the input of the given antenna to produce, in a given direction, the same field strength at the same distance. *Note 1:* Antenna gain is usually expressed in dB. *Note 2:* Unless otherwise specified, the gain refers to the direction of maximum radiation. The gain may be considered for a specified polarization. Depending on the choice of the reference antenna, a distinction is made between:

- absolute or isotropic gain (G_i), when the reference antenna is an isotropic antenna isolated in space;
- gain relative to a half-wave dipole (G_d) when the reference antenna is a half-wave dipole isolated in space and with an equatorial plane that contains the given direction;
- gain relative to a short vertical antenna (G_r), when the reference antenna is a linear conductor, much shorter than one quarter of the wavelength, normal to the surface of a perfectly conducting plane which contains the given direction. [RR] *Synonyms* **gain of an antenna, power gain of an antenna.**

antenna gain-to-noise-temperature (G/T): In the characterization of antenna performance, a figure of merit, where G is the antenna gain in decibels at the receive frequency, and T is the equivalent noise temperature of the receiving system in kelvins.

antenna height above average terrain: The antenna height above the average terrain elevations from 3.2 to 16 kilometers (2 to 10 miles) from the antenna for the eight directions spaced evenly for each 45° of azimuth starting with true north. *Note:* In general, a different antenna height above average terrain will be determined in each direction from the antenna. The average of these eight heights is the antenna height above average terrain. In some cases, such as seashore, fewer than eight directions may be used.



antenna height above average terrain

antenna lobe: A three-dimensional section of the radiation pattern of a directional antenna, bounded by one or more cones of nulls or by regions of diminished irradiance.

antenna matching: The process of adjusting impedance so that the input impedance of an antenna equals or approximates the characteristic impedance of its transmission line over a specified range of frequencies. *Note:* The impedance of either the transmission line, or the antenna, or both, may be adjusted to effect the match.

antenna noise temperature: The temperature of a hypothetical resistor at the input of an ideal noise-free receiver that would generate the same output noise power per unit bandwidth as that at the antenna output at a specified frequency. *Note 1:* The antenna noise temperature depends on antenna coupling to all noise sources in its environment as well as on noise generated within the antenna. *Note 2:* The antenna noise temperature is a measure of noise whose value is equal to the actual temperature of a passive device.

anti-clockwise polarized wave: *Synonym* **left-hand polarized wave.**

anti-interference: Pertaining to equipment, processes, or techniques used to reduce the effect of natural and man-made noise on radio communications.

anti-jam: Measures ensuring that intended transmitted information can be received despite deliberate jamming attempts. [INFOSEC-99]

anti-node: A point in a standing wave at which the amplitude is a maximum.

antireflection coating: A thin, dielectric or metallic film, or several such films, applied to an optical surface to reduce its reflectance and thereby increase its transmittance. [After 2196] *Note:* For minimum reflection of a normal incident wave of a single wavelength, the antireflection coating may consist of a single layer and must have (a) a refractive index equal to the square root of the refractive indices of the materials bounding the coating, and (b) a thickness equal to one-quarter the wavelength in question (*i.e.* , the wavelength within the material of which the coating consists). For minimum reflection of multiple wavelengths, additional layers must be added.

anti-spoof: 1. Measures taken to prevent an unauthorized person/entity from impersonating an authorized person/entity to gain access to a data system. [DoJ] **2.** Measures preventing an opponent's participation in an information system (IS). [INFOSEC-99]

anti-virus program: A computer program designed to detect computer-file viruses and possibly to suggest or take corrective action. *Synonym* **vaccine program.** [After 2382-pt.8]

anycall: In adaptive high-frequency (HF) radio automatic link establishment, a broadcast in which (a) the called stations are unspecified, (b) stations receiving the call stop scanning, and (c) each station automatically responds in pseudorandom time slots.

AP: *Abbreviation for* **anomalous propagation.**

APC: *Abbreviation for* **adaptive predictive coding.**

APD: *Abbreviation for* **avalanche photodiode.** *Note:* **apd** and **a.p.d.** are also used.

aperiodic antenna: An antenna designed to have an approximately constant input impedance over a wide range of frequencies. *Note:* Examples of aperiodic antennas include terminated rhombic antennas and wave antennas. *Synonym* **nonresonant antenna.**

aperture: 1. In a directional antenna, the portion of a plane surface very near the antenna normal to the direction of maximum radiant intensity, through which the major part of the radiation passes. **2.** In an acoustic device that launches a sound wave, the passageway, determined by the size of a hole in the inelastic material and the wavelength. [After 2196]

aperture correction: 1. In a scanned image system, electrical compensation for the distortion introduced by the limiting size of a scanning aperture. [IEEE 100; After SMPTE] **2.** In television technology, restoration of the depth of modulation to the higher (*i.e.,* higher Fourier) frequency components of the video signal, with the objective of achieving a subjective improvement in image quality. [After SMPTE] *Note:* Aperture correction is required to compensate for the properties of the camera lens, optical beam-splitting installation, and camera tube, all of which contribute to a reduced signal at higher spatial frequencies. Problems requiring aperture correction arise in a scanning system when the frequency response falls off as the effective wavelength of the detail to be resolved in the image approaches the dimension of the scanning aperture and becomes zero when that effective wavelength equals the dimension of the scanning aperture.

aperture distortion: In facsimile, the distortion of the recorded image caused by the shape and finite size of the scanning and recording apertures. *Note:* The distortion may occur in one or more attributes of the recorded image, such as in resolution, density, or shape.

aperture illumination: 1. The field distribution, in amplitude and phase, over the antenna physical aperture. **2.** The phase and amplitude of the element feed voltages or the distribution of the currents in an array of elements.

aperture-to-medium coupling loss: The difference between the theoretical gain of a very large antenna, such as the antennas in beyond-the-horizon microwave links, and the gain that can be realized in operation. *Note 1:* Aperture-to-medium coupling loss is related to the ratio of the scatter angle to the antenna beamwidth. *Note 2:* The "very large antennas" are referred to in wavelengths; thus, this loss can apply to line-of-sight systems also.

apogee: In an orbit of a satellite orbiting the Earth, the point that is farthest from the gravitational center of the Earth.

apogee altitude: *See* **altitude of the apogee or of the perigee.**

app: *Abbreviation for* **application, application software.**

apparent power: In alternating-current power transmission and distribution, the product of the rms voltage and amperage. *Note 1:* When the applied voltage and the current are in phase with one another, the apparent power is equal to the effective power, *i.e.,* the real power delivered to or consumed by the load. If the current lags or leads the applied voltage, the apparent power is greater than the effective power. *Note 2:* Only effective power, *i.e.,* the real power delivered to or consumed by the load, is expressed in watts. Apparent power is properly expressed only in volt-amperes, never watts. *See diagram under* **effective power.**

applet: A small, self-contained computer program that usually performs a task as part of, or under the control of, a larger software application. For example, most modern World Wide Web browsers are capable of making use of applets written in the Java programming language to perform simple tasks such as display animations or more complex tasks such as spreadsheet and database operations.

application: Software that performs a specific task or function, such as word-processing, creation of spreadsheets, generation of graphics, facilitating electronic mail, *etc. Synonym* **application software.**

application association: A cooperative relationship between two application entities, formed by their exchange of application protocol control information through their use of presentation services. [T1.215-1990]

application entity (AE): The system-independent application activities that are made available as application services to the application agent, *e.g.,* a set of application service elements that together perform all or part of the communication aspects of an application process. [T1.667-1999]

Application Layer: *See* **Open Systems Interconnection--Reference Model.**

application platform: *Synonym* **platform.**

application program: *See* **application.**

application program interface (API): A formalized set of software calls and routines that can be referenced by an application program in order to access supporting network services.

application protocol: A set of rules and formats (semantic and syntactic) that determines the communication behavior of application entities in the performance of application functions. [T1.208-1989]

application service element (ASE): A coherent set of integrated functions to help accomplish application communication, *e.g.,* within an application entity. [T1.667-1999]

application software: *Synonym* **application.**

applique: Circuit components added to an existing system to provide additional or alternate functions. *Note:* Applique may be used to modify carrier telephone equipment designed for ringdown manual operation to allow for use between points having dial equipment.

appointment book: A small (pocket-size or smaller), specialized, portable computing device, with a self-contained power source, designed to (a) accept as inputs; (b) store; and (c) read out, user-designated information, usually appointments, telephone numbers, *etc.*

approved circuit: *Deprecated synonym for* **protected distribution system.**

aramid yarn: Generic name for a tough synthetic yarn that is often used in optical cable construction for the strength member, protective braid, and/or rip cord for jacket removal. [FAA]

architecture: *See* **computer architecture, network architecture.**

archive file: A software file that has been set aside, often in a redundant storage medium, as a security measure or for later retrieval, *e.g.* , for research or verification.

archiving: The storing of files, records, and other data for reference and alternative backup.

area broadcast shift: The changing from listening to transmissions intended for one broadcast area to listening to transmissions intended for another broadcast area. *Note 1:* An area broadcast shift may occur when a ship or aircraft crosses the boundary between listening areas. *Note 2:* Shift times, on the date a ship or aircraft is expected to pass into another area, must be strictly observed or the ship or aircraft will miss messages intended for it. *Synonym* **radio watch shift.**

area code: *See* **access code, code, country code, NXX code.**

area loss: When optical fibers are joined by a splice or a pair of mated connectors, a power loss that is caused by any mismatch in size or shape of the cross section of the cores of the mating fibers. *Note 1:* Any of the above conditions may allow light from the core of the "transmitting" fiber to enter the cladding of the "receiving" fiber, where it is quickly lost. *Note 2:* Area loss may be dependent on the direction of propagation. For example, in coupling a signal from an optical fiber having a smaller core to an otherwise identical one having

a larger core, there will be no area loss, but in the opposite direction, there will be area loss. [After FAA]

argument: 1. An independent variable. **2.** Any value of an independent variable. *Note:* Examples of arguments include search keys, numbers that identify the location of a data item in a table, and the θ in sin θ.

arithmetic and logic unit (ALU):): A part of a computer that performs arithmetic, logic, and related operations.

arithmetic overflow: 1. In a digital computer, the condition that occurs when a calculation produces a result that is greater than a given register or storage location can store or represent. **2.** In a digital computer, the amount that a calculated value is greater than a given register or storage location can store or represent. *Note:* The overflow may be placed at another location. *Synonym [loosely]* **overflow.**

arithmetic register: A register that holds the operands or the results of operations such as arithmetic operations, logic operations, and shifts.

arithmetic shift: A shift, applied to the representation of a number in a fixed radix numeration system and in a fixed-point representation system, and in which only the characters representing the fixed-point part of the number are moved. An arithmetic shift is usually equivalent to multiplying the number by a positive or a negative integral power of the radix, except for the effect of any rounding; compare the logical shift with the arithmetic shift, especially in the case of floating-point representation.

arithmetic underflow: In a digital computer, the condition that occurs when a calculation produces a non-zero result that is less than the smallest non-zero quantity that a given register or storage location can store or represent.

arithmetic unit: In a processor, the part that performs arithmetic operations; sometimes the unit performs both arithmetic and logic operations.

Armed Forces Radio Service (AFRS): A radio broadcasting service that is operated by and for the personnel of the armed services in the area covered by the broadcast. *Note:* An example of an AFRS is the radio service operated by the U.S. Army for U.S. and allied military personnel on duty in overseas areas.

armor: Of a communications cable, a component intended to protect the critical internal components, *e.g.,* buffer tubes or fibers, or electrical conductors, from damage from external mechanical attack, *e.g.,* rodent attack or abrasion. [After FAA] *Note:* Armor usually takes the form of a steel or aluminum tape wrapped about an inner jacket that covers the critical internal components. An outer jacket usually covers the armor.

ARP: *Abbreviation for* **address resolution protocol.**

ARPANET: *Abbreviation for* **Advanced Research Projects Agency Network.** A packet-switching network used by the Department of Defense, later evolved into the Internet.

ARQ: *Abbreviation for* **automatic repeat-request.** Error control for data transmission in which the receiver detects transmission errors in a message and automatically requests a retransmission from the transmitter. *Note:* Usually, when the transmitter receives the ARQ, the transmitter retransmits the message until it is either correctly received or the error persists beyond a predetermined number of retransmissions. *Synonyms* **error-detecting-and-feedback system, repeat-request system.**

array: 1. An arrangement of elements in one or more dimensions. **2.** In a programming language, an aggregate that consists of data objects with identical attributes, each of which may be uniquely referenced by subscription.

array processor: A processor capable of executing instructions in which the operands may be arrays rather than data elements. *Synonym* **vector processor.**

arrester: A device that protects hardware, such as systems, subsystems, circuits, and equipment, from voltage or current surges produced by lightning or electromagnetic pulses. *Note:* If the hardware is adequately protected, associated software may also be adequately protected. *Synonyms* **surge protective device, surge suppressor.**

ARS: *Abbreviation for* **automatic route selection.**

article: *Synonym* **posting.**

articulation index: A measure of the intelligibility of voice signals, expressed as a percentage of speech units that are understood by the listener when heard out of context. *Note:* The articulation index is affected by noise, interference, and distortion.

articulation score (AS): A subjective measure of the intelligibility of a voice system in terms of the percentage of words correctly understood over a channel perturbed by interference. *Note:* Articulation scores have been experimentally obtained as functions of varying word content, bandwidth, audio signal-to-noise ratio and the experience of the talkers and listeners involved.

artifact: In facsimile or television, a defect or distortion of the image, introduced along the sequence from origination and image capture to final display. *Note 1:* Artifacts may arise from the overload of channel capacity by excess signal bandwidth. *Note 2:* In general, artifacts may result from (a) sampling effects in temporal, spatial, or frequency domains, (b) processing by the transfer functions, (c) compromises and inadequacies in the system employed, (d) cascading of minor defects, or (e) any other departure of the total system from "complete transparency." [After SMPTE]

artificial intelligence (AI): The capability of a device to perform functions that are normally associated with human intelligence, such as reasoning and optimization through experience. *Note:* AI is the branch of computer science that attempts to approximate the results of human reasoning by organizing and manipulating factual and heuristic knowledge. Areas of AI activity include expert systems, natural language understanding, speech recognition, vision, and robotics.

artificial transmission line: A four-terminal electrical network, *i.e.* an electrical circuit, that has the characteristic impedance, transmission time delay, phase shift, and/or other parameter(s) of a real transmission line and therefore can be used to simulate a real transmission line in one or more of these respects. *Synonym [loosely]* **art line.**

art line: *Synonym [loosely]* **artificial transmission line.**

ARU: *Abbreviation for* **audio response unit.**

ASCII: *Acronym for* **American Standard Code for Information Interchange.** The standard code used for information interchange among data processing systems, data communications systems, and associated equipment in the United States. *Note 1:* The ASCII character set contains 128 coded characters. *Note 2:* Each ASCII character is a 7-bit coded unique character; 8 bits when a parity check bit is included. *Note 3:* The ASCII character set consists of control characters and graphic characters. *Note 4:* When considered simply as a set of 128 unique bit patterns, or 256 with a parity bit, disassociated from the character equivalences in national implementations, the ASCII may be considered as an alphabet used in machine languages. *Note 5:* The ASCII is the U.S. version of International Reference Alphabet (IRA) No. 5 (formerly International Alphabet No. 5, or "IA5") as specified in ITU-T Recommendation T.50.

ASP: *Abbreviation for* **adjunct service point.**

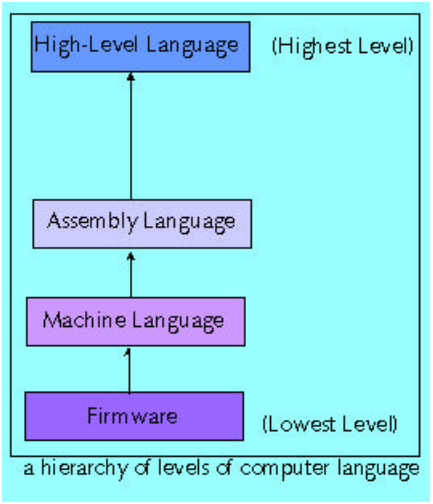
aspect ratio: 1. In facsimile or television, the ratio of the width to the height of a scanning field or image. *Note:* For example, the classical NTSC television standard specifies an aspect ratio of 4:3, and the new high-definition television standard specifies 16:9. **2.** The ratio of the width to the height of any video or scanned image display.

assemble: To translate a computer program expressed in an assembly language into a machine language.

assembler: A computer program that is used to assemble. *Synonym* **assembly program.**

assembly: In logistics, an item forming a portion of an equipment that can be provisioned and replaced as an entity and which normally incorporates replaceable parts or groups of parts. [JP1]

assembly language: A computer-oriented language (a) in which instructions are symbolic and usually in one-to-one correspondence with sets of machine language instructions and (b) that may provide other facilities, such as the use of macro instructions. *Synonym* **computer-dependent language.**



assembly program: *Synonym* **assembler.**

assembly time: The elapsed time taken for the execution of an assembler.

asset: 1. In security, a resource or information that is to be protected. [After CC-99] **2.** Any system or component (*e.g.,* subsystem, hardware, firmware, software, database, or interconnection communications network or facility) that is part of a communications system or an information system. [After FAA]

assigned frequency: 1. The center of the assigned frequency band assigned to a station. [RR] **2.** The frequency of the center of the radiated bandwidth. *Note:* The frequency of the rf carrier, whether suppressed or radiated, is usually given in parentheses following the assigned frequency, and is the frequency appearing in the dial settings of rf equipment intended for single-sideband or independent-sideband transmission. **3.** The frequency coinciding with the center of an authorized bandwidth of emission. [47CFR] **4.** The center of the frequency band assigned to a station. [47CFR]

assigned frequency band: The frequency band within which the emission of a station is authorized; the width of the band equals the necessary bandwidth plus twice the absolute value of the frequency tolerance. Where space stations are concerned, the assigned frequency band includes twice the maximum Doppler shift that may occur in relation to any point of the Earth's surface. [NTIA] [RR]

assignment: For NS/EP, the designation of priority level(s).

assignment (of a radio frequency or radio frequency channel): Authorization given by an administration for a radio station to use a radio frequency or radio frequency channel under specified conditions. [NTIA] [RR]

associated common-channel signaling: Common-channel signaling in which the signal channel is associated with a specific trunk group and terminates at the same pair of switches as the trunk group. *Note:* In associated common-channel signaling, the signaling is usually accomplished by using the same facilities as the associated trunk group.

associated mode of signaling: The mode in which messages for a signaling relation involving two adjacent signaling points are conveyed over a directly interconnecting signaling link. [T1.226-1992]

associative storage: 1. A storage device whose storage locations are identified by their contents, or by a part of their contents, rather than by their names or positions. *Note:* Associative storage can also refer to this process as well as to the device. *Synonym* **content-addressable storage. 2.** Storage that supplements another storage.

assurance: 1. Grounds for confidence that an information-technology (IT) product or system meets its security objectives. **2.** *In INFOSEC, see* **information assurance.**

asymmetrical modulator: *Synonym* **unbalanced modulator.**

asymmetric compression: A data compression technique that requires more processing capability to compress than to decompress. *Note:* Asymmetric compression is typically used for the mass distribution of programs on media such as CD ROM, where significant expense can be incurred for the production and compression of data but the retrieval (or the playback) system must be low in cost. [After Silicon]

asymmetric cryptographic algorithm: A cryptographic formula that uses two related keys—a public key and a private key—each of which has the characteristic algorithm that, given the public key, it is computationally infeasible to derive the private key. [After X9.62]

asymmetric digital subscriber line (ADSL): 1. An access technology that allows voice and high-speed data to be sent simultaneously over local exchange service copper facilities; the technology supports data rates of up to 1.544 Mb/s when receiving data (downstream rate) and up to 256 kb/s when sending data (upstream rate). **2.** A modem technology that provides enhanced and affordable access to the Internet, live video, and a wide variety of other multimedia broadband services over existing copper twisted-pair wirelines; usually the ADSL operates with different data rates in the two directions. [After NCS TIP 99-1]

asymmetric encryption: An encryption system that utilizes two keys, one called a *public key* (which is known to both the sender and the recipient of encrypted data), and the other, called a *private key* (known only to the individual sending the data). *Note:* Data are encrypted with the private key and decrypted with the public key. Asymmetric encryption allows for the secure transfer of data. [After Bahorsky]

asynchronous communications system: A data communications system that uses asynchronous operation. *Note:* The time spacing between successive data characters or blocks may be of arbitrary duration. *Synonym* **start-stop system.** [T1.X1]

asynchronous multiplexed transmission system: A multiplexed transmission system in which the rates of the carrier and its tributaries are not traceable to the same master clocking source. *Note:* In this type of system, extra signal elements are usually appended to the individual tributary signals for the purpose of interleaving them at a rate consistent with the carrier rate. [T1.X1]

asynchronous network: A network in which the clocks do not need to be synchronous or mesochronous. *Synonym* **nonsynchronous network.**

asynchronous operation: 1. A sequence of operations in which operations are executed out of time coincidence with any event. **2.** An operation that occurs without a regular or predictable time relationship to a specified event; *e.g.,* the calling of an error diagnostic routine that may receive control at any time during the execution of a computer program. *Synonym* **asynchronous working.**

asynchronous time-division multiplexing (ATDM): Time-division multiplexing in which asynchronous transmission is used.

asynchronous transfer mode (ATM): A high-speed multiplexing and switching method utilizing fixed-length cells of 53 octets to support multiple types of traffic. *Note:* ATM, specified in international standards, is asynchronous in the sense that cells carrying user data need not be periodic.

asynchronous transmission: Data transmission in which the instant that each character, or block of characters, starts is arbitrary; once started, the time of occurrence of each signal representing a bit within the character, or block, has the same relationship to significant instants of a fixed time frame.

asynchronous working: *Synonym* **asynchronous operation.**

ATB: *Abbreviation for* **all trunks busy.**

AT Commands: A *de facto* standard for modem commands from an attached CPU, used in most 1,200 and 2,400 b/s modems.

ATDM: *Abbreviation for* **asynchronous time-division multiplexing.**

ATM: *Abbreviation for* **asynchronous transfer mode.**

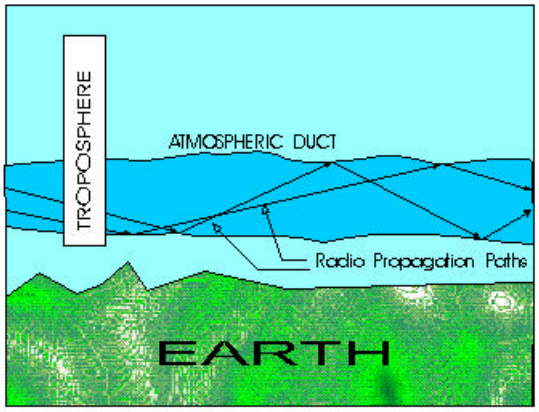
ATM (asynchronous transfer mode) connection: A virtual channel connection (VCC) or a virtual path connection (VPC). [T1.627-1993]

ATM (asynchronous transfer mode) layer connection: An association established by the ATM Layer to support communication between two or more ATM service users (*i.e.,* two or more next higher layer entities or two or more ATM Management entities). The communication over an ATM Layer connection may be either bidirectional or unidirectional. When bidirectional, two virtual channel connections (VCCS) are used. When unidirectional, only one VCC is used. *Note:* In the case where there is ATM Layer connection associated ATM Layer Management (*e.g.,* F5 Flow), the ATM Layer connection is bidirectional even if the user communication is unidirectional. [T1.629-1993]

ATM (asynchronous transfer mode) transport system: A transport system composed of a carrier system terminated by an ATM multiplexer at each end. The relationship between input and output, *i.e.,* virtual circuits, cannot change on a per call basis, *i.e.,* permanent virtual circuits only are supported. This device does not allow blocking or signal compression. [T1.Rpt46-1996]

ATM link (asynchronous transfer mode link): A virtual path link (VPL) or a virtual channel link (VCL). [T1.627-1993]

atmospheric duct: A horizontal layer in the lower atmosphere in which the vertical refractive index gradients are such that radio signals (a) are guided or focused within the duct, (b) tend to follow the curvature of the Earth, and (c) experience less attenuation in the ducts than they would if the ducts were not present. *Note:* The reduced refractive index at the higher altitudes bends the signals back toward the Earth. Signals in a higher refractive index layer, *i.e.,* duct, tend to remain in that layer because of the reflection and refraction encountered at the boundary with a lower refractive index material.



atmospheric ducting

atmospheric noise: Radio noise caused by natural atmospheric processes, primarily lightning discharges in thunderstorms.

ATM switch (asynchronous transfer mode switch): 1. With reference to both analog and digital interfaces, the ATM functional unit and technology that operates with analog 2-wire interfaces and standard digital line rates on both the inputs and the outputs, *e.g.,* DS1 on the input and DS3 on the output, and which passes the cells received on the input to the output. The relationship between input and output, can change on a per call basis, *i.e.,* switched virtual circuits must be supported and permanent virtual circuits may be supported. (For the purposes of this document it is assumed that the cell formation function associated with an analog input is performed before the switch function occurs. However, this definition is not intended to constrain technical implementations.) This device allows blocking and concentration. The switch function is also required to perform 2-wire to 4-wire conversion as well as A/D conversion. [T1.Rpt46-1996] **2.** With reference to digital interfaces only, the ATM functional unit and technology that operates with cell-based signals and over standard line rates on both the inputs and the outputs, *e.g.,* DS1 on the input and DS3 on the output, and which passes the cells received on the input to the output. The relationship between input and output, can change on a per-call basis, *i.e.,* switched virtual circuits must be supported and permanent virtual circuits may be supported. This device allows blocking and performs concentration. [T1.Rpt46-1996]

atomic time: *See* **International Atomic Time.**

ATOW: *Acronym for* **acquisition and tracking orderwire.** A downlink circuit that provides a terminal with information regarding uplink acquisition and synchronization status.

attachment: In e-mail, a computer file that is transmitted with an e-mail message. *Note:* Attachments are converted by an e-mail manager program, or by an add-on, to a MIME

(multipurpose Internet mail extension) or binary format. The files are recovered by the recipient's e-mail manager program or by an add-on into their original, usually application-specific, format. [Bahorsky]

attachment unit interface (AUI): In a local area network, the interface between the medium access unit (MAU) and the data terminal equipment within a data station.

attack: 1. An attempt to violate computer security. *Note:* An example of an attack is malicious logic. [2382-pt.8] **2.** [An] intentional act of attempting to bypass one or more of the following security controls of an information system (IS): nonrepudiation, authentication, integrity, availability, or confidentiality. [INFOSEC-99]

attack time: The time between (a) the instant that a signal at the input of a device or circuit exceeds the activation threshold of the device or circuit and (b) the instant that the device or circuit reacts in a specified manner, or to a specified degree, to the input. *Note:* Attack time occurs in devices such as clippers, peak limiters, compressors, and voxes.

attendant access loop: A switched circuit that provides an attendant with a manual means for call completion and control. *Note:* An attendant access loop might be given a specific telephone number. *Synonym* **access loop.**

attendant conference: A network-provided service feature that allows an attendant to establish a conference connection of three or more users.

attendant position: The part of a switching system used by an attendant, *i.e.,* an operator, to assist users in call completion and use of special services.

attention character: In [a] trusted-computing-base (TCB) design, a character entered from a terminal that tells the TCB the user wants a secure communications path from the terminal to some trusted node to provide a secure service for the user. [INFOSEC-99]

attention signal: The attention signal to be used by AM, FM, and TV broadcast stations to actuate muted receivers for inter-station receipt of emergency cuing announcements and broadcasts involving a range of emergency contingencies posing a threat to the safety of life or property. [47CFR]

attenuation: The decrease in intensity of a signal, beam, or wave as a result of absorption of energy and of scattering out of the path to the detector, but not including the reduction due to geometric spreading. [After JP1] *Note 1:* Attenuation is usually expressed in dB. *Note 2: "Attenuation"* is often used as a misnomer for "**attenuation coefficient,** " which is expressed in dB per kilometer. *Note 3:* A distinction must be made as to whether the attenuation is that of signal power or signal electric field strength.

attenuation coefficient: The rate of diminution of average power with respect to distance along a transmission path. *Note:* The attenuation coefficient is often calculated as the sum of the absorption coefficient and the scattering coefficient. *Synonym* **attenuation rate.**

attenuation constant: 1. The real part of the propagation constant in any electromagnetic propagation medium. *Note 1:* The attenuation constant is usually expressed as a numerical value per unit length. *Note 2:* The attenuation constant may be calculated or experimentally determined for each medium. **2.** For a particular propagation mode in an optical fiber, the real part of the axial propagation constant.

attenuation distortion: The difference in loss at specified frequencies relative to the loss at 1004 Hz, unless otherwise specified. [NECA/FCC-5]

attenuation-limited operation: The condition that prevails when attenuation, rather than bandwidth, limits the performance of a communications link.

attenuation rate: *Synonym* **attenuation coefficient.**

attenuator: 1. In electrical systems, a network that reduces the amplitude of a signal without appreciably distorting its waveform. *Note 1:* Electrical attenuators are usually passive devices. *Note 2:* The degree of attenuation may be fixed, continuously adjustable, or incrementally adjustable. Fixed attenuators are often called pads, especially in telephony. *Note 3:* The input and output impedances of an attenuator are usually matched to the impedances of the signal source and load, respectively. **2.** In optical systems, a device that reduces the amplitude of a signal without appreciably distorting its waveform. *Note 1:* Optical attenuators are usually passive devices. *Note 2:* The degree of attenuation may be fixed, continuously adjustable, or incrementally adjustable.

attribute: 1. In database management, a property inherent in an entity or associated with that entity for database purposes. **2.** In network management, a property of a managed object that has a value. *Note 1:* Mandatory initial values for attributes can be specified as part of the managed object class definition. *Note 2:* Attributes may be either mandatory or conditional.

attribute authority: In computer security, an entity that is trusted by at least two entities to create and assign attribute certificates. [After X9.45]

attribute certificate: A set of attributes and a public key certificate identifier that are made unforgeable by use of the digital signature created with a private key. [After X9.30]

ATV: *Abbreviation for* **advanced television.**

audible: *Synonym for* **audible ringing tone.**

audible ringing: An audible signal (information tone) transmitted to the calling party when the called party is alerted. [T1.401-1988]

audible ringing tone: In telephony, a signal, usually consisting of an audio tone interrupted at a slow repetition rate, provided to a caller to indicate that the called-party instrument is being sent a ringing signal. *Note:* The audible ringing tone may be generated by the called-party servicing switch or by the calling-party servicing switch, but it is not generated by the called telephone instrument. *Synonyms* **audible ringing, ringback tone.**

audio channel: A means for delivering audio signals from one point to another. An audio waveform submitted to the channel input results in a similar (not necessarily identical) waveform at the channel output. The audio channel may be comprised of the following components: encoders (compressors) and decoders (decompressors), buffers, multiplexors and demultiplexors, modulators and demodulators, transmission facilities, switches, multipoint conference units, and other components necessary to achieve the desired channel characteristics.

audio dubbing: 1. In videotape editing, a process or technique employed to (a) enhance (*e.g.* , remove noise from, or introduce some kind of special effect into), (b) add to, or (c) replace totally, the originally recorded audio (if any), without modifying the originally recorded video signal. **2.** In audiotape editing or mixing, a process analogous to any of the above, performed (a) on a single audio channel, or (b) on one or more audio channels of a multi-track recording without modifying the other channel(s). **3.** The copying of one or more audio signals from one storage medium, location, or format to another with or without modification or enhancement.

audio-follow-video: A video recording, mixing or switching technique or process in which the audio signal associated with any given video signal is recorded, switched, or mixed with that video signal.

audio frame: A presentation unit of the audio channel; a group of consecutive audio samples. The preferred number of samples in an audio frame depends on the audio sample rate. These audio frames have no relationship to the frames designated by certain audio/speech codecs. [T1.801.04-1997]

audio frequency (AF): The band of frequencies (approximately 20 Hz to 20 kHz) that, when transmitted as acoustic waves, can be heard by the normal human ear.

audio response unit (ARU): A device that provides synthesized voice responses to dual-tone multifrequency signaling input by processing calls based on (a) the call-originator input,

(b) information received from a host data base, and (c) information in the incoming call, such as the time of day. *Note:* ARUs are used to increase the number of information calls handled and to provide consistent quality in information retrieval.

audit: 1. To conduct an independent review and examination of system records and activities in order to test the adequacy and effectiveness of data security and data integrity procedures, to ensure compliance with established policy and operational procedures, and to recommend any necessary changes. **2.** Independent review and examination of records and activities to assess the adequacy of system controls, to ensure compliance with established policies and operational procedures, and to recommend necessary changes in controls, policies, or procedures. [INFOSEC-99]

audit record field: A field containing information regarding all entities in a transaction, and indicators of the types of processing performed by those entities. [After X9.17/95]

audit review file: A file created by executing statements included in a computer program for the explicit purpose of providing data for auditing.

audit trail: 1. A record of both completed and attempted accesses and service. **2.** Data in the form of a logical path linking a sequence of events, used to trace the transactions that have affected the contents of a record. **3.** [In INFOSEC, a] chronological record of system activities to enable the reconstruction and examination of the sequence of events and/or changes in an event. *Note:* Audit trail may apply to information in an information system (IS), to message routing in a communications system, or to the transfer of COMSEC material. [INFOSEC-99]

AUI: *Abbreviation for* **attachment unit interface.**

aurora: Sporadic radiant emission from the upper atmosphere that usually occurs about the North and South magnetic poles of the Earth. *Note 1:* Auroras are most intense at times of intense magnetic storms caused by sunspot activity. The distribution of auroral intensity with altitude shows a pronounced maximum near 100 km above the Earth. Auroras may occasionally be observed within 40° or less of the equator. *Note 2:* Auroras interfere with radio communications. *Note 3:* In the Northern hemisphere, the aurora is called the Aurora Borealis (Northern Lights). In the Southern hemisphere, the aurora is called the Aurora Australis (Southern Lights).

authenticate: 1. To establish, usually by challenge and response, that a transmission attempt is authorized and valid. **2.** [To] verify the identity of a user, user device, or other entity, or the integrity of data stored, transmitted, or otherwise exposed to unauthorized modification in an information system (IS), or establish the validity of a transmission. [INFOSEC-99] **3.** A challenge given by voice or electrical means to attest to the authenticity of a message or transmission. [JP1]

authentication: 1. [Any] Security measure designed to establish the validity of a transmission, message, or originator, or a means of verifying an individual's authorization to receive specific categories of information. [INFOSEC-99] [After JP 1-02] **2.** A security measure designed to protect a communications system against acceptance of a fraudulent transmission or simulation by establishing the validity of a transmission, message, or originator. [JP 1-02] **3.** Evidence by proper signature or seal that a document is genuine and official. [JP 1-02]

authentication algorithm: An encryption process or tool in which the results of text encryption depend on all relevant authentication elements. [After X9.24]

authentication element: A contiguous group of characters or bits that are corruption-protected by being processed by the authentication algorithm. [After X9.24]

authentication exchange: A mechanism intended to ensure the identity of an entity by means of an information exchange. [2382-pt.8]

authentication information: Information used to establish the validity of a claimed identity of an entity. [2382-pt.8]

authentication key: A (data-encryption algorithm) key used to authenticate data in accordance with specific encryption standards. [After X9.26]

authentication system: [A] cryptosystem or process used for authentication. [INFOSEC-99]

authenticator: 1. A symbol or group of symbols, or a series of bits, selected or derived in a prearranged manner and usually inserted at a predetermined point within a message or transmission for the purpose of attesting to the validity of the message or transmission. [JP 1-02] **2.** A letter, numeral, group of letters or numerals, or any combinations of these, attesting to the authenticity of a message or transmission. [After JP1] **3.** [In INFOSEC,] a means used to confirm the identity of a station, originator, or individual. [INFOSEC-99]

authorization: 1. The rights granted to a user to access, read, modify, insert, or delete certain data, or to execute certain programs. **2.** Access privileges granted to a user, program, or process. [INFOSEC-99]

authorization certificate: Any of several types of attribute certificates containing information used in the authorization process. *Note:* Authorization information may also be contained in a public key certificate, in which case that public key certificate also serves as an authorization certification [After X9.45]

authorized bandwidth: 1. Authorized bandwidth is, for purposes of this *Manual,* the necessary bandwidth (bandwidth required for transmission and reception of intelligence) and does not include allowance for transmitter drift or Doppler shift. [NTIA] **2.** The maximum bandwidth authorized to be used by a station as specified in the station license. This shall be occupied bandwidth or necessary bandwidth, whichever is greater. [47CFR] **3.** The maximum width of the band of frequencies permitted to be used by a station. This is normally considered to be the necessary or occupied bandwidth, whichever is greater. [47CFR]

authorized frequency: 1. A frequency that is allocated and assigned by a competent authority to a specific user for a specific purpose. **2.** The frequency, or frequency range, assigned to a station by the Commission [FCC] and specified in the instrument of authorization. [47CFR] *See* **assigned frequency.**

authorized signatory: The highest level issuer of authorization certificates in an organization. *Note:* Authorized signatories are designated in a signatory certificate, which is issued to an organization by an agreed signatory authority. [After X9.45]

authorized user: In security, a user who may, according to an organization's security policy, perform an operation. [After CC-99]

AUTODIN: *Acronym for* **automatic digital network.** *See* **Defense Data Network.**

automated data medium: *Synonym* **machine-readable medium.**

automated information system (AIS): 1. An assembly of computer hardware, software, firmware, or any combination of these, configured to accomplish specific information-handling operations, such as communication, computation, dissemination, processing, and storage of information. **2.** [In INFOSEC,] any equipment or interconnected system or subsystems of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission or reception of data and includes computer software, firmware, and hardware. *Note:* Included are computers, word processing systems, networks, or other electronic information handling systems, and associated equipment. [NIS] **3.** *See* **information systems security.**

automated information systems security: 1. Measures and controls that ensure confidentiality, integrity, and availability of the information processed and stored by automated information systems. *Note 1:* The unauthorized disclosure, modification, or destruction may be accidental or intentional. *Note 2:* Automated information systems security includes consideration of all hardware and software functions, characteristics and features; operational procedures; accountability procedures; and access controls at the central computer facility, remote computer, and terminal facilities; management constraints; physical structures and devices, such as computers, transmission lines, and power sources; and personnel and communications controls needed to provide an acceptable level of risk for the automated information system and for the data and information contained in the system. Automated information systems security also includes the totality of security safeguards needed to provide an acceptable protection level for an automated information system and for the data handled by an automated information system. **2.** In INFOSEC, *synonym* **computer security.**

automated maritime telecommunications system (AMTS): An automatic, integrated and interconnected maritime communications system serving ship stations on specified inland and coastal waters of the United States. [47CFR]

automated radio: A radio that can be automatically controlled by electronic devices and that requires little or no human intervention.

automated security monitoring: Use of automated procedures to ensure security controls are not circumvented or the use of these tools to track actions taken by subjects suspected of misusing the information system (IS). [INFOSEC-99]

automated tactical command and control system: A command and control system, or part thereof, that manipulates the movement of information from source to user without human intervention. *Note:* In an automated tactical command and control system, automated execution of a decision without human intervention is not mandatory.

automatic answering: A service feature in which the called terminal automatically responds to the calling signal and the call may be established whether or not the called terminal is attended by an operator.

automatic callback: A service feature that permits a user, when encountering a busy condition, to instruct the system to retain the called and calling numbers and to establish the call when there is an available line. *Note 1:* Automatic callback may be implemented in the terminal, in the switching system, or shared between them. *Note 2:* Automatic callback is not the same as camp-on.

automatic call distributor (ACD): A device that distributes incoming calls to a specific group of terminals. *Note:* If the number of active calls is less than the number of terminals, the next call will be routed to the terminal that has been in the idle state the longest. If all terminals are busy, the incoming calls are held in a first-in-first-out queue until a terminal becomes available.

automatic calling: Calling in which the elements of the selection signal are entered into the data network contiguously at the full data signaling rate. The selection signal is generated by the data terminal equipment. *Note:* A limit may be imposed by the design criteria of the network to prevent more than a permitted number of unsuccessful call attempts to the same address within a specified period.

automatic calling unit (ACU): A device that enables equipment, such as computers and card dialers, to originate calls automatically over a telecommunications network.

automatic data handling (ADH): 1. A generalization of automatic data processing to include the aspect of data transfer. [JP1] **2.** Combining data processing and data transfer.

automatic data processing (ADP): 1. An interacting assembly of procedures, processes, methods, personnel, and equipment to perform automatically a series of data processing operations on data. *Note:* The data processing operations may result in a change in the semantic content of the data. **2.** Data processing by means of one or more devices that use common storage for all or part of a computer program, and also for all or part of the data necessary for execution of the program; that execute user-written or user-designated programs; that perform user-designated symbol manipulation, such as arithmetic operations, logic operation, or character-string manipulations; and that can execute programs that modify themselves during their execution. *Note:* Automatic data processing may be performed by a stand-alone unit or by several connected units. **3.** Data processing largely performed by automatic means. [JP 1-02] **4.** That branch of science and technology concerned with methods and techniques relating to data processing largely performed by automatic means. [JP 1-02]

automatic data processing equipment (ADPE): Any equipment or interconnected system or subsystems of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception, of data or information (i) by a Federal agency, or (ii) under a contract with a Federal agency which (i) requires the use of such equipment, or (ii) requires the performance of a service or the furnishing of a product which is performed or produced making significant use of such equipment. Such term includes (i) computer, (ii) ancillary equipment, (iii) software, firmware, and similar procedures, (iv) services, including support services, and (v) related resources as defined by regulations issued by the Administrator for General Services. . . . [Public Law 99-500, Title VII, Sec. 822 (a) Section 111(a) of the *Federal Property and Administrative Services Act of 1949 (40 U.S.C. 759(a)) revised.*]

automatic dialing: *See* **automatic calling unit.**

Automatic Digital Network (AUTODIN): Formerly, a worldwide data communications network of the Defense Communications System, now replaced by the **Defense Switched Network (DSN).**

automatic error correction: *See* **error-correcting code.**

automatic exchange: In a telephone system, an exchange in which communications among users are effected by means of switches set in operation by the originating user equipment without human intervention at the central office or branch exchange.

automatic frequency control (AFC): A device or circuit that maintains the frequency of an oscillator within the specified limits with respect to a reference frequency.

automatic function: A machine function or series of machine functions controlled by a program and carried out without assistance of an operator.

automatic gain control (AGC): A process or means by which gain is automatically adjusted in a specified manner as a function of a specified parameter, such as received signal level.

automatic identified outward dialing (AIOD): A service feature of some switching or terminal devices that provides the user with an itemized statement of usage on directly dialed calls. *Note:* AIOD is facilitated by automatic number identification (ANI) equipment to provide automatic message accounting (AMA).

automatic link establishment (ALE): 1. In high-frequency (HF) radio, the capability of a station to make contact, or initiate a circuit, between itself and another specified radio station, without human intervention and usually under processor control. *Note:* ALE techniques include automatic signaling, selective calling, and automatic handshaking. Other automatic techniques that are related to ALE are channel scanning and selection, link quality analysis (LQA), polling, sounding, message store-and-forward, address protection, and anti-spoofing. **2.** In HF radio, a link control system that includes automatic scanning, selective calling, sounding, and transmit channel selection using link quality analysis data. *Note:* Optional ALE functions include polling and the exchange of orderwire commands and messages.

automatic link transfer: Automatic rerouting of the radio portion of a call for signal quality, traffic management, or other reasons. [T1.702-1995]

automatic message accounting (AMA): A service feature that automatically records data regarding user-dialed calls.

automatic message exchange (AME): In an adaptive high-frequency (HF) radio network, an automated process allowing the transfer of a message from message injection to addressee reception, without human intervention. *Note:* Through the use of machine-addressable transport guidance information, *i.e.,* the message header, the message is automatically routed through an on-line direct connection through single or multiple transmission media.

automatic message processing system (AMPS): Any organized assembly of resources and methods used to collect, process, and distribute messages largely by automatic means. [JP1]

automatic number identification (ANI): 1. A service feature in which the directory number or equipment number of a calling station is automatically obtained. *Note:* ANI is used in message accounting. **2.** The code that provides the billing number of the line or trunk that originated a call. [T1.104-1988] **3.** A system that identifies the billing account for a call. For 911 systems, the ANI identifies the calling party and may be used as a call back number. [47CFR]

automatic operation: The functioning of systems, equipment, or processes in a desired manner at the proper time under control of mechanical or electronic devices that operate without human intervention.

automatic personal deregistration: The process by which a user's location registration is automatically canceled without any explicit action from the user. [T1.Rpt34-1994]

automatic personal registration: The process by which a user's location registration is automatically updated without any explicit action from the user. [T1.Rpt34-1994]

automatic redial: A service feature that allows the user to dial, by depressing a single key or a few keys, the most recent telephone number dialed at that instrument. *Note:* Automatic redial is often associated with the telephone instrument, but may be provided by a PBX, or by the central office. *Synonym* **last number redial.**

automatic reload: *See* **bootstrap.**

automatic remote rekeying: [In INFOSEC, a] procedure to rekey a distant crypto-equipment electronically without specific actions by the receiving terminal operator. [INFOSEC-99] *Note:* Automatic remote rekeying may also apply to non-crypto devices.

automatic remote reprogramming and rekeying: The procedure by which distant equipment is reprogrammed or rekeyed electronically without specific actions by the receiving terminal.

automatic repeat-request (ARQ): *See* **ARQ.**

automatic ringdown circuit: A circuit providing priority telephone service, typically for key personnel; the circuit is activated when the telephone handset is removed from the cradle causing a ringing signal to be sent to the distant unit(s). *See* **verified off-hook.**

automatic route selection (ARS): Electronic or mechanical selection and routing of outgoing calls without human intervention.

Automatic Secure Voice Communications Network (AUTOSEVOCOM): A worldwide, switched, secure voice network developed to fulfill DOD long-haul, secure voice requirements. [JP1]

automatic sequential connection: A service feature in which the terminals at each of a set of specified addresses are automatically connected, in a predetermined sequence, to a single terminal at a specified address.

automatic signaling service: *Synonym* **hotline.**

automatic sounding: The testing of selected channels or paths by providing a very brief beacon-like identifying broadcast that may be used by other stations to evaluate connectivity, propagation, and availability, and to identify known working channels for possible later use for communications or calling. *Note 1:* Automatic soundings are primarily intended to increase the efficiency of the automatic link establishment (ALE) function, thereby increasing system throughput. *Note 2:* Sounding information is used for identifying the specific channel to be used for a particular ALE connectivity attempt.

automatic switching system: 1. In data communications, a switching system in which all the operations required to execute the three phases of information-transfer transactions are automatically executed in response to signals from a user end-instrument. *Note:* In an automatic switching system, the information-transfer transaction is performed without human intervention, except for initiation of the access phase and the disengagement phase by a user. **2.** In telephony, a system in which all the operations required to set up, supervise, and release connections required for calls are automatically performed in response to signals from a calling device.

Automatic Voice Network (AUTOVON): Formerly, the principal long-haul, unsecure voice communications network within the Defense Communications System, now replaced by the Defense Switched Network (DSN).

automation: 1. The implementation of processes by automatic means. [JP 1-02] **2.** The investigation, design, development, and application of methods of rendering processes automatic, self-moving, or self-controlling. **3.** The conversion of a procedure, a process, or equipment to automatic operation. [JP 1-02]

autonomous system: Internet (TCP/IP) terminology for a collection of gateways (routers) that fall under one administrative entity and that cooperate using a common interior gateway protocol (IGP). [Bahorsky] *Note:* Routers pertaining to different autonomous systems must agree on a common exterior gateway protocol in order to communicate with each other effectively.

auto-reply: In e-mail systems, a message sent automatically upon receipt of incoming e-mail. *Note:* Auto-replies are used to acknowledge delivery of e-mail and to provide receipts for e-mail messages.

AUTOSEVOCOM: *Acronym for* **Automatic Secure Voice Communications Network.**

AUTOVON: *Acronym for* **Automatic Voice Network.** *Superseded by* **Defense Switched Network.**

auxiliary operation: An offline operation performed by equipment not under control of the processing unit.

auxiliary power: Electric power that is provided by an alternate source and that serves as backup for the primary power source at the station main bus or prescribed sub-bus. *Note 1:* An offline unit provides electrical isolation between the primary power source and the critical technical load whereas an online unit does not. *Note 2:* A Class A power source is a primary power source, *i.e.,* a source that assures an essentially continuous supply of power. *Note 3:* Types of auxiliary power services include Class B, a standby power plant to cover extended outages of the order of days; Class C, a 10-to-60-second quick-start unit to cover short-term outages of the order of hours; and Class D, an uninterruptible non-break unit using stored energy to provide continuous power within specified voltage and frequency tolerances.

auxiliary storage: 1. Storage that is available to a processor only through its input/output channels. **2.** In a computer, any storage that is not internal memory, *i.e.,* is not random access memory (RAM). *Note:* Examples of auxiliary storage media are magnetic diskettes, optical disks including CD ROM, and magnetic tape cassettes.

availability: 1. The degree to which a system, subsystem, or equipment is operable and in a committable state at the start of a mission, when the mission is called for at an unknown, *i.e.,* a random, time. *Note 1:* The conditions determining operability and committability must be specified. *Note 2:* Expressed mathematically, availability is 1 minus the unavailability. **2.** The ratio of (a) the total time a functional unit is capable of being used during a given interval to (b) the length of the interval. *Note 1:* An example of availability is 100/168 if the unit is capable of being used for 100 hours in a week. *Note 2:* Typical availability objectives are specified in decimal fractions, such as 0.9998. **3.** Timely, reliable access to data and information services for authorized users. [INFOSEC-99]

available line: 1. In voice, video, or data communications, a circuit between two points that is ready for service, but is in the idle state. **2.** In facsimile transmission, the portion of the scanning line that can be specifically used for image signals. *Synonym* **useful line.**

available state: A state where a (bidirectional or unidirectional) service is usable. *Note:* Each direction of a service is assumed to be in the available state unless a transition to the unavailable state is observed without a subsequent transition to the available state. In this standard the transitions between the available and unavailable states are: (a) transition to the unavailable state occurs at the beginning of 10 consecutive severely errored seconds (SES); (b) transition to the available state occurs at the beginning of 10 consecutive seconds none of which is an SES. [T1.514-1995]

available time: From the point of view of a user, the time during which a functional unit can be used. *Note:* From the point of view of operating and maintenance personnel, the available time is the same as the uptime, *i.e.,* the time during which a functional unit is fully operational.

avalanche multiplication: A current-multiplying phenomenon that occurs in a semiconductor photodiode that is reverse-biased just below its breakdown voltage. *Note:* Under such a condition, photocurrent carriers, *i.e.* , electrons, are swept across the junction with sufficient energy to ionize additional bonds, creating additional electron-hole pairs in a regenerative action. [After FAA]

avalanche photodiode (APD): A photodiode that operates with a reverse-bias voltage that causes the primary photocurrent to undergo amplification by cumulative multiplication of charge carriers. *Note:* As the reverse-bias voltage increases toward the breakdown, hole-electron pairs are created by absorbed photons. An avalanche effect occurs when the hole-electron pairs acquire sufficient energy to create additional pairs when the incident photons collide with the ions, *i.e.,* the holes and electrons. Thus, a signal gain is achieved. [After 2196]

avatar: An interactive representation of a human in a virtual reality environment. [Bahorsky]

average picture level (APL): In video systems, the average level of the picture signal during active scanning time integrated over a frame period; defined as a percentage of the range between blanking and reference white level.

average rate of transmission: *Synonym* **effective transmission rate.**

AVI (.avi): *Abbreviation for* **audio video interleaved.** A file-name extension used to indicate a compressed video file in the AVI standard for a common operating system. *Note:* This file format for digital video and audio compression indicates that (a) the audio and video data are stored in alternate blocks, and (b) the file format is cross-platform compatible, allowing .avi video files to be played under various operating systems.

AVK: *Abbreviation for* **audio video kernel.** Digital video interface (.dvi) software designed for playing motion video and audio across several different varieties of hardware and operating systems. [After Silicon]

avoidance routing: The assignment of a circuit path to avoid certain critical or trouble-prone circuit nodes.

AVSS: *Abbreviation for* **audio-video support system.** A digital video interface system software (for DOS) that plays motion video and audio. [After Silicon]

AWG: *Abbreviation for* **American wire gauge.** A standard system for measuring and classifying the thickness of wire conductors; also referred to as the "Brown and Sharpe (B & S)" wire gauge.

AWGN: *Abbreviation for* **additive white gaussian noise.** *See* **white noise.**

axial propagation constant: In an optical fiber, the propagation constant evaluated along the optical axis of the fiber in the direction of transmission. *Note:* The real part of the axial propagation constant is the attenuation constant. The imaginary part is the phase constant. [After 2196]

axial ratio: Of an electromagnetic wave having elliptical polarization, the ratio of the magnitudes of the major axis and the minor axis of the ellipse described by the electric field vector.

axial ray: A light ray that travels along the optical axis.

b: *Abbreviation for* **bit.**

B: *Abbreviation for* **bel, byte.**

babble: In transmission systems, the aggregate of crosstalk induced in a given line by all other lines.

backbone: 1. The high-traffic-density connectivity portion of any communications network. **2.** In packet-switched networks, a primary forward-direction path traced sequentially through two or more major relay or switching stations. *Note:* In packet-switched networks, a backbone consists primarily of switches and interswitch trunks.

back door: *Synonym* **trapdoor.**

background: 1. In Web pages, an image or color, usually defined in HTML, that serves as the underlying color or imagery for a Web page. *Note:* Browsers may also be configured to dictate backgrounds. **2.** In computer display systems, the underlying color or imagery for the main screen or for the fundamental window of a computer's operating system.

background noise: The total system noise in the absence of information transmission.

background processing: The execution of lower priority computer programs when higher priority programs are not using the system resources. *Note:* Priorities may be assigned by system software, application software, or the operator.

backhaul: 1. The practice of routing telecommunications traffic beyond its intended destination, and then back to the intended destination, usually for the purpose of taking advantage of tariffs or prices that are lower than those afforded by direct routing. **2.** In security, to bring a call that has been routed along a particular path (usually via satellite) to some earlier position in the switching sequence (also using satellites). *Note:* The technique supports CALEA, the Communications Assistance to Law Enforcement Act and LAES, Lawfully Authorized Electronic Surveillance. **3.** In commercial telephone networks, referring to a trunk or line between two central offices that may not share the same facilities or geographic location, and which trunk is used to support special services, *e.g.,* orderwires, off-premises extensions, common exchange number routing, or least-cost routing of customer centrex services. **4.** In mission programs requiring contingency networking, referring to a link that provides feedback to the mission control center to verify that the transmission via a primary communications has been successful. *Note:* In cases where the primary path fails to deliver the transmission, the communications may occur over the backhaul connection or an alternative network connection. **5.** In contingency networking, an alternative connection that is routed via a diversified path, *e.g.,* an alternative frequency, satellite facility, cable, trunk, or time slot.

backscattering: 1. Radio wave propagation in which the direction of the incident and scattered waves, resolved along a reference direction (usually horizontal) are oppositely directed. A signal received by backscattering is often referred to as "backscatter." [JP 1-02] **2.** In optics, the scattering of light into a direction generally opposite to the original one.

back-to-back connection: 1. A direct connection between the output of a transmitting device and the input of an associated receiving device. *Note:* When used for equipment measurements or testing purposes, such a back-to-back connection eliminates the effects of the transmission channel or medium. **2.** A direct connection between the output of a receiving device and the input to a transmitting device. *Note:* The term *"direct,"* as used in both definitions, may be construed as permitting a passive device such as a pad (attenuator) to accommodate power level constraints.

backup: 1. [A] copy of files and programs made to facilitate recovery, if necessary. [INFOSEC-99] **2.** *See* **backup file.**

backup file: A copy of a file made for purposes of later reconstruction of the file, if necessary. *Note:* A backup file may be used for preserving the integrity of the original file and may be recorded on any suitable medium. *Synonym* **job-recovery control file.**

backward channel: 1. In data transmission, a secondary channel in which the direction of transmission is constrained to be opposite to that of the primary, *i.e.* , the forward (user-information) channel. *Note:* The direction of transmission in the backward channel is restricted by the control interchange circuit that controls the direction of transmission in the primary channel. **2.** In a data circuit, the channel that passes data in a direction opposite to that of its associated forward channel. *Note 1:* The backward channel is usually used for transmission of supervisory, acknowledgement, or error-control signals. The direction of flow of these signals is opposite to that in which user information is being transferred. *Note 2:* The backward-channel bandwidth is usually less than that of the primary channel, *i.e.,* the forward (user information) channel.

backward indicator bit (BIB): A signal unit (or sequence of bits) that (by changing its status) is used to request retransmission by the remote end whenever it receives a signal unit that is out of sequence. [T1.226-1992]

backward recovery: The reconstruction of an earlier version of a file by using a newer version of data recorded in a journal.

backward sequence number (BSN): A field in a signal unit that contains the forward sequence number of a correctly received signal unit being acknowledged in the signal unit that is being returned to the sender. [After T1.226-1992]

backward signal: A signal sent from the called to the calling station, *i.e.,* from the original data sink to the original data source. *Note:* Backward signals are usually sent via a backward channel and may consist of supervisory, acknowledgment, or control signals.

backward supervision: The use of supervisory signal sequences from a secondary to a primary station.

bacterium: A program that attempts to propagate itself by e-mailing a copy of itself to e-mail addresses found on a recipient's hard drive. This is done without the consent or knowledge of the recipient. *Note:* In many cases, this type of program does not attempt to cause any direct damage to user's system, but rather attempts to overload the e-mail distribution system, much as a successful chain letter would do to the postal system. *Synonym [in cryptosystems]* **chain letter.**

bad sectoring: A technique for copy protection in which bad sectors are intentionally written on a diskette. [2382-pt.8]

balance: In electrical circuits and networks, to adjust the impedance to achieve specific objectives, such as to reach specified return loss objectives at a hybrid junction of two-wire and four-wire circuits.

balanced: Pertaining to electrical symmetry.

balanced code: 1. In PCM systems, a code constructed so that the frequency spectrum resulting from the transmission of any code word has no dc component. **2.** In PCM, a code that has a finite digital sum variation.

balanced line: A transmission line consisting of two conductors in the presence of ground, capable of being operated in such a way that when the voltages of the two conductors at all transverse planes are equal in magnitude and opposite in polarity with respect to ground, the currents in the two conductors are equal in magnitude and opposite in direction. *Note:* A balanced line may be operated in an unbalanced condition. *Synonym* **balanced signal pair.**

balanced modulator: A modulator constructed so that the carrier is suppressed and any associated carrier noise is balanced out. *Note 1:* The balanced modulator output contains only the sidebands. *Note 2:* Balanced modulators are used in AM transmission systems.

balanced signal pair: *Synonym* **balanced line.**

balance return loss: 1. A measure of the degree of balance between two impedances connected to two conjugate sides of a hybrid set, coil, network, or junction. **2.** A measure of the effectiveness with which a balancing network simulates the impedance of a two-wire circuit at a hybrid coil.

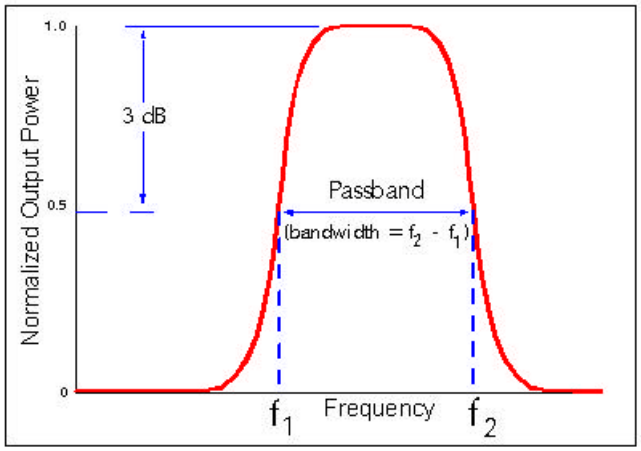
balancing network: 1. In a hybrid set, hybrid coil, or resistance hybrid, a circuit used to match, *i.e.* , to balance, the impedance of a uniform transmission line, *i.e.,* twisted metallic pair, over a selected range of frequencies. *Note:* A balancing network is required to ensure isolation between the two ports of the four-wire side of the hybrid. **2.** A device used between a balanced device or line and an unbalanced device or line for the purpose of transforming from balanced to unbalanced or from unbalanced to balanced.

balun: *Abbreviation for* **balanced to unbalanced.** In radio frequency usage, a device used to couple a balanced device or line to an unbalanced device or line.

band: 1. In communications, the frequency spectrum between two defined limits. **2.** A group of tracks on a magnetic drum or on one side of a magnetic disk. **3.** A set of frequencies authorized for use in a geographical area defined for common carriers for purposes of communications system management.

band-elimination filter: *Synonym* **band-stop filter.**

bandpass filter: A filter that ideally passes all frequencies between two non-zero finite limits and bars all frequencies not within the limits. *Note:* The cutoff frequencies are usually taken to be the 3-dB points.

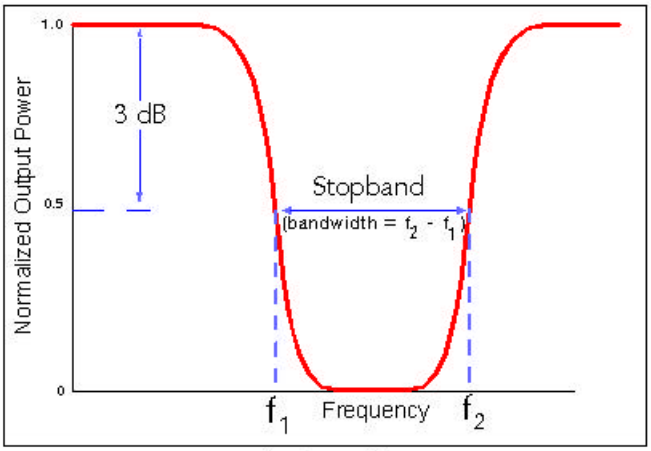


bandpass filter

bandpass limiter: A device that imposes hard limiting on a signal and contains a filter that suppresses the unwanted products (harmonics) of the limiting process.

band-rejection filter: *Synonym* **band-stop filter.**

band-stop filter: A filter that attenuates, usually to very low levels, all frequencies between two non-zero, finite limits and passes all frequencies not within the limits. *Note:* A band-stop filter may be designed to stop the specified band of frequencies but usually only attenuates them below some specified level. *Synonyms* **band-elimination filter, band-rejection filter, band-suppression filter, notched filter.**



band-stop filter

band-suppression filter: *Synonym* **band-stop filter.**

bandwidth (BW): 1. The difference between the limiting frequencies within which performance of a device, in respect to some characteristic, falls within specified limits. **2.** The difference between the limiting frequencies of a continuous frequency band.

bandwidth balancing mechanism: In a distributed-queue dual-bus network, a procedure in which a node occasionally skips the use of empty queued arbitrated slots, and which procedure effects sharing of the bandwidth mechanisms.

bandwidth compression: 1. The reduction of the bandwidth needed to transmit a given amount of data in a given time. **2.** The reduction of the time needed to transmit a given amount of data in a given bandwidth. *Note:* Bandwidth compression implies a reduction in normal bandwidth of an information-carrying signal without reducing the information content of the signal.

bandwidth•distance product: Of an optical fiber, under specified launching and cabling conditions, at a specified wavelength, a figure of merit equal to the product of the fiber's length and the 3-dB bandwidth of the optical signal. *Note 1:* The bandwidth•distance product is usually stated in megahertz•kilometer (MHz•km) or gigahertz•kilometer (GHz•km). *Note 2:* The bandwidth•distance product, which is normalized to 1 km, is a useful figure of merit for predicting the effective fiber bandwidth for other lengths, and for concatenated fibers. *Synonym* **bandwidth•length product.**

bandwidth•length product: *Synonym for* **bandwidth•distance product.**

bandwidth-limited operation: The condition prevailing when the system bandwidth limits performance. *Note:* Bandwidth-limited operation occurs when the system distorts the signal waveform beyond specified limits. For linear systems, bandwidth-limited operation is equivalent to distortion-limited operation.

bandwidth (of an optical fiber): 1. The lowest modulation frequency at which the RMS peak-to-valley amplitude (optical power) difference of an intensity-modulated monochromatic signal decreases, at the output of the fiber, to a specified fraction (usually one-half) of the RMS peak-to-valley amplitude (optical power) difference of a nearly-zero (arbitrarily low) modulation frequency, both modulation frequencies having the same RMS peak-to-valley amplitude (optical power) difference at the fiber input. *Note 1:* In multimode fibers, multimode distortion is usually the most significant parameter limiting fiber bandwidth, although material dispersion may also play a significant role, especially in the first (850-nm) window. *Note 2:* In multimode fibers, the bandwidth•distance product (loosely, *"fiber bandwidth"*) is customarily specified by vendors for the bandwidth as limited by multimode distortion only. The spectral width of the optical source is assumed to be extremely narrow. In practice, the effective fiber bandwidth will also be limited by dispersion, especially in the first (850-nm) window, where material dispersion is relatively high, because optical sources have a finite spectral width. Laser diodes typically have a spectral width of several nanometers, FWHM. LEDs typically have a spectral width of 35 to 100 nm, FWHM. *Note 3:* The effective risetime of multimode fibers may be estimated fairly accurately as the square root of the sum of the squares of the material-dispersion-limited risetime and the multimode-distortion-limited risetime. *Note 4:* In single-mode fibers, the most

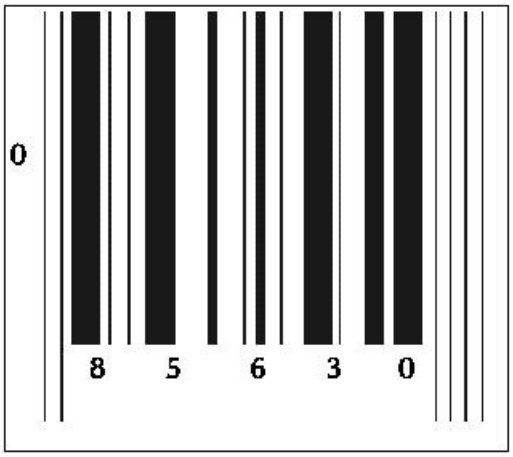
important parameters affecting fiber bandwidth are material dispersion and waveguide dispersion. Practical fibers are designed so that material dispersion and waveguide dispersion cancel one another at the wavelength of interest. *Note 5:* Regarding effective fiber bandwidth as it affects overall system performance, it should be recognized that optical detectors such as PIN diodes are square-law devices. Their photocurrent is proportional to the optical power of the detected signal. Because electrical power is a function of the square of the current, when the optical power decreases by one-half (a 3-dB decrease), the electrical power decreases by three-fourths (a 6-dB decrease). **2.** Loosely, *synonym* **bandwidth•distance product.**

bang: The exclamation point character (!) used in early addressing schemes to separate the names of individual machines. *Note:* Bang-style addressing is no longer common. *Synonym* **scream.**

banner: 1. An HTML tag that creates scrolling text on a Web page. [Bahorsky] **2.** Scrolling or fixed text used as an advertisement on a Web page, *e.g.,* banner advertising. [Bahorsky] **3.** In computer networking, a page that is automatically prefixed to, and printed out as part of, a printing job , as a means of identifying uniquely the output belonging to a given user of a shared printer. *Note:* A banner may, in addition to identifying the owner of the printout, also identify the file name, queue , and server involved. *Synonym* **banner page. 4.** [A] display on an information system (IS) that sets parameters for system or data use. [INFOSEC-99]

banner page: *Synonym* **banner.**

bar code: A code representing characters by sets of parallel bars of varying thickness and separation that are read optically by transverse scanning. *Note:* Bar code uses include identifying merchandise, sorting mail, and inventorying supplies.



bar code

barrage jamming: Jamming accomplished by transmitting a band of frequencies that is large with respect to the bandwidth of a single emitter. *Note:* Barrage jamming may be accomplished by presetting multiple jammers on adjacent frequencies or by using a single wideband transmitter. Barrage jamming makes it possible to jam emitters on different frequencies simultaneously and reduces the need for operator assistance or complex control equipment. These advantages are gained at the expense of reduced jamming power at any given frequency.

base: 1. In the numeration system commonly used in scientific notation, the real number that is raised to a power denoted by the exponent and then multiplied by the coefficient to determine the value of the number represented without the use of exponents. *Note:* An example of a base is the number 6.25 in the expression $2.70 \times 6.25^{1.5} \approx 42.19$. The 2.70 is the coefficient and the 1.5 is the exponent. In the decimal numeration system, the base is 10 and in the binary numeration system, the base is 2. The value $e \approx 2.718$ is the natural base. **2.** A reference value. **3.** A number that is multiplied by itself as many times as indicated by an exponent.

base address: 1. An address that is used as the origin in the calculation of addresses in the execution of a computer program. [From Weik '96] **2.** A given address from which an absolute address is derived by combination with a relative address. *Note:* Base addresses are primarily used by computer programmers rather than by computer users. [From Weik '96]

baseband: 1. The original band of frequencies produced by a transducer, such as a microphone, telegraph key, or other signal-initiating device, prior to initial modulation. *Note 1:* In transmission systems, the baseband signal is usually used to modulate a carrier. *Note 2:* Demodulation re-creates the baseband signal. *Note 3: Baseband* describes the signal state prior to modulation, prior to multiplexing, following demultiplexing, and following demodulation. *Note 4:* Baseband frequencies are usually characterized by being much lower in frequency than the frequencies that result when the baseband signal is used to modulate a carrier or subcarrier. **2.** In facsimile, the frequency of a signal equal in bandwidth to that between zero frequency and maximum keying frequency.

baseband local area network: A local area network in which information is encoded, multiplexed, and transmitted without modulation of carriers.

baseband modulation: Intensity modulation of an optical source, *e.g.* , LED or ILD, directly, without first modulating the signal of interest onto an electrical carrier wave. [After FAA]

baseband signaling: Transmission of a digital or analog signal at its original frequencies; *i.e.* , a signal in its original form, not changed by modulation.

basecom: *Abbreviation for* **base communications.**

base communications (basecom): Communications services, such as the installation, operation, maintenance, augmentation, modification, and rehabilitation of communications networks, systems, facilities, and equipment, including off-post extensions, provided for the operation of a military post, camp, installation, station, or activity. *Synonym* **communications base station.**

base Earth station: An Earth station in the fixed-satellite service or, in some cases, in the land mobile-satellite service, located at a specified fixed point or within a specified area on land to provide a feeder link for the land mobile-satellite service. [NTIA] [RR] [47CFR]

base key: A key used to derive (to compute cryptographically) or to decrypt transaction keys. [After X9.24]

base station: 1. A land station in the land mobile service. [NTIA] [RR] [47CFR] **2.** In personal communication service, the common name for all the radio equipment located at one fixed location, and that is used for serving one or several cells.

basic access: A characterization of a simple standardized combination of access channels that constitute the access arrangements for the majority of ISDN users; specifically, any of the following combinations of access channels: (1) one D-channel, (2) one B-channel plus one D-channel, (3) two B-channels plus one D-channel. [After T1.601-1988]

basic call: A call between two users that does not include additional features (*e.g.,* a plain telephone call).

basic call process (BCP): The sequence of activities used in processing a basic call attempt. [T1.667-1999]

basic exchange telecommunications radio service (BETRS): A commercial service that can extend telephone service to rural areas by replacing the local loop with radio communications. *Note:* In the BETRS, non-government ultra high frequency (UHF) and very high frequency (VHF) common carrier and the private radio service frequencies are shared.

basic group: *See* **group.**

basic mode link control: Control of data links by use of the control characters of the 7-bit character set for information processing interchange as given in ISO Standard 646-1983 and CCITT (ITU-T) Recommendation V.3-1972.

basic rate interface (BRI): An ITU-T Integrated Services Digital Network (ISDN) multipurpose user interface standard that denotes the capability of simultaneous voice and data services provided over two clear 64-kb/s channels and one clear 16-kb/s channel (2B+D) access arrangement to each user location.

basic service: 1. A pure transmission capability over a communication path that is virtually transparent in terms of its interaction with customer-supplied information. **2.** The offering of transmission capacity between two or more points suitable for a user's transmission needs and subject only to the technical parameters of fidelity and distortion criteria, or other conditioning.

basic service element (BSE): 1. An optional unbundled feature, generally associated with the basic serving arrangement (BSA), that an enhanced-service provider (ESP) may require or find useful in configuring an enhanced service. **2.** A fundamental (basic) communication network service; an optional network capability associated with a BSA. *Note:* BSEs constitute optional capabilities to which the customer may subscribe or decline to subscribe.

basic serving arrangement (BSA): 1. The fundamental tariffed switching and transmission (and other) services that an operating company must provide to an enhanced service provider (ESP) to connect with its customers through the company network. **2.** In an open-network-architecture context, the fundamental underlying connection of an enhanced service provider (ESP) to and through the operating company's network including an ESP access link, the features and functions associated with that access link at the central office serving the ESP and/or other offices, and the transport (dedicated or switched) within the network that completes the connection from the ESP to the central office serving its customers or to capabilities associated with the customer's complementary network services. *Note:* Each component may have a number of categories of network characteristics. Within these categories of network characteristics are alternatives from among which the customer must choose. Examples of BSA components are ESP access link, transport and/or usage.

basic status: In data transmission, the status of the capability of a secondary station to send or receive a frame containing an information field.

bastion host: A host computer that, in a screened subnetwork, performs the functions of a firewall. *Synonym* **screened-host gateway.** [2382-pt.35]

batched communications: *Synonym* **batched transmission.**

batched transmission: The transmission of two or more messages from one station to another without intervening responses from the receiving station. *Synonym* **batched communications.**

batch processing: 1. The processing of data or the accomplishment of jobs accumulated in advance in such a manner that the user cannot further influence the processing while it is in progress. **2.** The processing of data accumulated over a period of time. **3.** *Loosely,* the execution of computer programs serially. **4.** Pertaining to the technique of executing a set of computer programs such that each is completed before the next program of the set is started. **5.** Pertaining to the sequential input of computer programs or data.

baud (Bd): 1. A unit of modulation rate. *Note:* One baud corresponds to a rate of one unit interval per second, where the modulation rate is expressed as the reciprocal of the duration in seconds of the shortest unit interval. **2.** A unit of signaling speed equal to the number of discrete signal conditions, variations, or events per second. *Note 1:* If the duration of the unit interval is 20 milliseconds, the signaling speed is 50 bauds. If the signal transmitted during each unit interval can take on any one of n discrete states, the bit rate is equal to the rate in bauds times $\log_2 n$. The technique used to encode the allowable signal states may be any combination of amplitude, frequency, or phase modulation, but it cannot use a further time-division multiplexing technique to subdivide the unit intervals into multiple subintervals. In some signaling systems, non-information-carrying signals may be inserted to facilitate synchronization; *e.g.,* in certain forms of binary modulation coding, there is a forced inversion of the signal state at the center of the bit interval. In these cases, the synchronization signals are included in the calculation of the rate in bauds but not in the computation of bit rate. *Note 2: Baud* is sometimes used as a synonym for *bit-per-second* . This usage is deprecated.

Baudot code: A synchronous code in which five equal-length bits represent one character. *Note 1:* The Baudot code, which was developed circa 1880, has been replaced by the start-stop asynchronous International Alphabet No. 2 (IA No. 2). *Note 2:* IA No. 2 is not, and should not be identified as, the Baudot code. *Note 3:* The Baudot code has been widely used in teletypewriter systems.

BCC: *Abbreviation for* **block check character.**

BCD: *Abbreviation for* **binary-coded decimal code.** *See* **binary-coded decimal notation.**

B channel: 1. A communications channel used for the transmission of an aggregate signal generated by multichannel transmitting equipment. **2.** The CCITT (now, ITU-T) designation for a clear channel, 64-kb/s service capability provided to a subscriber under the Integrated Services Digital Network offering. *Note:* The B channel, also called the bearer channel, is intended for transport of user information, as opposed to signaling information.

BCH code: *Abbreviation for* **Bose-Chaudhuri-Hochquenghem code.** A multilevel, cyclic, error-correcting, variable-length digital code used to correct errors up to approximately 25% of the total number of digits. *Note:* BCH codes are not limited to binary codes, but may be used with multilevel phase-shift keying whenever the number of levels is a prime number or a power of a prime number, such as 2, 3, 4, 5, 7, 8, 11, and 13. A BCH code in 11 levels has been used to represent the 10 decimal digits plus a sign digit.

BCI: *Abbreviation for* **bit-count integrity.**

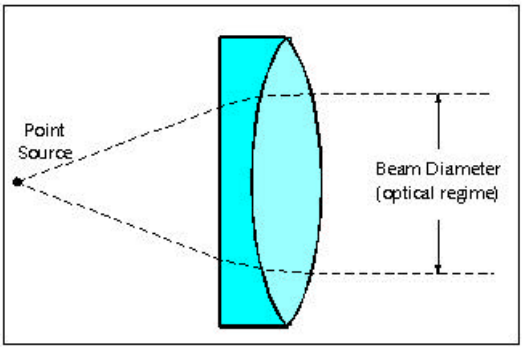
Bd: *Abbreviation for* **baud.**

beacon: *See* **radiobeacon station.**

beam: 1. The main lobe of an antenna radiation pattern. **2.** A column of light. *Note:* A beam may be parallel, divergent, or convergent. [After FAA]

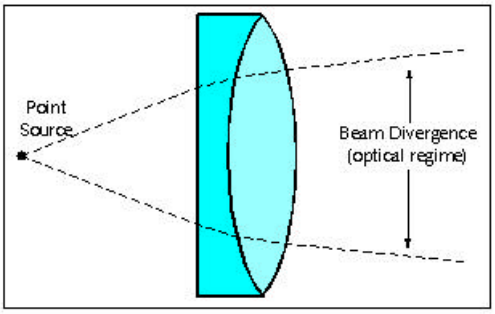
beam diameter: Of an electromagnetic beam, along any specified line that (a) intersects the beam axis and (b) lies in any specified plane normal to the beam axis, the distance between the two diametrically opposite points at which the irradiance is a specified fraction, *e.g.,* ½ or $1/e$, of the beam's peak irradiance. *Note 1:* Beam diameter is usually used to

characterize electromagnetic beams in the optical regime, and occasionally in the microwave regime, *i.e.,* cases in which the aperture from which the beam emerges is very large with respect to the wavelength. *Note 2:* Beam diameter usually refers to a beam of circular cross section, but not necessarily so. A beam may, for example, have an elliptical cross section, in which case the orientation of the beam diameter must be specified, *e.g.,* with respect to the major or minor axis of the elliptical cross section.



beam diameter

beam divergence: Of an electromagnetic beam, in any plane that intersects the beam axis, the increase in beam diameter with distance from the aperture from which the beam emerges. *Note 1:* Beam divergence is usually used to characterize electromagnetic beams in the optical regime, *i.e.,* cases in which the aperture from which the beam emerges is very large with respect to the wavelength. *Note 2:* Beam divergence usually refers to a beam of circular cross section, but not necessarily so. A beam may, for example, have an elliptical cross section, in which case the orientation of the beam divergence must be specified, *e.g.,* with respect to the major or minor axis of the elliptical cross section.

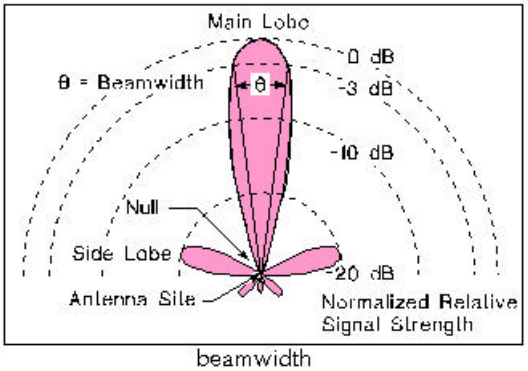


beam divergence

beamsplitter: A device for dividing an optical beam into two or more separate beams. *Note:* An example of a beamsplitter is a partially reflecting mirror.

beam steering: Changing the direction of the main lobe of a radiation pattern. *Note:* In radio systems, beam steering may be accomplished by switching antenna elements or by changing the relative phases of the rf signals driving the elements. In optical systems, beam steering may be accomplished by changing the refractive index of the medium through which the beam is transmitted or by the use of mirrors or lenses.

beamwidth: 1. In the radio regime, of an antenna pattern, the angle between the half-power (3-dB) points of the main lobe, when referenced to the peak effective radiated power of the main lobe. *Note:* Beamwidth is usually expressed in degrees. It is usually expressed for the horizontal plane, but may also be expressed for the vertical plane. **2.** For the optical regime, *see* **beam divergence.**



beamwidth

bearer channel: *See* **B channel.**

bearer service: A telecommunications service that allows transmission of user-information signals between user-network interfaces. *See* **B channel, service access.**

beating: *See* **heterodyne.**

beeping: *Synonym* **paging, radio paging.**

Bell-La Padula security model: [A] formal state-transition model of a computer security policy that describes a formal set of access controls based on information sensitivity and subject authorizations. [INFOSEC]

benign: [In INFOSEC a] condition of cryptographic data that cannot be compromised by human access. [INFOSEC-99]

benign environment: [In security, a] nonhostile environment that may be protected from external hostile elements by physical, personnel, and procedural security countermeasures.

[INFOSEC-99]

beta test: A secondary software product test involving select or voluntary participants before the product is marketed to the general public. *Note:* Participants agree to provide detailed feedback to the product's manufacturer in return for their being allowed to preview, use, and contribute to the final form of the product. [After Bahorsky]

B8ZS: *Abbreviation for* **bipolar with eight-zero substitution.** A T-carrier line code in which bipolar violations are deliberately inserted if user data contains a string of 8 or more consecutive zeros. *Note 1:* B8ZS is used to ensure a sufficient number of transitions to maintain system synchronization when the user data stream contains an insufficient number of "ones" to do so. *Note 2:* B8ZS is used in the European hierarchy at the T1 rate.

bel (B): A unit of measure of ratios of power levels, *i.e.,* relative power levels. *Note 1:* The number of bels for a given ratio of power levels is calculated by taking the logarithm, to the base 10, of the ratio. Mathematically, the number of bels is calculated as $B = \log_{10}(P_1/P_2)$ where P_1 and P_2 are power levels. *Note 2* : The dB, equal to 0.1 B, is a more commonly used unit.

bell (BEL) character: A transmission control character that is used when there is a need to call for user or operator attention in a communications system, and that usually activates an audio or visual alarm or other attention-getting device.

Bell Operating Company (BOC): Historically, any of the 22 operating companies that were divested from AT&T by court order. *Note:* Cincinnati Bell Telephone Co. and Southern New England Bell Telephone Co. were not included.

bend loss: *See* **macrobend loss, microbend loss.**

BER: *Abbreviation for* **bit error ratio.**

BERT: *Acronym for* **bit error ratio tester.**

BETRS: *Abbreviation for* **basic exchange telecommunications radio service.**

between-the-lines entry: Unauthorized access to a momentarily inactive terminal, of a legitimate user, assigned to a communications channel.

BEX: *Abbreviation for* **broadband exchange.**

b frame: An MPEG video frame type that provides bidirectional interframe compression. *Note:* A b frame derives its content from the closest 1 or P frame, one in the past and one in the future. Generating b frames requires greater computing power than does generating 1 or P frames. The use of b frames enables compression ratios of 200:1. Robust MPEG encoders employ a combination of b, 1, and P frame encoding. [After Silicon]

bias: 1. A systematic deviation of a value from a reference value. **2.** The amount by which the average of a set of values departs from a reference value. **3.** Electrical, mechanical, magnetic, or other force (field) applied to a device to establish a reference level to operate the device. **4.** In telegraph signaling systems, the development of a positive or negative dc voltage at a point on a line that should remain at a specified reference level, such as zero. *Note:* A bias may be applied or produced by (i) the electrical characteristics of the line, (ii) the terminal equipment, and (iii) the signaling scheme.

bias distortion: 1. Signal distortion resulting from a shift in the bias. **2.** In binary signaling, distortion of the signal in which all the significant intervals have uniformly longer or shorter durations than their theoretical durations. *Note:* Bias distortion is expressed in percent of the system-specified unit interval.

biased: In the generation of pseudorandom or random numbers, pertaining to or describing a condition that renders the more likely occurrence of some numbers or patterns than others. [After X9.17]

biconical antenna: An antenna consisting of two conical conductors, having a common axis and vertex, and extending in opposite directions. *Note 1:* In a biconical antenna, excitation is applied at the common vertex. *Note 2:* If one of the cones is reduced to a plane, the antenna is called a discone.

bidirectional asymmetry: In data transmission, the condition that exists when information flow characteristics are different in each direction.

bidirectional connection: Association established between two higher layer entities for which information is transmitted between both entities. [After T1.629-1999]

bidirectional coupler: *See* **directional coupler.**

bidirectional symmetry: The condition that exists when information flow characteristics are the same in each direction.

big-endian: A format for transmission or storage of binary data in which the most significant byte (bit) appears first. [After X9.42]

BIH: *French abbreviation for* **International Time Bureau.** *See* **International Atomic Time.**

bilateral control: *Synonym* **bilateral synchronization.**

bilateral synchronization: A synchronization control system between exchanges A and B in which the clock at exchange A controls the data received at exchange B and the clock at exchange B controls the data received at exchange A. *Note:* Bilateral synchronization is usually implemented by deriving the timing from the incoming bit stream. *Synonym* **bilateral control.**

billboard antenna: An array of parallel dipole antennas with flat reflectors, usually positioned in a line or plane. *Note 1:* The spacing and dimensions of the dipoles depend on the wavelength. *Note 2:* The main lobe of a fixed billboard antenna may, within limits, be steered by appropriate phasing of the respective signals to individual elements of the array. *Synonym* **broadside antenna.**

binary: 1. Pertaining to a selection, choice, or condition that has two possible different values or states. **2.** Pertaining to a fixed radix numeration system that has a radix of 2.

binary code: A code, the elements of which can assume either one of two possible states.

binary-coded decimal (BCD): Pertaining to the representation of a decimal digit by a unique arrangement of no fewer than four binary digits.

binary-coded decimal code: *Synonym* **binary-coded decimal notation.**

binary-coded decimal interchange code: *See* **binary-coded decimal notation.**

binary-coded decimal (BCD) notation: A binary notation in which each of the decimal digits is represented by a binary numeral. *Synonyms* **binary-coded decimal code, binary-coded decimal representation.**

binary-coded decimal representation: *Synonym* **binary-coded decimal notation.**

binary digit (bit): *See* **bit.**

binary element: A constituent element of data that takes either of two values or states. *Note: Binary element* should not be confused with *binary digit.*

binary exponential backoff: *See* **truncated binary exponential backoff.**

binary modulation: The process of varying a parameter of a carrier as a function of two finite, discrete states.

binary notation: 1. Any notation that uses two different characters, usually the digits 0 and 1. *Note:* Data encoded in binary notation need not be in the form of a pure binary numeration system; *e.g.,* they may be represented by a Gray code. **2.** A scheme for representing numbers, which scheme is characterized by the arrangements of digits in sequence, with the understanding that successive digits are interpreted as coefficients of successive powers of base 2.

binary number: A number that is expressed in binary notation and is usually characterized by the arrangement of bits in sequence, with the understanding that successive bits are interpreted as coefficients of successive powers of the base 2.

binary string: *Synonym* **bit string.**

binary synchronous (bi-sync) communication: A character-oriented, data-link-layer protocol. *Note:* The bi-sync protocol is being phased out of most computer communication networks in favor of bit-oriented protocols such as SDLC, HDLC, and ADCCP.

binding: 1. In computer, communications, and automatic data processing systems, assigning a value or referent to an identifier. *Note:* Examples of binding include assigning a value to a parameter, assigning an absolute address to a virtual or relative address, and assigning a device identifier to a symbolic address or label. **2.** [In security, the] process of associating a specific communications terminal with a specific cryptographic key or associating two related elements of information. [INFOSEC-99]

biometric: Any specific and uniquely identifiable physical human characteristic, *e.g.,* of the retina, iris, acoustic spectrum of the voice (*i.e.,* voiceprint), fingerprint(s), handwriting, pattern of finger lengths, *etc.,* that may be used to validate the identity of an individual. *Note:* Biometrics provide a highly secure means of identification, for purposes of security involving, *e.g.,* Internet communications and cryptosystems.

biometrics: [In INFOSEC] automated methods of authenticating or verifying an individual based upon a physical or behavioral characteristic. [INFOSEC-99]

biphase modulation: *Synonym* **phase-shift keying.**

bipolar signal: 1. A signal that may assume either of two polarities, neither of which is zero. *Note 1:* A bipolar signal may have a two-state non-return-to-zero (NRZ) or a three-state return-to-zero (RZ) binary coding scheme. *Note 2:* A bipolar signal is usually symmetrical with respect to zero amplitude, *i.e.,* the absolute values of the positive and negative signal states are nominally equal. **2.** A pseudoternary signal, conveying binary digits, in which successive "ones" (marks, pulses) are of alternating, positive (+) and negative (-) polarity, equal in amplitude, and in which a "zero" (space, no pulse) is of zero amplitude. [T1.403-1989] *Synonym* **alternate mark inversion signal.**

bipolar violation: In a bipolar alternate mark inversion (AMI) signal, a "one" condition (mark, pulse) having the same polarity as its predecessor. [After T1.408-1990]

birefringence: In a transparent material, anisotropism of the refractive index, which varies as a function of polarization as well as orientation with respect to the incident ray. *Note 1:* The term *"birefringence"* means, literally, *"double refraction." Note 2:* All crystals except those of cubic lattice structure exhibit some degree of anisotropy with regard to their physical properties, including refractive index. Other materials, such as glasses or plastics, become birefringent when subjected to mechanical strain. *Note 3:* Birefringent materials, including crystals, have the ability to refract an unpolarized incident ray into two separate, orthogonally polarized rays, which in the general case take different paths, depending on orientation of the material with respect to the incident ray. The refracted rays are referred to as the "ordinary," or "O" ray, which obeys Snell's Law, and the "extraordinary," or "E" ray, which does not. [After FAA] *Synonym* **double refraction.**

birefringent medium: *See* **birefringence.**

birthday phenomenon: The phenomenon stating that, for a category size of 365 (the number of days in a year), after only 23 people are gathered, the probability is greater than 0.5 that at least two people have a common birthday (month and day). *Note:* The birthday phenomenon applied to DES encryption means that where category size is 264, this same probability of a repeat (match) occurs at approximately r=232. The theory behind this principle applies that for a 64-bit block encryption operation with a fixed key, if one has a text dictionary of 232 plaintext/ciphertext pairs and 232 blocks of ciphertext produced from random input, then it should be expected that one block of unknown ciphertext will be found in the dictionary.

B-ISDN: *Abbreviation for* **broadband ISDN.**

bistable: Pertaining to a device capable of assuming either one of two stable states.

bistable circuit: *Synonym* **flip-flop.**

bistable multivibrator: *Synonym* **flip-flop.**

bistable trigger circuit: *Synonym* **flip-flop.**

bi-sync: *Abbreviation for* **binary synchronous (bi-sync) communication.**

bit: *Abbreviation for* **binary digit. 1.** A character used to represent one of the two digits in the numeration system with a base of two, and only two, possible states of a physical entity or system. **2.** In binary notation either of the characters 0 or 1. **3.** A unit of information equal to one binary decision or the designation of one of two possible and equally likely states of anything used to store or convey information.

bit-by-bit asynchronous operation: In data transmission, an operation in which manual, semiautomatic, or automatic shifts in the data modulation rate are accomplished by gating or slewing the clock modulation rate. *Note:* For example, bit-by-bit asynchronous operation may be at 50 b/s one moment and at 1200 b/s the next moment.

bit configuration: The sequence of bits used to encode a character.

bit-count integrity (BCI): 1. In message communications, the preservation of the exact number of bits that are in the original message. **2.** In connection-oriented services, preservation of the number of bits per unit time. *Note:* Bit-count integrity is not the same as bit integrity, which requires that the delivered bits correspond exactly with the original bits.

bit density: The number of bits recorded per unit length, area, or volume. *Note:* Bit density is the reciprocal of bit pitch. *Synonym* **recording density.**

bit depth: *Synonym* **bits per pixel.**

biternary transmission: Digital transmission in which two binary pulse trains are combined for transmission over a channel in which the available bandwidth is sufficient for transmission of only one of the two pulse trains at a time if they remain in binary form.

bit error: A bit that is transferred from the source to the destination within the assigned time slot, but that, when delivered, is of a different value from that sent from the source. [After T1.503-1989] [After T1.507-1996]

bit error rate: *Deprecated term. See* **bit error ratio.**

bit error ratio (BER): The number of erroneous bits divided by the total number of bits transmitted, received, or processed over some stipulated period. *Note 1:* Examples of bit error ratio are (a) transmission BER, *i.e.,* the number of erroneous bits received divided by the total number of bits transmitted; and (b) information BER, *i.e.,* the number of erroneous decoded (corrected) bits divided by the total number of decoded (corrected) bits. *Note 2:* The BER is usually expressed as a coefficient and a power of 10; for example, 2.5 erroneous bits out of 100,000 bits transmitted would be 2.5 out of 10^5 or 2.5×10^{-5}.

bit error ratio tester (BERT): A testing device that compares a received data pattern with a known transmitted pattern to determine the level of transmission quality.

bit interleaved parity N (BIP-N): A method of error monitoring. If even parity is used, an N bit code is generated by the transmitting equipment over a specified portion of the signal in such a manner that the first bit of the code provides even parity over the first bit of all N-bit sequences in the covered portion of the signal, the second bit provides even parity over the second bits of all N-bit sequences within the specified portion, and so on. Even parity is generated by setting the BIP-N bits so that there are an even number of 1s in each of all N-bit sequences including the BIP-N. [T1.105-1988]

bit interval: *See* **bit, character interval, unit interval.**

bit inversion: 1. The changing of the state of a bit to the opposite state. **2.** The changing of the state that represents a given bit, *i.e.,* a 0 or a 1, to the opposite state. *Note:* For example, if a 1 is represented by a given polarity or phase at one stage in a circuit, the 1 is represented by the opposite polarity or phase at the next stage.

bitmap: In computer graphics, a representation of an image (which category includes characters) by code or a coding scheme that defines (a) the position of pixels by row (horizontal position) and column (vertical position), and (b) individual pixel characteristics such as gray scale and color. *Loosely synonymous with* **raster.**

bitmapped graphics: In computer graphics, an image created with, or represented by, a matrix of pixels. *Synonym [loosely]* **raster graphics.**

bit masking: In embedded ADPCM (adaptive differential pulse-code modulation), the process of discarding the enhancement bits. [T1.310-1991]

BITNET: *Abbreviation for* **Because It's Time NETwork.** An early (*ca.* 1981) store-and-forward digital communications network interconnecting universities and research institutions worldwide. *Note:* BITNET, which is now obsolete, had a purpose akin to that of the present Internet, but was not nearly so robust, and at a speed of only 9600 b/s, it could not support the data rates presently attainable via the Internet.

bit pairing: The practice of establishing, within a code set, a number of subsets that have an identical bit representation except for the state of a specified bit. *Note:* An example of bit pairing occurs in the International Alphabet No. 5 and the American Standard Code for Information Interchange (ASCII), where the upper case letters are related to their respective lower case letters by the state of bit six.

bit period (T): The amount of time required to transmit a logical one or a logical zero. [T1.106-1988]

bit position: A character position in a word in a binary notation.

bit rate (BR): 1. In a bit stream, the number of bits occurring per unit time, usually expressed in bits per second. *Note:* For n-ary operation, the bit rate is equal to $\log_2 n$ times the rate (in bauds), where n is the number of significant conditions in the signal. **2.** The rate of transmission of information in binary (two state) form in bits per unit time. [47CFR]

bit-rate•distance product: *See* **bandwidth•distance product.**

bit robbing: In digital carrier systems, the practice or technique of preempting, at regular intervals and for the purpose of transmitting signaling information, one digit time slot that (a) is associated with the given user channel for which signaling is required, and (b) is used primarily for transporting encoded speech via that channel. *Note 1:* Bit robbing is an option in networks compatible with T-carrier, *e.g.,* an ISDN. *Note 2:* In conventional T-carrier systems, bit robbing uses, in every sixth frame, the time slot associated with the least significant bit. *Synonym* **speech digit signaling.**

bit-sequence independence: A characteristic of some digital data transmission systems that impose no restrictions on, or modification of, the transmitted bit sequence. *Note:* Bit-sequence-independent protocols are in contrast to protocols that reserve certain bit sequences for special meanings, such as the flag sequence, 01111110, for HDLC, SDLC, and ADCCP protocols.

bit slip: In digital transmission, the loss of a bit or bits, caused by variations in the respective clock rates of the transmitting and receiving devices. *Note:* One cause of bit slippage is overflow of a receive buffer that occurs when the transmitter's clock rate exceeds that of the receiver. This causes one or more bits to be dropped for lack of storage capacity.

bits per inch (b/in): A unit used to express the linear bit density of data in storage. *Note:* The abbreviation "*bpi* " is not in accordance with international standards, and is therefore deprecated.

bits per pixel (BPP): In a digitized image, the number of bits used to represent the luminance (brightness, gray scale) and chroma (color) information contained in each pixel. *Synonym* **bit depth.**

bits per second (b/s): A unit used to express the number of bits passing a designated point per second. *Note 1:* For example, for two-condition serial transmission in a single channel in which each significant condition represents a bit, *i.e.,* a 0 or a 1, the bit rate in bits per second and the baud have the same numerical value only if each bit occurs in a unit interval. In this case, the data signaling rate in bits per second is 1/T, where T is the unit interval. *Note 2:* The abbreviation *"bps"* is not in accordance with international standards, and is therefore deprecated.

bit-stepped: Pertaining to the control of digital equipment in which operations are performed one step at a time at the applicable bit rate.

bit-stream transmission: 1. In bit-oriented systems, the transmission of bit strings. **2.** In character-oriented systems, the transmission of bit streams that represent characters. *Note:* In bit-stream transmission, the bits usually occur at fixed time intervals, start and stop signals are not used, and the bit patterns follow each other in sequence without interruption.

bit string: A sequence of bits. *Note:* In a bit stream, individual bit strings may be separated by data delimiters. *Synonym* **binary string.**

bit stuffing: The insertion of noninformation bits into data. *Note 1:* Stuffed bits should not be confused with overhead bits. *Note 2:* In data transmission, bit stuffing is used for various purposes, such as for synchronizing bit streams that do not necessarily have the same or rationally related bit rates, or to fill buffers or frames. The location of the stuffing bits

is communicated to the receiving end of the data link, where these extra bits are removed to return the bit streams to their original bit rates or form. Bit stuffing may be used to synchronize several channels before multiplexing or to rate-match two single channels to each other. *Synonym* **positive justification.**

bit stuffing rate: *See* **nominal bit stuffing rate.**

bit synchronization: Synchronization in which the decision instant is brought into alignment with the received bit, *i.e.,* the basic signaling element.

bit synchronous operation: Operation in which data circuit terminating equipment (DCE), data terminal equipment (DTE), and transmitting circuits are all operated in bit synchronism with a clock. *Note 1:* In bit synchronous operation, clock timing is usually delivered at twice the modulation rate, and one bit is transmitted or received during each clock cycle. *Note 2:* Bit synchronous operation is sometimes erroneously referred to as digital synchronization.

BIU: *Abbreviation for* **bus interface unit.** *See* **network interface device.**

BLACK: 1. [A] designation applied to telecommunications and automated information systems, and to associated areas, circuits, components, and equipment, in which only unclassified signals are processed. *Note:* Encrypted signals are unclassified. [NIS] **2.** Designation applied to information systems, and to associated areas, circuits, components, and equipment, in which national security information is not processed. [INFOSEC-99]

blackbody: A totally absorbing body that does not reflect radiation. *Note:* In thermal equilibrium, a blackbody absorbs and radiates at the same rate; the radiation will just equal absorption when thermal equilibrium is maintained.

black box: A generic term for a single-purpose device having limited functionality. *Note:* A black box is usually represented in schematic drawings as a geometric figure, possibly with defined connector(s), but no details with respect to the type or number of internal components that enable it to perform its defined task.

black burst: A composite color video signal comprised of sync, color burst, and black video. *Note:* Black burst is used to synchronize (genlock) other video sources to the same sync and color information. Black burst generators are used in video studios to "lock" the entire facility to a common signal ("house sync" or "house black"). [After Silicon]

black facsimile transmission: 1. In facsimile systems using amplitude modulation, that form of transmission in which the maximum transmitted power corresponds to the maximum density of the subject. **2.** In facsimile systems using frequency modulation, that form of transmission in which the lowest transmitted frequency corresponds to the maximum density of the subject.

black level: Of a television baseband signal (*e.g.,* NTSC composite video), the voltage level corresponding to black or to the maximum limit of black peaks.

black noise: Noise that has a frequency spectrum of predominately zero power level over all frequencies except for a few narrow bands or spikes. *Note:* An example of black noise in a facsimile transmission system is the spectrum that might be obtained when scanning a black area in which there are a few random white spots. Thus, in the time domain, a few random pulses occur while scanning.

black recording: 1. In facsimile systems using amplitude modulation, recording in which the maximum received power corresponds to the maximum density of the record medium. **2.** In a facsimile system using frequency modulation, recording in which the lowest received frequency corresponds to the maximum density of the record medium.

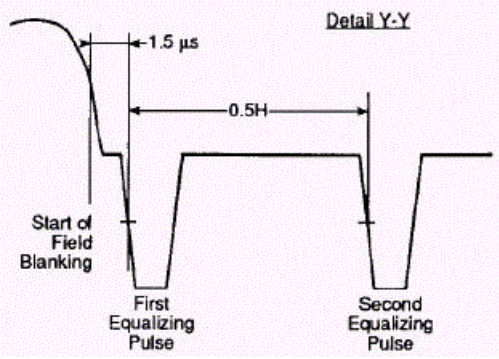
black signal: In facsimile, the signal resulting from scanning a maximum-density area of the object.

BLACK signal: A signal that represents only unclassified or encrypted information, usually in cryptographic systems.

blanketing: The interference that is caused by the presence of an AM broadcast signal of one volt per meter (V/m) or greater strengths in the area adjacent to the antenna of the transmitting station. The 1 V/m contour is referred to as the blanket contour and the area within this contour is referred to as the *"blanket area."* [47CFR]

blanketing area: In the vicinity of a transmitting antenna, the area in which the signal from that antenna interferes with the reception of other signals. *Note:* The blanketing area around a given transmitting antenna depends on the selectivity and sensitivity of the receiver, and on the respective levels of the other signals in question.

blanking: 1. The period of time in which no video image is displayed. [JP 1-02] **2.** In graphic display, the suppression of the display of one or more display elements or display segments.



blanking interval: In raster-scanned television technology, the period between (a) the end of one horizontal scanning line and the beginning of the next (the horizontal blanking interval), or (b) the end of one field and the beginning of the next (the vertical blanking interval), during which the display of picture information is suppressed. *Note 1:* Blanking intervals were a necessary part of the original NTSC and other, similar, television signal structures, which were based on the state of the art of electronics in the 1930s and even earlier. Both the camera and display (television receiver) were dependent upon specialized electron tubes that employed an electron beam that was swept (scanned) across the photosensitive or photoemissive area, respectively, of the tube in question. It was necessary that the beam be turned off during its return sweep (trace), to avoid marring the image (trace). While television cameras based on charge-coupled devices (CCDs), which have no such constraint, have supplanted cameras based on electron beams, most receivers still depend upon beam-based tubes. *Note 2:* To support a smooth transition (avoid obsolescence of older receivers) as the state of the art improved, the basic original signal structure was retained, with modifications (*e.g.* , the superposition of signals necessary to support color).

blanking level: In a baseband television signal, the DC level (nominally 0 volts) from which the amplitudes of the various components of the signal are measured. Conventionally, the viewable parts of the signal (except subcarriers) are positive with respect to blanking, while the synchronizing pulses are negative with respect to blanking. In North American NTSC signals, the darkest portions of the image (black level) are offset positively with respect to blanking level. This offset is called either pedestal or setup, depending on how it is generated. In almost all other television signals, including component RGB, there is no setup, so black level is the same voltage as blanking level. [After SMPTE] *Synonym* **pedestal.**

blind transmission: Transmission without obtaining a receipt, *i.e.,* acknowledgement of reception, from the intended receiving station. *Note:* Blind transmission may occur or be necessary when security constraints, such as radio silence, are imposed, when technical difficulties with a sender's receiver or receiver's transmitter occur, or when lack of time precludes the delay caused by waiting for receipts.

blinking: In graphic display devices, an intentional periodic change in the intensity of one or more display elements or display segments.

block: 1. A group of bits or digits that is transmitted as a unit and that may be encoded for error-control purposes. **2.** A string of records, words, or characters, that for technical or logical purposes are treated as a unit. *Note 1:* Blocks (a) are separated by interblock gaps, (b) are delimited by an end-of-block signal, and (c) may contain one or more records. *Note 2:* A block is usually subjected to some type of block processing, such as multidimensional parity checking, associated with it. **3.** In programming languages, a subdivision of a program that serves to group related statements, delimit routines, specify storage allocation, delineate the applicability of labels, or segment parts of the program for other purposes.

block character: *See* **end-of-transmission-block character.**

block check: In the processing or transmission of digital data, an error-control procedure that is used to determine whether a block of data is structured according to given rules.

block check character (BCC): A character added to a transmission block to facilitate error detection. *Note:* In longitudinal redundancy checking and cyclic redundancy checking, block check characters are computed for, and added to, each message block transmitted. This block check character is compared with a second block check character computed by the receiver to determine whether the transmission is error free.

block code: An error detection and/or correction code in which the encoded block consists of N symbols, containing K information symbols ($K < N$) and N-K redundant check symbols, such that most naturally occurring errors can be detected and/or corrected.

block diagram: A diagram of a system, a computer, or a device in which the principal parts are represented by suitably annotated geometrical figures to show both the basic functions of the parts and their functional relationships.

block distortion: In the received image in video systems, distortion characterized by the appearance of an underlying block encoding structure.

block dropping: A process by which one or more of the less significant bits of all the samples stored in a packet are dropped to alleviate congestion. [T1.509-1995]

block efficiency: In a block, the ratio of the number of user information bits to the total number of bits. *Note:* For a given block scheme, block efficiency represents the maximum possible efficiency for a given block scheme transmitted over a perfect transmission link.

block error: A block within which at least one bit error occurs when the block is transferred from the source to the destination within the time slot assigned. [After T1.503-1996]

block-error probability: The expected block-error ratio.

block-error ratio: 1. The ratio of the number of incorrectly received blocks to the total number of blocks transferred. *Note:* The block-error ratio is calculated using empirical measurements. Multiple block-error ratios may be used to predict block-error probability. **2.** The ratio of the number of blocks that contain at least one bit in error to the total number of blocks transmitted in a given time interval. [T1.501-1988]

blocking: 1. The formatting of data into blocks for purposes of transmission, storage, checking, or other functions. **2.** Denying access to, or use of, a facility, system, or component. **3.** The failure of a telecommunications network to meet a user service demand, because of the lack of an available communications path.

blocking criterion: In telephone traffic engineering, a criterion that specifies the maximum number of calls or service demands that fail to receive immediate service. *Note:* The blocking criterion is usually expressed in probabilistic notation, such as P.001.

blocking factor: The number of records in a block. *Note:* The blocking factor is calculated by dividing the block length by the length of each record contained in the block. If the records are not of the same length, the average record length may be used to compute the blocking factor. *Synonym* **grouping factor.**

blocking formula: A specific probability distribution function intended to model calling patterns of users who fail to find available facilities. *Note:* There are several blocking formulas. The applicability of each to a given situation depends on its underlying assumptions regarding caller behavior.

blocking network: In telecommunications, a network that has fewer transmission paths than would be required if all users were to communicate simultaneously. *Note:* Blocking networks are used because not all users require service simultaneously. Certain statistical distributions apply to the patterns of user demand.

block length: The number of data units, such as bits, bytes, characters, or records, in a block.

block-loss probability: The ratio of the number of lost blocks to the total number of block transfer attempts during a specified period.

block-misdelivery probability: The ratio of the number of misdelivered blocks to the total number of block transfer attempts during a specified period.

block parity: The designation of one or more bits in a block as parity bits used to force the block into a selected parity, either odd or even. *Note:* Block parity is used to assist in error detection or correction.

block transfer: The process, initiated by a single action, of transferring one or more blocks of data.

block transfer attempt: A coordinated sequence of user and telecommunication system activities undertaken to effect transfer of an individual block from a source user to a destination user. *Note:* A block transfer attempt begins when the first bit of the block crosses the functional interface between the source user and the telecommunication system. A block transfer attempt ends either in successful block transfer or in block transfer failure.

block transfer efficiency: The average ratio of user information bits to total bits in successfully transferred blocks.

block transfer failure: Failure to deliver a block successfully. *Note:* The principal block transfer failure outcomes are: lost block, misdelivered block, and added block.

block transfer rate: The number of successful block transfers during a performance measurement period divided by the duration of the period.

block transfer time: The average value of the duration of a successful block transfer attempt. *Note:* A block transfer attempt is successful if (a) the transmitted block is delivered to the intended destination user within the maximum allowable performance period and (b) the contents of the delivered block are correct.

blue noise: In a spectrum of frequencies, a region in which the spectral density, *i.e.,* power per hertz, is proportional to the frequency.

blue-screening: *See* **chroma keying.**

Bluetooth: A low-power, short-range, rf technology that allows the connection of intelligent communications devices or appliances in a household or an office in a short-range

wireless network. Examples of Bluetooth applications are transferring data between cell phones, radios, pagers, personal digital assistants, notebook computers, video and still cameras, audio players, and local area networks.

blurring: In television and video systems, a global distortion over the entire image, characterized by reduced sharpness of edges and limited spatial detail. [T1.801.02-1996]

BNC connector: A type of bayonet (twist-lock) coaxial connector commonly used in applications involving small (*e.g.,* RG-59, RG-62) coaxial cables.

BOC: *Abbreviation for* **Bell Operating Company.**

Boltzmann's constant (k): The number that relates the average energy of a molecule to its absolute temperature. *Note:* Boltzmann's constant is approximately 1.38×10^{-23} J/K (joules/kelvin).

bond: An electrical connection that provides a low-resistance path between two conducting surfaces.

bonding: 1. In electrical engineering, the process of connecting together metal parts so that they make low resistance electrical contact for direct current and lower frequency alternating currents. [JP1] **2.** The process of establishing the required degree of electrical continuity between two or more conductive surfaces that are to be joined.

bookmark: A name or address of an Internet resource, stored in a software file at a user's site, *e.g.* , in a desktop computer, for convenient future use. *Note:* An example of a bookmark is an entry in a bookmark file (or bookmark list) such as maintained within or by a Web browser for the convenience of the user in revisiting a previously visited Web site. [2382-pt.35]

bookmark list: *Synonym* **hotlist.**

Boolean function: 1. A mathematical function that describes Boolean operations. **2.** A switching function in which the number of possible values of the function and each of its independent variables is two.

Boolean operation: 1. Any operation in which each of the operands and the result take one of two values. *Note:* Typical states are "0 or 1," "on or off," "open or closed," or "present or absent." **2.** An operation that follows the rules of Boolean Algebra.

bootstrap: 1. A technique or device designed to bring about a desired state by means of its own action. **2.** That part of a computer program that may be used to establish another version of the computer program. **3.** The automatic procedure whereby the basic operating system of a processor is reloaded following a complete shutdown or loss of memory. **4.** A set of instructions that cause additional instructions to be loaded until the complete computer program is in storage. **5.** To initialize a system by means of a bootstrap.

bootup: In computer science, the initial sequence of events (usually preprogrammed in firmware present in the computer) that are necessary to start a computer; *i.e.,* to initialize its operating system, load programs into memory, *etc.,* when (a) it is first powered up, or (b) when already powered up, upon some kind of assenting action by the user.

boot up: To take some kind of assenting action to initiate computer bootup, *e.g.,* to turn on the primary power (often referred to as initiating a cold bootup) or restart a powered-up computer (often referred to as initiating a hot bootup or hot reboot).

boresight: 1. The physical axis of a directional antenna. **2.** To align a directional antenna, using either an optical procedure or a fixed target at a known location.

Bose-Chaudhuri-Hochquenghem code: *See* **BCH code.**

bot: *Abbreviation for* **robot.** A relatively small and focused computer application that (a) runs continuously, in the background (*i.e.,* simultaneously), as other programs are being run, and (b) responds automatically to a user's activity. *Synonyms* **agent, droid, infobot.** *Note 1:* Many bots are created for the benefit of the user, *e.g.,* those that send information upon request, perform automated searches, or monitor messages in a network forum. Other robots (*e.g.,* a computer virus) are intended to harm the user or to spam the user (*e.g.,* with advertising). *Note 2:* Many bots have nicknames that loosely describe their function. Some examples of bots are:

adbot	A bot that searches newsgroups and other on-line documents for email addresses. When one is found, an advertisement is automatically sent to that address. The address is usually saved in a database for sale to other advertisers. Alternatively, an adbot can be one that automatically posts advertisements to newsgroups and other network forums.
crawler	*Synonym* **web crawler.**
knowbot	*Abbreviation for* **knowledge robot.** A bot that automatically searches on-line information for data relevant to a user's previous search criteria.
knowledge robot	*See* **knowbot.**
list server	A bot that accepts messages from users and then sends a copy of that messages to all members of the related mailing list. The list server will also allow list members to customize the way messages are sent to them (*e.g.* , the messages can be sent as they are received by the list server or saved, compiled, and then sent).
pokerbot	A bot that automatically plays the game of poker in various on-line forums. *Note:* Many on-line games have had bots designed to play them, *e.g.* , a chessbot or a bridgebot.
portal	A bot that serves as a starting point for browsers. A portal will often include a search engine.
robot	*See* **bot.**
robotic librarian	*Synonym* **search engine.**
search bot	*Synonym* **search engine.**
search engine	A bot that accepts words or phrases from an Internet user via a browser, searches a database for matching web pages, and displays a list of those pages that match the search criteria.
spambot	A bot that sends unwanted, unrequested, and usually repetitive e-mail or messages directly to a user or to a message forum. In most cases, this unwanted information is commercial advertisements, although the message can be propaganda supporting a cause or nonsense messages designed to fill up a user's mailbox.
spider	*Synonym* **web crawler.**
web crawler	A bot that searches the world wide web for new and updated web pages. Found pages are categorized by subject and placed in a database. Typically, an associated search engine will access that database.
wizard	A bot that has some ability to make informed decisions. For example, a wizard might determine the city from which you are accessing the network and provide to you the current weather report for your area.

bounce: To return, to the sender, e-mail that is, for whatever reason, undeliverable to its intended destination. *Note 1:* There are various reasons why e-mail may be bounced. Examples are an incorrect address, problems with local network facilities, and problems with telecommunications links. *Note 2:* Bounced e-mail is often accompanied by an error message describing the reason that it was not delivered.

bouncing busy hour (BBH): The hour in which the highest usage is measured for any day. The readings are on the hour or half hour. The selected clock hour will vary from day to day, depending on the measured usage. [T1.Rpt 11-1991]

boundary: 1. [In security,] Software, hardware, or a physical barrier that limits access to a system or part of a system. [INFOSEC-99] **2.** *Synonym [in networking]* **section boundary.**

bound mode: In an optical fiber, a mode that (a) has a field intensity that decays monotonically in the transverse direction everywhere external to the core and (b) does not lose power to radiation. *Note:* Except for single-mode fibers, the power in bound modes is predominantly contained in the core of the fiber. [After 2196] *Synonyms* **guided mode, trapped mode.**

bound ray: *Synonym* **guided ray.**

bpi: *See* **bits per inch.**

braid: 1. An essential part of many fiber-optic cable designs, consisting of a layer of woven yarn. *Note:* In the case of single-fiber loose-buffered or two-fiber "zip-cord" loose-buffered fiber-optic cables, the braid is situated between the buffer tube and jacket. In the case of cables having multiple buffer tubes, the braid is usually situated between the inner jacket and outer jacket. **2.** Loosely, an unwoven parallel bundle of yarn situated around the tight buffer of a single-fiber or two-fiber "zip-cord" fiber-optic cable. *Note 1:* The braid serves to add tensile strength to the cable. The braid may also be anchored to an optical connector or splice organizer assembly to secure the end of the cable. *Note 2:* The braid is often of an aramid yarn. [After FAA]

branch: 1. In a computer program, a conditional jump or departure from the implicit or declared order in which instructions are being executed. **2.** To select a branch, as in definition #1. **3.** A direct path joining two nodes of a network or graph. **4.** In a power distribution system, a circuit from a distribution device (power panel) of a lower power handling capability than that of the input circuits to the device.

branching network: A network used for transmission or reception of signals over two or more channels.

branching repeater: A repeater with two or more outputs for each input.

branch point: A network point where two or more possible routes through different intermediate networks from the origination network to destination network physically diverge. A branch point may occur in any network except the destination network. [T1.118-1992]

breach: The circumvention or disablement of some element of computer security, with or without detection, which could result in a penetration of (a) the affected computer's software or data base(s), or (b) another device or network to which the affected computer may also be connected. [After 2382-pt.8]

breadboard: 1. An assembly of circuits or parts used to prove the feasibility of a device, circuit, system, or principle with little or no regard to the final configuration or packaging of the parts. **2.** To prepare a breadboard.

break interval: 1. In dial-pulse signaling, that portion of the dial pulse in which the pulsing circuit is in its high-impedance condition. [T1.405-1989] **2.** In dial-pulse signaling, that portion of the dial pulse in which the pulsing circuit is on-hook. [T1.409-1996]

break out: To separate the individual fibers or buffer tubes of a fiber-optic cable for the purpose of splicing or installing optical connectors. [After FAA] *Synonyms* **fan out, furcate.**

break-out box: A testing device that permits a user to access individual leads of an interface cable, using jumper wires, in order to monitor, switch, or patch the electrical output of the cable.

breakout cable: A multifiber fiber-optic cable design in which individual fibers, usually tight-buffered, are surrounded by separate strength members and jackets, which are in turn enveloped by a common jacket. *Note 1:* The breakout cable facilitates easy installation of fiber-optic connectors. All that need be done to prepare the ends of the cable to receive connectors is to remove the outer jacket, exposing what are essentially individual single-fiber cables. *Note 2:* Because it tends to induce bends in the fibers, the breakout cable design usually results in slightly higher transmission losses, for a given fiber, than loose-buffer designs. [After FAA] *Synonym* **fanout cable.**

breakout kit: A kit of materials, composed of an outer jacket in which is contained a strength member consisting of a bundle of usually aramid yarn, which jacket and yarn may be slipped over a loose buffer tube containing a single fiber, to convert the buffer tube and fiber to a complete single-fiber cable to which a fiber-optic connector may be directly attached. *Note 1:* A heat-shrinkable plastic boot may also be used for cosmetic purposes, strain relief, and to seal the point where the individual cables so created, merge. *Note 2:* Use of a breakout kit enables a fiber-optic cable containing multiple loose buffer tubes to receive connectors without the splicing of pigtails. [After FAA]

Brewster's angle: For a plane electromagnetic wavefront incident on a plane boundary between two dielectric media having different refractive indices, the angle of incidence at which transmittance from one medium to the other is unity when the wavefront is linearly polarized with its electric vector parallel to the plane of incidence. *Note 1:* Brewster's angle θ_B, is given by

$$\theta_B = \tan^{-1}\left(\frac{n_2}{n_1}\right) = \tan^{-1}\sqrt{\frac{\epsilon_2}{\epsilon_1}},$$

where n_1 and n_2 are the refractive indices of the respective media, and ϵ_1 and ϵ_2, their respective electric permittivities. *Note 2:* For a randomly polarized ray incident at Brewster's angle, the reflected and refracted rays are at 90° with respect to one another.

Brewster's law: *See* **Brewster's angle.**

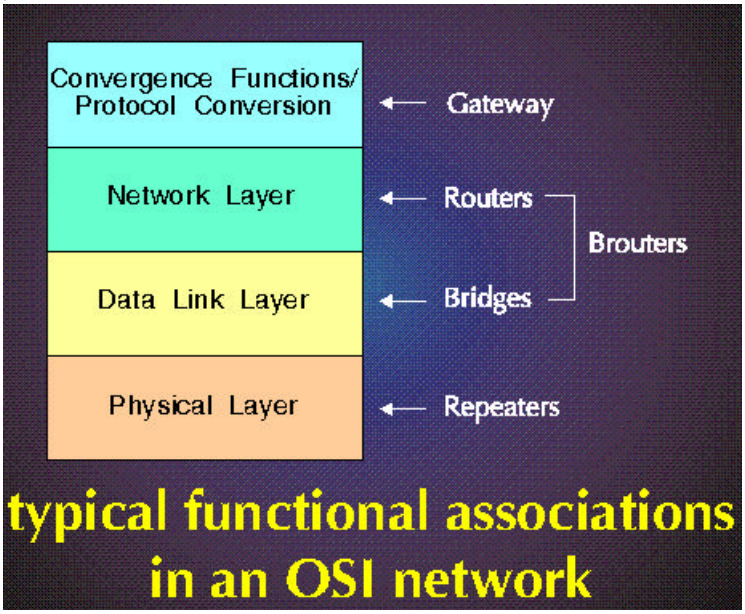
BRI: *Abbreviation for* **basic rate interface.**

brick: An informal name for a hand-held radiotelephone unit. *Synonyms* **personal terminal, radio personal terminal.**

brick wall filter: A low-pass filter with a steep cut-off (such as 20 dB/octave or greater), such that a negligible amount of higher frequency information passes. *Note:* A brick wall filter typically has uniform group delay. [After SMPTE]

bridge: 1. In communications networks, a device that (a) links or routes signals from one ring or bus to another or from one network to another, (b) may extend the distance span and capacity of a single LAN system, (c) performs no modification to packets or messages, (d) operates at the data-link layer of the OSI--Reference Model (Layer 2), (e) reads packets, and (f) passes only those with addresses on the same segment of the network as the originating user. **2.** A functional unit that interconnects two local area networks that use the same

logical link control procedure, but may use different medium access control procedures. **3.** A balanced electrical network, *e.g.* , a Wheatstone bridge. *Note:* A bridge may be used for electrical measurements, especially resistances or impedances. **4.** *See* **hybrid coil.**



bridged ringing: The part of a signaling system in which ringers associated with a particular line are connected across that line.

bridged tap: Any portion of a loop that is not in the direct talking path between the central office and the service user's terminating equipment. A bridged tap may be an unused cable pair connected at an intermediate point or an extension of the circuit beyond the service user's location. *Note:* A bridged tap creates an impedance mismatch within the transmission line, which creates signal reflections. These reflections are generally not noticed in standard (POTS) voicegrade service, but become significant with high frequency (*x* DSL--which can be *A* DSL, *asynchronous* DSL, or *S* DSL, *synchronous* DSL, *etc.*) and digital transmission (DDS and DS1) services.

bridge lifter: A device that electrically or physically removes bridged telephone pairs. *Note:* Relays, saturable inductors, and semiconductors are used as bridge lifters.

bridge-to-bridge station: A ship station operating in the port operations service in which messages are restricted to navigational communications and which is capable of operation from the ship's navigational bridge or, in the case of a dredge, from its main control station, operating on a frequency or frequencies in the 156-162 MHz band. [NTIA]

bridge transformer: *Synonym* **hybrid coil.**

bridging connection: A parallel connection used to extract some of the signal energy from a circuit, usually with negligible effect on the normal operation of the circuit.

bridging loss: At a given frequency, the loss that results when an impedance is connected across a transmission line. *Note:* Bridging loss is expressed as the ratio, in dB, of the signal power delivered, prior to bridging, to a given point in a system downstream from the bridging point, to the signal power delivered to the given point after bridging.

brightness: An attribute of visual perception in which a source appears to emit a given amount of light. *Note 1: "Brightness"* should be used only for nonquantitative references to physiological sensations and perceptions of light. *Note 2: "Brightness"* was formerly used as a synonym for the photometric term *"luminance"* and (incorrectly) for the radiometric term *"radiance."*

Brillouin diagram: *See* **Brillouin scattering.**

Brillouin scattering: In a physical medium, scattering of lightwaves, caused by thermally driven density fluctuations. *Note:* Brillouin scattering may cause frequency shifts of several gigahertz at room temperature. [From Weik '89]

broadband: 1. *Synonym [in analog technology]* **wideband. 2.** A descriptive term for evolving digital technologies that provide consumers a signal-switched facility offering integrated access to voice, high-speed data service, video-demand services, and interactive delivery services. [FCC]

broadband exchange (BEX): A communications switch capable of interconnecting channels having bandwidths greater than voice bandwidth.

broadband ISDN (B-ISDN): An Integrated Services Digital Network (ISDN) offering broadband capabilities. *Note 1:* B-ISDN is an ITU-T proposed (originally a CCITT-proposed) service that may (a) include interfaces operating at data rates from 150 to 600 Mb/s, (b) use asynchronous transfer mode (ATM) to carry all services over a single, integrated, high-speed packet-switched network, (c) have LAN interconnection capability, (d) provide access to a remote, shared disk server, (e) provide voice/video/data teleconferencing, (f) provide transport for programming services, such as cable TV, (g) provide single-user controlled access to remote video sources, (h) handle voice/video telephone calls, and (i) access shop-at-home and other information services. *Note 2:* Techniques used in the B-ISDN include code conversion, information compression, multipoint connections, and multiple-connection calls. Current proposals use a service-independent call structure that allows flexible arrangement and modular control of access and transport edges. The service components of a connection can provide each user with independent control of access features and can serve as the basis of a simplified control structure for multipoint and multiconnection calls. Such a network might be expected to offer a variety of ancillary information processing functions.

broadband system: *See [in analog technology]* **wideband.**

broadcasting-satellite service: A radiocommunication service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public. In the broadcasting-satellite service, the term *"direct reception"* shall encompass both individual reception and community reception. [NTIA] [RR]

broadcasting satellite space station: A space station in the broadcasting-satellite service (sound broadcasting). [NTIA]

broadcasting service: A radiocommunication service in which the transmissions are intended for direct reception by the general public. This service may include sound transmissions, television transmissions or other types of transmissions. [NTIA] [RR]

broadcasting station: A station in the broadcasting service. [NTIA] [RR]

broadcast operation: The transmission of signals that may be simultaneously received by stations that usually make no acknowledgement.

broadside antenna: *Synonym* **billboard antenna.**

brouter: A combined bridge and router that operates without protocol restrictions, routes data using a protocol it supports, and bridges data it cannot route.

browser: Any computer software program for reading hypertext. *Note 1:* Browsers are usually associated with the Internet and the World Wide Web (WWW). *Note 2:* A browser may be able to access information in many formats, and through different services including HTTP and FTP.

browsing: [The] act of searching through information-system (IS) storage to locate or acquire information without necessarily knowing of the existence or the format of the information being sought. [INFOSEC-99]

brute-force attack: In security, an attack that requires trying all (or a large fraction of all) possible values until the right value is found. *Synonym [loosely]* **exhaustive attack.**

b/s: *Abbreviation for* **bits per second.**

BSA: *Abbreviation for* **basic serving arrangement.**

BSE: *Abbreviation for* **basic service element.**

BSI: *Abbreviation for* **British Standards Institution.**

B6ZS: *Abbreviation for* **bipolar with six-zero substitution.** A T-carrier line code in which bipolar violations are deliberately inserted if user data contain a string of 6 or more consecutive zeros. *Note 1:* B6ZS is used to ensure a sufficient number of transitions to maintain system synchronization when the user data stream contains an insufficient number of "ones" to do so. *Note 2:* B6ZS is used in the North American hierarchy at the T2 rate.

B3ZS: *Abbreviation for* **bipolar with three-zero substitution.** A T-carrier line code in which bipolar violations are deliberately inserted if user data contain a string of 3 or more consecutive zeros. *Note 1:* B3ZS is used to ensure a sufficient number of transitions to maintain system synchronization when the user data stream contains an insufficient number of "ones" to do so. *Note 2:* B3ZS is used in the North American hierarchy at the T3 rate.

budgeting: *Synonym* **proration.**

buffer: 1. A routine or storage medium used to compensate for a difference in rate of flow of data, or time of occurrence of events, when transferring data from one device to another. *Note:* Buffers are used for many purposes, such as (a) interconnecting two digital circuits operating at different rates, (b) holding data for use at a later time, (c) allowing timing corrections to be made on a data stream, (d) collecting binary data bits into groups that can then be operated on as a unit, (e) delaying the transit time of a signal in order to allow other operations to occur. **2.** To use a buffer or buffers. **3.** An isolating circuit, often an amplifier, used to minimize the influence of a driven circuit on the driving circuit. *Synonym* **buffer amplifier. 4.** In a fiber optic communication cable, one type of component used to encapsulate one or more optical fibers for the purpose of providing such functions as mechanical isolation, protection from physical damage and fiber identification. *Note:* The buffer may take the form of a miniature conduit, contained within the cable and called a loose buffer, or loose buffer tube, in which one or more fibers may be enclosed, often with a lubricating gel. A tight buffer consists of a polymer coating in intimate contact with the primary coating applied to the fiber during manufacture.

buffer amplifier: *Synonym* **buffer.**

bug: 1. A concealed microphone or listening device or other audiosurveillance device. [JP 1-02] **2.** A mistake in a computer program. **3.** To install means for audiosurveillance. [JP 1-02] **4.** A semiautomatic telegraph key. **5.** A mistake or malfunction.

building out: The process of adding a combination of inductance, capacitance, and resistance to a cable pair so that its electrical length may be increased by a desired amount to control impedance and loss characteristics. *Synonym* **line buildout.**

build-out delay: The maximum variable transmission and processing delay that is permitted in a wideband network. Each PVP (packetized voice protocol) node records the delay that it adds and updates accordingly the TS (time stamp) value in the packet header. When the terminating endpoint of a PVP node receives a voice packet, the provisioned build-out and the time stamp value are compared. If the TS value is larger than the build-out, the PVP node drops the packet. If the delay is less than the provisioned build-out, the packet is delayed by the difference between the two values. [T1.312-1991]

bulk encryption: Simultaneous encryption of all channels of a multichannel telecommunications link. [INFOSEC] *Note:* A single encryption device can be used to encrypt the output signal from a multiplexer.

bulletin board: A form of electronic messaging in which addressed messages or files are entered by users into a computer or network of computers. *Note:* Other users may obtain, at their convenience and request, messages or files available to them. *Synonym* **electronic bulletin board.**

bunched frame-alignment signal: A frame-alignment signal in which the signal elements occupy consecutive digit positions.

bundle: 1. A group of optical fibers or electrical conductors, such as wires and coaxial cables, usually in a single jacket. *Note:* Multiple bundles of optical fibers or electrical conductors may be placed in the same cable. [After 2196] **2.** In cryptography, the three cryptographic keys (K1, K2, K3) used with a TDEA mode. [After X9.52] [After X9.65]

buried cable: *See* **direct-buried cable.**

buried plant: *See* **direct-buried cable.**

burst: 1. In data communications, a sequence of signals, noise, or interference counted as a unit in accordance with some specific criterion or measure. **2.** To separate continuous-form or multipart paper into discrete sheets.

burst isochronous: *Deprecated synonym for* **isochronous burst transmission.**

burst switching: In a packet-switched network, a switching capability in which each network switch extracts routing instructions from an incoming packet header to establish and maintain the appropriate switch connection for the duration of the packet, following which the connection is automatically released. *Note:* In concept, burst switching is similar to connectionless mode transmission, but it differs from the latter in that burst switching implies an intent to establish the switch connection in near real time so that only minimum buffering is required at the node switch.

burst transmission: 1. Transmission that combines a very high data signaling rate with very short transmission times. **2.** Operation of a data network in which data transmission is interrupted at intervals. *Note:* Burst transmission enables communications between data terminal equipment (DTEs) and a data network operating at dissimilar data signaling rates. *Synonym* **data burst.**

bus: One or more conductors or optical fibers that serve as a common connection for a group of related devices.

bus interface unit (BIU): *See* **network interface device.**

bus network: *See* **network topology.**

bus topology: *See* **network topology.**

busy back: *Deprecated term. See* **busy signal.**

busy hour: In a communications system, the sliding 60-minute period during which occurs the maximum total traffic load in a given 24-hour period. *Note 1:* The busy hour is determined by fitting a horizontal line segment equivalent to one hour under the traffic load curve about the peak load point. *Note 2:* If the service time interval is less than 60 minutes, the busy hour is the 60-minute interval that contains the service timer interval. *Note 3:* In cases where more than one busy hour occurs in a 24-hour period, *i.e.,* when saturation occurs, the busy hour or hours most applicable to the particular situation are used. *Synonym* **peak busy hour.**

busy season: During a 1-year cycle, the period of 3 consecutive months having the highest busy hour traffic.

busy signal: 1. In telephony, an audible or visual signal that indicates that no transmission path to the called number is available. *Synonym* **busy tone. 2.** In telephony, an audible or visual signal that indicates that the called number is occupied or otherwise unavailable. *Synonym* **reorder tone.**

busy test: In telephony, a test made to determine whether certain facilities, such as a subscriber line or a central office trunk, are available for use.

busy tone: *Synonym* **busy signal.**

busy verification: In a public switched telephone network, a network-provided service feature that permits an attendant to verify the busy or idle state of station lines and to break into the conversation. *Note:* A 440-Hz tone is applied to the line for 2 seconds, followed by a 0.5-second burst every 10 seconds, to alert both parties that the attendant is connected to the circuit.

BW: *Abbreviation for* **bandwidth.**

bypass: 1. The use of any telecommunications facilities or services that circumvents those of the local exchange common carrier. *Note:* Bypass facilities or services may be either customer-provided or vendor-supplied. **2.** An alternate circuit that is routed around equipment or system component. *Note:* Bypasses are often used to allow system operation to continue when the bypassed equipment or a system component is inoperable or unavailable.

byte (B): A sequence of contiguous bits (usually 8) considered as a unit. *Note:* In pre-1970 literature, *"byte"* referred to a variable-length bit string. Since that time, the usage has changed so that now it almost always refers to an 8-bit string. This usage predominates in computer and data transmission literature; when so used, the term is synonymous with *"octet."*

cable: 1. An assembly of one or more insulated conductors, or optical fibers, or a combination of both, within an enveloping jacket. *Note 1:* A cable is constructed so that the conductors or fibers may be used singly or in groups. *Note 2:* Certain types of communications cables, especially long submarine cables but also terrestrial cables, whether the communications media are metallic or optical fiber, may contain metallic conductors that supply power to repeaters (amplifiers). **2.** A message sent by cable, or by any means of telegraphy (including wireless means).

cable assembly: A cable that is ready for installation in specific applications and usually terminated with connectors.

cable fill factor: The ratio of cable conductor or cable pair kilometers in use to total cable conductor or cable pair kilometers available in the plant, *e.g.,* the ratio of revenue producing cable pair kilometers in use to total cable pair kilometers in plant. [47 CFR Pt.36-A]

cable headend: *Synonym [in cable television]* **headend.**

cable jacket: *See* **sheath.**

cable cutoff wavelength (λ_{cc}): For a cabled single-mode optical fiber under specified length, bend, and deployment conditions, the wavelength at which the fiber's second order mode is attenuated a measurable amount when compared to a multimode reference fiber or to a tightly bent single-mode fiber.

cable modem: In CATV systems, a bidirectional high-speed digital communications interface, located on a subscriber's or user's premises, and used, for example, for Internet access or other digital communications.

cable television relay service (CARS) station: A fixed or mobile station used for the transmission of television and related audio signals, signals of standard and FM broadcast stations, signals of instructional television fixed stations, and cablecasting from the point of reception to a terminal point from which the signals are distributed to the public. [47CFR]

cable TV (CATV): A broadband communications technology in which multiple television channels, as well as audio and data signals, may be transmitted either one way or bidirectionally through an often hybrid (fiber and coaxial) distribution system to a single or to multiple specific locations. CATV originated in areas where good reception of direct broadcast TV was not possible. Now CATV also consists of a cable distribution system to large metropolitan areas in competition with direct broadcasting. The abbreviation *CATV* originally meant *community antenna television.* However, *CATV* is now usually understood to mean *cable TV.*

cache memory: A buffer, smaller and faster than main storage, used to hold a copy of instructions and data in main storage that are likely to be needed next by the processor and that have been obtained automatically from main storage.

CAD: *Abbreviation for* **computer-aided design.**

call: 1. In communications, any demand to set up a connection. **2.** A unit of traffic measurement. **3.** The actions performed by a call originator. **4.** The operations required to establish, maintain, and release a connection. **5.** To use a connection between two stations. **6.** The action of bringing a computer program, a routine, or a subroutine into effect, usually by specifying the entry conditions and the entry point. **7.** A customer attempt for which complete address information (*e.g.,* 0-, 911, or 10 digits) is provided to the serving dial tone office. [NECA/FCC]

call abandoned: *See* **abandoned call.**

call acceptance: The mechanism that allows a user to be alerted on one terminal and to choose to answer the call on any terminal, not necessarily the one through which alerting took place. [T1.Rpt34-1994]

call accepted signal: A call control signal sent by the called terminal to indicate that it accepts the incoming call.

call associated signaling (CAS): Signaling required for supervision of a bearer service between two end points, including support for the functions of call origination, call delivery,

and handover.

call attempt: In a telecommunications system, a demand by a user for a connection to another user. *Note:* In telephone traffic analysis, call attempts are counted during a specific time frame. The call-attempt count includes all completed, overflowed, abandoned, and lost calls.

call back: [The] procedure for identifying and authenticating a remote information-systems (IS) terminal, whereby the host system disconnects the terminal and reestablishes contact. [INFOSEC-99] *Synonym* **dial back.**

call collision: 1. The contention that occurs when a terminal and data circuit-terminating equipment (DCE) specify the same channel at the same time to transfer a call request and handle an incoming call. *Note:* When call collision occurs, the DCE proceeds with the call request and cancels the incoming call. **2.** The condition that occurs when a trunk or channel is seized at both ends simultaneously, thereby blocking a call. *Synonym* **dual seizure.** *Deprecated synonym* **glare.**

call completion rate: The ratio of successfully completed calls to the total number of attempted calls. *Note:* This ratio is typically expressed as either a percentage or a decimal fraction.

call control character: One of a set of control characters used in call-control signaling. *Note:* The signals representing call control characters may be used under defined conditions on interchange circuits other than the originating circuit.

call control function (CCF): The network intelligence that provides call/connection processing and control. [T1.667-1999]

call control signal: A member of the set of network management signals used to establish, maintain, or release a call.

call data channel (CDC): The logical link between the device performing an electronic surveillance access function and the LEA (law enforcement agency) that primarily carries call-identifying information. [T1.260-1998]

call delay: 1. The delay that occurs when a call arrives at an automatic switching device and no channel or facility is immediately available to process the call. **2.** The time between the instant a system receives a call attempt and the instant of initiation of ringing at the call receiver end instrument.

call detail recording (CDR): A service feature in which call data on a specific telephone extension or group of subscribers are collected and recorded for cost-of-service accounting purposes.

call duration: 1. The time between (a) the instant a connection, *i.e.,* off-hook condition at each end, is established between the call originator and the call receiver and (b) the instant the call originator or the call receiver terminates the call. **2.** In data transmission, the duration of the information transfer phase of an information transfer transaction.

called-line identification facility: A network-provided service feature in which the network notifies a calling terminal of the address to which the call has been connected.

called-line identification signal: A sequence of characters transmitted to the calling terminal to permit identification of the called line.

called party: *Synonym* **call receiver.**

called-party camp-on: A communication system service feature that enables the system to complete an access attempt in spite of issuance of a user blocking signal. *Note:* Systems that provide this feature monitor the busy user until the user blocking signal ends, and then proceed to complete the requested access. This feature permits holding an incoming call until the called party is free.

caller ID: A network service feature that permits the recipient of an incoming call to determine, even before answering, the number from which the incoming call is being placed.

caller identification: *See* **caller ID.**

caller's emergency service identification (CESID): The number used to identify the calling terminal within the context of the emergency service call. [T1.414-1998]

call-failure signal: A signal sent in the backward direction indicating that a call cannot be completed because of a time-out, a fault, or a condition that does not correspond to any other particular signal.

call forwarding: A service feature, available in some switching systems, whereby calls can be rerouted automatically from one line, *i.e.,* station number, to another or to an attendant. *Note:* Call forwarding may be implemented in many forms.

call hold: A service feature in which a user may retain an existing call while accepting or originating another call using the same end instrument.

call identifier: A network utility that consists of a name assigned by the originating network for each established or partially established virtual call. *Note:* When a call identifier is used in conjunction with the calling data terminal equipment (DTE) address, the call identifier uniquely identifies the virtual call.

calling frequency: A radio frequency that a station uses to call another station.

calling line identification (CLI): At a minimum, the calling line identification includes a single calling party number; it may also include a second calling party number, a calling party subaddress, and redirecting number information. Calling line identification may not include any calling party number due to interworking, or because of an interaction with the CLIR supplementary service. [T1.625-1993]

calling-line identification facility: A network-provided service feature in which the network notifies a called terminal of the address from which the call has originated.

calling-line identification signal: A sequence of characters transmitted to the called terminal to permit identification of the calling line.

calling party: *Synonym* **call originator.**

calling-party camp-on: A service feature that enables the system to complete an access attempt in spite of temporary unavailability of system transmission or switching facilities required to establish the requested access. *Note:* Systems that provide calling party camp-on monitor the system facilities until the necessary facilities become available, and then proceed to complete the requested access. Such systems may or may not issue a system blocking signal to apprise the originating user of the access delay.

calling party number (CPN): A set of digits and related indicators (type of number, numbering, plan identification, screening indicator, presentation indicator) that provide numbering information related to the calling party. [T1.625-1993]

calling rate: The number of telephone calls originated during a specified time interval such as one hour.

calling sequence: A sequence of instructions together with any associated data necessary to perform a call.

calling signal: A call control signal transmitted over a circuit to indicate that a connection is desired.

call intensity: *Synonym* **traffic intensity.**

call management: 1. In telegraphy, route selection, signaling, and circuit usage and availability for a call. **2.** In universal personal telecommunications, the ability of a user to inform the network how to handle incoming calls in accord with certain parameters, such as the call originator, the time of day, and the nature of the call. *Note:* Call management is accomplished by means of information in the user's service profile.

call-not-accepted signal: A call control signal sent by the called terminal to indicate that it does not accept the incoming call.

call originator: An entity, such as a person, equipment, or program that originates a call. *Synonym* **calling party.**

call pickup: A service feature of some switching systems enabling a user, by dialing a predetermined code, to answer incoming calls that are directed to another user in a preselected call group.

call processing: 1. The sequence of operations performed by a switching system from the acceptance of an incoming call through the final disposition of the call. **2.** The end-to-end sequence of operations performed by a network from the instant a call attempt is initiated until the instant the call release is completed. **3.** In data transmission, the operations required to complete all three phases of an information transfer transaction.

call-processing state: A call state during which the network establishes a communications path between the caller and the public safety answering point (PSAP) customer installation (CI). [T1.414-1998]

call progress signal: 1. A call control signal transmitted by the called data circuit-terminating equipment (DCE) to the calling data terminal equipment (DTE) to report (a) the progress of a call by using a positive call progress signal or (b) the reason why a connection could not be established by using a negative call progress signal. **2.** A voiceband tone that is applied to the network interface (NI) by the customer installation (CI) to indicate the status of CI handling of a call attempt. [T1.405-1989]

call progress tone: An audible signal returned by a network to a call originator to indicate the status of a call. *Note:* Examples of call progress tones include dial tones and busy signals.

call receiver: An entity, such as a person, equipment, or program to which a call is directed. *Synonym* **called party.**

call record: Recorded data pertaining to a single call.

call release time: In communication systems, the time interval from initiation of a clearing signal by a terminal until the available-line condition appears on originating terminal equipment.

call-request time: In the establishment of a connection or in the call setup, *i.e.* , placement of a call, the time from the initiation of a calling signal to the receipt of a proceed-to-select signal--such as a dial tone--by the call originator.

call restriction: A switching system service feature that prevents selected terminals from exercising one or more service features otherwise available from the switching system.

calls-barred facility: A service feature that permits a terminal either to make outgoing calls or to receive incoming calls, but not both.

call-second: A unit used to measure communications traffic. *Note 1:* A call-second is equivalent to 1 call 1 second long. *Note 2:* One user making two 75-second calls is equivalent to two users each making one 75-second call. Each case produces 150 call-seconds of traffic. *Note 3:* The CCS, equivalent to 100 call-seconds, is often used. *Note 4:* 3600 call-seconds = 36 CCS = 1 call-hour. *Note 5:* 3600 call-seconds per hour = 36 CCS per hour = 1 call-hour per hour = 1 erlang = 1 traffic unit.

call segment: A specific portion of the processing of a call. [T1.667-1999]

call-selection time: In the establishment of a connection or the placement of a call, the time from the receipt by the call originator of a proceed-to-select signal (dial tone), until all the selection signals have been transmitted (dialing has been completed).

call set-up error probability: The ratio of total call attempts that result in call set-up error to the total call attempts in a population of interest. [T1.504-1989]

call set-up failure probability: The ratio of total call attempts that result in call set-up failure to the total call attempts in a population of interest. [T1.504-1989]

call set-up time: 1. The overall length of time required to establish a circuit-switched call between users. **2.** For data communication, the overall length of time required to establish a circuit-switched call between terminals; *i.e.,* the time from the initiation of a call request to the beginning of the call message. *Note:* Call set-up time is the summation of: (a) call request time--the time from initiation of a calling signal to the delivery to the caller of a proceed-to-select signal; (b) selection time--the time from the delivery of the proceed-to-select signal until all the selection signals have been transmitted; and (c) post selection time--the time from the end of the transmission of the selection signals until the delivery of the call-connected signal to the originating terminal.

call sign: A station or address designator represented by a combination of characters or pronounceable words that is used to identify such entities as a communications facility, station, command, authority, activity, or unit.

call-sign allocation plan: The table of allocation of international call sign series contained in the current edition of the *International Telecommunication Union (ITU) Radio Regulations. Note:* In the table of allocation, the first two characters of each call sign (whether two letters or one number and one letter, in that order) identify the nationality of the station. In certain instances where the complete alphabetical block is allocated to a single nation, the first letter is sufficient for national identity. Individual assignments are made by appropriate national assignment authorities from the national allocation. [47CFR]

call spill-over: In common-channel signaling, the effect on a traffic circuit of the arrival at a switching center of an abnormally delayed call control signal relating to a previous call, while a subsequent call is being set up on the circuit.

call splitting: A switching system service feature that allows a switch attendant to talk privately in either direction on an established call.

call tracing: A procedure that permits an entitled user to be informed about the routing of data for an established connection, identifying the entire route from the origin to the destination. *Note:* There are two types of call tracing. Permanent call tracing permits tracing of all calls. On-demand call tracing permits tracing, upon request, of a specific call, provided that the called party dials a designated code immediately after the call to be traced is disconnected, *i.e.,* before another call is received or placed.

call transfer: A switching system service feature that allows the calling or called user to instruct the local switching equipment or switch attendant to transfer an existing call to another terminal. *Note:* Call transfer may be available on a call-by-call basis or on a semipermanent basis.

call waiting: In telephony, a service feature that provides an indication to a terminal already engaged in an established call that one or more calls are awaiting connection.

CAMA: *Acronym for* **centralized automatic message accounting.**

camcorder: A combination of camera and video tape recorder in one device. *Note:* Camcorders permit easy and rapid photography and recording simultaneously. Camcorders are available in most home video formats: 8mm, Hi-8, VHS, VHS-C, S-VHS, *etc.* [After Silicon]

camp-on: *See* **automatic callback, called-party camp-on, queue traffic.**

camp-on busy signal: 1. A signal that informs a busy telephone user that another call originator is waiting for a connection. **2.** A teleprinter exchange facility signal that automatically causes a calling station to retry the call-receiver number after a given interval when the call-receiver teleprinter is occupied or the circuits are busy. *Synonym* **speed-up tone.**

camp-on-with-recall: A camp-on with the release of the call-originator terminal until the called-receiver terminal becomes free. *Note:* The call originator can thus establish other calls until the recall signal is obtained, rather than simply wait until the call-receiver line is available.

CAN: *Abbreviation for* **cancel character.**

Canadian Standards Association (CSA): An independent, nongovernment, not-for-profit association for the development, by consensus, of Canadian standards and product certification.

cancel character (CAN): 1. A control character used by some conventions to indicate that the data with which it is associated are in error or are to be disregarded. **2.** An accuracy control character used to indicate that the data with which it is associated are in error, are to be disregarded, or cannot be represented on a particular device.

candela: The luminous intensity in a specified direction, of a monochromatic source which has a frequency of 540×10^{12} Hz and which has a radiant intensity, in the specified direction, of (1/683) watt per steradian.

canonical name: A domain name of an Internet resource indicating its type or its capabilities. *Note:* One Internet resource may have a set of different domain names, one of which is the preferred one. Example: www.isi.edu denotes a host containing a Web server. [2382-pt.35]

capability code: *Synonym* **alias point code.**

capacitive coupling: The transfer of energy from one circuit to another by means of the mutual capacitance between the circuits. *Note 1:* The coupling may be deliberate or inadvertent. *Note 2:* Capacitive coupling favors transfer of the higher frequency components of a signal, whereas inductive coupling favors lower frequency components, and conductive coupling favors neither higher nor lower frequency components.

capacity: *See* **channel capacity, traffic capacity.**

capture effect: A phenomenon, associated with FM reception, in which only the stronger of two signals at or near the same frequency will be demodulated. *Note 1:* The complete suppression of the weaker signal occurs at the receiver limiter, where it is treated as noise and rejected. *Note 2:* When both signals are nearly equal in strength, or are fading independently, the receiver may switch from one to the other. *Synonym* **FM capture effect.**

cardinal radial: Eight imaginary straight lines extending radially on the ground from an antenna location in the following azimuths with respect to true North: 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°. [47CFR] *Note:* The four radials at 0°, 90°, 180°, and 270° of azimuth with respect to true North are referred to as the cardinal points. The cardinal points are equivalent to true north, east, south, and west.

card session: In telephone-service security, a link between the card and a terminal starting with the answer to reset (ATR) and ending with a subsequent reset or a deactivation of the card. [T1.707-1998]

card validation: The validating process that includes, but is not limited to, ensuring that a telecommunications charge card has been assigned by the card issuer and that the personal identification number matches the one assigned to that account. [T1.230-1992]

carrier: In a frequency stabilized system, the sinusoidal component of a modulated wave whose frequency is independent of the modulating wave; or the output of a transmitter when the modulating wave is made zero; or a wave generated at a point in the transmitting system and subsequently modulated by the signal; or a wave generated locally at the receiving terminal which when combined with the side bands in a suitable detector, produces the modulating wave. [47CFR] *Synonym* **common carrier.**

carrier access code (CAC): A code (dialed by the user) to select a specific service provided by the entity to which the code is assigned by the NANPA (North American Numbering Plan Administration); the code used is either 10XXX or 101XXXX where the Xs represent the 3- or 4-digit code that was assigned. The originating switch uses the code to route the call to a specific trunk group.

carrier (cxr): 1. A wave suitable for modulation by an information-bearing signal. **2.** An unmodulated emission. *Note:* The carrier is usually a sinusoidal wave or a uniform or predictable series of pulses. *Synonym* **carrier wave. 3.** Sometimes employed as a *synonym for* **carrier system.**

carrier dropout: A short-duration loss of carrier signal.

carrier facility system: A transmission facility that provides several telecommunication channels over a single bidirectional path. A carrier facility system generally consists of multiplex equipment at two terminal locations and an interconnecting path consisting of: (a) a higher level facility system; (b) a facility assembly, or (c) combinations of carrier facility systems and facility assemblies. [T1.238-1994/97]

carrier frequency: 1. The nominal frequency of a carrier wave. **2.** In frequency modulation, *synonym* **center frequency. 3.** The frequency of the unmodulated electrical wave at the output of an amplitude modulated (AM), frequency modulated (FM), or phase modulated (PM) transmitter. [47CFR] **4.** The output of a transmitter when the modulating wave is made zero. [47CFR]

carrier identification code (CIC): 1. A numeric code assigned by the North American Numbering Plan (NANP) Administrator for the provisioning of selected switched services. The numeric code is unique to each entity and is used by the telephone company to route the call to the trunk group designated by the entity to which the code was assigned. [FCC] **2.** A 4-digit code that controls the routing applied to a call by the originating switch. [FCC]

carrier leak: The carrier remaining after carrier suppression in a suppressed carrier transmission system. *Note:* Sometimes the residual carrier is used to provide the reference for an automatic frequency control system.

carrier level: The level of a carrier signal at a specified point in a communications system. *Note:* The carrier level is usually expressed in dB relative to a specified reference level.

carrier multiplex: *See* **frequency-division multiplexing.**

carrier noise level: The noise level resulting from undesired variations of a carrier in the absence of any intended modulation. *Synonym* **residual modulation.**

carrier power (of a radio transmitter): 1. The average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle taken under the condition of no modulation. [NTIA] [RR] *Note:* The concept does not apply to pulse modulation or frequency-shift keying. **2.** The average unmodulated power supplied to a transmission line.

carrier selection: A code that identifies whether the caller dialed the elected or chosen carrier and whether the caller presubscribed to the elected or chosen carrier. [T1.667-1999]

carrier sense: In a local area network, an ongoing activity of a data station to detect whether another station is transmitting.

carrier sense multiple access (CSMA): A network control scheme in which a node verifies the absence of other traffic before transmitting.

carrier sense multiple access with collision avoidance (CSMA/CA): A network control protocol in which (a) a carrier sensing scheme is used, (b) a data station that intends to transmit sends a jam signal, (c) after waiting a sufficient time for all stations to receive the jam signal, the data station transmits a frame, and (d) while transmitting, if the data station detects a jam signal from another station, it stops transmitting for a random time and then tries again.

carrier sense multiple access with collision detection (CSMA/CD): A network control protocol in which (a) a carrier sensing scheme is used and (b) a transmitting data station that detects another signal while transmitting a frame, stops transmitting that frame, transmits a jam signal, and then waits for a random time interval before trying to send that frame again.

carrier shift: 1. In the transmission of binary or teletypewriter signals, keying in which the carrier frequency is shifted in one direction for marking signals and in the opposite direction for spacing signals. **2.** In amplitude modulation, a condition that results from imperfect modulation in which the positive and negative excursions of the modulating envelope are unequal in amplitude. *Note 1:* The carrier shift results in a change in carrier power. *Note 2:* The carrier shift may be a shift to a higher or to a lower frequency.

carrier suppression: *See* **suppressed carrier transmission.**

carrier synchronization: In a radio receiver, the generation of a reference carrier with a phase closely matching that of a received signal.

carrier system: A multichannel telecommunications system in which a number of individual circuits (data, voice, or combination thereof) are multiplexed for transmission between nodes of a network. *Note 1:* In carrier systems, many different forms of multiplexing may be used, such as time-division multiplexing and frequency-division multiplexing. *Note 2:* Multiple layers of multiplexing may ultimately be performed upon a given input signal; *i.e.,* the output resulting from one stage of modulation may in turn be modulated. *Note 3:* At a given node, specified channels, groups, supergroups, *etc.,* may be demultiplexed without demultiplexing the others. *Synonym [loosely]* **carrier.**

carrier-to-noise ratio (CNR): In radio receivers, the ratio of the level of the carrier to that of the noise in the intermediate frequency (IF) band before any nonlinear process, such as amplitude limitation and detection, takes place. *Note:* The CNR is usually expressed in dB.

carrier-to-receiver noise density (C/kT): In satellite communications, the ratio of the received carrier power to the receiver noise power density. *Note 1:* The carrier-to-receiver noise density ratio is usually expressed in dB. *Note 2:* The carrier-to-receiver noise density is given by C/kT, where C is the received carrier power in watts, k is Boltzmann's constant in joules per kelvin, and T is the receiver system noise temperature in kelvins. *Note 3:* The receiver noise power density, kT, is the receiver noise power per hertz.

carrier wave: *Synonym* **carrier (cxr).**

CARS: *Acronym for* **cable television relay service (CARS) station.**

Carson bandwidth rule: A rule defining the approximate bandwidth requirements of communications system components for a carrier signal that is frequency modulated by a continuous or broad spectrum of frequencies rather than a single frequency. *Note 1:* The Carson bandwidth rule is expressed by the relation CBR = $2(\Delta f + f_m)$ where CBR is the bandwidth requirement, Δf is the carrier peak deviation frequency, and f_m is the highest modulating frequency. *Note 2:* The Carson bandwidth rule is often applied to transmitters, antennas, optical sources, receivers, photodetectors, and other communications system components.

CAS: *Abbreviation for* **centralized attendant services.**

cascade: 1. A series of reply posts to a message on a bulletin board system. **2.** An offset stack of (usually) active windows displayed on a computer screen. **3.** A connected series of essentially identical electronic circuits (for example, as might be used in serial-parallel converters).

CASE: *Acronym for* **computer-aided software engineering, computer-aided systems engineering.** Software used for the automated development of systems software, *i.e.* , computer code. *Note 1:* CASE functions include analysis, design, and programming. *Note 2:* CASE tools automate methods for designing, documenting, and producing structured computer code in the desired programming language.

case shift: 1. In data equipment, the change from letters to other characters, or vice versa. **2.** In typewriting or typesetting, the change from lower case letters to upper case letters, or vice versa.

CASE technology: Technology that makes use of computer assisted software engineering (CASE) to enhance the development of systems design and development.

Cassegrain antenna: An antenna in which the feed radiator is mounted at or near the surface of a concave main reflector and is aimed at a convex secondary reflector slightly inside the focus of the main reflector. *Note 1:* Energy from the feed unit illuminates the secondary reflector, which reflects it back to the main reflector, which then forms the desired forward beam. *Note 2:* The Cassegrain antenna design is adapted from optical telescope technology and allows the feed radiator to be more easily supported.

catastrophic degradation: The rapid reduction of the ability of a system, subsystem, component, equipment, or software to perform its intended function. *Note:* Catastrophic degradation usually results in total failure to perform any function.

Category 3: The ANSI/EIA/TIA-568 designation for 100-ohm unshielded twisted-pair cables and associated connecting hardware whose characteristics are specified for data transmission up to 16 Mb/s.

Category 4: The ANSI/EIA/TIA-568 designation for 100-ohm unshielded twisted-pair cables and associated connecting hardware whose characteristics are specified for data transmission up to 20 Mb/s.

Category 5: The ANSI/EIA/TIA-568 designation for 100-ohm unshielded twisted-pair cables and associated connecting hardware whose characteristics are specified for data transmission up to 100 Mb/s.

CATV: *Abbreviation for* **cable TV.**

CAV: *Abbreviation for* **component analog video.** A signal in which an analog voltage or current, rather than a set of numbers, represents the value of a pixel. *Synonym* **analog component.** [After Silicon]

cavity: A volume defined by conductor-dielectric or dielectric-dielectric reflective boundaries, or a combination of both, and having dimensions designed to produce specific

interference effects (constructive or destructive) when excited by an electromagnetic wave.

C-band: 1. *Loosely,* the group of microwave frequencies from 4 GHz to 6 GHz used in satellite communications. **2.** The band of satellite downlink frequencies between 3.7 and 4.2 GHz. *Note 1:* For federal procurement purposes, the radio frequency band(s) must be specified using the upper and lower limits of the band, per 47 CFR 300. *Note 2:* Letter designators of radio frequency bands are imprecise, and in the international community are deprecated and obsolete.

CCD: *Abbreviation for* **charge coupled device.** A semiconductor image-sensing device that (a) is usually in the form of a plane rectangular matrix of microscopic, individual sensing elements, each of which corresponds to an image pixel, (b) is placed at the focal plane of an optical imaging system, and (c) converts the optical image into electrical signals which represent the information contained within each pixel, and which may be extracted sequentially and stored or otherwise processed in digital form for the purpose of transmitting or storing a digital representation of the optical image. *Note:* CCDs are commonly used as image sensors in professional and consumer television cameras and camcorders, and as image sensors in digital still cameras.

CCH: *Abbreviation for* **connections per circuit hour.**

CCIP: *Abbreviation for* **Commission on Critical Infrastructure Protection.** *See* **Critical Infrastructure.**

CCIR: *Abbreviation for* International Radio Consultative Committee, a predecessor organization of the ITU-R.

CCIS: *Abbreviation for* **common-channel interoffice signaling.**

CCITT: *Abbreviation for* International Telegraph and Telephone Consultative Committee; a predecessor organization of the ITU-T.

CCS: *Abbreviation for* **hundred call-seconds.** *See* **call-second.**

CCSA: *Abbreviation for* **common control switching arrangement.**

CCTV: *Abbreviation for* **closed-circuit TV.** *See* **closed circuit.**

CDF: *Abbreviation for* **combined distribution frame.**

CD-i: *Abbreviation for* **compact disc-interactive.** A compact disc format that provides audio, digital data, still graphics, and limited motion video, and that accepts variable user input to generate correspondingly variable output. [After Silicon]

CDMA: *Abbreviation for* **code-division multiple access.**

CDPSK: *Abbreviation for* **coherent differential phase-shift keying.**

CDR: *Abbreviation for* **call detail recording.**

CD ROM: *Abbreviation for* **compact disk read-only memory.** An optical digital storage device, of high capacity, capable of being read from but not written to.

CD ROM XA: *Abbreviation for* **compact disc read only memory eXtended architecture.** An extension of the CD-ROM standard, billed as a hybrid of CD ROM and CD-IS formats. *Note:* The extension adds ADPCM audio to permit the interleaving of sound and video data to animation and with sound synchronization. It is a component in the design of advanced multimedia computers. [After Silicon]

C-E: *Abbreviation for* **communications-electronics.**

CEI: *Abbreviation for* **comparably efficient interconnection.**

cell: 1. In cellular mobile, the geographical area covered by the smaller of: a base station, or a subsystem (sector antenna) of that base station corresponding to a specific logical identification on the radio path. *Note:* Mobile stations in a cell may be reached by the corresponding radio equipment of the base station. **2.** The service area of an individual transmitter location in a cellular system. [47CFR] **3.** In communications, a string that contains a header and user information. *Note 1:* A cell is dedicated to one user for one session. Cells for a given system are usually of fixed length and smaller than a frame, such as 424 bits for a cell, compared to 1024 for a frame. *Note 2:* In asynchronous transfer mode (ATM) systems, a cell consists of 53 bytes, *i.e.,* a 5-byte header field and a 48-byte information field. *Note 3:* A cell does not have error-correction capability and is therefore suited for low-BER communications systems, such as digital fiber optic systems. **4.** In OSI, a fixed-length block labeled at the Physical Layer of the Open Systems Interconnection--Reference Model (OSI--RM). **5.** In computer systems, an addressable, internal hardware location. **5.** In computer applications, a single location on a spreadsheet.

cell delay variation: A quantification of variability in cell delay for an asynchronous transfer mode (ATM) layer connection. [T1.630-1999]

cell delineation: The identification of the asynchronous transfer mode (ATM) cell boundaries within a cell stream. [T1.646-1995]

cell header: Asynchronous transfer mode (ATM) layer protocol control information that precedes user data. [After T1.627-1993]

cell loss ratio: 1. In a network, the ratio $(1 - x/y)$, where: y is the number of cells that arrive in an interval at the ingress of the network; and x is the number of these y cells that leave at the egress of the network. [T1.627-1993] **2.** In a network element, the ratio $(1 - x/y)$, where y is the umber of cells that arrive in an interval at the ingress of the network element; and x is the number of these y cells that leave at the egress of the network element. [T1.627-1993]

cell relay: A statistically multiplexed interface protocol for packet switched data communications that uses fixed-length packets, *i.e.,* cells, to transport data. *Note 1:* Cell relay transmission rates usually are between 56 kb/s and 1.544 Mb/s, *i.e.,* the data rate of a DS1 signal. *Note 2:* Cell relay protocols (a) have neither flow control nor error correction capability, (b) are information-content independent, and (c) correspond only to layers one and two of the ISO Open Systems Interconnection--Reference Model. *Note 3:* Cell relay systems enclose variable-length user packets in fixed-length packets, *i.e.,* cells, that add addressing and verification information. Frame length is fixed in hardware, based on time delay and user packet-length considerations. One user data message may be segmented over many cells. *Note 4:* Cell relay is an implementation of fast packet technology that is used in (a) connection-oriented broadband integrated services digital networks (B-ISDN) and (b) connectionless IEEE 802.6, switched multi-megabit data service (SMDS). *Note 5:* Cell relay is used for time-sensitive traffic such as voice and video.

cellular mobile: A mobile communications system that uses a combination of radio transmission and conventional telephone switching to permit telephone communication to and from mobile users within a specified area. *Note:* In cellular mobile systems, large geographical areas are segmented into many smaller areas, *i.e.,* cells, each of which has its own radio transmitters and receivers and a single controller interconnected with the public switched telephone network. *Synonyms* **cellular phone, cellular radio, cellular telephone.**

cellular phone: *Synonym* **cellular mobile.**

cellular radio: *Synonym* **cellular mobile.**

cellular technology: In telephony, a generic term for all wireless phones, regardless of the technology they use; the term derives from cellular base stations that receive and transmit

calls. Both cellular and PCS phones use cellular technology. [After the FCC] *Note:* The strategically placed rf base stations have limited, usually overlapping coverage areas (cells) that serve to connect mobile, usually small handheld radio tranceivers (cellular mobile telephones (called "cell phones") to the public switched telephone network. When necessary, based on the rf signal strength from a given moving cell phone, calls in progress may be automatically switched via landlines from one cell to another, to maintain the connection.

cellular telephone: *Synonym* **cellular mobile.**

CELP: *Acronym for* **code-excited linear prediction.**

center frequency: 1. In frequency modulation, the rest frequency, *i.e.,* the frequency of the unmodulated carrier. *Synonym* **carrier frequency. 2.** The frequency of the middle of the bandwidth of a channel. [47CFR] **3.** In facsimile systems, the frequency midway between the picture-black and picture-white frequencies.

centralized attendant services (CAS): A function of a usually centrally located attendant console that permits the control of multiple switches, some of which may be geographically remote.

centralized automatic message accounting (CAMA): An automatic message accounting system that serves more than one switch from a central location. *Note:* When using CAMA, human intervention may be required.

centralized operation: Operation of a communication network in which transmission may occur between the control station and any tributary station, but not between tributary stations.

centralized ordering group (COG): An organization provided by some communications service providers to coordinate services between the companies and vendors.

central office (C.O.): 1. A common carrier switching center in which trunks and/or loops are terminated and switched. *Note:* In the DOD, "common carrier" is called "commercial carrier." *Synonym* **switch.** *Other synonyms [loosely]* **end office, exchange, local central office, local exchange, local office, switching center** (except in DOD DSN [formerly AUTOVON] usage), **switching exchange, telephone exchange. 2.** A switching unit, in a telephone system which provides service to the general public, having the necessary equipment and operations arrangements for terminating and interconnecting subscriber lines and trunks or trunks only. There may be more than one central office in a building. [47 CFR Pt.36-A]

central office connecting facility: *Loosely* , in the sense of a trunk between public and private switches, *a synonym for* **central office trunk.** *See* **trunk.**

central office prefix: The first three digits (NXX) of the seven-digit telephone number assigned to a customer's telephone exchange service when dialed on a local basis. [NECA/FCC] *Synonym [loosely]* **prefix.**

central office trunk: *Loosely* , in the sense of a trunk between public and private switches, *a synonym for* **central office connecting facility.** *See* **trunk.**

central processing unit: *See* **CPU.**

central processor: *Synonym* **CPU.**

Centrex® (CTX) service: A service offered by Bell Operating Companies that provides functions and features comparable to those provided by a PBX or a PABX. *Note: "Centrex ® C.O."* indicates that all equipment except the attendant's position and station equipment is located in the central office. *"Centrex ® C.U."* indicates that all equipment, including the dial switching equipment, is located on the customer's premises.

certificate: 1. In cryptography, the public key and the identity of an entity, with other information, rendered unforgeable by digitally signing the entire information with the private key of the issuing certification authority. [After X9.42] *Synonym* **digital certificate. 2.** [A] record holding security information about an information-system (IS) user and vouches to the truth and accuracy of the information it contains. [INFOSEC-99]

certificate hold: In cryptography, an order suspending the use of a certificate. *Note:* A certificate hold is a security procedure that is analogous to placing a hold on a bank account to prevent the fraudulent use of the account (including the transfer of funds from that account).

certificate information: In cryptography, the information in a certificate which is signed. [After X9.57]

certificate management: [The] process whereby certificates . . . are generated, stored, protected, transferred, loaded, used, and destroyed. [INFOSEC-99]

certificate revocation list: *See* **CRL.**

certificate serial number: In cryptography, an integer value that is (a) unique within the issuing certificate authority (CA), and (b) unambiguously associated with a certificate issued by that CA. [After X.509]

certificate user: In cryptography, a station, agency, or individual user that needs to know, with certitude, the public key of another entity. [After X.509]

certification: [The] comprehensive evaluation of the technical and nontechnical security features of an IS [information system] and other safeguards, made as a part of and in support of the accreditation process, to establish the extent to which a particular design and implementation meets a set of specified security requirements. [INFOSEC-99]

certification agent: [The] individual responsible for making a technical judgment of the system's compliance with stated requirements, identifying and assessing the risks associated with operating the system, coordinating the certification activities, and consolidating the final certification and accreditation packages. [INFOSEC-99]

certification authority (CA): 1. In cryptography, a center trusted by one or more agencies or individuals to create and assign certificates and, optionally, to create user's keys. [After X9.31] **2.** In secure communications, a trusted person or entity who issues certificates (also called "public- key certificates") for encryption purposes. **3.** An independent party identifying and certifying payers and payees for real-time credit card transactions in electronic commerce. [Mattila] **4.** Third level of the Public Key Infrastructure (PKI)Certification Management Authority responsible for issuing and revoking user certificates, and exacting compliance to the PKI policy as defined by-the parent Policy Creation Authority (PCA). [INFOSEC-99]

certification path: In cryptography, the ordered sequence of entity certificates that can be processed, with the public key of the initial entity in the path, to determine the public key of the final entity in the path. [After X9.57]

certified network engineer: In computer networking, one who has met proprietary training and certification requirements pertinent to network design or maintenance. *Note:* The training requirements embrace both software and hardware configuration.

cesium clock: A clock containing a cesium standard as a frequency-determining element.

cesium standard: A primary frequency standard in which electronic transitions between the two hyperfine ground states of cesium-133 atoms control the output frequency. *Note 1:* The difference between the energy levels of the two hyperfine ground states of the cesium-133 atom corresponds, in the absence of external influences (*e.g.* , the magnetic field of the Earth), to electromagnetic radiation having a frequency of precisely 9,192,631,770 Hz (microwave regime). *Note 2:* The preceding is exact because by internationally recognized (SI)

definition, the second is the interval required for 9,192,631,770 cycles of this radiation to occur in the absence of external influences. A very slightly higher, but known and controlled, transition rate occurs in realizeable cesium standards, making the second by far the most precisely determined SI base unit.

CGA: *Abbreviation for* **color graphics adapter.** A low-resolution video display standard, having a pixel resolution of 320 x 200. [After Silicon]

CGI: 1. *Abbreviation for* **common gateway interface.** A means for allowing programs or scripts (usually written in C++ or Perl) to add functionality to the World Wide Web. *Note:* Examples are search engines, feedback forms, and guestbooks. [Bahorsky] **2.** *Abbreviation for* **computer graphics interface.**

cgm: *Abbreviation for* **computer graphics metafile.** A digital file format (standard) used for the storage or transmission of digital representations of graphics (*i.e.* , images). *Note:* The cgm format (indicated by the filename extension ".cgm") is used most by CAD programs.

chain letter: *Synonym (in cryptosystems)* **bacterium.**

challenge and reply authentication: [A] prearranged procedure in which a subject requests authentication of another, and the latter establishes validity with a correct reply. [INFOSEC-99]

change back: The procedure of transferring signaling traffic from alternative signaling link(s) to the signaling link which has become available as a result of having been restored, uninhibited, or unblocked. This procedure performs actions opposite to changeover. [T1.226-1992]

changeover: The procedure of transferring signaling traffic from one signaling link to one or more different signaling links, when the link in use fails or is required to be cleared of traffic. [T1.110-1987]

channel: 1. A connection between initiating and terminating nodes of a circuit. **2.** A single path provided by a transmission medium via either (a) physical separation, such as by multipair cable or (b) electrical separation, such as by frequency- or time-division multiplexing. **3.** A path for conveying electrical or electromagnetic signals, usually distinguished from other parallel paths. **4.** Used in conjunction with a predetermined letter, number, or codeword to reference a specific radio frequency. **5.** The portion of a storage medium, such as a track or a band, that is accessible to a given reading or writing station or head. **6.** In a communications system, the part that connects a data source to a data sink. **7.** A virtual area where Internet Relay Chat (IRC) users communicate (exchanging text messages) in real time. *Note:* There are thousands of channels located on the Internet. **8.** An IRC conduit designated for the real-time exchange of text messages. [Bahorsky] **9.** An electrical path suitable for the transmission of communications between two or more points, ordinarily between two or more stations or between channel terminations in Telecommunication Company central offices. A channel may be furnished by wire, fiber optics, radio or a combination thereof. [47 CFR Pt.36-A] **10.** The portion of the electromagnetic spectrum assigned by the FCC for one emission. In certain circumstances, however, more than one emission may be transmitted on a channel. [47CFR]

channel-associated signaling: Signaling in which the signals necessary to switch a given circuit are transmitted via the circuit itself or via a signaling channel permanently associated with it.

channel bank: The part of a carrier-multiplex terminal that performs the first step of modulation by multiplexing a group of channels into a higher bandwidth analog channel or higher bit-rate digital channel and, conversely, demultiplexes these aggregates back into individual channels.

channel bits: Binary data transmitted over a communications link. *Note:* Channel bits are derived from user information by FEC (forward error correction) coding and interleaving.

channel capacity: The maximum possible information transfer rate through a channel, subject to specified constraints.

channel gate: A device for connecting a channel to a highway, or a highway to a channel, at specified times.

channeling: An application of push technology that allows users to automatically receive specific kinds of content. [Bahorsky]

channelization: The use of a single wideband, *i.e.,* high-capacity, facility to create many relatively narrowband, *i.e.,* lower capacity, channels by subdividing the wideband facility.

channel noise level: 1. The ratio of the channel noise at any point in a transmission system to an arbitrary level chosen as a reference. *Note 1:* The channel noise level may be expressed in (a) dB above reference noise (dBrn), (b) dB above reference noise with C-message weighting (dBrnC), or (c) adjusted dB (dBa). *Note 2:* Each unit used to measure channel noise level reflects a circuit noise reading of a specialized instrument designed to account for different interference effects that occur under specified conditions. **2.** The noise power density spectrum in the frequency range of interest. **3.** The average noise power in the frequency range of interest.

channel offset: The constant frequency difference between a channel frequency and a reference frequency which may frequency hop.

channel packing: Maximizing the use of voice frequency channels for data transmission by multiplexing a number of channels of lower data rate into a single voice frequency channel of higher data rate.

channel reliability (ChR): The percentage of time a channel was available for use in a specified period of scheduled availability. *Note 1:* Channel reliability is given by

$$ChR = 100\left(1 - \frac{T_o}{T_s}\right) = 100\frac{T_a}{T_s},$$

where T_o is the channel total outage time, T_s is the channel total scheduled time, and T_a is the channel total available time. *Note 2:* $T_s = T_a + T_o$.

channel service unit (CSU): A line bridging device that (a) is used to perform loop-back testing, (b) may perform bit stuffing, (c) may also provide a framing and formatting pattern compatible with the network, and (d) is the last signal regeneration point, on the loop side, coming from the central office, before the regenerated signal reaches a multiplexer or data terminal equipment (DTE).

channel supergroup: *See* **group.**

channel time slot: A time slot that starts at a particular instant in a frame and is allocated to a channel for transmitting data, such as a character or an in-slot signal.

character: 1. A letter, digit, or other symbol that is used as part of the organization, control, or representation of data. **2.** One of the units of an alphabet.

character check: A method of error detection using the preset rules for the formulation of characters.

character-count integrity: The preservation of the exact number of characters that are originated in a message in the case of message communications, or per unit time, in the case of a user-to-user connection. *Note:* Character-count integrity is not the same as character integrity, which requires that the characters delivered are, in fact, exactly the same as they

were originated.

character filter: Software that is capable of selectively removing characters from a data stream, *e.g.* , software that removes communications-control characters so that they are not printed.

character generator: A functional unit that converts the coded representation of a character into the graphic representation of the character for display.

character integrity: Preservation of a character during processing, storage, and transmission.

character interval: In a communications system, the total number of unit intervals required to transmit any given character, including synchronizing, information, error checking, or control characters, but not including signals that are not associated with individual characters. *Note:* An example of a time interval that is excluded when determining character interval is any time added between the end of a stop signal and the beginning of the next start signal to accommodate changing transmission conditions, such as a change in data signaling rate or buffering requirements. This added time is defined as a part of the intercharacter interval.

characteristic distortion: In telegraphy, the distortion caused by transients that, as a result of previous modulation, are present in the transmission channel. *Note:* Characteristic distortion effects are not consistent. Their effects on a given signal transition are dependent upon transients remaining from previous signal transitions.

characteristic frequency: A frequency which can be easily identified and measured in a given emission. A carrier frequency may, for example, be designated as the characteristic frequency. [NTIA] [RR]

characteristic impedance (Z_0): 1. The impedance of a circuit that, when connected to the output terminals of a uniform transmission line of arbitrary length, causes the line to appear infinitely long. *Note 1:* A uniform line terminated in its characteristic impedance will have no standing waves, no reflections from the end, and a constant ratio of voltage to current at a given frequency at every point on the line. *Note 2:* If the line is not uniform, the iterative impedance must be used. **2.** For Maxwell's equations, the impedance of a linear, homogeneous, isotropic, dielectric propagation medium free of electric charge, given by the relation $Z = (\mu/\epsilon)^{1/2}$ where μ is the magnetic permeability and ϵ is the electric permittivity of the medium.

character recognition: The identification of characters by automatic means.

character set: 1. A finite set of different characters that is complete for a given purpose. *Note:* A character set may or may not include punctuation marks or other symbols. **2.** An ordered set of unique representations. *Note:* Examples of character sets include the 26 letters of the English alphabet, Boolean characters 0 and 1, the 128 ASCII characters, and International Telegraph Alphabet 5 (ITA-5), published as CCITT (ITU-T) Recommendation V.3 and ISO 646.

characters per inch (cpi): In a recording medium, a unit of linear packing density of characters.

characters per second (cps): A unit of signaling speed used to express the number of characters passing a designated point per second.

character-stepped: Pertaining to control of start-stop teletypewriter equipment in which a device is stepped one character at a time. *Note:* The step interval is equal to or greater than the character interval at the applicable signaling rate.

charge coupled device (CCD): *See* **CCD.**

charging reference location: In Universal Personal Telecommunications Service, the geographical location that may be used by the UPT service providers to determine the distance-related charges applying to the call originator and/or to the destination UPT user.

chat: *Abbreviation for* **conversational hypertext access technology.** A form of interactive online typewritten communication that allows participants ("members") to engage in text-message conferencing, via real-time computer networking over designated communications facilities ("chat rooms"), without storing the messages. *Note:* Participants' messages are instantaneously relayed to all other participants logged into the chat room; in turn, their replies are likewise instantaneously relayed to the originator and all other participants.

chat group: In computer conferencing chat, *synonym* **forum.**

chat room: An Internet relay chat (IRC) channel designated for the real-time exchange of text messages. *Note:* Chat rooms are usually named in such as way as to identify the subject matter of the conversation they are intended to promote. [Bahorsky]

chat script: A batch of commands and responses, prerecorded on a terminal computer, for the purpose of facilitating easy or automatic access to a network. *Note:* A chat script usually contains a user name and a password that are automatically supplied to the network machine during the login procedure.

check: A process for determining accuracy.

check bit: 1. A bit, such as a parity bit, derived from and appended to a bit string for later use in error detection and possibly error correction. **2.** A data bit associated with a character or block for the purpose of checking the absence of error within the character or block. [T1.226-1992]

checkbox: An element in a Web page's interactive form that allows users to select an option associated with that element. *Note:* The selection is sent electronically to the Web site when the user submits the form. [After Bahorsky]

check character: A character, derived from and appended to a data item, for later use in error detection and possibly error correction.

check digit: A digit, derived from and appended to a data item, for later use in error detection and possibly error correction.

checking code: Machine instructions used in the detection or interpretation of certain data or data fields from a diskette, for the purpose of determining whether the diskette is an authorized or unauthorized copy. [2382-pt.8]

check loop: A device that is attached to interconnect the **Go** and **Return** paths of a circuit at the incoming end of a circuit on command to permit maintenance personnel to make a continuity check on a loop basis. [T1.110-1987]

check sequence (CS): A 16-bit sequence in the last two octets of a frame (excluding flags) that offers a cyclic redundancy check (CRC). The CRC is derived over either the header in unnumbered-information-header format frames or over the entire packet frame for unnumbered-information frames (excluding flags). The algorithm used is described in ISO 3309. [T1.312-1991]

checksum: 1. The sum of a group of data items, which sum is used for checking purposes. *Note 1:* A checksum is stored or transmitted with the group of data items. *Note 2:* The checksum is calculated by treating the data items as numeric values. *Note 3:* Checksums are used in error detecting and correcting. **2.** [The] value computed on data to detect error or manipulation during transmission. *See* **hash total.** [INFOSEC-99]

checkvalue: In cryptography, a computed value that results from passing a data value through an irreversible algorithm. [After X9.24]

check word: Cipher text generated by cryptographic logic to detect failures in cryptography. [INFOSEC-99]

chip: 1. *Synonym* **integrated circuit. 2.** In satellite communications systems, the smallest element of data in an encoded signal. **3.** The most elemental component of a spread spectrum signal when it is decompressed in time; that is, the longest duration signal in which signal parameters are approximately constant.. **4.** In micrographic and display systems, a relatively small and separate piece of microform that contains microimages and coded information for search, identification, and retrieval purposes.

chip rate: 1. The rate of encoding. [NTIA] **2.** In direct-sequence-modulation spread-spectrum systems, the rate at which the information signal bits are transmitted as a pseudorandom sequence of chips. *Note:* The chip rate is usually several times the information bit rate.

chip time: In spread-spectrum systems, the duration of a chip produced by a frequency-hopping signal generator.

chirping: 1. The rapid changing, as opposed to long-term drifting, of the frequency of an electromagnetic wave. *Note:* Chirping is most often observed in pulsed operation of a source. **2.** A pulse compression technique that uses (usually linear) frequency modulation during the pulse.

chosen-plaintext attack: In cryptography, an analytical attack in which a cryptanalyst can submit an unlimited number of plaintext messages and examine the corresponding ciphertext. [2382-pt.8]

chroma keying: In television, nearly instantaneous switching between multiple video signals, based on the state, *i.e.* , phase, of the color (chroma) signal of one, to form a single composite video signal. *Note 1:* Chroma keying is used to create an overlay effect in the final picture, *e.g.* , to insert a false background, such as a weather map or scenic view, behind the principal subject being photographed. *Note 2:* The principal subject is photographed against a background having a single color or a relatively narrow range of colors, usually in the blue or green. When the phase of the chroma signal corresponds to the preprogrammed state or states associated with the background color, or range of colors, behind the principal subject, the signal from the alternate, *i.e* ., false, background is inserted in the composite signal and presented at the output. When the phase of the chroma signal deviates from that associated with the background color(s) behind the principal subject, video associated with the principal subject is presented at the output. *Synonyms* **color keying,** *[loosely]* **blue-screening,** *[in security]* **keying.**

chroma noise: Noise that manifests itself in a video picture as colored snow. [After Silicon]

chromatic dispersion: *A commonly used (but redundant) synonym for* **material dispersion.** *See* **dispersion.**

chromaticity chart: *See* **chromaticity diagram.**

chromaticity diagram: A two-dimensional Cartesian plot that depicts the multidimensional subjective relationship among colors perceived by the normal human visual system (eyes and nervous system, including the brain) when additively stimulated by (two or more; usually three) discrete monochromatic visible sources (wavelengths). *Note:* The familiar CIE chromaticity diagram depicts perceived colors plotted as a function of the normalized relative intensity of a defined red (increasingly red with increased "X", or abscissa, value) versus the normalized relative intensity of a defined green (increasingly green with increased "Y". or ordinate, value). With respect to a given perceived color, as plotted on the chromaticity diagram, the normalized relative intensity of a defined blue at any point is obtained by adding the normalized relative intensities of the red and green, and subtracting the total from 1.

chrominance: The difference between a color and a specified reference color having a specified chromaticity and an equal luminance. [After Laurin]

chrominance signal: In color television, that signal or portion of the composite signal that bears the color information.

CIE: *Abbreviation for* **Commission International de l'Eclairage (International Commission on Illumination).** An international standards-setting organization, based in Vienna, Austria, which is concerned with the development of (a) color-matching systems, (b) recommended practices and standards concerning the properties and applications of light, and (c) methods of measurement pertaining thereto.

cinepak: A software file-compression scheme for video on low-power central processing units (CPUs), and typically operating with 320 x 240 pixels at 15 frames per second. [After Silicon]

cipher: 1. Any cryptographic system in which arbitrary symbols, or groups of symbols, represent units of plain text or in which units of plain text are rearranged, or both. [INFOSEC-99] **2.** The result of using a cipher. *Note:* An example of a cipher is an enciphered message or text.

cipher system: Any cryptosystem that requires the use of a key to convert, unit by unit, plain text, encoded text, or signals into an unintelligible form for secure transmission. *Note:* The capability to decipher must be available at the receiving site.

cipher text: Enciphered information. [INFOSEC-99] *Note:* Cipher text is the result obtained from enciphering plain or encoded text.

cipher text auto-key: Cryptographic logic that uses previous cipher text to generate a key stream. [INFOSEC-99]

ciphertext string: In cryptography, ciphertext that is formed by encrypting concatenated encryption elements. [After X9.23]

ciphertext substring: In cryptography, a segment of a ciphertext string. [After X9.23]

ciphony: The process of enciphering audio information, resulting in encrypted speech. [INFOSEC-99] *Note: "Ciphony"* is a contraction of *"ciphered telephony ."*

circuit: 1. The complete path between two terminals over which one-way or two-way communications may be provided. **2.** An electronic path between two or more points, capable of providing a number of channels. **3.** A number of conductors connected together for the purpose of carrying an electrical current. **4.** An electronic closed-loop path among two or more points used for signal transfer. **5.** A number of electrical components, such as resistors, inductances, capacitors, transistors, and power sources connected together in one or more closed loops. **6.** A fully operative communications path established in the normal circuit layout and currently used for message, WATS access, TWX, or private line services. [47 CFR Pt.36-A]

circuit identification code: Information identifying a circuit between a pair of exchanges, for which signaling is being performed (14 bits in the ISDN user part). [T1.110-1987]

circuit kilometers: The route kilometers of revenue producing circuits in service, determined by measuring the length in terms of kilometers, of the actual path followed by the transmission medium. [47 CFR Pt.36-A]

circuit noise level: At any point in a transmission system, the ratio of the circuit noise at that point to an arbitrary level chosen as a reference. *Note:* The circuit noise level is usually expressed in dBrn0, signifying the reading of a circuit noise meter, or in dBa0, signifying circuit noise meter reading adjusted to represent an interfering effect under specified conditions.

circuit reliability (*CiR*): The percentage of time a circuit was available for use in a specified period of scheduled availability. *Note 1:* Circuit reliability is given by

$$CiR = 100\left(1 - \frac{T_o}{T_e}\right) = 100\frac{T_a}{T_e} \quad ,$$

where T_o is the circuit total outage time, T_s is the circuit total scheduled time, and T_a is the circuit total available time. *Note 2:* $T_s = T_a + T_o$. *Synonym* **time availability.**

circuit restoration: The process by which a communications circuit is established between two users after disruption or loss of the original circuit. *Note:* Circuit restoration is usually performed in accordance with planned procedures and priorities. Restoration may be effected automatically, *e.g.,* by switching to a hot standby, or manually, *e.g.,* by manual patching.

circuit routing: In open systems architecture, the logical path of a message in a communications network based on a series of gates at the physical network layer in the Open Systems Interconnection--Reference Model and the GOSIP FIPS PUB 146-1.

circuit-switched data transmission service: A data transmission service requiring the establishment of a circuit-switched connection before data can be transferred from source data terminal equipment (DTE) to a sink DTE. *Note:* A circuit-switched data transmission service uses a connection-oriented network.

circuit switching: 1. A method of routing traffic through a switching center, from local users or from other switching centers, whereby a connection is established between the calling and called stations until the connection is released by the called or calling station. **2.** A process that, on demand, connects two or more data terminal equipments (DTEs) and permits the exclusive use of a data circuit between them until the connection is released.

circuit switching center: *See* **circuit switching, switching center.**

circuit switching unit (CSU): Equipment used for routing messages over common-user circuits that interconnect a source data terminal equipment (DTE) to a sink DTE for information interchange.

circuit transfer mode: In ISDN applications, a transfer mode by means of permanent allocation of channels or bandwidth between connections.

circular polarization: In electromagnetic wave propagation, polarization such that the tip of the electric field vector describes a helix. *Note 1:* The magnitude of the electric field vector is constant. *Note 2:* The projection of the tip of the electric field vector upon any fixed plane intersecting, and normal to, the direction of propagation, describes a circle. *Note 3:* A circularly polarized wave may be resolved into two linearly polarized waves in phase quadrature with their planes of polarization at right angles to each other. *Note 4:* Circular polarization may be referred to as *"right-hand"* or *"left-hand,"* depending on whether the helix describes the thread of a right-hand or left-hand screw, respectively.

circulator: 1. A passive junction of three or more ports in which the ports can be accessed in such an order that when power is fed into any port it is transferred to the next port, the first port being counted as following the last in order. **2.** In radar, a device that switches the antenna alternately between the transmitter and receiver.

civision: 1. The application of cryptography to television signals. **2.** Television signals that have been enciphered to preserve the confidentiality of the transmitted information.

***C*/k*T*:** *Abbreviation for* **carrier-to-receiver noise density.**

cladding: 1. Of an optical fiber, one or more layers of material of lower refractive index, in intimate contact with a core material of higher refractive index. **2.** A process of covering one metal with another (usually achieved by pressure rolling, extruding, drawing, or swaging) until a bond is achieved.

cladding diameter: In the cross section of a realizable optical fiber, ideally circular, but in practice assumed to a first approximation to be elliptical, the average of the diameters of the smallest circle that can be circumscribed about the cladding, and the largest circle that can be inscribed within the cladding.

cladding eccentricity: *See* **ovality.**

cladding mode: An undesired mode that is confined to the cladding of an optical fiber by virtue of the fact that the cladding has a higher refractive index than the surrounding medium, *i.e.,* air or primary polymer overcoat. *Note:* Modern fibers have a primary polymer overcoat with a refractive index that is slightly higher, rather than lower, than that of the cladding, in order to strip off cladding modes after only a few centimeters of propagation.

cladding mode stripper: In an optical fiber, anything used to convert cladding modes to radiation modes, thus removing them from the fiber. *Note:* In practice, the fiber's polymer overcoat (which is also used to protect it from mechanical damage and to isolate it optically from other fibers) is used as a cladding mode stripper. The refractive index of the coating material is made to be slightly higher than that of the cladding. This forces optical energy in the cladding modes to radiate into the relatively lossy coating, from which it quickly dissipates.

cladding noncircularity: *See* **ovality.**

cladding ovality: *Synonym* **cladding noncircularity.** *See* **ovality.**

cladding ray: *See* **cladding mode.**

C-language: A general-purpose, high-level, structured computer programming language. *Note:* C-language was originally designed for and implemented on the UNIX™ operating system.

CLASS: *Acronym for* **custom local area signaling service.**

class d address: *Synonym (in Internet protocol)* **multicast address.**

classmark: A designator used to describe the service feature privileges, restrictions, and circuit characteristics for lines or trunks that access a switch. *Note:* Examples of classmarks include precedence level, conference privilege, security level, and zone restriction. *Synonym* **class-of-service mark.**

class of emission: The set of characteristics of an emission, designated by standard symbols, *e.g.* , type of modulation of the main carrier, modulating signal, type of information to be transmitted, and also, if appropriate, any additional signal characteristics. [NTIA] [RR]

class of office: A ranking, assigned to each switching center in a communications network, determined by the center switching functions, interrelationships with other offices, and transmission requirements.

class of service: 1. A designation assigned to describe the service treatment and privileges given to a particular terminal. **2.** A subgrouping of telephone users for the purpose of rate distinction. *Note:* Examples of class of service subgrouping include distinguishing between (a) individual and party lines, (b) Government and non-Government lines, (c) those

permitted to make unrestricted international dialed calls and those not so permitted, (d) business, residence, and coin-operated, (e) flat rate and message rate, and (f) restricted and extended area service. **3.** A category of data transmission provided by a public data network in which the data signaling rate, the terminal operating mode, and the code structure, are standardized. *Note:* Class of service is defined in ITU-T Recommendation X.1. *Synonym* **user service class.**

class-of-service mark: *Synonym* **classmark.**

clear: To cause one or more storage locations to be in a prescribed state, usually that corresponding to a zero or that corresponding to the space character.

clear channel: 1. In radio broadcasting, a frequency assigned for the exclusive use of one entity. **2.** In networking, a signal path that provides its full bandwidth for a user's service. *Note:* No control or signaling is performed on this path.

clear channel capability (CCC): A characteristic of a transmission path in which the bit position allocated for customer data may represent any combination of zeros and ones. For the DS1 rate, the bits allocated for customer data are the last 192 bits of each frame. [T1.408-1990]

clear collision: Contention that occurs when a DTE and a DCE simultaneously transfer a clear request packet and a clear indication packet specifying the same logical channel. *Note:* The DCE will consider that the clearing is completed and will not transfer a DCE clear confirmation packet.

clear confirmation signal: A call control signal used to acknowledge reception of the data-terminal-equipment (DTE) clear request by the data circuit-terminating equipment (DCE) or to acknowledge the reception of the DCE clear indication by the DTE.

clearing: 1. A sequence of events used to disconnect a call and return to the ready state. **2.** Removal of data from an information system (IS), its storage devices, and other peripheral devices with storage capacity, in such a way that the data may not be reconstructed using common system capabilities (*i.e.,* keyboard strokes); however, the data may be reconstructed using laboratory methods. Cleared media may be reused at the same classification level or at a higher level. Overwriting is one method of clearing. [INFOSEC-99]

clear message: 1. A message that (a) is sent in the forward direction and the backward direction, (b) contains a circuit-released signal or circuit-released acknowledgment signal, and (c) usually contains an indication of whether the message is in the forward or the backward direction. **2.** A message in plain language, *i.e.,* not enciphered.

clear text: *Synonym* **plain text.**

cleave: 1. In an optical fiber, a deliberate, controlled break, intended to create a perfectly flat endface, perpendicular to the longitudinal axis of the fiber. *Note:* A cleave is made by first introducing a microscopic fracture ("nick") into the fiber with a special tool, called a *"cleaving tool,"* which has a sharp blade of hard material, such as diamond, sapphire, or tungsten carbide. If proper tension is applied to the fiber as the nick is made, or immediately afterward (this may be done by the cleaving tool in some designs, or manually in other designs), the fracture will propagate in a controlled fashion, creating the desired endface. **2.** To break a fiber in such a controlled fashion. *Note:* A good cleave is required for a successful splice of an optical fiber, whether by fusion or mechanical means. Also, some types of fiber-optic connectors do not employ abrasives and polishers. Instead, they use some type of cleaving technique to trim the fiber to its proper length, and produce a smooth, flat perpendicular endface.

CLEC: *Abbreviation for* **competitive local exchange carrier.** The new local exchange carrier that is attempting to compete outside its traditional operating territory. [After FCC]

click data: Data obtained by analyzing the log file containing information regarding who has accessed the Web page or the banner under consideration.

click rate: Of a Web page menu item, especially an advertisement, the ratio of (a) the number of time it is selected ("clicked") to (b) the number of times it is viewed.

clicks: *Synonym* **click-through.**

click-through: The process of clicking on a Web advertisement and going directly to the advertiser's Web site. *Synonyms* **ad clicks, clicks, requests.**

client: 1. In networking, a software application that allows the user to access a service from a server computer, *e.g.,* a server computer on the Internet or a LAN. **2.** A computer, *e.g.* , a desktop computer on a LAN, that is so served.

client ID: A unique identification number used when sending data to a specific client. Clients that are standardized for use in generic applications are allocated standard client IDs (listed in this standard). Client IDs also may be assigned for non-standard or proprietary applications using the manufacturer-specific mechanism described. [T1.800.08-1995]

client-server: Any hardware/software combination that generally adheres to a client-server architecture, regardless of the type of application.

client-server architecture: Any network-based software system that uses client software to request a specific service, and corresponding server software to provide the service from another computer on the network.

cliff effect: In the digital transmission of analog signals, including analog television and digital audio broadcasting (DAB), a signal-quality effect in which the decoded analog signal is either essentially flawless or totally unusable; *i.e.* , it exhibits no gradual degradation or improvement attributable to the presence or absence of transient phenomena such as amplitude variations that may occur during transmission. *Note:* The cliff effect arises from the fact that analog variations in the intensity of the detected digital have no perceptible effect on the decoded analog signal; the only criterion for declaration of a digital mark is that the digital signal level is at or exceeds the decision level. The analog signal is then recovered without perceptible degradation. If the detection threshold is not met or exceeded, there will be no digital marks declared and the analog signal represented by them cannot be decoded, and will be lost entirely.

clip: 1. In moving picture or television technology, a relatively short, continuous set of frames (often including the associated audio, if any), stored on a recording medium. *Synonyms* **take** , **scene. 2.** In audio, a short, uninterrupted sound track. *Note:* Both audio and video clips may be part of a digitized information package, *e.g.* , on a Web page. **3.** To limit to a predetermined level (*e.g.* , at the output of an otherwise linear amplifier) the amplitude of an otherwise linear signal. *Note:* In contrast with an analog compression circuit, which reduces the dynamic range of a signal but retains its basic waveform, a clipping circuit treats (processes, amplifies) a signal in a linear fashion unless the output level reaches a certain threshold, which it may not exceed, and at which it remains unless the input decreases to a level at which the processed output level is lower than the clipping level.

clipper: A circuit or device that limits the instantaneous output signal amplitude to a predetermined maximum value, regardless of the amplitude of the input signal.

clipping: 1. In telephony, the loss of the initial or final parts of a word, words, or syllable, usually caused by the nonideal operation of voice-actuated devices. **2.** The limiting of instantaneous signal amplitudes to a predetermined maximum value. **3.** In a display device, the removal of those parts of display elements that lie outside of a given boundary.

clock: 1. A reference source of timing information. **2.** A device providing signals used in a transmission system to control the timing of certain functions such as the duration of signal elements or the sampling rate. **3.** A device that generates periodic, accurately spaced signals used for such purposes as timing, regulation of the operations of a processor, or generation of interrupts.

clock accuracy: The level of agreement of the frequency of a clock with the ideal frequency. This is specified as the magnitude of the fractional frequency offset from the ideal frequency. [T1.105.09-1996]

clock error: The difference between local clock time or value and a designated reference clock time or value. *Note:* Subtracting the clock difference from the local clock brings the local clock into agreement with the reference clock.

clock fast mode: An operating condition of a clock in which it is locked to an external reference and is using time constants that are altered to quickly bring the local oscillator's frequency into approximate agreement with the synchronization reference frequency. [T1.101-1987]

clock free-run mode: An operating condition of a clock in which its local oscillator is not locked to an external synchronization reference, and is using no storage techniques to sustain its accuracy. [T1.101-1987]

clock holdover mode: An operating condition of a clock that has lost its controlling input and is using stored data, acquired while in normal operation, to control its output. The stored data is averaged to minimize the effects of short-term variations, allowing the normal conditions to be simulated within specifications. Holdover terminates when the output of the clock is no longer controlled by the data stored from a previously connected reference. [T1.105.09-1996]

clock normal mode: An operating condition of a clock in which the output signals are controlled by an external input reference. It is the expected mode. In normal mode, each clock in a chain has the same long-term average frequency, and the time error between the input and output of each clock is bounded. Only stratum 1 sources of timing require no input and therefore have a unique status of "normal" operation being equivalent to "freerun". *Synonym [in ITU-T Recommendation G.810]* **locked mode.** [T1.105.09-1996]

clock phase slew: The rate of relative phase change between a given clock signal and a stable reference signal. *Note:* The two signals are generally at or near the same frequency or have an integral multiple frequency relationship.

clock rate: The rate at which a clock issues timing pulses. *Note:* Clock rates are usually expressed in pulses per second, such as 4.96 Mp/s (megapulses per second).

clock tolerance: The maximum permissible departure of a clock indication from a designated time reference such as Coordinated Universal Time (UTC).

clock track: A track on which a pattern of signals is recorded to provide a timing reference.

clockwise polarized wave: *Synonym* **right-hand (or clockwise) polarized wave.**

closed captioning: In broadcast and cable television, the insertion, into the blank lines between frames, of information that may be decoded and displayed on the screen as written words corresponding to those being spoken and transmitted via the conventional audio subcarrier. *Note:* Closed captioning, developed for the hearing-impaired, requires a special decoder, which may be external to, or built into, the television receiver. Closed captioning is mandated by the Americans with Disabilities Act of 1990.

closed circuit: 1. In radio and television transmission, pertaining to an arrangement in which programs are directly transmitted to specific users and not broadcast to the general public. **2.** In telecommunications, a circuit dedicated to specific users. **3.** A completed electrical circuit.

closed-loop noise bandwidth: The integral, over all frequencies, of the absolute value of the closed-loop transfer function of a phase-locked loop. *Note:* The closed-loop noise bandwidth, when multiplied by the noise spectral density, gives the output noise power in a phase-locked loop.

closed-loop response integrity: In cryptography, the originator's confirmation of the integrity of the entire transaction, *i.e.,* of both the transaction request and its transaction response. [After X9.19]

closed-loop transfer function: A mathematical expression (algorithm) describing the net result of the effects of a closed (feedback) loop on the input signal to the circuits enclosed by the loop. *Note 1:* The closed-loop transfer function is measured at the output. *Note 2:* The output signal waveform can be calculated from the closed-loop transfer function and the input signal waveform.

closed-security environment: 1. An environment in which special attention is paid (in the form of authorizations, security clearances, configuration controls, *etc.*) to protect data and resources from accidental or malicious acts. [2382-pt.8] **2.** [An] environment providing sufficient assurance that applications and equipment are protected against the introduction of malicious logic during an information system (IS) life cycle. Closed security is based upon a system's developers, operators, and maintenance personnel having sufficient clearances, authorization, and configuration control. [INFOSEC-99]

closed user group: In a network, a group of users permitted to communicate with each other but not with users outside the group. *Note:* A user data terminal equipment (DTE) may belong to more than one closed user group.

closed user group with outgoing access: A closed user group in which at least one member of the group has a facility that permits communication with one or more users external to the closed user group.

closed waveguide: An electromagnetic waveguide (a) that is tubular, usually with a circular or rectangular cross section, (b) that has electrically conducting walls, (c) that may be hollow or filled with a dielectric material, (d) that can support a large number of discrete propagating modes, though only a few may be practical, (e) in which each discrete mode defines the propagation constant for that mode, (f) in which the field at any point is describable in terms of the supported modes, (g) in which there is no radiation field, and (h) in which discontinuities and bends cause mode conversion but not radiation.

closure: *Synonym* **splice closure.**

cloud attenuation: In the transmission of electromagnetic signals, attenuation caused by absorption and scattering by water or ice particles in clouds. *Note:* The amount of cloud attenuation depends on many factors, including (a) the density, particle size, and turbulence of the clouds and (b) the transmission path length in the clouds.

C-message weighting: A noise spectral weighting used in a noise power measuring set to measure noise power on a line that is terminated by a 500-type set or similar instrument. *Note:* The instrument is calibrated in dBrnC.

CMRR: *Abbreviation for* **common-mode rejection ratio.**

CNR: *Abbreviation for* **carrier-to-noise ratio, combat-net radio.**

CNS: *Abbreviation for* **complementary network service.**

C.O.: *Abbreviation for* **central office.**

COAM: *Acronym for* **customer owned and maintained equipment.** *Deprecated term. See* **customer premises equipment.**

coast Earth station: An Earth station in the fixed-satellite service or, in some cases, in the maritime mobile-satellite service, located at a specified fixed point on land to provide a feeder link for the maritime mobile-satellite service. [NTIA] [RR]

coasting mode: In timing-dependent systems, a free-running operational timing mode in which continuous or periodic measurement of clock error, *i.e.,* of timing error, is not made. *Note:* Operation in the coasting mode may be enhanced for a period of time by using clock-error data or clock-correction data (obtained during a prior period of operation in the tracking mode) to estimate clock corrections.

coast station: A land station in the maritime mobile service. [RR]

coating: *See* **primary coating.**

coax: *See* **coaxial cable.**

coaxial cable (coax): 1. A cable consisting of a center conductor surrounded by an insulating material and a concentric outer conductor and optional protective covering, all of circular cross-section. *Synonym* (when combined with others under a common sheath) **coaxial tube. 2.** A cable consisting of multiple coaxial tubes under a single protective sheath. *Note:* Coaxial cables are used primarily for CATV and other wideband, video, or rf applications.

coaxial patch bay: *See* **patch bay.**

COBOL: *Acronym for* **common business oriented language.** A programming language designed for business data processing.

co-channel interference: Interference caused by another signal operating on the same channel.

code: 1. A set of unambiguous rules specifying the manner in which data may be represented in a discrete form. *Note 1:* Codes may be used for brevity or security. *Note 2:* Use of a code provides a means of converting information into a form suitable for communications, processing, or encryption. **2.** [In COMSEC, any] system of communication in which arbitrary groups of letters, numbers, or symbols represent units of plain text of varying length. [INFOSEC-99] *Note:* Codes may or may not provide security. Common uses include: (a) converting information into a form suitable for communications or encryption, (b) reducing the length of time required to transmit information, (c) describing the instructions which control the operation of a computer, and (d) converting plain text to meaningless combinations of letters or numbers and vice versa. [NIS] **3.** A cryptosystem in which the cryptographic equivalents, (usually called "code groups") typically consisting of letters or digits (or both) in otherwise meaningless combinations, are substituted for plain text elements which are primarily words, phrases, or sentences. **4.** A set of rules that maps the elements of one set, the coded set, onto the elements of another set, the code element set. *Synonym* **coding scheme. 5.** A set of items, such as abbreviations, that represents corresponding members of another set. *Synonym* **encode. 6.** To represent data or a computer program in a symbolic form that can be accepted by a processor. **7.** To write a routine.

code book: Document containing plain text and code equivalents in a systematic arrangement, or a technique of machine encryption using a word substitution technique. [INFOSEC-99]

codec: *Acronym for* **coder-decoder. 1.** An assembly consisting of an encoder and a decoder in one piece of equipment. **2.** A circuit that converts analog signals to digital code and vice versa. **3.** An electronic device that converts analog signals, such as video and voice signals, into digital form and compresses them to conserve bandwidth on a transmission path. *Note:* Codecs in this sense are used in this sense for video conferencing systems.

code character: A character that (a) is used to represent a discrete value or symbol and (b) is derived in accordance with a code.

code conversion: 1. Conversion of signals, or groups of signals, in one code into corresponding signals, or groups of signals, in another code. **2.** A process for converting a code of some predetermined bit structure, such as 5, 7, or 14 bits per character interval, to another code with the same or a different number of bits per character interval. *Note:* In code conversion, alphabetical order is not significant.

coded character set: A character set established in accordance with unambiguous rules that define the character set and the one-to-one relationships between the characters of the set and their coded representations.

coded image: A representation of a display image in a form suitable for storage and processing.

code-division multiple access (CDMA): A coding scheme, used as a modulation technique, in which multiple channels are independently coded for transmission over a single wideband channel. *Note 1:* In some communication systems, CDMA is used as an access method that permits carriers from different stations to use the same transmission equipment by using a wider bandwidth than the individual carriers. On reception, each carrier can be distinguished from the others by means of a specific modulation code, thereby allowing for the reception of signals that were originally overlapping in frequency and time. Thus, several transmissions can occur simultaneously within the same bandwidth, with the mutual interference reduced by the degree of orthogonality of the unique codes used in each transmission. *Note 2:* CDMA permits a more uniform distribution of energy in the emitted bandwidth.

coded set: A set of elements onto which another set of elements has been mapped according to a code. *Note:* Examples of coded sets include the list of names of airports that is mapped onto a set of corresponding three-letter representations of airport names, the list of classes of emission that is mapped onto a set of corresponding standard symbols, and the names of the months of the year mapped onto a set of two-digit decimal numbers.

code element: One of a set of parts of which the characters in a given code may be composed.

code-excited linear prediction (CELP): An analog-to-digital voice coding scheme.

code group: [A] group of letters, numbers, or both in a code system used to represent a plain text word, phrase, or sentence. [INFOSEC-99] *Note:* Code groups may include symbols and other elements.

code-independent data communication: *Synonym* **code-transparent data communication.**

code restriction: A service feature by which certain terminals are prevented from accessing certain features of the network.

code set: The complete set of representations defined by a particular code and language.

code structure: The basic characteristics of a code: its length and generic representation. [T1.238-1994/97] [T1.266-2000]

code-transparent data communication: A mode of data communication that uses protocols that do not depend for their correct functioning on the data character set or data code used. *Synonym* **code-independent data communication.**

code vocabulary: [A] set of plain text words, numerals, phrases, or sentences for which code equivalents are assigned in a code system. [INFOSEC-99]

code word: 1. In a code, a word that consists of a sequence of symbols assembled in accordance with the specific rules of the code and assigned a unique meaning. *Note:* Examples of code words are error-detecting-or-correcting code words and communication code words, such as SOS, MAYDAY, ROGER, TEN-FOUR, and OUT. **2.** A cryptonym used to identify sensitive intelligence data. [JP 1-02] **3.** A word that has been assigned a classification and a classified meaning to safeguard intentions and information regarding a classified plan or operation. [JP 1-02]

coding: 1. In communications systems, the altering of the characteristics of a signal to make the signal more suitable for an intended application, such as optimizing the signal for transmission, improving transmission quality and fidelity, modifying the signal spectrum, increasing the information content, providing error detection and/or correction, and providing data security. *Note:* A single coding scheme usually does not provide more than one or two specific capabilities. Different codes have different advantages and disadvantages. **2.** In communications and computer systems, implementing rules that are used to map the elements of one set onto the elements of another set, usually on a one-to-one basis. **3.** The digital

encoding of an analog signal and, conversely, decoding to an analog signal.

coding scheme: *Synonym* **code.**

codress message: In military communications systems, a message in which the entire address is encrypted with the message text.

COG: *Abbreviation for* **centralized ordering group.**

coherence area: Pertaining to an electromagnetic wave, the area of a surface perpendicular to the direction of propagation, over which the electromagnetic wave maintains a specified degree of coherence. *Note:* The specified degree of coherence is usually taken to be 0.88 or greater.

coherence degree: *See* **degree of coherence.**

coherence length: The propagation distance from a coherent source to a point where an electromagnetic wave maintains a specified degree of coherence. *Note 1:* In long-distance transmission systems, the coherence length may be reduced by propagation factors such as dispersion, scattering, and diffraction. *Note 2:* In optical communications, the coherence length, L , is given approximately by $L = \lambda^2/(n\ \Delta\lambda)$, where λ is the central wavelength of the source, n is the refractive index of the medium, and $\Delta\lambda$ is the spectral width of the source. *Note 3: Coherence length* is usually applied to the optical regime.

coherence time: For an electromagnetic wave, the time over which a propagating wave may be considered coherent. *Note 1:* In long-distance transmission systems, the coherence time may be reduced by propagation factors such as dispersion, scattering, and diffraction. *Note 2:* In optical communications, coherence time, τ, is calculated by dividing the coherence length by the phase velocity of light in a medium; approximately given by $\tau = \lambda^2/(c\Delta\lambda)$ where λ is the central wavelength of the source, $\Delta\lambda$ is the spectral width of the source, and c is the velocity of light in vacuum. *Note 3:* "*Coherence time* " is usually applied to the optical regime.

coherent: Pertaining to a fixed phase relationship between corresponding points on an electromagnetic wave. *Note:* A truly coherent wave would be perfectly coherent at all points in space. In practice, however, the region of high coherence may extend over only a finite distance.

coherent bundle: *Synonym* **aligned bundle.**

coherent differential phase-shift keying (CDPSK): Phase-shift keying (a) that is used for digital transmission, (b) in which the phase of the carrier is discretely modulated in relation to the phase of a reference signal and in accordance with data to be transmitted, and (c) in which the modulated carrier is of constant amplitude and frequency. *Note:* A phase comparison is made of successive pulses, and information is recovered by examining the phase transitions between the carrier and successive pulses rather than by the absolute phases of the pulses.

coherent pulse operation: In pulsed carrier transmission, a method of operation in which a fixed phase relationship of the carrier wave is maintained from one pulse to the next.

coherent radiation: *See* **coherent.**

cold standby: Pertaining to spare electronic equipment that is available for substitute use, but is not powered or warmed up and ready for use.

cold start: [In security, a] procedure for initially keying crypto-equipment. [INFOSEC-99]

collective address: *Synonym* **group address.**

collective routing: Routing in which a switching center automatically delivers messages to a specified list of destinations. *Note 1:* Collective routing avoids the need to list each single address in the message heading. *Note 2:* Major relay stations usually transmit messages bearing collective-routing indicators to tributary, minor, and other major relay stations.

collimation: The process by which a divergent or convergent beam of electromagnetic radiation is converted into a beam with the minimum divergence or convergence possible for that system (ideally, a bundle of parallel rays).

collimator: A device that renders divergent or convergent rays more nearly parallel. *Note:* The degree of collimation (parallelism) should be stated.

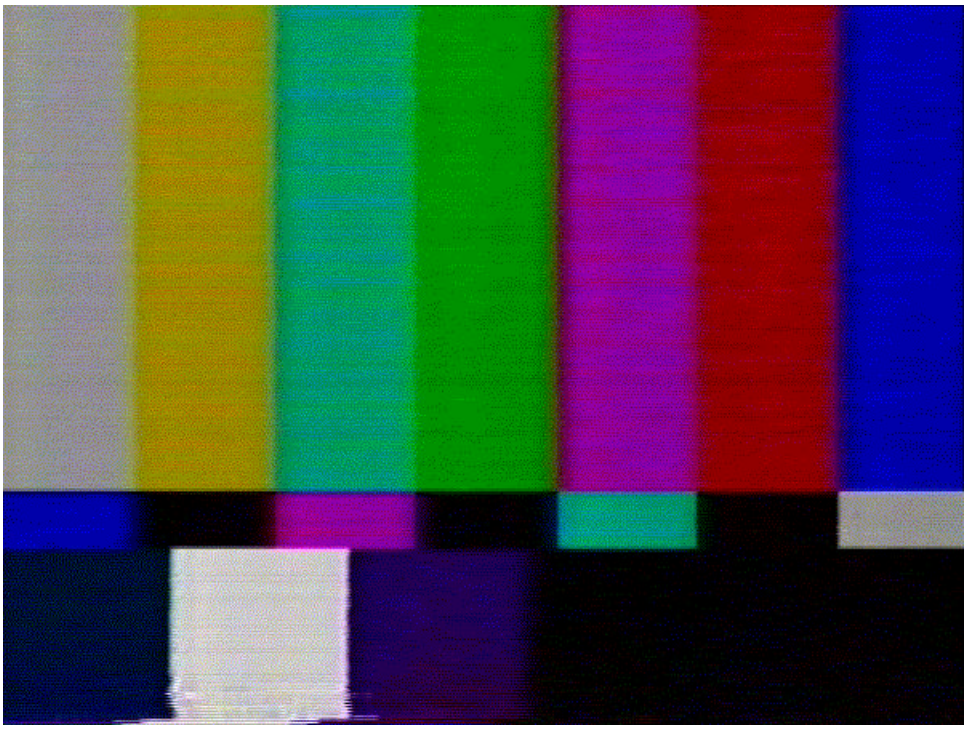
collinear antenna array: An array of dipole antennas mounted in such a manner that every element of each antenna is in an extension, with respect to its long axis, of its counterparts in the other antennas in the array. *Note:* A collinear array is usually mounted vertically, in order to increase overall gain and directivity in the horizontal direction. When stacking dipole antennas in such a fashion, doubling their number will, with proper phasing, produce a 3-dB increase in directive gain.

collision: 1. In a data transmission system, the situation that occurs when two or more demands are made simultaneously on equipment that can handle only one at any given instant. **2.** In a computer, the situation that occurs when an attempt is made to store simultaneously two different data items at a given address that can hold only one of the items.

color balancing: In color television technology, a calibration process involving adjustment of the relative amplitudes of the signal levels representing the tristimulus colors to (a) achieve a camera output signal or (b) monitor display such that the resulting additive mixture of the excited phosphors accurately creates the perception of white.

color bars: 1. In color television technology, any of several electronically generated video test patterns displayed as vertical bars of usually equal width, and of specified color (*e.g.* , 6 hues, plus gray and black) and intensity, used to establish or verify a proper color reference; *e.g.* , prior to broadcasting or recording. **2.** *Loosely,* the signal that produces color bars.

color bar test signal: The color bar test signal shown in the associated figure, consists of discrete steps of chroma and luminance levels that produce eight different colors superimposed upon standard synchronizing and blanking signals. [T1.Rpt16-1992]



color burst: In analog color television technology, a signal consisting of several (8 to 10 in NTSC) cycles of unmodulated color subcarrier, superimposed at a specified location within the composite signal. *Note:* The color burst (a) enables the color-decoding circuits in the receiver, and (b) serves as an amplitude, frequency, and phase reference to which the local color (subcarrier frequency) oscillator in the receiver is phase-locked to ensure color fidelity and stability in the displayed picture.

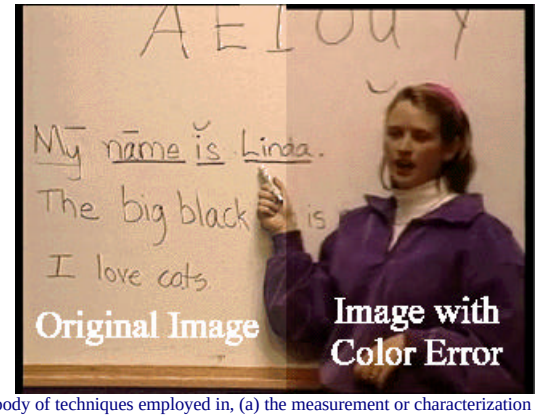
color coordinate transformation: Computation of the tristimulus values of colors in terms of one set of primaries. *Note:* This computation may be performed electrically in a color television system. [IEEE] [After SMPTE]

color correction: In television and computer graphics, the electronic adjustment of a color reproduction process to improve the perceived-color conformity of the reproduction to the original. [After IEEE 100] [After SMPTE]

color decoder: In color television technology, of a receiver, the circuitry that separates the chroma information from the video (gray-scale) information and processes the former into its constituent signal components.

color-difference signal: The chrominance vectors carrying the color information in a composite format. *Note:* The color-difference signals have been defined by the ITU-R for existing television systems.

color errors: In video systems, distortion of hues in all or a portion of the received image.



colorimetry: 1. Measurement of colors based on a set of conventions. [After SMPTE] **2.** The science of, or body of techniques employed in, (a) the measurement or characterization of color, and (b) the interpretation of the results. *Note:* Human perception of color is a subjective phenomenon resulting from and dependent upon the properties of the eye and the brain.

color keying: *Synonym* **chroma keying.**

color-matching functions: 1. The tristimulus values corresponding to monochromatic stimuli of equal radiant power. *Note:* The three values of a set of color-matching functions at a given wavelength are called the color-matching coefficients. The color-matching functions may be used to calculate the tristimulus values of a color stimulus from the color stimulus function. [After SMPTE] **2.** The tristimulus value per unit wavelength interval and unit spectral radiant flux. [After SMPTE] **3.** A set of three simultaneous equations used to transform a color specification from one set of matching stimuli to another. [After SMPTE] *Note:* Color-matching functions adopted by the CIE are tabulated as functions of wavelength throughout the spectrum and are given in section 13.5 of ANSI/IES RP16-1986. [IEEE 100]

color phase: In color television technology, the instantaneous phase of the chroma signal with respect to that of the color burst signal. *Note:* The phase of the chroma signal at any given instant determines the color balance of the video signal at that instant.

color processing: In color television technology, electronic alteration of the color information content to effect a change in the color balance of the video signal.

color subcarrier: In analog color television technology, a signal superimposed upon the picture (gray scale) information for the purpose of conveying the associated color information. *Note:* The color information is conveyed by the instantaneous phase of the color subcarrier with respect to that of the color burst.

color temperature: Of an electromagnetic source, especially in the optical regime, the hue or wavelength (spectral content) expressed or specified as the hypothetical wavelength(s) emitted by an ideal blackbody having an absolute temperature of n kelvins (n K). *Note 1:* Higher numbers indicate hues in or toward the blue; lower numbers indicate hues in or toward the red. *Note 2:* Examples of color temperature are approximately 5000 K to 5500 K (daylight), approximately 4100 K (fluorescent lighting), and approximately 2800 K (incandescent). *Note 3:* Color temperature is commonly used to characterize ambient lighting or lighting employed for photographic purposes. [JSB/FAA]

.com: 1. A top-level domain name-suffix originally intended to designate commercial entities such as corporations and companies. **2.** A filename suffix indicating an executable file. *Note:* Usually, ".com" programs are smaller and simpler than programs with the ".exe" suffix.

combat-net radio (CNR): A radio operating in a network that (a) provides a half-duplex circuit and (b) uses either a single radio frequency or a discrete set of radio frequencies when in a frequency hopping mode. *Note:* CNRs are primarily used for push-to-talk-operated radio nets for command and control of combat, combat support, and combat service support operations among ground, sea, and air forces.

combinational logic element: A device having at least one output channel and one or more input channels, all characterized by discrete states, such that at any instant the state of each output channel is completely determined by the states of the input channels at the same instant.

combined communications: The common use of communications facilities by two or more military services, each belonging to a different nation. *Note:* Such use might be specified by a combined communications-electronics agency.

combined distribution frame (CDF): A distribution frame that combines the functions of main and intermediate distribution frames and contains both vertical and horizontal terminating blocks. *Note 1:* The vertical blocks are used to terminate the permanent outside lines entering the station. Horizontal blocks are used to terminate inside plant equipment. This arrangement permits the association of any outside line with any desired terminal equipment. These connections are made either with twisted pair wire, normally referred to as jumper wire, or with optical fiber cables, normally referred to as jumper cables. *Note 2:* In technical control facilities, the vertical side may be used to terminate equipment as well as outside lines. The horizontal side is then used for jackfields and battery terminations.

combined link set: A load-sharing collection of more than one link set to the same message destination. [T1.226-1992]

combined station: In high-level data-link control (HDLC) operation, the station that is usually responsible for performing balanced link-level operations and that generates commands, interprets responses, interprets received commands, and generates responses.

combiner: *See* **maximal-ratio combiner.**

COMINT: *Acronym for* **communications intelligence.**

comma-free code: A code constructed so that any partial code word, beginning at the start of a code word but terminating prior to the end of that code word, is not a valid code word. *Note 1:* The comma-free property permits the proper framing of transmitted code words when (a) external synchronization is provided to identify the start of the first code word in a sequence of code words and (b) no uncorrected errors occur in the symbol stream. *Note 2:* Examples of comma-free are the variable-length Huffman codes. *Synonym* **prefix-free code.**

command: 1. An order for an action to take place. **2.** In data transmission, an instruction sent by the primary station instructing a secondary station to perform some specific function. **3.** In signaling systems, a control signal. **4.** In computer programming, that part of a computer instruction word that specifies the operation to be performed. **5.** *Loosely,* a mathematical or logic operator.

command and control (C^2): The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, coordinating, and controlling forces and operations in the accomplishment of the mission. [JP1-02]

command and control (C^2) system: The facilities, equipment, communications, procedures, and personnel essential to a commander for planning, directing, and controlling operations of assigned forces pursuant to the missions assigned. [JP 1-02]

command and control warfare (C^2W): The integrated use of operations security (OPSEC), military deception, psychological operations (PSYOP), electronic warfare (EW), and physical destruction, mutually supported by intelligence, to deny information to, influence, degrade, or destroy adversary command and control capabilities, while protecting friendly command and control capabilities against such actions. *Note:* Command and control warfare applies across the operational continuum and all levels of conflict. C^2W is both offensive and defensive:

- (a) **counter-C^2 :** To prevent effective C^2 of adversary forces by denying information to, influencing, degrading, or destroying the adversary C^2 systems.
- (b) **C^2-protection:** To maintain effective command and control of own forces by turning to friendly advantage or negating adversary efforts to deny information to, influence, degrade, or destroy the friendly C^2 system. [JP1]

command, control and communications (C^3): The capabilities required by commanders to exercise command and control of their forces. [JCS Pub 18, *Operations Security,* Dec. 1982.]

command, control, communications, computers, and intelligence (C^4I): The facilities, computer equipment, communications equipment, display devices, and intelligence systems necessary to support military operations.

command, control, communications, and computer systems (C^4S): 1. Integrated systems of doctrine, procedures, organizational structures, personnel, equipment, facilities, and communications designed to support a commander's exercise of command and control, through all phases of the operational continuum. [JP1] **2.** Integrated systems of doctrine, procedures, organizational structures, personnel, equipment, facilities, and communications designed to support a commander's exercise of command and control, across the range of military operations. [JP 1-02] *Synonym* **C^4 systems.**

command frame: In data transmission, a frame, containing a command, transmitted by a primary station.

command line: 1. The form or point of interface, usually indicated by a command prompt, on some operating systems in which a command is entered. [Bahorsky] **2.** Describing a system that uses a command-line interface. [Bahorsky]

command menu: A list of all the different commands that may be given to a computer or communications system by an operator. *Note:* Commands on a command menu may be selected by the operator by (a) using an electromechanical pointer, such as a light pen, (b) touching the display screen with a finger, (c) speaking to a voice-recognition system, or (d) positioning a cursor or reverse-video bar by using a keyboard or mouse, and depressing one or more keys on the keyboard or mouse.

command net: A communications network which connects an echelon of command with some or all of its subordinate echelons for the purpose of command and control. [JP 1-02]

command protocol data unit: A protocol data unit (PDU) transmitted by a logical link control (LLC) sublayer in which the PDU command/response (C/R) bit is equal to "0".

comm center: *Synonym* **communications center.**

commercial carrier: *Synonym* **common carrier.**

commercial refile: In military communications systems, the processing of a message from (a) a given military network, such as a tape-relay network, a point-to-point telegraph network, a radio-telegraph network, or the DSN to (b) a commercial communications network. *Note:* Commercial refiling of a message will usually require a reformatting of the message, particularly the heading.

commit transaction: The application, *i.e.,* insertion, of information into any data repository of an integrated database management system in a distributed local communications network.

commonality: 1. A quality that applies to materiel or systems: (a) possessing like and interchangeable characteristics enabling each to be utilized, or operated and maintained by personnel trained on the others without additional specialized training; (b) having interchangeable repair parts and/or components; (c) applying to consumable items interchangeably equivalent without adjustment. **2.** Pertaining to equipment or systems that have the quality of one entity possessing like and interchangeable parts with another equipment or system entity. **3.** Pertaining to system design in which a given part can be used in more than one place in the system, *i.e.,* subsystems and components have parts in common. *Note:* Examples of commonality include the use of a firing pin that fits in many different weapons and the use of a light source that fits in many different types of fiber optic transmitters.

common battery: A single electrical power source used to energize more than one circuit, component, equipment, or system. *Note 1:* A common battery is usually an electrolytic device and is usually centrally located to the equipment that it serves. *Note 2:* In many telecommunications applications, the common battery is at a nominal -48 Vdc. *Note 3:* A central office common battery supplies power to operate all directly connected instruments. *Note 4: Common battery* may include one or more power conversion devices to transform commercial power to direct current, with an electrolytic battery floating across the output.

common-battery signaling: Signaling in which the signaling power of a telephone is supplied by the serving switch. *Note:* In common-battery signaling, "talking power" may be supplied by common or local battery.

common bonding network (CBN): The set of metallic components that are intentionally or incidentally interconnected to provide the principal means for effecting bonding and grounding inside a telecommunications building. These components include: structural steel or reinforcing rods, metallic plumbing, ac power conduit, cable racks, and bonding conductors. The CBN is connected to the exterior grounding electrode system. *Synonym* **integrated ground plane.** [After T1.320-1994]

common carrier: In a telecommunications context, a telecommunications company that holds itself out to the public for hire to provide communications transmission services. *Note:* In the United States, such companies are usually subject to regulation by Federal and state regulatory commissions. *Synonyms* **carrier, commercial carrier, communications common carrier,** *[and, loosely]* **interexchange carrier.**

common-channel interoffice signaling (CCIS): In multichannel switched networks, a method of transmitting all signaling information for a group of trunks by encoding it and transmitting it over a separate channel using time-division digital techniques.

common channel network signaling: Channels between switching offices used to transmit signaling information independent of the subscribers' communication paths or transmission channels. [47 CFR Pt.36-A]

common-channel signaling: 1. In a multichannel communications system, signaling in which one channel in each link is used for signaling to control, account for, and manage traffic on all channels of the link. *Note:* The channel used for common-channel signaling does not carry user information. **2.** A signaling method in which a single channel conveys, by means of labeled messages, signaling information relating to a multiplicity of circuits or calls and other information, such as that used for network management. [T1.110-1987]

common channel signaling network: A network consisting of two or more signaling points and connecting common channel signaling links that are administered in common. [T1.110-1987]

common control: An automatic switching arrangement in which the control equipment necessary for the establishment of connections is shared by being associated with a given call only during the period required to accomplish the control function for the given call. *Note:* In common control, the channels that are used for signaling, whether frequency bands or time slots, are not used for message traffic.

common control switching arrangement (CCSA): An arrangement in which switching for a private network is provided by one or more common control switching systems. *Note:* The switching systems may be shared by several private networks and also may be shared with the public telephone networks.

common control system: An automatic switching system that makes use of common equipment to establish a connection. *Note:* The common equipment then becomes available to establish other connections.

common equipment: Equipment used by more than one system, subsystem, component, or other equipment, such as a channel or switch.

common fill device: [In security,] one of a family of devices developed to read-in, transfer, or store key. [INFOSEC-99]

common gateway interface: *See* **CGI.**

common management information protocol (CMIP): A protocol used by an application process to exchange information and commands for the purpose of managing remote computer and communications resources.

common management information service (CMIS): A service that specifies the service interface to the Common Management Information Protocol (CMIP). *Note:* To transfer management information between open systems using CMIS/CMIP, peer connections, *i.e.,* associations, must be established. This requires the establishment of an Application Layer association, a Session Layer connection, a Transport Layer connection, and, depending on supporting communications technology, Network Layer and Link Layer connections.

common-mode interference: 1. Interference that appears between signal leads, or the terminals of a measuring circuit, and ground. **2.** A form of coherent interference that affects two or more elements of a network in a similar manner (*i.e.* , highly coupled) as distinct from locally generated noise or interference that is statistically independent between pairs of network elements.

common-mode rejection ratio (CMRR): The ratio of the common-mode interference voltage at the input of a circuit, to the corresponding interference voltage at the output.

common-mode voltage: 1. The voltage common to both input terminals of a device. **2.** In a differential amplifier, the unwanted part of the voltage between each input connection point and ground that is added to the voltage of each original signal. *Synonym* **longitudinal voltage.**

common return: A return path that is common to two or more circuits and that serves to return currents to their source or to ground.

common return offset: In a line or circuit, the dc potential difference between ground and the common return.

common transport trunk group: A trunk group between exchange carrier switches which transports access traffic for numerous interexchange carriers concurrently and may also carry exchange carrier (EC) traffic. [T1.Rpt 11-1991]

common user: In communications systems, pertaining to communications facilities and services provided to essentially all users in the area served by the system, rather than to one user or to a relatively small number of users, such as a closed user group with outgoing access.

common user circuit: A circuit designated to furnish a communication service to a number of users.

common user network: A system of circuits or channels allocated to furnish communication paths between switching centers to provide communication service on a common basis to all connected stations or subscribers. It is sometimes described as a general purpose network. [JP1]

communication configuration: An attribute describing the special arrangement for transferring information between two or more access points; it completes the structure associated with a telecommunication service as it associates the relationship between the access points involved and the flow of information between these access points. Values associated with this attribute are point-to-point, multipoint, and broadcast. [T1.603-1990] [T1.604-1990]

communication function: A function in an open system that provides the means for cooperating processes in different real open systems to communicate. This communication is concerned not only with the transfer of information between open systems, but also with their capability to interwork to accomplish a specific operations, administration, maintenance and provisioning (OAM & P) function. [T1.210-1993]

communications: 1. Information transfer, among users or processes, according to agreed conventions. **2.** The branch of technology concerned with the representation, transfer, interpretation, and processing of data among persons, places, and machines. *Note:* The meaning assigned to the data must be preserved during these operations.

communications base station: *Synonym* **base communications.**

communications blackout: 1. A cessation of communications or communications capability caused by a lack of power to a communications facility or equipment. **2.** A total lack of communications capability caused by propagation anomalies, *e.g.,* those present during strong auroral activity or during the re-entry of a spacecraft into the Earth's atmosphere.

communications center: 1. An agency charged with the responsibility for handling and controlling communications traffic. The center normally includes message center, transmitting, and receiving facilities. [JP 1-02] **2.** A facility that (a) serves as a node for a communications network, (b) is equipped for technical control and maintenance of the circuits originating, transiting, or terminating at the node, (c) may contain message-center facilities, and (d) may serve as a gateway. *Synonyms* **comm center, message center.**

communications channel: *See* **channel.**

communications common carrier: 1. The term "communications common carrier" as used in this part [*of 47CFR*] means any person (individual, partnership, association, joint-stock company, trust, corporation, or other entity) engaged as a common carrier for hire, in interstate or foreign communication by wire or radio or in interstate or foreign radio transmission of energy, including such carriers as are described in subsection 2(b) (2) and (3) of the *Communications Act of 1934,* as amended, and, in addition, for purposes of subpart H of this part, includes any individual, partnership, association, joint-stock company, trust, corporation, or other entity which owns or controls, directly or indirectly, or is under direct or indirect common control with, any such carrier. [47CFR] **2.** Any person engaged in rendering communication service for hire to the public. [47CFR] *Synonym* **common carrier.**

communications cover: Concealing or altering of characteristic communications patterns to hide information that could be of value to an adversary. [INFOSEC-99]

communications deception: 1. Deliberate transmission, retransmission, or alteration of communications to mislead an adversary's interpretation of the communications. [NIS] **2.** Use of devices, operations, and techniques with the intent of confusing or misleading the user of a communications link or a navigation system. [JP 10-2]

communications-electronics (C-E): The specialized field concerned with the use of electronic devices and systems for the acquisition or acceptance, processing, storage, display, analysis, protection, disposition, and transfer of information. *Note:* C-E includes the wide range of responsibilities and actions relating to (a) electronic devices and systems used in the transfer of ideas and perceptions, (b) electronic sensors and sensory systems used in the acquisition of information devoid of semantic influence, and (c) electronic devices and systems intended to allow friendly forces to operate in hostile environments and to deny to hostile forces the effective use of electromagnetic resources.

communications intelligence (COMINT): Technical and intelligence information derived from foreign communications by other than the intended recipients. [JP 1-02]

communications jamming (COMJAM): 1. The portion of electronic jamming that is directed against communications circuits and systems. **2.** The prevention of successful radio communications by the use of electromagnetic signals, *i.e.,* the deliberate radiation, reradiation, or reflection of electromagnetic energy with the objective of impairing the effective use of electronic communications systems. *Note:* The aim of communications jamming is to prevent communications by electromagnetic means, or at least to degrade communications sufficiently to cause delays in transmission and reception. Jamming may be used in conjunction with deception to achieve an overall electronic-countermeasure (ECM) plan implementation.

communications net: An organization of stations capable of direct communication on a common channel or frequency. [JP 1-02] *Synonym* **net.**

communications net operation: *See* **net operation.**

communications network: An organization of stations capable of intercommunications, but not necessarily on the same channel. [JP 1-02]

communications processor unit (CPU): A computer embedded in a communications system. *Note 1:* An example of a CPU is the message data processor of a DDN switching center. *Note 2: CPU* is also an abbreviation for *central processing unit* of a computer.

communications profile: [An] analytic model of communications associated with an organization or activity. The model is prepared from a systematic examination of communications content and patterns, the functions they reflect, and the communications security measures applied. [INFOSEC-99]

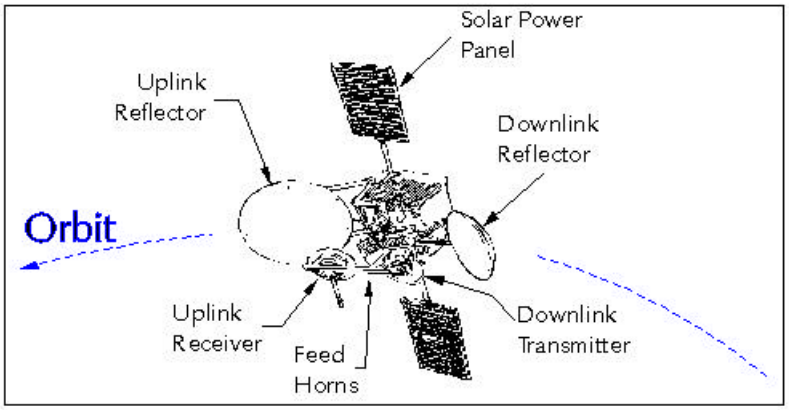
communications protection: The application of communications security (COMSEC) measures to telecommunications systems in order (a) to deny unauthorized persons access to sensitive unclassified information of value, (b) to prevent disruption of telecommunications services, or (c) to ensure the authenticity of information handled by telecommunications systems.

communications protocol: *See* **protocol.**

communications reliability: The probability that information transmitted from a communications station will arrive at the intended destination in a timely manner without loss of

content.

communications satellite: An orbiting vehicle that relays signals between (a) terrestrial communications stations, (b) a terrestrial communications station and another communications satellite, or (c) other communications satellites.



communications satellite

communications saturation: *See* **saturation.**

communications security (COMSEC): Measures and controls taken to deny unauthorized persons information derived from telecommunications and to ensure the authenticity of such telecommunications. *Note:* Communications security includes cryptosecurity, transmission security, emission security, and physical security of COMSEC material. [INFOSEC]

- **(a) cryptosecurity:** [The] component of communications security that results from the provision of technically sound cryptosystems and their proper use. [NIS]
- **(b) emission security:** Protection resulting from all measures taken to deny unauthorized persons information of value which might be derived from intercept and analysis of compromising emanations from crypto-equipment, AIS, and telecommunications systems. [NIS]
- **(c) physical security:** The component of communications security that results from all physical measures necessary to safeguard classified equipment, material, and documents from access thereto or observation thereof by unauthorized persons. [JP 1-02]
- **(d) transmission security:** [The] component of communications security that results from the application of measures designed to protect transmissions from interception and exploitation by means other than cryptanalysis . [NIS]

communications security equipment: *See* **COMSEC equipment.**

communications security material: *See* **COMSEC material.**

communications silence: The avoidance of any type of transmission, emission, or radiation by any means, including radiation from receiving equipment. *Note:* An example of communications silence is the maintaining of a listening watch only if the receivers do not radiate beyond a specified level.

communications sink: *See* **sink.**

communications source: *See* **source.**

communications subsystem: A functional unit or operational assembly that is smaller than the larger assembly under consideration. *Note:* Examples of communications subsystems in the Defense Communications System (DCS) are (a) a satellite link with one Earth terminal in CONUS and one in Europe, (b) the interconnect facilities at each Earth terminal of the satellite link, and (c) an optical fiber cable with its driver and receiver in either of the interconnect facilities.

communications survivability: The ability of communications systems to continue to operate effectively under adverse conditions, though portions of the system may be damaged or destroyed. *Note:* Various methods may be used to maintain communications services, such as using alternate routing, different transmission media or methods, redundant equipment, and sites and equipment that are radiation hardened.

communications system: A collection of individual communications networks, transmission systems, relay stations, tributary stations, and data terminal equipment (DTE) usually capable of interconnection and interoperation to form an integrated whole. *Note:* The components of a communications system serve a common purpose, are technically compatible, use common procedures, respond to controls, and operate in unison.

communications system engineering: The translation of user requirements for the exchange of information into cost-effective and low-risk technical solutions in terms of equipment and subsystems. *Note:* Communications system engineering encompasses the integration of these parts into a complete entity resulting in a minimum investment for the entire system life cycle required to satisfy the requirements of a majority of users of the communication system.

communications system survivability: *See* **survivability.**

communications theory: Theory that is devoted to the probabilistic characteristics of the transmission of data in the presence of noise, and that is used to advance the design, development, and operation of communications systems.

communications watch: The monitoring of one or more communications lines, frequencies, or channels to obtain information by listening to or receiving all transmissions on them and transmitting and receiving messages as required.

communications zone: The rear part of the theater of war or theater of operations that contains the lines of communications, theater logistics bases, forward operating bases, and other agencies required for the immediate support and maintenance of the field forces. It extends back to the CONUS base. [JP 1-02]

community antenna television (CATV): *See* **cable TV.**

community of interest: A grouping of users who generate a majority of their traffic in calls to other members of the group. *Note:* The community of interest may be related to a geographic area or to an administrative organization. *Synonym* **special interest group.**

community reception (in the broadcasting-satellite service): The reception of emissions from a space station in the broadcasting-satellite service by receiving equipment, which in some cases may be complex and have antennae larger than those used for individual reception, and intended for use:

- by a group of the general public at one location;

  or

- through a distribution system covering a limited area. [NTIA] [RR]

compact: *See* **data compaction.**

compact disk read-only memory: *See* **CD ROM.**

compaction: *See* **data compaction.**

companding: An operation in which the dynamic range of signals is compressed before transmission and is expanded to the original value at the receiver. *Note:* The use of companding allows signals with a large dynamic range to be transmitted over facilities that have a smaller dynamic range capability. Companding reduces the noise and crosstalk levels at the receiver.

compandor: A device that incorporates a compressor and an expander, each of which may be used independently.

comparably efficient interconnection (CEI): An equal-access concept developed by the FCC stating that, ". . . if a carrier offers an enhanced service, it should be required to offer network interconnection (or collocation) opportunities to others that are comparably efficient to the interconnection that its enhanced service enjoys. Accordingly, a carrier would be required to implement CEI only as it introduces new enhanced services." [FCC *Report and Order* June 16, 1986]

comparator: 1. In analog computing, a functional unit that compares two analog variables and indicates the result of that comparison. **2.** A device that compares two items of data and indicates the result of that comparison. **3.** A device for determining the dissimilarity of two items such as two pulse patterns or words.

compartmentalization: 1. The division of data into isolated blocks for the purpose of reducing risk; *e.g.,* the isolation of the operating system, application software , and files from one another in a storage device in order to provide protection against unauthorized or concurrent access. [After 2382-pt.8] **2.** A nonhierarchical grouping of sensitive information used to control access to data more finely than with hierarchical security classification alone. [INFOSEC-99]

compartmentation: The segregation of components, programs, and information to provide isolation. *Note:* Compartmentation provides some protection against overall compromise, contamination, or unauthorized access.

compartmented mode: [An] information systems (IS) mode of operation wherein each user with direct or indirect access to a system, its peripherals, remote terminals, or remote hosts has all of the following: (a) valid security clearance for the most restricted information processed in the system; (b) formal access approval and signed nondisclosure agreements for that information [to] which a user is to have access; and (c) valid need-to-know for information [to] which a user is to have access. [INFOSEC-99]

compatibility: 1. Capability of two or more items or components of equipment or material to exist or function in the same system or environment without mutual interference. [JP 1-02] **2.** In computing, the ability to execute a given program on different types of computers without modification of the program or the computers. **3.** The capability that allows the substitution of one subsystem (storage facility), or of one functional unit (*e.g.* , hardware, software), for the originally designated system or functional unit in a relatively transparent manner, without loss of information and without the introduction of errors.

compatibility testing: Testing to be carried out to validate proper interworking of interconnecting network facilities and equipment. Compatibility tests are performed prior to cutover to validate functional capabilities and services provided over the interconnections. [T1.234-1993]

compatible sideband transmission: Independent sideband transmission in which the carrier is deliberately reinserted at a lower level after its normal suppression to permit reception by conventional AM receivers. *Note:* Compatible sideband transmission is usually single-sideband (SSB) amplitude-modulation-equivalent (AME) transmission consisting of the emission of the carrier plus the upper sideband. *Synonym* **amplitude modulation equivalent.**

compelled signaling: Signaling in which the transmission of each signal in the forward direction from an originating terminal is inhibited until an acknowledgement of the satisfactory receipt of the previous signal is received by the originating terminal.

competitive access provider (CAP): A company that provides exchange access services in competition with an established U.S. telephone local exchange carrier.

competitive clip: In time-assignment speech interpolation (TASI) or digital speech interpolation (DSI), truncation of the initial part of a speech spurt, caused when all channels in a given direction of transmission are busy and the transmission of the spurt must wait for an available channel.

compile: 1. To translate a computer program expressed in a high-level language into a program expressed in a lower level language, such as an intermediate language, assembly language, or a machine language. **2.** To prepare a machine language program from a computer program written in another programming language by making use of the overall logic structure of the program or by generating more than one computer instruction for each symbolic statement as well as performing the function of an assembler.

compiler: A computer program for compiling. *Synonym* **compiling program.**

compiling program: *Synonym* **compiler.**

complementary colors: 1. With respect to additive mixing, any pair of colors that are radially opposite one another relative to the white point on a chromaticity chart, *e.g.* , the familiar CIE chart. *Note:* Complementary colors may be combined additively to produce the perception of white. **2.** Analogous pairs of colors with respect to subtractive mixing.

complementary network service (CNS): A means for an enhanced-service provider customer to connect to a network and to the enhanced service provider. *Note:* Complementary network services usually consist of the customer local service, such as a business or residence, and several associated service features, such as a call-forwarding service.

complement (of cable): A group of conductors of the same general type (*e.g.,* quadded, paired) within a single cable sheath. [47 CFR Pt.36-A]

complex: All groups of operator positions, wherever located, associated with the same call distribution and/or stored program control unit. [47 CFR Pt.36-A]

compliance testing: A one-time process to verify that a collection of software and hardware fulfills given specifications. [Mattila]

component: 1. An assembly, or part thereof, that is essential to the operation of some larger assembly and is an immediate subdivision of the assembly to which it belongs. *Note:* For example, a radio receiver may be a component of a complete radio set consisting of a combined transmitter-receiver, *i.e.,* a transceiver. The same radio receiver could also be a subsystem of the combined transmitter-receiver, in which case the IF amplifier section would be a component of the receiver but not of the radio set. Similarly, within the IF amplifier section, items, such as resistors, capacitors, vacuum tubes, and transistors, are components of that section. **2.** In logistics, a part, or combination of parts having a specified function, that can only be installed or replaced as an entity. [JP1]. **3.** In material, an assembly or any combination of parts, subassemblies, and assemblies mounted together in manufacture, assembly, maintenance, or rebuild. [JP1]

component analog video: *See* **CAV.**

component color: The structure of a video signal wherein the R', G', and B' signals are kept separate from one another or wherein luminance and two bandlimited color-difference signals are kept separate from one another. *Note:* The separation may be achieved by separate channels, or by time-division multiplexing, or by a combination of both. [After SMPTE]

composite cable: A communications cable having both optical and metallic signal-carrying components. *Note 1:* A cable having optical fiber(s) and a metallic component, *e.g.,* a metallic twisted pair, used solely for conduction of electric power to repeaters, does qualify as a composite cable. *Note 2:* A cable having optical fiber(s), plus a metallic strength member or armor, does not qualify as a composite cable.

composite color: The structure of a video signal wherein the luminance and two bandlimited color-difference signals are simultaneously present in the channel. *Note:* The format may be achieved by frequency-division multiplexing, quadrature modulation, *etc.* It is common to strive for integrity by suitable separation of the frequencies, or since scanned video signals are highly periodic, by choosing frequencies such that the chrominance information is interleaved within spectral regions of the luminance signal wherein a minimum of luminance information resides. [After SMPTE]

composited circuit: A circuit that can be used simultaneously either for telephony and dc telegraphy or for telephony and signaling. *Note:* Separation of the two may be accomplished by frequency discrimination. *Synonym* **voice-plus circuit.**

composite signaling (CX): Signaling in which an arrangement is made to provide direct current signaling and dial pulsing beyond the range of conventional loop signaling. *Note:* Composite signaling, like DX signaling, permits duplex operation, *i.e.,* permits simultaneous two-way signaling. *Synonym* **CX signaling.**

composite synchronization: A signal consisting of horizontal sync pulses, vertical sync pulses, and equalizing pulses only. [After Silicon]

composite test signal: In television systems, a test signal consisting of a line bar (125 ns rise time and fall time), a 2T pulse (250 ns half-amplitude duration), a 12.5T (1.5625 microseconds half-amplitude duration) chrominance pulse, and a five-riser staircase signal modulated by the color subcarrier having a peak-to-peak amplitude of 40 IRE units superimposed upon standard synchronizing and blanking signals. Reference 'A' and 'B' are the measurement points utilized in the measurement of insertion gain and insertion-gain variation. [T1.Rpt16-1992]

composite two-tone test signal: A test signal composed of two different frequencies and used for intermodulation distortion measurements.

composite video: *See* **composite video signal.**

composite video signal: The electrical signal that represents complete color picture information and all synchronization signals, including blanking and the deflection synchronization signals to which the color synchronization signal is added in the appropriate time relationship. [After IEEE] *Synonym* **composite video.**

compound document: 1. A document represented by a software file that is composed of more than one element; *e.g.* , text, graphics, voice, video. **2.** The software file itself.

compound signal: In ac signaling, a signal consisting of the simultaneous transmission of more than one frequency. *Note:* An example of compound signaling is dual-tone multifrequency (DTMF) signaling.

compress: *See* **data compaction, data compression, signal compression.**

compressed video: Video that has been encoded so as to reduce the number of bits required for storage or transmission.

compression: *See* **data compression, signal compression.**

compression ratio: 1. In signal compression, the ratio of the dynamic range of compressor input signals to the dynamic range of the compressor output signals. *Note:* The compression ratio is usually expressed in dB. For example, a 40-dB input range compressed to a 30-dB output range would be equivalent to a 10-dB compression. **2.** In digital facsimile, the ratio of the total pels scanned for the object to the total encoded bits sent for picture information. **3.** The ratio of the gain of a device at a low power level to the gain at some higher level. *Note:* The compression ratio is usually expressed in dB.

compressor: A nonlinear analog device that has a lower gain at higher input levels than at lower input levels. *Note:* A compressor is used to allow signals with a large dynamic range to be sent through devices or circuits with a smaller dynamic range.

compromise: 1. The known or suspected exposure of clandestine personnel, installations, or other assets or of classified information or material, to an unauthorized person. [JP1] **2.** The disclosure of cryptographic information to unauthorized persons. **3.** The recovery of plain text of encrypted messages by unauthorized persons through cryptanalysis methods. **4.** Disclosure of information to unauthorized persons or a violation of the security policy of a system in which unauthorized intentional or unintentional disclosure, modification, destruction, or loss of an object may have occurred. [INFOSEC-99]

compromised obsolete: In cryptography, a key state in which the secrecy or integrity of the key is suspect. [After X9.17/95]

compromising emanations: Unintentional signals that, if intercepted and analyzed, would disclose the information transmitted, received, handled, or otherwise processed by information systems equipment. [INFOSEC]

computer: 1. A device that accepts data, processes the data in accordance with a stored program, generates results, and usually consists of input, output, storage, arithmetic, logic, and control units. **2.** A functional unit that can perform substantial computation, including numerous arithmetic operations or logic operations, without human intervention during a run. *Note 1:* This definition, approved by the Customs Council, distinguishes a computer from similar devices, such as hand-held calculators and certain types of control devices. *Note 2:* Computers have been loosely classified into microcomputers, minicomputers, and main-frame computers, based on their size. These distinctions are rapidly disappearing as the capabilities of even the smaller units have increased. Microcomputers now are usually more powerful and versatile than the minicomputers and the main-frame computers were a few years ago.

computer abuse: 1. In computer security, a willful or negligent unauthorized activity that affects or involves the computer security of a data processing system. [2382-pt.8] **2.** In computer crime, the use of a computer to perform an illegal or unauthorized act. **3.** Intentional or reckless misuse, alteration, disruption, or destruction of information processing resources. [INFOSEC-99]

computer-aided software engineering: *See* **CASE.**

computer-aided systems engineering: *See* **CASE.**

computer architecture: Of a computer, the physical configuration, logical structure, formats, protocols, and operational sequences for processing data, controlling the configuration, and controlling the operations. *Note:* Computer architecture may also include word lengths, instruction codes, and the interrelationships among the main parts of a computer or group of computers.

computer conference: A communication session, facilitated by means of a computer network, between several participants, each of them having access to all messages submitted.

Note: Messages, in general, have no specified recipient, but are sent to the entire membership. Messages may contain text, video, audio, graphics, software, or a combination thereof. Some of these may be contained in the message and may be stored on line for future retrieval. Computer conferencing can be conducted either in real time or in store-and-forward mode.

computer conferencing: 1. Teleconferencing supported by one or more computers. **2.** An arrangement in which access, by multiple users, to a common database is mediated by a controlling computer. **3.** The interconnection of two or more computers working in a distributed manner on a common application process.

computer crime: A violation of law committed with the aid of, or directly involving, a data processing system or network. [2382-pt.8]

computer cryptography: Use of a crypto-algorithm program by a computer to authenticate or encrypt/decrypt information. [INFOSEC-99]

computer-dependent language: *Synonym* **assembly language.**

computer fraud: A fraud committed with the aid of, or directly involving, a data processing system or network. [2382-pt.8]

computer graphics: 1. Graphics implemented through the use of computers. **2.** Methods and techniques for converting data to or from graphic displays via computers. **3.** The branch of science and technology concerned with methods and techniques for converting data to or from visual presentation using computers.

computer graphics metafile: *See* **cgm.**

computer language: *Synonym* **programming language.**

computer network: 1. A network of data processing nodes that are interconnected for the purpose of data communication. **2.** A communications network in which the end instruments are computers.

computer network engineering: *See* **network engineering.**

computer network operating system (NOS): A specialized operating system designed for computer networking on minicomputers and microcomputers in a local networking area / campus area network. *Note:* A NOS is usually designed to run on existing software designed for that computer and may require interface hardware for the workstation and server.

computer-oriented language: A programming language in which words and syntax are designed for use on a specific computer or class of computers. *Synonyms* **low-level language, machine-oriented language.**

computer peripheral: *See* **peripheral equipment.**

computer program: *See* **program.**

computer program origin: The address assigned to the initial storage location of a computer program in main storage.

computer routine: *See* **routine.**

computer science: The discipline that is concerned with methods and techniques relating to data processing performed by automatic means.

computer security (COMPUSEC): 1. Measures and controls that ensure confidentiality, integrity, and availability of information-system (IS) assets including hardware, software, firmware, and information being processed, stored, and communicated. [INFOSEC-99] *Synonym* **automated information systems security. 2.** The application of hardware, firmware and software security features to a computer system in order to protect against, or prevent, the unauthorized disclosure, manipulation, deletion of information or denial of service. **3.** The protection resulting from all measures to deny unauthorized access and exploitation of friendly computer systems. [JP1-02]

computer security subsystem: Hardware/software designed to provide computer security features in a larger system environment. [INFOSEC-99]

computer system: A functional unit, consisting of one or more computers and associated software, that (a) uses common storage for all or part of a program and also for all or part of the data necessary for the execution of the program, (b) executes user-written or user-designated programs, and (c) performs user-designated data manipulation, including arithmetic and logic operations. *Note:* A computer system may be a stand-alone system or may consist of several interconnected systems. *Synonyms* **ADP system, computing system.**

computer-system audit: An examination of the procedures used in a data processing system to evaluate their effectiveness and correctness, and to recommend improvements. [2382-pt.8]

computer system fault tolerance: The ability of a computer system to continue to operate correctly even though one or more of its components are malfunctioning. *Note:* System performance, such as speed and throughput, may be diminished until the faults are corrected. *Synonym* **computer system resilience.**

computer system resilience: *Synonym* **computer system fault tolerance.**

computer systems engineering: *See* **systems design.**

computer word: In computing, a group of bits or characters that occupies one or more storage locations and is treated by computers as a unit. *Synonym* **machine word.**

computing system: *Synonym* **computer system.**

COMSEC: *Acronym for* **communications security.**

COMSEC boundary: [The] definable perimeter encompassing all hardware, firmware, and software components performing critical COMSEC functions, such as key generation and key handling and storage. [INFOSEC-99]

COMSEC chip set: [A] collection of NSA-approved microchips. [INFOSEC-99]

COMSEC control program: Computer instructions or routines controlling or affecting the externally performed functions of key generation, key distribution, message encryption/decryption, or authentication. [INFOSEC-99]

COMSEC end-item: Equipment or a combination of components ready for use in a COMSEC application. [INFOSEC-99]

COMSEC equipment: Equipment designed to provide security to telecommunications by converting information to a form unintelligible to an unauthorized interceptor and, subsequently, by reconverting such information to its original form for authorized recipients; also, equipment designed specifically to aid in, or as an essential element of, the conversion process. *Note:* COMSEC equipment includes crypto-equipment, crypto-ancillary equipment, cryptoproduction equipment, and authentication equipment. [INFOSEC]

COMSEC insecurity: COMSEC incident that has been investigated, evaluated, and determined to jeopardize the security of COMSEC material or the secure transmission of information. [INFOSEC-99]

COMSEC material: [An] item designed to secure or authenticate telecommunications. *Note:* COMSEC material includes, but is not limited to, key, equipment, devices, documents, firmware or software that embodies or describes cryptographic logic and other items that perform COMSEC functions. [INFOSEC-99]

COMSEC module: [A] removable component that performs COMSEC functions in a telecommunications equipment or system. [INFOSEC-99]

COMSEC monitoring: [The] act of listening to, copying, or recording transmissions of one's own official telecommunications to analyze the degree of security. [INFOSEC-99]

COMSEC profile: [A] statement of COMSEC measures and materials used to protect a given operation, system, or organization. [INFOSEC-99]

COMSEC survey: [An] organized collection of COMSEC and communications information relative to a given operation, system, or organization. [INFOSEC-99]

COMSEC system data: Information required by a COMSEC equipment or system to enable it to properly handle and control key. [INFOSEC-99]

concentration equipment: Central office equipment whose function is to concentrate traffic from subscriber lines onto a lesser number of circuits between the remotely located concentration equipment and the serving central office concentration equipment. This concentration equipment is connected to the serving central office line equipment. [47 CFR Pt.36-A]

concentrator: 1. In data transmission, a functional unit that permits a common path to handle more data sources than there are channels currently available within the path. *Note:* A concentrator usually provides communication capability between many low-speed, usually asynchronous channels and one or more high-speed, usually synchronous channels. Usually different speeds, codes, and protocols can be accommodated on the low-speed side. The low-speed channels usually operate in contention and require buffering. **2.** A device that connects a number of circuits, which are not all used at once, to a smaller group of circuits for economy.

concentricity error: In an optical fiber, the distance between the center of the two concentric circles that specify the cladding diameter and the center of the two concentric circles that specify the core diameter. *Note:* The concentricity error is used in conjunction with tolerance fields to specify or characterize optical fiber core and cladding geometry. *Synonyms* **core eccentricity, core-to-cladding concentricity, core-to-cladding eccentricity, core-to-cladding offset.**

concrete signal: An off-hook condition applied to the network interface (NI) by the network that indicated the network intends to complete a call attempt to the customer installation (CI) or intends to continue an established connection. [T1.208-1989]

concrete syntax: Those aspects of the rules used in the formal specification of data that embody a specific representation of those data. [T1.208-1989]

concurrent operation: 1. *Synonym* **multitasking. 2.** In data link operations, the operation in which two or more data links are used during the same, usually short, time interval, while adhering to the protocols of each link without providing data forwarding among the links.

conditioned baseband representation: *Synonym* **non-return-to-zero mark.**

conditioned circuit: A communications circuit optimized to obtain desired characteristics for voice or data transmission.

conditioned diphase modulation: A form of diphase modulation, combined with signal conditioning, that (a) eliminates the dc component of the signal, (b) enhances timing recovery, and (c) facilitates transmission over voice frequency (VF) circuits or coaxial cables.

conditioned loop: A loop that has conditioning equipment to obtain the desired line characteristics for voice or data transmission. *Note:* The conditioning equipment is used to improve the amplitude-vs.-frequency characteristics of the circuit and to match impedance.

conditioning equipment: 1. At junctions of circuits, equipment used to obtain desired circuit characteristics, such as matched transmission levels, matched impedances, and equalization between facilities. **2.** Corrective networks used to improve data transmission, such as equalization of the insertion-loss-vs.-frequency characteristic and the envelope delay distortion over a desired frequency range.

conducted interference: 1. Interference resulting from noise or unwanted signals entering a device by conductive coupling, *i.e.,* by direct coupling. **2.** An undesired voltage or current generated within, or conducted into, a receiver, transmitter, or associated equipment, and appearing at the antenna terminals.

conduction band: 1. In a semiconductor, the range of electron energy, higher than that of the valence band, sufficient to make the electrons free to move from atom to atom under the influence of an applied electric field and thus constitute an electric current. **2.** In the atomic structure of a material, a partially filled or empty energy level in which electrons are free to move, thus allowing the material to conduct an electrical current upon application of an electric field by means of an applied voltage.

conductive coupling: Energy transfer achieved by means of physical contact, *i.e.,* coupling other than inductive or capacitive coupling. *Note 1:* Conductive coupling may be achieved by wire, resistor, or common terminal, such as a binding post or metallic bonding. *Note 2:* Conductive coupling passes the full spectrum of frequencies, including dc. *Synonym* **direct coupling.**

cone of silence: *Synonym* **antenna blind cone.**

CONEX: *Acronym for* **connectivity exchange.**

conference active: In conference calling, the state in which conference resources have been allocated to the specified conference and at least one party has a connection to the conference. That connection could be either active or held. [T1.647-1995]

conference call: A service feature that allows a call to be established among three or more stations in such a manner that each of the stations is able to communicate with all the other stations. *Synonym* **multiple call.**

conference controller: In audio and video teleconferences, the user in charge of the conference when the service is invoked and the conference reaches the active state. *Note:* The conference controller may perform any or all of the following actions: drop, floating, isolate, reattach, and split. [After T1.647-1995] *Synonym [loosely]* **moderator.**

conference floating: In conference calling, the state in which the conference is active but without a controller. This state is possible when two or more conferees exist on an active conference and the controller successfully disconnects himself/herself. [T1.647-1995]

conference ID: In conference calling, the served user's (or controller's) reference to the conference itself. [T1.647-1995]

conference idle: In conference calling, the state prior to the receipt of a "conference invocation request," or after a particular conference has ended. [T1.647-1995]

conference operation: In a communications network, operation that allows a call to be established among three or more stations in such a manner that each of the stations is able to

communicate directly with all the other stations. *Note:* In radio systems, the stations may receive simultaneously, but must transmit one at a time. The common operational modes are "push-to-talk" for telephone operation and "push-to-type" for telegraph and data transmission.

confidentiality: 1. Of classified or sensitive data, the degree to which the data have not been compromised; *i.e.,* have not been made available or disclosed to unauthorized individuals, processes, or other entities. [After 2382-pt.8] **2.** Assurance that information is not disclosed to unauthorized persons, processes, or devices. [INFOSEC-99] **3.** A property by which information relating to an entity or party is not made available or disclosed to unauthorized individuals, entities, or processes. [T1.Rpt22-1993]

configuration: In a communications or computer system, an arrangement of functional units according to their nature, number, and chief characteristics. *Note 1:* Configuration pertains to hardware, software, firmware, and documentation. *Note 2:* The configuration will affect system performance.

configuration control: 1. After establishing a configuration, such as that of a telecommunications or computer system, the evaluating and approving changes to the configuration and to the interrelationships among system components. **2.** In distributed-queue dual-bus (DQDB) networks, the function that ensures the resources of all nodes of a DQDB network are configured into a correct dual-bus topology. *Note:* The functions that are managed include the head of bus, external timing source, and default slot generator functions. **3.** [The] process of controlling modifications to hardware, firmware, software, and documentation to ensure the information system (IS) is protected against improper modifications prior to, during, and after system implementation. [INFOSEC-99]

configuration management: 1. [The] management of security features and assurances through control of changes made to hardware, software, firmware, documentation, test, test fixtures, and test documentation throughout the life cycle of an information system (IS). [INFOSEC-99] **2.** The control of changes--including the recording thereof--that are made to the hardware, software, firmware, and documentation throughout the system life cycle.

confirmation signaling: Signaling that ensures error-free transmission of dialed information by returning a unique digit-dependent signal from the far end as each digit is sent over a trunk.

confirmation to receive: In facsimile, a signal from a CCITT Group 1, 2, or 3 facsimile receiver, indicating it is ready to receive picture signals.

conformance test: A test performed by an independent body to determine if a particular piece of equipment satisfies the criteria in a specified controlling document, such as a Federal standard, an American National Standard, a Military Standard, or a Military Specification.

congestion: 1. In a communications switch, a state or condition that occurs when more subscribers attempt simultaneously to access the switch than it is able to handle, even if unsaturated. **2.** In a saturated communications system, the condition that occurs when an additional demand for service occurs.

congestion level indicator (CLI): A local variable of a node that indicates the number of blocks to be dropped from packets containing droppable blocks (0, 1, 2, or 3 blocks may be specified). [T1.312-1991]

connecting arrangement: In the public switched telephone networks, the equipment provided by a common carrier to accomplish electrical interconnection between customer-provided equipment and the facilities of the common carrier.

connection: 1. A provision for a signal to propagate from one point to another, such as from one circuit, line, subassembly, or component to another. **2.** An association established between functional units for conveying information. **3.** A temporary concatenation of transmission channels or telecommunication circuits, switching and other functional units set up to provide a route for a transfer of information between two or more points in a telecommunication network. [After T1.506-1989]

connection control: The set of functions used for setting up, maintaining, and releasing a communication path between two or more users or a user and a network entity, *e.g.,* a dual-tone multifrequency receiver. [T1.667-1999]

connection endpoint (CE): A terminating device at one end of a layer connection within a service access point (SAP). [After T1.627-1993]

connection establishment: The establishment of the capability for the transmission of user information. [T1.507-1996]

connection identification: A number that identifies unambiguously a certain connection at the interface between the signaling connection control plan (SCCP) and a user function. [T1.110-1987]

connection-in-progress signal: A call control signal at the data circuit-terminating-equipment/data-terminal-equipment (DCE/DTE) interface that indicates to the DTE that the establishment of the data connection is in progress and that the ready-for-data signal will follow.

connectionless data transfer: *See* **connectionless mode transmission.**

connectionless mode transmission: 1. In a packet-switched network, transmission in which each packet is encoded with a header containing a destination address sufficient to permit the independent delivery of the packet without the aid of additional instructions. *Note 1:* A packet transmitted in a connectionless mode is frequently called a datagram. *Note 2:* In connectionless mode transmission of a packet, the service provider usually cannot guarantee there will be no loss, error insertion, misdelivery, duplication, or out-of-sequence delivery of the packet. However, the risk of these hazards' occurring may be reduced by providing a reliable transmission service at a higher protocol layer, such as the Transport Layer of the Open Systems Interconnection--Reference Model. **2.** The transmission of a unit of data in a single self-contained operation without establishing, maintaining, and releasing a connection. [After T1.204-1992]

connectionless network service: A network service that transfers information between end users without establishing a logical connection or virtual circuit between those specific users. [After T1.110-1987]

connectionless service: A service that allows the transfer of information among subscribers without the need for end-to-end establishment procedures. [T1.629-1999]

connectionless transmission: *See* **connectionless mode transmission.**

connection-minute: The product of (a) the number of messages and, (b) the average minutes of connection per message. [47 CFR Pt.36-A]

connection mode: *See* **connection-oriented mode transmission, connection-oriented network service.**

connection-mode transmission: *See* **connection-oriented mode transmission.**

connection-oriented data transfer protocol: A data-transfer protocol in which a logical connection is established between end user terminals.

connection-oriented mode transmission: 1. In a packet-switched network, a mode of transmission in which there is a complete information transfer transaction for each packet or group of packets, *i.e.,* the information transfer phase is preceded by an access phase and followed by a disengagement phase. *Note 1:* During the information transfer phase of connection-oriented mode transmission, more than one packet may be transmitted. The header of each information packet contains a sequence number and an identifier field that associates the packet with the connection that was established during the access phase before the information transfer phase begins. *Note 2:* Connection-oriented mode transmission usually enables detection of lost, erroneous, duplicated, or out-of-sequence packets because a connection is established from end to end before transmission begins. *Note 3:* The ITU-T X.25 protocols are widely used to implement connection-oriented mode transmission on packet-switched public data networks. The protocols are implemented at Layers 1, 2,

and 3 of the Open Systems Interconnection--Reference Model. **2.** The transfer of data between two or more peer entities which involves three distinct phases: connection establishment, data transfer, and connection release. [After T1.204-1992]

connection-oriented network service: A network service that establishes logical connections between end users before transferring information. [T1.110-1987]

connections per circuit hour (CCH): 1. A unit of traffic measurement expressed as the number of connections established at a switching point per hour. **2.** A unit of traffic measurement used to express the rate at which circuits are established at a switch. *Note:* The magnitude of the CCH is an instantaneous value subject to change as a function of time, *i.e.,* from moment to moment.

connectivity: For nodes (or links), the minimum number of nodes (or links) whose removal results in losing all paths that can be used to transfer information from a source to a sink. [T1.Rpt24-1993]

connectivity exchange (CONEX): In an adaptive or manually operated high-frequency (HF) radio network, the automatic or manual exchange of information concerning routes to stations that are not directly reachable by the exchange originator. *Note:* The purpose of the exchange is to identify indirect paths and/or possible relay stations to those stations that are not directly reachable.

connector: A device for mating and demating electrical power connections or communications media. *Note:* A connector is distinguished from a splice, which is a permanent joint.

connect signal: An off-hook condition applied to the network interface (NI) by the network that indicated the network intends to complete a call attempt to the customer installation (CI) or intends to continue an established connection. [T1.405-1989]

connect time: The amount of time that a terminal (client) is being served by a network. [Bahorsky] *Note:* Connect time can refer to either the total amount of time that the terminal is connected to the network or just the amount of time that the terminal actually transmits or receives data.

conservation of radiance: A basic principle of optics, that no passive optical system can increase the quantity L/n^2, where L is the radiance of a beam and n is the local refractive index. *Note: "Conservation of radiance"* was formerly called *"conservation of brightness"* or the *"brightness theorem."*

consolidated carrier: A carrier authorized to provide telecommunications services both within and outside World Zone 1 using the North American Numbering Plan (NANP)and the international dialing plan, respectively. [T1.104-1988]

consolidated local telecommunications service: Local communications service provided by GSA to all Federal agencies located in a building, complex, or geographical area.

constant luminance: In video, an image coding system that derives a luminance signal and two bandwidth-limited color-difference signals, to provide luminance information that is encoded into one signal supplemented by, but totally independent of, two color signals carrying only chrominance information, *i.e.,* hue and saturation. *Note 1:* Constant luminance is only achieved when the luminance and chrominance vectors are derived from linear signals. The introduction of nonlinear transform characteristics (usually to achieve a better signal-to-noise ratio and to control dynamic range prior to bandwidth reduction) before creating the luminance and chrominance vectors destroys constant luminance. Current video systems do not reconstitute the luminance and chrominance signals in their linear form before further processing and, therefore, depart from constant luminance. *Note 2:* When R,G,B information is required to be recovered from the set of luminance and color-difference signals, the values correlated to the original signals are obtained only if the luminance and chrominance signals have been derived from linear R,G,B functions or have been transformed back to linear. *Note 3:* Constant luminance not only provides a minimum of subjective noise in the display (since the luminance channel does not respond to chrominance noise), but also preserves this noise minimum through chrominance transformations. [After SMPTE]

consultation hold: A service feature that allows a speaker on an extension instrument to place one call on hold and to speak with another caller on a separate line.

contamination: The introduction of data of one security [classification or] security category into data of a lower security classification or different security category. [2382-pt.8] [INFOSEC-99]

content: In Web terminology, the text, media, and links or information displayed by a browser at a particular Web site. [Bahorsky]

content-addressable storage: *Synonym* **associative storage.**

content hierarchy levels: The nested units of information into which a media stream can be decomposed. [T1.801.04-1997]

content hosting (hosting): Storage and management of databases by a content provider. [2382-pt.35]

contention: 1. A condition that arises when two or more data stations attempt to transmit at the same time over a shared channel, or when two data stations attempt to transmit at the same time in two-way alternate communication. *Note:* A contention can occur in data communications when no station is designated a master station. In contention, each station must monitor the signals and wait for a quiescent condition before initiating a bid for master status. **2.** Competition by users of a system for use of the same facility at the same time. *Synonym* **access contention.**

content label: A rating provided by a rating service that defines or categorizes the contents of a Web site. [Bahorsky]

content provider: An organization that creates and maintains databases containing information from an information provider. *Note:* The content provider and the information provider may be the same organization. [2382-pt.35]

contingency key: [A] key held for use under specific operational conditions or in support of specific contingency plans. [INFOSEC-99]

contingency plan: 1. A plan for backup procedures, emergency response, and post-disaster recovery. *Synonym* **disaster recovery plan.** [2382-pt.8] **2.** [A] plan maintained for emergency response, backup operations, and post-disaster recovery for an information system (IS), to ensure the availability of critical resources and to facilitate the continuity of operations in an emergency situation. [INFOSEC-99]

contingency procedure: A procedure that is an alternative to the normal path of a process if an unusual but anticipated situation occurs. [2382-pt.8]

continuity check: A check made of a circuit to verify that a communication or power path exists.

continuity check transponder: A device that is used to interconnect the **Go** and **Return** paths of a circuit at the incoming end, and through which the detection of an incoming check tone transmits another check tone to permit a continuity checking of a 2-wire circuit. [After T1.110-1987] *Synonym [loosely]* **smart jack.**

continuously variable slope delta (CVSD) modulation: A type of delta modulation in which the size of the steps of the approximated signal is progressively increased or decreased as required to make the approximated signal closely match the input analog wave.

continuous operation: 1. Operation in which certain components, such as nodes, facilities, circuits, or equipment, are in an operational state at all times. *Note:* Continuous operation usually requires that there be fully redundant configuration, or at least a sufficient X out of Y degree of redundancy for compatible equipment, where X is the number of spare components and Y is the number of operational components. **2.** In data transmission, operation in which the master station need not stop for a reply from a slave station after

transmitting each message or transmission block.

continuous presence: In teleconferencing, the concurrent presence of two or more video images, such as two images that may appear on a single monitor on a split screen or on two separate monitors.

continuous tone: A characteristic of an image (*e.g.,* a photograph) such that the image has all the values (0 to 100%) of gray (black and white) or color in it. *Note:* A continuous tone can be approximated by the use of thousands or millions of gradations of black and white or colors. The granularity of computer screens (*viz.,* pixel size) can limit the ability to display absolute continuous tone.

continuous tone copy: In facsimile, an object, *i.e.,* an original, or a recorded copy, that contains shades of gray, *i.e.,* contains densities between black and white, such as in a photographic print.

continuous wave (cw): A wave of constant amplitude and constant frequency.

contouring: In digital facsimile, density step lines in the recorded copy resulting from analog-to-digital conversion when the object, *i.e.,* the original, has observable shades of gray between the smallest density steps of the digital system.

contrast: 1. In display systems, the relation between the intensity of color or brightness of an area occupied by an element or an image and the intensity of the area not occupied by that element or image. *Deprecated synonym* **brightness ratio. 2.** In optical character recognition, the difference between color or shading of the printed material on a document and the background on which it is printed. **3.** In display systems, the extent to which the various luminance values in a picture are mapped to very dark and very light values. *Note:* A high-contrast picture is dominated by black and white and few values between. A low-contrast picture has many middle tones without many very dark or very light areas. [After Silicon]

contribution: In B-ISDN applications, the use of broadband transmission of audio or video information to the user for post-production processing and distribution.

control ball: *Synonym* **trackball.**

control character: A character that initiates, modifies, or stops a function, event, operation, or control operation. *Note:* Control characters may be recorded for use in subsequent actions. They are not graphic characters but may have a graphic representation in some circumstances.

control communications: The branch of technology devoted to the design, development, and application of communications facilities used specifically for control purposes, such as for controlling (a) industrial processes, (b) movement of resources, (c) electric power generation, distribution, and utilization, (d) communications networks, and (e) transportation systems.

control field: In a protocol data unit (PDU), the field that (a) contains data interpreted by the receiving destination logical-link controller (LLC) and (b) may be the field immediately following the destination service access point (DSAP) and source service access point (SSAP) address fields of the PDU.

control function: *Synonym* **control operation.**

controlled access: Access in which the resources of an area or system is limited to authorized personnel, users, programs, processes, or other systems, and denied to all others.

controlled area: 1. An area (a) in which uncontrolled movement will not result in compromise of classified information, (b) that is designed to provide administrative control and safety, or (c) that serves as a buffer for controlling access to limited-access areas. **2.** An area to which security controls have been applied to protect an information-processing system's equipment and wirelines, equivalent to that required for the information transmitted through the system.

controlled cryptographic item (CCI): Secure telecommunications or information handling equipment, or associated cryptographic component, that is unclassified but governed by a special set of control requirements. Such items are marked "CONTROLLED CRYPTOGRAPHIC ITEM" or, where space is limited, "CCI." [INFOSEC-99]

controlled not-ready signal: A signal, sent in the backward direction, to indicate that a call cannot be completed because the called line is not in a ready condition, but is under control, as opposed to not being in a ready condition and not under control.

controlled rerouting: A procedure of transferring, in a controlled way, signaling traffic from an alternative signaling route to the normal signaling route when the latter becomes available. [T1.226-1992]

controlled security mode: *See* **controlled security operation, multilevel security.**

controlled security operation: In a communications system, operation in which (a) internal security controls prevent inadvertent disclosures, (b) personnel, physical, and administrative controls are used to prevent unauthorized access, (c) both cleared and uncleared users are serviced, and (d) if required, both secured and unsecured remote terminal areas are serviced.

controlled sharing: [A] condition existing when access control is applied to all users and components of an information system (IS). [INFOSEC-99]

controlled space: Three-dimensional space surrounding information-system (IS) equipment, within which unauthorized persons are denied unrestricted access and are either escorted by authorized persons or are under continuous physical or electronic surveillance. [INFOSEC-99] *Synonym* **restricted area.**

controller: In an automated radio, the device that commands the radio transmitter and receiver, and that performs processes, such as automatic link establishment, channel scanning and selection, link quality analysis, polling, sounding, message store and forward, address protection, and anti-spoofing.

controlling authority: [In cryptosystems, the] official responsible for directing the operation of a cryptonet and for managing the operational use and control of keying material assigned to the cryptonet. [INFOSEC-99]

control monitor: 1. In computers and networks, the device that displays the progress or status of the overriding software or procedures. **2.** In video production, a display device used primarily for decisions on subject matter, composition, and sequences to be selected in real time. [After SMPTE] **3.** In robotics, a visual device used to view the work of robots or to view hazardous processes in safety.

control of electromagnetic radiation: 1. Measures taken to minimize unintended electromagnetic radiation emanating from a system or component and to minimize electromagnetic interference. *Note:* Control of electromagnetic radiation is exercised for purposes of security and the reduction of interference, especially on ships and aircraft. **2.** A national operational plan to minimize the use of electromagnetic radiation in the United States and its possessions and the Panama Canal Zone in the event of attack or imminent threat thereof, as an aid to the navigation of hostile aircraft, guided missiles, or other devices.

control operation: An operation that affects the recording, processing, transmission, or interpretation of data. *Note:* Examples of control operations include starting and stopping a process; executing a carriage return, a font change, or a rewind; and transmitting an end-of-transmission (EOT) control character. *Synonym* **control function.**

control station: 1. In a communications network, the station that selects the master station and supervises operational procedures, such as polling, selecting, and recovery. *Note:* The

control station has the overall responsibility for the orderly operation of the entire network. **2.** A fixed station whose transmissions are used to control automatically the emissions or operations of another radio station at a specified location, or to transmit automatically to an alarm center telemetering information relative to the operation of such station. [47CFR]

control track: The magnetized portion along the length of a videotape on which synchronous control information is placed; the control track contains a pulse for each video field and is used to synchronize the tape and the video signal. [After Silicon]

convergence: 1. In a tristimulus color monitor (*i.e.* , CRT) that employs phosphors excited (driven) by one or more electron beams, the process of controlling the beam(s) to ensure that the individual phosphors representing the color elements within each pixel are properly driven so that (a) within a given pixel there is a proper color balance to ensure the illusion of white, and (b) there is no spillover to adjacent pixels, causing false colors. **2.** An analogous process applied to other types of color displays; *e.g.* , a projection system using three spatially separated monochromatic CRTs, each generating a different color, and in which the three projected color images are superimposed on the projection screen, by means of off-axis optics, to achieve the illusion of white. **3.** The calibration process performed to achieve the required proper color balance. **4.** The result of such a calibration process, or the degree to which the ideal result is achieved.

convergence point: A network point at which two or more possible routes through different intermediate networks from the origination network to destination network converge. A convergence point may occur in any network except the origination network. A convergence point for a message transiting in one direction is a branch point for a message transiting in the opposite direction. [T1.118-1992]

conversational hypertext access technology (chat): *See* **chat.**

conversational mode: A mode of communication analogous to a conversation between two persons.

conversational service: In telecommunications, a service that provides two-way, interactive, real-time, end-to-end information transfer.

conversation-minute: The product of (a) the number of messages and, (b) the average minutes of conversation per message. [47 CFR Pt.36-A]

conversation-minute-kilometers: The product of (a) the number of messages, (b) the average minutes of conversation per message, and (c) the average route kilometers of circuits involved. [47 CFR Pt.36-A]

convolutional code: A type of error-correction code in which (a) each m-bit information symbol (each m-bit string) to be encoded is transformed into an n-bit symbol, where $n > m$ and (b) the transformation is a function of the last k information symbols, where k is the constraint length of the code. *Note:* Convolutional codes are often used to improve the performance of radio and satellite links.

convoy internal communications: In a land or maritime convoy, communications (a) that is among the elements of the convoy, (b) includes radio, visual, and sound transmissions, (c) in which radio intervehicle or intership communications are usually by radiotelephone using the receipt method of operation, (d) in which the convoy commander vehicle or ship usually has the net-control station aboard and (e) that usually use a single assigned frequency.

cookie: 1. A small piece of information that is automatically stored on a client computer by a Web browser and referenced to identify repeat visitors to a Web site and to tailor information in anticipation of the visitor's interests. *Note:* Some privacy advocates have objected to the use of cookies without a user's consent. [After Bahorsky] **2.** A general mechanism that server side connections (such as CGI scripts) can use both to store and to retrieve information on the client side of the connection. *Note 1:* A server, when returning an HTTP object to a client, may also send a piece of state information that the client will store. Included in that state object is a description of the range of URLs for which that state is valid. Any future HTTP requests made by the client that fall in that range will include a transmittal of the current value of the state object from the client back to the server. The state object is called a *cookie.* This simple mechanism provides a tool that enables new types of applications to be written for Web-based environments. Shopping applications can now store information about the currently selected items, for-fee services can send back registration information and free the client from retyping a user ID on subsequent connections, sites can store per-user preferences on the client, and have the client supply those preferences every time that site is accessed. *Note 2: Session cookies* are volatile in that they disappear at the end of a session, whereas *persistent cookies* are retained from one session to the next. *Synonym* **magic cookie.**

cooperation factor: In facsimile systems, the product of the total scanning length and the scanning density, given by $CF = L \sigma$, where L is the scanning line length and σ is the scanning line density, both in compatible units. *Note:* For example, a 20-cm line and a line density of 6 scanning pitches per centimeter would yield a cooperation factor of 120.

cooperative key generation: Electronically exchanging functions of locally generated, random components, from which both terminals of a secure circuit construct traffic encryption key or key encryption key for use on that circuit. [INFOSEC-99]

cooperative remote rekeying: *Synonym* **manual remote rekeying.**

coordinated clock: One of a set of clocks distributed over a spatial region, producing time scales that are synchronized to the time scale of a reference clock at a specified location.

coordinated time scale: A time scale synchronized within given tolerances to a reference time scale.

Coordinated Universal Time (UTC): Time scale based on the second (SI), as defined and recommended by the CCIR, and maintained by the Bureau International des Poids et Mesures (BIPM). For most practical purposes associated with the *Radio Regulations,* UTC is equivalent to mean solar time at the prime meridian (0° longitude), formerly expressed in GMT. [NTIA] [RR] *Note 1:* The maintenance by BIPM includes coordinating inputs from time standards belonging to various national laboratories around the world, which inputs are averaged to create the international time standard (second). *Note 2:* The full definition of UTC is contained in CCIR Recommendation 460-4. *Note 3* : The second was formerly defined in terms of astronomical phenomena. When this practice was abandoned in order to take advantage of atomic resonance phenomena ("atomic time") to define the second more precisely, it became necessary to make occasional adjustments in the "atomic" time scale to coordinate it with the workaday mean solar time scale, UT-1, which is based on the somewhat irregular rotation of the Earth. Rotational irregularities usually result in a net decrease in the Earth's average rotational velocity, and ensuing lags of UT-1 with respect to UTC. *Note 4:* Adjustments to the atomic, *i.e.,* UTC, time scale consist of an occasional addition or deletion of one full second, which is called a *leap second.* Twice yearly, during the last minute of the day of June 30 and December 31, Universal Time, adjustments may be made to ensure that the accumulated difference between UTC and UT-1 will not exceed 0.9 s before the next scheduled adjustment. Historically, adjustments, when necessary, have usually consisted of adding an extra second to the UTC time scale in order to allow the rotation of the Earth to "catch up." Therefore, the last minute of the UTC time scale, on the day when an adjustment is made, will have 61 seconds. *Synonyms* **World Time, Z Time, Zulu Time.**

coordination area: The area associated with an Earth station outside of which a terrestrial station sharing the same frequency band neither causes nor is subject to interfering emissions greater than a permissible level. [NTIA] [RR]

coordination contour: 1. The line enclosing the coordination area. [NTIA] [RR] **2.** The perimeter of the coordination area.

coordination distance: 1. Distance on a given azimuth from an Earth station beyond which a terrestrial station sharing the same frequency band neither causes nor is subject to interfering emissions greater than a permissible level. [NTIA] [RR] **2.** For the purpose of this part [of *47CFR*], the expression "coordination distance" means the distance from an earth station, within which there is a possibility of the use of a given transmitting frequency at this earth station causing harmful interference to stations in the fixed or mobile service, sharing the same band, or of the use of a given frequency for reception at this earth station receiving harmful interference from such stations in the fixed or mobile service. [47CFR]

copy: 1. To receive a message. **2.** A recorded message or a duplicate of it. **3.** To read data from a source, leaving the source data unchanged at the source, and to write the same data elsewhere, though they may be in a physical form that differs from that of the source. **4.** To understand a transmitted message.

copy-protected: Of a data medium such as a diskette, pertaining to the use of one or more schemes designed to thwart copying in violation of copyright law or security considerations.

copy watch: A radio- or video-communications watch in which an operator is required to maintain a continuous receiver watch and to keep a complete log.

cord circuit: A switchboard circuit in which a plug-terminated cord is used to establish connections manually between user lines or between trunks and user lines. *Note:* A number of cord circuits are furnished as part of the switchboard position equipment. The cords may be referred to as front cord and rear cord or trunk cord and station cord. In modern cordless switchboards, the cord-circuit function is switch operated and may be programmable.

cord lamp: The lamp associated with a cord circuit that indicates supervisory conditions for the respective part of the connection.

cordless switchboard: A telephone switchboard in which manually operated keys are used to make connections.

core: 1. The central region about the longitudinal axis of an optical fiber, which region supports guiding of the optical signal. *Note 1:* For the fiber to guide the optical signal, the refractive index of the core must be slightly higher than that of the cladding. *Note 2:* In different types of fibers, the core and core-cladding boundary function slightly differently in guiding the signal. Especially in single-mode fibers, a significant fraction of the energy in the bound mode travels in the cladding. **2.** A piece of ferromagnetic material, usually toroidal in shape, used as a component in a computer memory device. *Note:* The type of memory referred to has very limited application in today's computer environment. It has been largely replaced by semiconductor and other technologies. **3.** The material at the center of an electromechanical relay or solenoid, about which the coil is wound.

core area: The part of the cross-sectional area of an optical fiber within which the refractive index is everywhere greater than that of the innermost homogeneous cladding, by a specified fraction of the difference between the maximum refractive index of the core and the refractive index of the innermost cladding. *Note 1:* Artifacts of the manufacturing process, such as refractive index dip, are ignored in computing the points (refractive indices) of demarcation. *Note 2:* The core area is the cross-sectional area within which the refractive index is given by

$$n_3 > \left[n_2 + m\left(n_1 - n_2\right)\right] ,$$

where n_1 is the maximum refractive index of the core, n_2 is the refractive index of the homogeneous cladding adjacent to the core, n_3 is the defining refractive index, and m is a fraction, usually not greater than 0.05. [After 2196]

core-cladding offset: *See* **concentricity error.**

core diameter: In the cross section of a realizable optical fiber, ideally circular, but assumed to a first approximation to be elliptical, the average of the diameters of the smallest circle that can be circumscribed about the core-cladding boundary, and the largest circle that can be inscribed within the core-cladding boundary.

core dump: A printout, usually in hexadecimal characters, of the contents of core memory. *Note:* A core dump is useful for analyzing an abnormally terminated computer run or finding bugs in a computer program.

core eccentricity: *Synonym* **concentricity error.** *See* **ovality.**

core gateway: Historically, one of a set of gateways (routers) operated by the Internet Network Operations Center at BBN. *Note:* The core gateway system forms a central part of Internet routing in that all groups must advertise paths to their networks from a core gateway, using the exterior gateway protocol (EGP). [Bahorsky]

core noncircularity: *See* **ovality.**

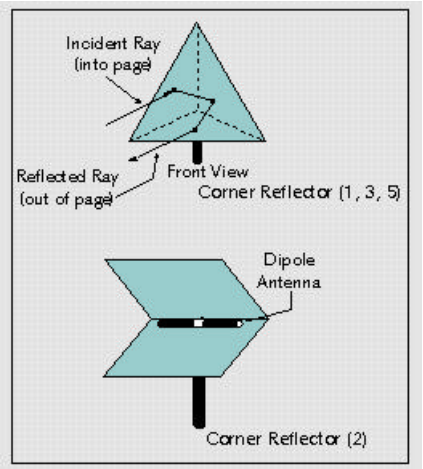
core storage: *See* **magnetic core storage.**

core-to-cladding concentricity: *Synonym* **concentricity error.**

core-to-cladding eccentricity: *Synonym* **concentricity error.**

core-to-cladding offset: *Synonym* **concentricity error.**

corner reflector: 1. A reflector consisting of three mutually perpendicular intersecting conducting flat surfaces, which returns a reflected electromagnetic wave to its point of origin. *Note:* Such reflectors are often used as radar targets. **2.** A directional antenna using two mutually intersecting conducting flat surfaces. **3.** A device, normally consisting of three metallic surfaces or screens perpendicular to one another, designed to act as a radar target or marker. [JP 1-02] **4.** In radar interpretation, an object that, by means of multiple reflections from smooth surfaces, produces a radar return of greater magnitude than might be expected from the physical size of the object. [JP 1-02] **5.** A passive optical mirror, that consists of three mutually perpendicular flat, intersecting reflecting surfaces, which returns an incident light beam in the opposite direction.



corner reflector

corner reflector antenna: *See* **corner reflector.**

Corporation for Research and Educational Networking: *See* **CREN.**

corrective maintenance: 1. Maintenance actions carried out to restore a defective item to a specified condition. **2.** Tests, measurements, and adjustments made to remove or correct a fault.

correctness proof: A mathematical proof of consistency between a specification and its implementation. [INFOSEC-99]

corresponding entities: Peer entities with a lower layer connection among them. [T1.629-1999]

COSINE: *Abbreviation for* **Cooperation for Open Systems Interconnection Networking in Europe.** *Note:* COSINE is a program sponsored by the European Commission, aimed at using OSI (Open Systems Interconnection) to tie together European research networks. [After Bahorsky]

cosine emission law: *Synonym* **Lambert's cosine law.**

cosite: Collocation of electronic equipment on the same vehicle, station, or base. *Note:* Equipment so located is often subject to interference because of its proximity to other equipment.

cosmic noise: Random noise that originates outside the Earth's atmosphere. *Note:* Cosmic noise characteristics are similar to those of thermal noise. Cosmic noise is experienced at frequencies above about 15 MHz when highly directional antennas are pointed toward the Sun or to certain other regions of the sky such as the center of the Milky Way Galaxy. *Synonym* **galactic radio noise.**

Costas loop: A phase-locked loop used for carrier phase recovery from suppressed-carrier modulation signals, such as from double-sideband suppressed carrier signals. *Note:* In the usual implementation of a Costas loop, a local voltage-controlled oscillator provides quadrature outputs, one to each of two phase detectors, *i.e.,* product detectors. The same phase of the input signal is also applied to both phase detectors and the output of each phase detector is passed through a low-pass filter. The outputs of these low-pass filters are inputs to another phase detector, the output of which passes through a loop filter before being used to control the voltage-controlled oscillator.

Coulomb's law: The universal law of attraction and repulsion of electric charges.

countermeasure: [An] action, device, procedure, technique, or other measure that reduces the vulnerability of an information system (IS). [INFOSEC-99]

counterpoise: A conductor or system of conductors used as a substitute for earth or ground in an antenna system. [From Weik '89]

country code: 1. In international direct telephone dialing, a code that consists of 1-, 2-, or 3-digit numbers in which the first digit designates the region and succeeding digits, if any, designate the country (click here for a list). **2.** In international record carrier transmissions, a code consisting of 2- or 3-letter abbreviations of the country names, or 2- or 3-digit numbers that represent the country names, that follow the geographical place names. **3.** In a URL or e-mail address, the two-letter abbreviation (subdomain suffix) used in lieu of ".net," ".org," or "gov." to signify the country in which the web site originates. *Note:* Examples of country codes are ".gb" for Great Britain, ".jp" for Japan, and ".us" for United States.

coupled bonding conductor: A conductor used to extend the ground at an approved building entrance facility to certain types of ac-powered equipment.

coupled modes: 1. In fiber optics, a mode that shares energy among one or more other modes, all of which propagate together. [After 2196] *Note:* The distribution of energy among the coupled modes changes with propagation distance. **2.** In microwave transmission, a condition where energy is transferred from the fundamental mode to higher order modes. *Note:* Energy transferred to coupled modes is undesirable in usual microwave transmission in a waveguide.

coupler: *See* **directional coupler.**

coupling: The desirable or undesirable transfer of energy from one medium, such as a metallic wire or an optical fiber, to another like medium, including fortuitous transfer. *Note:* Examples of coupling include capacitive (electrostatic) coupling, inductive (magnetic) coupling, conducted (resistive or hard-wire) coupling, and fiber-optic coupling.

coupling coefficient: A number that expresses the degree of electrical coupling that exists between two circuits. *Note:* The coupling coefficient is calculated as the ratio of the mutual impedance to the square root of the product of the self-impedances of the coupled circuits, all impedances being expressed in the same units.

coupling efficiency: In fiber optics, the efficiency of optical power transfer between two optical components. [After 2196] *Note 1:* The transfer may take place (a) between an active component, such as an LED, and a passive component, such as an optical fiber, or (b) between two passive components such as two optical fibers. *Note 2:* Coupling efficiency is usually expressed as the ratio, converted to percent, of the input power, *i.e.,* the available power from one component, to the power transferred to the other component.

coupling loss: 1. The loss that occurs when energy is transferred from one circuit, circuit element, or medium to another. *Note:* Coupling loss is usually expressed in the same units--such as watts or dB--as in the originating circuit element or medium. **2.** In fiber optics, the power loss that occurs when coupling light from one optical device or medium to

another. [After 2196]

cover: The technique of concealing or altering the characteristics of communications patterns for the purpose of denying an unauthorized receiver information that would be of value; a process of modulo two addition of a pseudorandom bit stream generated by a cryptographic device with bits from the control message.

coverage: In radio communications, the geographical area within which service from a radio communications facility can be received.

covert channel: 1. A transmission channel that may be used to transfer data in a manner that violates security policy. [2382-pt.8] **2.** [An] unintended and/or unauthorized communications path that can be used to transfer information in a manner that violates an information system (IS) security policy. [INFOSEC-99]

covert storage channel: [A] covert channel involving the direct or indirect writing to a storage location by one process and the direct or indirect reading of the storage location by another process. Covert storage channels typically involve a finite resource (*e.g.,* sectors on a disk) that is shared by two subjects at different security levels. [INFOSEC-99]

covert timing channel: [A] covert channel in which one process signals information to another process by modulating its own use of system resources (*e.g.,* CPU time) in such a way that this manipulation affects the real response time observed by the second process. [INFOSEC-99]

CPE: *Abbreviation for* **customer premises equipment.**

CPE line (customer premises equipment line): A dedicated facility between a network switch and a subscriber termination. [T1.207-2000]

CPE trunk (customer premises equipment trunk): The common facility between a network switch and a CPE switch. [T1.207-2000]

cpi: *Abbreviation for* **characters per inch.**

cps: 1. *Abbreviation for* **characters per second.** *Note: Formerly, abbreviation for* **cycles per second,** the unit used to express frequency. However, the *hertz (Hz),* an SI unit, is now the internationally accepted unit of frequency. **2.** *Abbreviation for* **cellular priority service.**

CPU: *Abbreviation for* **central processing unit. 1.** The portion of a computer that includes circuits controlling the interpretation and execution of instructions. **2.** The portion of a computer that executes programmed instructions, performs arithmetic and logical operations on data, and controls input/output functions. *Synonym* **central processor. 3.** *Abbreviation for* **communications processor unit.** A computer embedded in a communications system, *i.e.,* the portion of a digital communications switch that executes programmed instructions, performs arithmetic and logical operations on signals, and controls input/output functions.

CR: *Abbreviation for* **channel reliability, circuit reliability.**

cracker: 1. Hacker jargon to indicate "one who breaks security on a system." *Note:* The term *cracker* was coined *ca.* 1985 by hackers in defense against journalistic misuse of the term *hacker.* **2.** An individual who, with malicious intent, gains or tries to gain illegal access to computers or computer programs. [After Bahorsky] *Synonym* **password cracker.**

crawler: *Synonyms* **droid, Web crawler, Web spider.**

CRC: *Abbreviation for* **cyclic redundancy check.**

credential: 1. In cryptography , a subset of access permissions (developed with the use of media-independent data) attesting to, or establishing, the identity of an entity, such as a birth certificate, driver's license, mother's maiden name, social security number, fingerprint, voice print, or other biometric parameter(s). [After X9.69] **2.** [In security], information, passed from one entity to another, used to establish the sending entity's access rights. [INFOSEC-99]

CREN: *Abbreviation for* **Corporation for Research and Educational Networking.** The organization resulting from the merger of BITNET and the academic computer network CSNET. [Bahorsky]

crest factor: The peak-to-rms voltage ratio of an alternating current (ac) signal. [T1.401-1988]

critical angle: In geometric optics, at a refractive boundary, the smallest angle of incidence at which total internal reflection occurs. *Note 1:* The angle of incidence is measured with respect to the normal at the refractive boundary. *Note 2:* The critical angle is given by

$$\theta_c = \sin^{-1}\left(\frac{n_1}{n_2}\right),$$

where θ_c is the critical angle, n_1 is the refractive index of the less dense medium, and n_2 is the refractive index of the denser medium. *Note 3:* The incident ray is in the denser medium. *Note 4:* If the incident ray is precisely at the critical angle, the refracted ray is tangent to the boundary at the point of incidence.

critical area: An operational area that requires specific environmental control because of the equipment or information contained therein.

critical frequency: 1. In radio propagation by way of the ionosphere, the limiting frequency at or below which a wave component is reflected by, and above which it penetrates through, an ionospheric layer. **2.** At vertical incidence, the limiting frequency at or below which incidence, the wave component is reflected by, and above which it penetrates through, an ionospheric layer. *Note:* The existence of the critical frequency is the result of electron limitation, *i.e.,* the inadequacy of the existing number of free electrons to support reflection at higher frequencies.

critical infrastructure: 1. Elements of a system that are so vital that disabling any of them would incapacitate the entire system. **2.** [In security,] those physical and cyber-based systems essential to the minimum operations of the economy and government. [INFOSEC-99]

critical service: *Synonym* **essential service.**

critical technical load: That part of the total technical power load required for synchronous communications and automatic switching equipment.

critical wavelength: The free-space wavelength that corresponds to the critical frequency. *Note:* The critical wavelength is equal, in meters, to the speed of light (3×10^8 m/s) divided by the critical frequency in hertz.

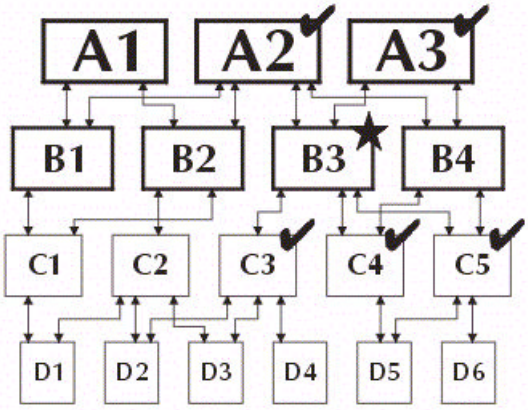
CRL: *Abbreviation for* **certificate revocation list.** In cryptography, a list of revoked certificates.

cross assembler: An assembler that can run symbolic-language input on one type of computer and produce machine-language output for another type of computer.

cross-band radiotelegraph procedure: A radiotelegraph network operational procedure in which calling stations, such as ship stations, call other stations, such as shore stations, using one frequency, and then shift to another frequency to transmit their messages; the called stations answer using a third frequency.

crossbar switch: A switch that has a plurality of vertical paths, a plurality of horizontal paths, and electromagnetic means, *i.e.,* relays, for interconnecting any one of the vertical paths to any one of the horizontal paths.

cross certification: An authentication method used by one certificate authority (CA) to certify any CA other than a CA immediately adjacent to it in a hierarchy (*i.e.* , a superior or subordinate CA). [After X9.57]



cross-connect: *Synonym* **cross-connection.**

cross-connection: Connections between terminal blocks on the two sides of a distribution frame, or between terminals on a terminal block. *Note:* Connections between terminals on the same block are also called *straps. Synonyms* **cross-connect, jumper.**

cross coupling: The coupling of a signal from one channel, circuit, or conductor to another, where it is usually considered to be an undesired signal.

crossfade: 1. In audio programming, recording, or mixing, to combine signals in such a manner that one channel or source fades out as another fades in, while maintaining an essentially constant program volume. **2.** The result produced thereby.

crosslink: A data link between two satellites.

cross modulation: Intermodulation caused by the modulation of the carrier of a desired signal by an undesired signal.

cross office check: A check made across the exchange to verify that an acceptable speech path exists. [T1.226-1992]

cross-office trunk: A trunk that has its terminations within a single facility.

cross-platform: Pertaining to software that will run on more than one operating system (*i.e.,* on more than one platform).

crosspoint: A single element that (a) is in the array of elements that compose a switch and (b) consists of a set of physical or logical contacts that operate together to extend the speech and signaling channels in a switched network.

cross-polarized operation: The operation of two transmitters on the same frequency, but with polarizations in the opposite sense, *e.g.* , plane polarization with one transmitter-receiver pair being vertically polarized and the other pair horizontally polarized.

crosspost: In electronic fora (*e.g.,* e-mail, newsgroups, and electronic bulletin boards), to send a message to more than one forum, where it might be of interest to a wider audience than is reached with a single forum.

cross-site link: In a satellite communications system, the signal power and control connections between the components of an Earth station. *Note:* Examples of cross-site links are (a) links between transmitters and antennas and (b) links between control consoles and transmitters.

crosstalk (XT): 1. Undesired coupling of a signal from one circuit, part of a circuit, or channel, to another. **2.** Any phenomenon by which a signal transmitted on one circuit or channel of a transmission system creates an undesired effect in another circuit or channel. *Note 1:* In telephony, crosstalk is usually distinguishable as speech or signaling tones. *Note 2:* In video, "ghost" images from one source appear in addition to the signals of interest transmitted from another.

crosstalk coupling: The ratio of the power in a disturbing circuit to the induced power in the disturbed circuit observed at specified points of the circuits under specified terminal conditions. *Note:* Crosstalk coupling is usually expressed in dB. *Synonym* **crosstalk coupling loss.**

crosstalk coupling loss: *Synonym* **crosstalk coupling.**

cryptanalysis: 1. Operations performed in converting encrypted messages to plain text without initial knowledge of the crypto-algorithm and/or key employed in the encryption. [INFOSEC-99] **2.** The study of encrypted texts.

cryptanalytical attack: *Synonym (in cryptography)* **analytical attack.**

CRYPTO: [The] marking or designator identifying COMSEC keying material used to secure or authenticate telecommunications carrying classified or sensitive U.S. Government or U.S. Government-derived information. [INFOSEC-99] *Note:* When written in all upper case letters, CRYPTO has the meaning stated above. When written in lower case as a prefix, *crypto* and *crypt* are abbreviations for *cryptographic.* [NIS]

crypto-alarm: [A] circuit or device that detects failures or aberrations in the logic or operation of crypto-equipment. [A] crypto-alarm may inhibit transmission or may provide a visible and/or audible alarm. [INFOSEC-99]

crypto-algorithm: [A] well-defined procedure or sequence of rules or steps, or a series of mathematical equations used to describe cryptographic processes such as encryption/decryption, key generation, authentication, signatures, *etc.* [INFOSEC-99]

crypto-ancillary equipment: Equipment designed specifically to facilitate efficient or reliable operation of crypto-equipment, without performing cryptographic functions itself. [INFOSEC-99]

cryptochannel: A complete system of crypto-communications between two or more holders. The basic unit for naval cryptographic communication. A cryptochannel is analogous to a radio circuit. It includes:

- (a) The cryptographic aids prescribed.
- (b) The holders thereof.
- (c) The indicators or other means of identification.
- (d) The area or areas in which effective.
- (e)The special purpose, if any, for which provided.
- (f) Pertinent notes as to distribution, usage, *etc.* [JP1-02]

crypto-equipment: *See* **cryptographic equipment.**

cryptographic: Pertaining to, or concerned with, cryptography. [INFOSEC-99]

cryptographic component: Hardware or firmware embodiment of the cryptographic logic. A cryptographic component may be a modular assembly, a printed wiring assembly, a microcircuit, or a combination of these items. [INFOSEC-99]

cryptographic equipment (crypto-equipment): Any device that embodies cryptographic logic or performs one or more cryptographic functions (*e.g.,* key generation, encryption, and authentication).

cryptographic hash: A mathematical function that maps values from a large (or even very large) domain into a smaller range, and is (a) one-way in that it is computationally infeasible to find any input which maps to any pre-specified output; and (b) collision-free in that it is computationally infeasible to find any two distinct inputs which map to the same output. [After X9.31]

cryptographic hash function: *See* **cryptographic hash.**

cryptographic information: All information significantly descriptive of cryptographic techniques and processes or of cryptographic systems and equipment, or their functions and capabilities, and all cryptomaterial. [JP 1-02]

cryptographic initialization: [A] function used to set the state of a cryptographic logic prior to key generation, encryption, or other operating mode. [INFOSEC-99]

cryptographic key: A mathematical value that is used (a) in an algorithm to generate cipher text from plain text or vice versa, and (b) to determine the operation of a cryptographic function (*e.g.,* the synchronized generation of keying material), or a digital signature computation or validation. [After X9.31]

cryptographic key synchronization: The ability for two nodes, that have cryptographically processed a transaction, to determine the identical transaction key. [After X9.24]

cryptographic logic: The embodiment of one (or more) crypto-algorithm(s) along with alarms, checks, and other processes essential to effective and secure performance of the cryptographic process(es). [INFOSEC-99]

cryptographic randomization: [A] function that randomly determines the transmit state of a cryptographic logic. [INFOSEC-99]

cryptographic synchronization: *See* **cryptographic key synchronization.**

cryptography: 1. [The] art or science concerning the principles, means, and methods for rendering plain information unintelligible, and for restoring encrypted information to intelligible form. [INFOSEC-99] **2.** The branch of cryptology that treats of the principles, means, and methods of designing and using cryptosystems.

crypto-ignition key (CIK): [A] device or electronic key used to unlock the secure mode of crypto-equipment. [INFOSEC-99]

crypto key: *Deprecated term. See* **key.**

cryptologic: Of or pertaining to cryptology. [JP 1-02]

cryptology: 1. The science that deals with hidden, disguised, or encrypted communications. It includes communications security and communications intelligence. [JP1-02] **2.** [The] field encompassing both cryptography and cryptanalysis. [INFOSEC-99]

cryptomaterial: All material including documents, devices, equipment, and apparatus essential to the encryption, decryption, or authentication of telecommunications. When classified, it is designated CRYPTO and subject to special safeguards. [JP 1-02]

cryptonet: Stations holding a common key. [INFOSEC-99] *Note:* Activities that hold key for other than use, such as cryptologistic depots, are not cryptonet members for that key. Controlling authorities are *de facto* members of the cryptonets they control. [NIS]

cryptoperiod: 1. The time span during which a specific key is authorized or in which the keys for a given system remain in effect. [After X9.31] **2.** [The] time span during which each key setting remains in effect. [INFOSEC-99]

cryptosecurity: *See* **communications security.**

cryptosynchronization: [The] process by which a receiving decrypting cryptographic logic attains the same internal state as the transmitting encrypting logic. [INFOSEC-99]

cryptosystem: Associated COMSEC items interacting to provide a single means of encryption or decryption. [INFOSEC]

crystal oscillator (XO): An oscillator in which the frequency is controlled by a piezoelectric crystal. *Note 1:* A crystal oscillator may require controlled temperature because its operating frequency is a function of temperature. *Note 2:* Types of crystal oscillators include voltage-controlled crystal oscillators (VCXO), temperature-compensated crystal oscillators (TCXO), oven-controlled crystal oscillators (OCXO), temperature-compensated-voltage controlled crystal oscillators (TCVCXO), oven-controlled voltage-controlled crystal oscillators (OCVCXO), microcomputer-compensated crystal oscillators (MCXO), and rubidium crystal oscillators (RbXO).

CSMA: *Abbreviation for* **carrier sense multiple access.**

CSMA/CA: *Abbreviation for* **carrier sense multiple access with collision avoidance.**

CSMA/CD: *Abbreviation for* **carrier sense multiple access with collision detection.**

CSU: *Abbreviation for* **channel service unit, circuit switching unit, customer service unit.**

C2W: *Abbreviation for* **command and control warfare.**

CTX: *Abbreviation for* **Centrex ® service.**

cumulative transit delay: The total transit delay applicable for a data call obtained by summing the individual transit delays of all component portions of the data connection. [T1.615-1992]

current billing: The combined amount of changes billed, excluding arrears. [47 CFR Pt.36-A]

cursor: A movable, visible mark used to indicate a position of interest on a display surface. *Note:* A cursor may have a controllable shape, such as an underline, a rectangle, or a pointer and usually indicates where the next character or graphic will be entered or revised.

curvature loss: *Synonym* **macrobend loss.**

curve-fitting compaction: Data compaction accomplished by substituting an analytical expression for the data to be stored or transmitted. *Note:* Examples of curve-fitting compaction are (a) the breaking of a continuous curve into a series of straight line segments and specifying the slope, intercept, and range for each segment and (b) using a mathematical expression, such as a polynomial or a trigonometric function, and a single point on the corresponding curve instead of storing or transmitting the entire graphic curve or a series of points on it.

customer access: In an Integrated Services Digital Network (ISDN), the portion of the ISDN access that a network provider supplies to connect the customer, *i.e.,* subscriber, installation to the network. *Note:* Customer access includes those network elements or portions of elements that extend from the access switch to the network interface.

customer dialed charge traffic: Traffic which is both (a) handled to completion through pulses generated by the customer and (b) for which either a message unit charge, bulk charge or message toll charge is except for that traffic recorded by means of message registers. [47 CFR Pt.36-A]

customer installation (CI): All telecommunication equipment and wiring on the customer side of the network interface. [T1.Rpt37-1994]

customer management complex: In network management, a complex that (a) is controlled by a customer and (b) is responsible for, and performs, maintenance for the customer installation.

customer office terminal: 1. Termination equipment that (a) is located on the customer premises and (b) performs a function that may be integrated into the common carrier equipment. *Note:* An example of a customer office terminal is a stand-alone multiplexer located on the customer premises. **2.** The digital loop carrier (DLC) multiplexing function that is near the exchange termination (ET) when provided by a stand-alone multiplexer. *Note:* This function may be integrated into the ET.

customer owned and maintained equipment (COAM): *Deprecated term. See* **customer premises equipment.**

customer premises equipment (CPE): 1. Terminal and associated equipment and inside wiring located at a subscriber's premises and connected with a carrier's communication channel(s) at the demarcation point *("demarc")* . *Note 1:* The demarc is a point established in a building or complex to separate customer equipment from telephone company equipment. *Note 2:* Excluded from CPE are over-voltage protection equipment and pay telephones. **2.** Items of telecommunications terminal equipment in Accounts 2310 referred to as CPE in §64.702 of the Federal Communication Commission's Rules adopted in the Second Computer Inquiry such as telephone instruments, data sets, dialers and other supplemental equipment, and PBX's which are provided by common carriers and located on customer premises and inventory included in these accounts to be used for such purposes. Excluded from this classification are similar items of equipment located on telephone company premises and used by the company in the normal curse of business as well as over voltage protection equipment, customer premises wiring, coin operated public or pay telephones, multiplexing equipment to deliver multiple channels to the customer, mobile radio equipment and transmit Earth stations. [47 CFR Pt.36-A]

customer premises wire: The segment of wiring from the customer's side of the protector to the customer premises equipment. [47 CFR Pt.36-A]

customer-provided equipment: *Deprecated term. See* **customer premises equipment.**

customer service unit (CSU): A device that provides an accessing arrangement at a user location to either switched or point-to-point, data-conditioned circuits at a specifically established data signaling rate. *Note:* A CSU provides local loop equalization, transient protection, isolation, and central office loop-back testing capability.

custom local area signaling service (CLASS): One of an identified group of network-provided enhanced services. *Note:* A CLASS group for a given network usually includes several enhanced service offerings, such as incoming-call identification, call trace, call blocking, automatic return of the most recent incoming call, call redial, and selective forwarding and programming to permit distinctive ringing for incoming calls.

cut: In motion picture or television production or editing, an abrupt change from one scene to another.

cutback technique: A destructive technique for determining certain optical fiber transmission characteristics, such as attenuation and bandwidth, by (a) performing the desired measurements on a long length of the fiber under test, (b) cutting the fiber under test at a point near the launching end, (c) repeating the measurements on the short length of fiber, and (d) subtracting the results obtained on the short length to determine the results for the residual long length. *Note 1:* The cut should not be made less than 1 meter from the launch end. However, cutting the fiber so close to the launch end (in a multimode fiber) will introduce errors in the measurements because at that point, modal equilibrium conditions have not been established. The errors so introduced will result in conservative results (*i.e.* , higher transmission losses and lower bandwidths) than would be realized under equilibrium conditions. *Note 2:* Several characteristics may be determined using the same test fiber. *Note 3:* A variation of the cutback technique is the substitution method, in which measurements are made on a full length of fiber, and then on a short length of fiber having the same characteristics (core size, numerical aperture), with the results from the short length being subtracted to give the results for the full length.

cutoff attenuator: A waveguide, of adjustable length, which varies the attenuation of signals passing through it.

cutoff frequency: 1. The frequency either above which or below which the output of a circuit, such as a line, amplifier, or filter, is reduced to a specified level. **2.** The frequency below which a radio wave fails to penetrate a layer of the ionosphere at the incidence angle required for transmission between two specified points by reflection from the layer.

cutoff mode: The highest order mode that will propagate in a given waveguide at a given frequency.

cutoff wavelength: 1. The wavelength corresponding to the cutoff frequency. **2.** In an uncabled single-mode optical fiber, the wavelength greater than which a particular waveguide mode ceases to be a bound mode. *Note 1:* The cutoff wavelength is usually taken to be the wavelength at which the normalized frequency is equal to 2.405. *Note 2* : The *cabled* cutoff wavelength is usually considered to be a more functional parameter because it takes into consideration the effects of cabling the fiber.

cutover: The physical changing of circuits or lines from one configuration to another.

CVSD: *Abbreviation for* **continuously variable slope delta modulation.**

CX: *Abbreviation for* **composite signaling.**

cxr: *Abbreviation for* **carrier.**

CX signaling: *Synonym* **composite signaling.**

cyber: *Loosely,* a prefix referring to anything related to computers or networking. *Note 1:* For example, a "cyber cafe" is a coffee shop that offers computer terminals for customers to browse the Internet while sipping coffee, and a "cybersleuth" is an investigator who researches and attempts to solve or find the cause of, unusual Internet occurrences. *Note 2:* While "cyber" is listed herein as colloquial, its use has become ubiquitous and it is rapidly becoming accepted as formal language.

cybercommunity: 1. The aggregate of participants in the use of a portion of cyberspace. **2.** A special-interest group (SIG) of cyberspace participants. *Synonym* **wired community.**

cybermall: An electronic site shared by a number of commercial interests, and at which users can browse, shop, and place orders for the products listed at that site. [Bahorsky] *Synonym* **Internet mall.**

cybernaut: 1. One who uses the Internet. **2.** *Synonym* **Web surfer.**

cyber security: *See* **information security.**

cyberspace: The impression of space and community formed by computers, computer networks, and their users; the virtual "world" that Internet users inhabit when they are online.

cybersquatting: The practice of registering Internet domain names--usually based on prominent trade names, trademarks, or corporate names--before the legitimate holders of same have had an opportunity or interest in registering the domain names for themselves. *Note:* Cybersquatters engage(d) in this practice, which has now been ruled illegal, for the purpose of (a) denying the domain name(s) to, or (b) attempting to profit by selling them (possibly at an exorbitant price) to, the holder of the of the trademark, *etc.*

cyclic distortion: In telegraphy, distortion that (a) is periodic and (b) is not characteristic, not biased, and not fortuitous. *Note:* Causes of cyclic distortion include irregularities in the duration of contact time of the brushes of a transmitter distributor and interference by disturbing alternating currents.

cyclic redundancy check (CRC): 1. An error-detection scheme that (a) uses parity bits generated by polynomial encoding of digital signals, (b) appends those parity bits to the digital signal, and (c) uses decoding algorithms that detect errors in the received digital signal. *Note:* Error correction, if required, may be accomplished through the use of an automatic repeat-request (ARQ) system. **2.** [An] error checking mechanism that checks data integrity by computing a polynomial algorithm based checksum. [INFOSEC-99]

D*: *(Pronounced "D-Star") See* **specific detectivity.**

D-A: *Abbreviation for* **digital-to-analog.** *See* **digital transmission system.**

DACS: *Acronym for* **digital access and cross-connect system.**

daemon: *Abbreviation for* **disk and execution monitor.** A procedure that is invoked without being called explicitly whenever an alteration, an addition, or a deletion or other event occurs. [ANSDIT] *Pronounced* dee' mun. *Also spelled* **demon.**

DAMA: *Abbreviation for* **demand assignment multiple access.**

damping: 1. The progressive diminution with time of certain quantities characteristic of a phenomenon. **2.** The progressive decay with time in the amplitude of the free oscillations in a circuit. **3.** Energy dissipation mechanisms that reduce the amplification and broaden the vibratory response in the region of a resonance. [T1.329-1995]

damping ratio: In studies of network survivability in an earthquake, the ratio of actual damping to critical damping. [After T1.329-1995]

dangling threat: Set of properties about the external environment for which there is no corresponding vulnerability and therefore no implied risk. [INFOSEC-99]

dangling vulnerability: [A] set of properties about the internal environment for which there is no corresponding threat and, therefore, no implied risk. [INFOSEC-99]

dark current: The external current that, under specified biasing conditions, flows in a photoconductive detector when there is no incident radiation.

DAT: *Abbreviation for* **digital audio tape.** A consumer audio-recording and playback medium/format that maintains a signal quality equal to that of the CD-ROM medium/format.

data: Representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automatic means. Any representations such as characters or analog quantities to which meaning is or might be assigned. [JP 1-02]

data access arrangement: 1. In public switched telephone networks, a single item or group of items at the customer side of the network interface for data transmission purposes, including all equipment that may affect the characteristics of the interface. **2.** A data circuit-terminating equipment (DCE) supplied or approved by a common carrier that permits a DCE or data terminal equipment (DTE) to be attached to the common carrier network. *Note:* Data access arrangements are an integral part of all modems built for the public telephone network.

data aggregation: [In security,] the compilation of unclassified individual data systems and data elements resulting in the totality of the information being classified. [INFOSEC-99]

data attribute: A characteristic of a data element such as length, value, or method of representation.

data authentication: A process used to verify data integrity, *e.g.,* verification that data received are identical to data sent, or verification that a program is not infected by a virus. [After 2382-pt.8]

data bank: 1. A set of data related to a given subject and organized in such a way that it can be consulted by users. **2.** A data repository accessible by local and remote users. *Note:* A data bank may contain information on single or multiple subjects, may be organized in any rational manner, may contain more than one database, and may be geographically distributed. More than one data bank may be required to build a comprehensive database.

database: 1. A set of data that is required for a specific purpose or is fundamental to a system, project, enterprise, or business. *Note:* A database may consist of one or more data banks and be geographically distributed among several repositories. **2.** A formally structured collection of data. *Note:* In automated information systems, the database is manipulated using a database management system.

database engineering: The discipline involving (a) the conception, modeling, and creation, *i.e.,* programming, of a database, (b) data analysis and administration of the database, and (c) database documentation.

database management system (DBMS): A software system that facilitates (a) the creation and maintenance of a database or databases, and (b) the execution of computer programs using the database or databases.

data base node (DBN): A signaling point that acts as a repository of information and provides query/response services for processing and routing of certain types of network calls (for example, 800 Data Base Service Calls). [T1.226-1992]

data burst: *Synonym* **burst transmission.**

data bus: A bus used to transfer data within or to and from a processing unit or storage device.

data channel: A means for delivering data from one point to another. The data channel may be comprised of the following components: format conversion devices, encoders (compressors) and decoders (decompressors), buffers, stream segmentation and reassembly devices, multiplexors and demultiplexors, modulators and demodulators, transmission facilities, switches, multipoint conference units, and other components necessary to achieve the desired channel characteristics. A sequence of data bits submitted to the channel input results in a similar (not necessarily identical) sequence of bits at the channel output. [After T1.801.04-1997]

data circuit connection: The interconnection of any combination of links and trunks, on a tandem basis, by means of switching equipment to facilitate information interchange.

data circuit-terminating equipment: *See* **DCE.**

data collection facility: A facility for gathering and organizing data from a group of sources.

data collection processor: A communications device, serving as mediation equipment in the telecommunication management network, that provides concentration, protocol conversion, and operations functions such as accumulation and thresholding. One or more NEs (network elements) may be connected to each physical port. [T1.210-1993]

data communication: The transfer of information between functional units by means of data transmission according to a protocol. *Note:* Data are transferred from one or more sources to one or more sinks over one or more data links.

data communication control procedure: A means used to control the orderly communication of information among stations in a data communication network.

data communication network (DCN): A configuration of telecommunication facilities for the purpose of transmitting data, as opposed to analog signals. [After T1.210-1989]

data communications control character: *See* **control character.**

data communications equipment: *Deprecated term. See* **DCE.**

data compaction: The reduction of the number of data elements, bandwidth, cost, and time for the generation, transmission, and storage of data without loss of information by eliminating unnecessary redundancy, removing irrelevancy, or using special coding. *Note 1:* Examples of data compaction methods are the use of fixed-tolerance bands, variable-tolerance bands, slope-keypoints, sample changes, curve patterns, curve fitting, variable-precision coding, frequency analysis, and probability analysis. *Note 2:* Simply squeezing noncompacted data into a smaller space, for example by increasing packing density or by transferring data on punched cards onto magnetic tape, is not data compaction. *Note 3:* Whereas data compaction reduces the amount of data used to represent a given amount of information, data compression does not.

data composite: A collection of data elements treated as a unit. [T1.238-1994/97] [T1.266-2000]

data compression: 1. Increasing the amount of data that can be stored in a given domain, such as space, time, or frequency, or contained in a given message length. **2.** Reducing the amount of storage space required to store a given amount of data, or reducing the length of message required to transfer a given amount of information. *Note 1:* Data compression may be accomplished by simply squeezing a given amount of data into a smaller space, for example, by increasing packing density or by transferring data on punched cards onto magnetic tape. *Note 2:* Data compression does not reduce the amount of data used to represent a given amount of information, whereas data compaction does. Both data compression and data compaction result in the use of fewer data elements for a given amount of information.

data concentrator: A functional unit that permits a common transmission medium to serve more data sources than there are channels currently available within the transmission medium.

data conferencing repeater: A device that enables any one user of a group of users to transmit a message to all other users in that group. *Synonym* **technical control hubbing repeater.**

data contamination: *Synonym* **data corruption.**

data corruption: An accidental or intentional violation of data integrity. [2382-pt.8]

data country code: A 3-digit numerical country identifier that is part of the 14-digit network terminal numbering plan. *Note:* The data country code prescribed numerical designation further constitutes a segment of the overall 14-digit X.121 numbering plan for an ITU-T X.25 network.

data definition: The process of creating a complete description of the structure of a database by identifying and describing data elements and their relationships that make up the database structure. [After ANSDIT]

data definition language (DDL): A database language that describes data structures and data in a database. [After ANSDIT] *Synonym* **data description language.**

data-dependent protection: The application of protective data elements to a data stream in such a manner that the composition of the data stream determines the amount or type of protective elements to be added.

data description language (DDL): *Synonym* **data definition language.**

data dictionary: 1. A part of a database management system that provides a centralized repository of information about data in a database, such as meaning, relationship to other data. **2.** An inventory that describes, defines, and lists all of the data elements that are stored in a database.

data directory: An inventory that specifies the source, location, ownership, usage, and destination of all of the data elements that are stored in a database.

data element: 1. A named unit of data that, in some contexts, is considered indivisible and in other contexts may consist of data items. **2.** A named identifier of each of the entities and their attributes that are represented in a database. **3.** A basic unit of information built on standard structures having a unique meaning and distinct units or values. **4.** In electronic recordkeeping, a combination of characters or bytes referring to one separate item of information, such as name, address, or age. [JP 1-02]

Data Encryption Standard (DES): [A] cryptographic algorithm for the protection of unclassified computer data and published by the National Institute of Standards and Technology in Federal Information Processing Standard Publication 46-1. [INFOSEC-99] *Note:* DES is **not** approved for protection of national security classified information.

data flow control: *Synonym* **information flow control.**

data forwarder: A device that (a) receives data from one data link and retransmits data representing the same information, using proper format and link protocols, to another data link and (b) may forward data between (a) links that are identical, *i.e.,* TADIL B to TADIL B, (b) links that are similar, *i.e.,* TADIL A to TADIL B, or (c) links that are dissimilar, *i.e.,* TADIL A to TADIL J.

data frame: A presentation unit of the data channel; a defined group of consecutive data bits. The preferred number of bits in a data frame depends on the application for the data channel. [T1.801.04-1997]

datagram: In packet switching, a self-contained packet, independent of other packets, that contains information sufficient for routing from the originating data terminal equipment (DTE) to the destination DTE without relying on prior exchanges between the equipment and the network. *Note:* Unlike virtual call service, when datagrams are sent there are no call establishment or clearing procedures. Thus, the network may not be able to provide protection against loss, duplication, or misdelivery.

data integrity: 1. [The] condition existing when data is unchanged from its source and has not been accidentally or maliciously modified, altered, or destroyed. [INFOSEC-99] **2.** The condition in which data are identically maintained during any operation, such as transfer, storage, and retrieval. **3.** The preservation of data for their intended use. **4.** Relative to specified operations, the *a priori* expectation of data quality.

data item: 1. A named component of a data element; usually the smallest component. **2.** A subunit of descriptive information or value classified under a data element. For example the data element "military personnel grade" contains data items such as sergeant, captain, and colonel. [JP 1-02]

data key: A cryptographic key used for authentication or for encryption and decryption. [After X9.17]

data link: 1. The means of connecting one location to another for the purpose of transmitting and receiving data. [JP 1-02] **2.** An assembly, consisting of parts of two data terminal equipments (DTEs) and the interconnecting data circuit, that is controlled by a link protocol enabling data to be transferred from a data source to a data sink.

data link connection identifier (DLCI): In frame-relay transmission systems, 13-bit field that defines the destination address of a packet. The address is local on a link-by-link basis. [After T1.312-1991]

data link escape character (DLE): A transmission control character that changes the meaning of a limited number of contiguously following characters or coded representations.

Data Link Layer: *See* **Open Systems Interconnection--Reference Model.**

data logging: The dating, time-labeling, and recording of data.

data management: The control of data handling operations--such as acquisition, analysis, translation, coding, storage, retrieval, and distribution of data--but not necessarily the generation and use of data. [From Weik '89]

data management system: *See* **database management system.**

data medium: The material in or on which one or more characteristics of the material may be used to represent information statically or dynamically. *Note:* Examples of data media are films, compact optical disks, cards, magnetic disks, magnetic drums, and paper.

data mining: The process of analyzing data to determine data relationships undiscovered by previous analyses.

data mode: In a communications network, the state of data circuit-terminating equipment (DCE) when connected to a communications channel and ready to transmit data, usually digital data. *Note:* When in the data mode, the DCE is not in a talk or dial mode.

data network identification code (DNIC): In the ITU-T International X.121 format, the first four digits of the international data number, the three digits that may represent the data country code, and the 1-digit network code, *i.e.* , the network digit.

data numbering plan area (DNPA): In the U.S. implementation of a ITU-T X.25 network, the first three digits of a network terminal number (NTN). *Note:* The 10-digit NTN is the specific addressing information for an end-point terminal in an X.25 network.

data origin authentication: Corroborating the source of data is as claimed. [INFOSEC-99]

data phase: The phase of a data call during which data may be transferred between data terminal equipments (DTEs) that are interconnected via the network. *Note:* The data phase of a data call corresponds to the information transfer phase of an information transfer transaction.

data processing: The systematic performance of operations upon data such as handling, merging, sorting, and computing. *Note:* The semantic content of the original data should not be changed. The semantic content of the processed data may be changed. *Synonym* **information processing.**

data processing equipment: Office equipment such as that using punched cards, punched tape, magnetic or other comparable storage media as an operating vehicle for recording and processing information. Includes machines for transcribing raw data into punched cards, *etc.,* but does not include such items as key-operated, manually or electrically driven adding, calculating, bookkeeping or billing machines, typewriters, or similar equipment. [47 CFR Pt.36-A]

data protection: The implementation of administrative, technical, or physical measures to guard against the unauthorized access to data. [2382-pt.8]

data rate: *See* **data signaling rate.**

data reconstitution: A method of data restoration by assembling data from components available from alternative sources. [After 2382-pt.8]

data reconstruction: A method of data restoration by analyzing original sources. [2382-pt.8]

data register: *See* **register.**

data restoration: The act of regenerating data that have been lost or contaminated. *Note:* Methods include copying data from archive, data reconstitution from alternative sources, or data reconstruction from source data. [2382-pt.8]

data scrambler: A device used in digital transmission systems to convert digital signals into a pseudorandom sequence that is free from long strings of simple patterns, such as marks and spaces. *Note:* The data scrambler facilitates timing extraction, reduces the accumulation of jitter, and prevents baseline drift.

data security: [The] protection of data from unauthorized (accidental or intentional) modification, destruction, or disclosure. [INFOSEC-99]

data separation: The application of encryption as a means of access control. [After X9.69]

data service unit (DSU): 1. A device used for interfacing data terminal equipment (DTE) to the public telephone network. **2.** A type of short-haul, synchronous-data line driver, usually installed at a user location, that connects user synchronous equipment over a 4-wire circuit at a preset transmission rate to a servicing central office. *Note:* This service can be for a point-to-point or multipoint operation in a digital data network.

data set: *Deprecated term. See* **DCE.**

data signaling rate (DSR): The aggregate rate at which data pass a point in the transmission path of a data transmission system. *Note 1:* The DSR is usually expressed in bits per second. *Note 2:* The data signaling rate is given by

$$\sum_{i=1}^{m} \frac{\log_2 n_i}{T_i} ,$$

where m is the number of parallel channels, n_i is the number of significant conditions of the modulation in the I-th channel, and T_i is the unit interval, expressed in seconds, for the I-th channel. *Note 3:* For serial transmission in a single channel, the DSR reduces to $(1/T)\log_2 n$; with a two-condition modulation, *i.e.* , n =2, the DSR is $1/T$. *Note 4:* For parallel transmission with equal unit intervals and equal numbers of significant conditions on each channel, the DSR is $(m/T)\log_2 n$; in the case of a two-condition modulation, this reduces to m/T . *Note 5:* The DSR may be expressed in bauds, in which case, the factor $\log_2 n_i$ in the above summation formula should be deleted when calculating bauds. *Note 6:* In synchronous binary signaling, the DSR in bits per second may be numerically the same as the modulation rate expressed in bauds. Signal processors, such as four-phase modems, cannot change the DSR, but the modulation rate depends on the line modulation scheme, in accordance with Note 4. For example, in a 2400 b/s 4-phase sending modem, the signaling rate is 2400 b/s on the serial input side, but the modulation rate is only 1200 bauds on the 4-phase output side.

data signaling rate transparency: *See* **transparency.**

data sink: *See* **sink.**

data source: *See* **source.**

data station: Data terminal equipment (DTE), data circuit-terminating equipment (DCE), and any intermediate equipment connected at one location. *Note:* The DCE may be connected directly to a data processing system or it may be a part of the data processing system.

data stream: A sequence of digitally encoded signals used to represent information in transmission.

data subscriber terminal equipment: In the DDN, a general purpose terminal device that consists of (a) all the equipment necessary to provide interface functions, perform code conversion, and transform messages on various data media, such as punched cards, magnetic tapes, and paper tapes, to electrical signals for transmission and (b) all the equipment necessary to convert received electrical signals into data stored or recorded on various data media. [From Weik '89]

data switching exchange (DSE): The equipment installed at a single location to perform switching functions such as circuit switching, message switching, and packet switching.

data template: A specified logical structure for a collection of data objects, including allowable ranges for their values and other data consistency specifications. [T1.667-1999]

data terminal equipment: *See* **DTE.**

data transfer device: [A] fill device designed to securely store, transport, and transfer electronically both COMSEC and TRANSEC key, designed to be backward compatible with the previous generation of COMSEC common fill devices, and programmable to support modern mission systems. [INFOSEC-99]

data transfer rate: The average number of bits, characters, or blocks per unit time passing between corresponding equipment in a data transmission system.

data transfer request signal: A call control signal transmitted by the data circuit-terminating equipment (DCE) to the data terminal equipment (DTE) indicating that a request signal, originated by a distant DTE, has been received from a distant DCE to exchange data with the station.

data transfer time: The time between (a) the instant at which a user data unit, such as a character, word, block, or message, is made available to a network for transfer by a transmitting data terminal equipment (DTE) and (b) the receipt of that complete data unit by a receiving DTE.

data transmission: The sending of data from one place to another by means of signals over a channel.

data transmission circuit: The transmission media and the intervening equipment used for the transfer of data between data terminal equipments (DTEs). *Note 1:* A data transmission circuit includes any required signal conversion equipment. *Note 2:* A data transmission circuit may transfer information in (a) one direction only, (b) either direction but one way at a time, or (c) both directions simultaneously.

data unit: A single kind of data for which the identification and description are identical for all occurrences. It may be a data element or a data composite. [T1.238-1994/97]

data validation: A process used to determine if data are accurate, complete, or meet specified criteria. [2382-pt.8]

data volatility: Pertaining to the rate of change in the values of stored data over a period of time.

date: An instant in the passage of time, identified with desired precision by a clock and a calendar. *Note:* An example of a date is 23 seconds after 3:14 PM on February 9, 1926. This date might be represented as 1926FEB091514.23.

date-time group (DTG): In a message, a set of characters, usually in a prescribed format, used to express the day of the month, the hour of the day, the minute of the hour, the time zone, and the year. *Note 1:* The DTG is usually placed in the header of the message. *Note 2:* The DTG may be used as a message identifier if it is unique for each message. *Note 3:* The DTG may indicate either the date and time a message was dispatched by a transmitting station or the date and time it was handed into a transmission facility by a user or originator for dispatch.

dating format: The format used to express the time of an event. *Note:* The time of an event on the UTC time scale is given in the following sequence: hour, day, month, year; *e.g.,* 0917 UT, 30 August 1997. The hour is designated by the 24-hour system.

dB: *Abbreviation for* **decibel(s).** One tenth of the common logarithm of the ratio of relative powers, equal to 0.1 B (bel). *Note 1:* The decibel is the conventional relative power ratio, rather than the bel, for expressing relative powers because the decibel is smaller and therefore more convenient than the bel. The ratio in dB is given by

$$dB = 10 \log_{10}\left(\frac{P_1}{P_2}\right),$$

where P_1 and P_2 are the actual powers. Power ratios may be expressed in terms of voltage and impedance, E and Z, or current and impedance, I and Z, since

$$P = I^2 Z = \frac{E^2}{Z}.$$

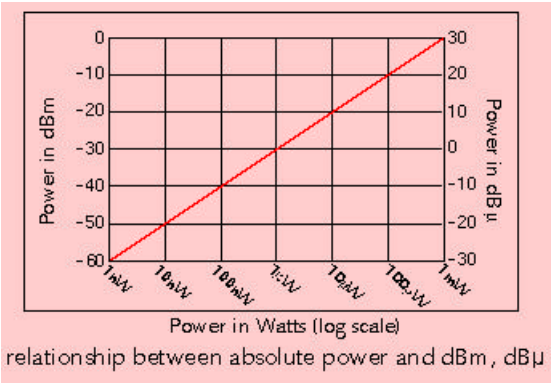
Thus dB is also given by

$$dB = 10 \log_{10}\left(\frac{E_1^2/Z_1}{E_2^2/Z_2}\right) = 10 \log_{10}\left(\frac{I_1^2 Z_1}{I_2^2 Z_2}\right).$$

If $Z_1 = Z_2$, these become

$$dB = 20 \log_{10}\left(\frac{E_1}{E_2}\right) = 20 \log_{10}\left(\frac{I_1}{I_2}\right).$$

Note 2: The dB is used rather than arithmetic ratios or percentages because when circuits are connected in tandem, expressions of power level, in dB, may be arithmetically added and subtracted. For example, in an optical link, if a known amount of optical power, in dBm, is launched into a fiber, and the losses, in dB, of each component (*e.g.* , connectors, splices, and lengths of fiber) are known, the overall link loss may be quickly calculated with simple addition and subtraction.



relationship between absolute power and dBm, dBµ

dBa: *Abbreviation for* **decibels adjusted.** Weighted absolute noise power, calculated in dB referenced to 3.16 picowatts (-85 dBm), which is 0 dBa. *Note:* The use of F1A-line or HA1-receiver weighting must be indicated in parentheses as required. A one-milliwatt, 1000-Hz tone will read +85 dBa, but the same power as white noise, randomly distributed over a 3-kHz band (nominally 300 to 3300 Hz), will read +82 dBa, due to the frequency weighting. *Synonym* **dBrn adjusted.**

dB(A): dB of sound volume in relation to 20 micropascal weighted, simulating human ear sensitivity at 40 phon level. *Note 1:* 20 micropascal is the human hearing threshold, *i.e.,* 0 dB(A). *Note 2:* Sound volumes louder than dB(A) are represented by a graduated scale: dB(B), dB(C), and dB(D). *Note 3:* This scale is widely used in occupational safety and hearing protection measurements.

dBa(F1A): Weighted absolute noise power in dBa, measured by a noise measuring set with F1A-line weighting. *Note:* F1A weighting is no longer used for DOD applications.

dBa(HA1): Weighted noise power in dBa, measured across the receiver of a 302-type or similar subscriber set, by a noise measuring set with HA1-receiver weighting. *Note:* HA1 weighting is no longer used in DOD applications.

dBa0: Noise power in dBa referenced to or measured at zero transmission level point (0TLP), also called a point of zero relative transmission level (0 dBr). *Note:* It is preferred to convert noise readings from dBa to dBa0, as this makes it unnecessary to know or state the relative transmission level at the point of actual measurement.

dBc: *Abbreviation.* dB relative to the carrier power.

dBi: *Abbreviation.* In the expression of antenna gain, the number of decibels of gain of an antenna referenced to the zero dB gain of a free-space isotropic radiator.

dBm: *Abbreviation.* dB referenced to one milliwatt. *Note 1:* dBm is used in communication work as a measure of absolute power values. Zero dBm equals one milliwatt. *Note 2:* In DOD practice, unweighted measurement is normally understood, applicable to a certain bandwidth, which must be stated or implied. *Note 3:* In European practice, psophometric weighting may be implied, as indicated by context; equivalent to dBm0p, which is preferred.

dBm(psoph): Noise power in dBm, measured with psophometric weighting where

$$dBm\,(psoph) = 10\log_{10}(pWp) - 90$$
$$= dBa - 84\ ,$$

where *pWp* is power in picowatts psophometrically weighted and *dBa* is the weighted noise power in dB referenced to 3.16 picowatts.

DBMS: *Abbreviation for* **database management system.**

dBμ: *Abbreviation.* dB referenced to 1 microvolt. Used for receiver sensitivity measurement.

dBmV: *Abbreviation.* dB referenced to one millivolt across 75 ohms. *Note:* This reference is not equivalent to dBm; it is, in fact, 1.33×10^{-5} milliwatts.

dBm0: Power in dBm referred to or measured at a zero transmission level point (0TLP). *Note 1:* A 0TLP is also called a point of zero relative transmission level (0 dBr0). *Note 2:* Some international documents use dBm0 to mean noise power in dBm0p (psophometrically weighted dBm0). In the United States, dBm0 is not so used.

dBm0p: Noise power in dBm0, measured by a psophometer or noise measuring set having psophometric weighting.

dBr: *Abbreviation.* The power ratio, expressed in dB, between any point and a reference point selected as the zero relative transmission level point. *Note:* Any power expressed in dBr does not specify the absolute power. It is a relative measurement only.

dBrn: *Abbreviation* . dB above reference noise. *Note 1:* Weighted noise power in dB is referred to 1.0 picowatt. Thus, 0dBrn = -90 dBm. Use of 144-line, 144-receiver, or C-message weighting, or flat weighting, must be indicated in parentheses as required. *Note 2:* With C-message weighting, a one-milliwatt, 1000-Hz tone will read +90 dBrn, but the same power as white noise, randomly distributed over a 3-kHz band will read approximately +88.5 dBrn (rounded off to +88 dBrn), because of the frequency weighting. *Note 3:* With 144 weightings, a one-milliwatt, 1000-Hz white noise tone will also read +90 dBrn, but the same 3-kHz power will only read +82 dBrn, because of the different frequency weighting.

dBrn adjusted: *Synonym* **dBa.**

dBrnC: Weighted noise power in dBrn, measured by a noise measuring set with C-message weighting.

dBrnC0: Noise power in dBrnC referred to or measured at a zero transmission level point (0TLP).

dBrn(f_1-f_2): Flat noise power in dBrn, measured over the frequency band between frequencies f_1 and f_2.

dBrn(144-line): Weighted noise power in dBrn, measured by a noise measuring set with 144-line weighting.

DBS: *Abbreviation for* **direct broadcast satellite.** The technology of rebroadcasting digital signals, via geosynchronous communications satellites, directly to the consumer; DBS technology allows consumers situated over a relatively large footprint to receive broadcasts (which, for all practical purposes, are now always digitally encoded) by using a small-aperture dish antenna.

dBu: *Abbreviation.* dB in reference to 1 mW at 600 ohms, equal to 0.775 V, mainly used in audio systems (*e.g.,* to measure audio levels in broadcasting as an audio reference) and in analog telephony. Also used in reference to 0.775 V from low-impedance outputs and high impedance inputs. *Note:* These are measurements of an audio voltage, not power.

dBv: *Abbreviation* . dB relative to 1 volt peak-to-peak. *Note:* The dBv is usually used for television video signal level measurements. [From Weik '89]

dBW: *Abbreviation* . dB referenced to one watt.

dBx: *Abbreviation* . dB above reference coupling. *Note:* dBx is used to express the amount of crosstalk coupling in telephone circuits. dBx is measured with a noise measuring set. [From Weik '89]

dc: *Abbreviation for* **direct current.**

DCA: *Abbreviation for* **Defense Communications Agency.** *Now* **DISA** (Defense Information Systems Agency)**.**

DCE: *Abbreviation for* **data circuit-terminating equipment. 1.** In a data station, the equipment that (a) performs functions, such as signal conversion and coding, at the network end of the line between the data terminal equipment (DTE) and the line, and (b) may be a separate or an integral part of the DTE or of intermediate equipment. **2.** The interfacing equipment that may be required to couple the data terminal equipment (DTE) into a transmission circuit or channel and from a transmission circuit or channel into the DTE. *Synonyms* **data communications equipment** *(deprecated)* **, data set** *(deprecated).* **3.** *Abbreviation for* **distributed computing environment.** An architecture of standard programming interfaces, conventions, and server functionalities (*e.g.,* naming, distributed file system, remote procedure call) for distributing applications transparently across networks of heterogeneous computers.

DCE clear signal: A call control signal transmitted by data circuit-terminating equipment (DCE) to indicate that it is clearing the associated circuit after a call is finished.

DCE waiting signal: A call control signal at the data-circuit-terminating-equipment/data-terminal-equipment (DCE/DTE) interface that indicates that the DCE is ready for another event in the call establishment procedure.

D channel: In ISDN, the 16-kb/s segment of a 144-kb/s, full-duplex subscriber service channel that is subdivided into 2B+D channels, *i.e.* , into two 64-kb/s clear channels and one 16-kb/s channel for the ISDN basic rate. *Note 1:* The D channel is usually used for out-of-band signaling. The two 64-kb/s clear channels are used for subscriber voice and data services. *Note 2:* The D-channel specifications are addressed in the CCITT (now, the ITU-T) Recommendation for the Integrated Services Digital Network (ISDN). *Note 3:* The D-channel may be 64 kb/s for the primary rate ISDN service.

DCOM: *Abbreviation for* **distributed component object model.** A model for developing objects in a language-independent format so that those objects can be communicated via a network as if they were on the same machine.

dc patch bay: A patch bay in which dc circuits are grouped.

DCS: *Abbreviation for* **Defense Communications System.**

DDD: *Abbreviation for* **direct distance dialing.**

DDL: *Abbreviation for* **data definition language, data description language.**

DDN: *Abbreviation for* **Defense Data Network.**

dead link: A URL that leads to no existing document. *Note:* An attempt to use a dead link usually results in a "404 Error" message. Dead links are usually the result of a machine name change, changes in server accounts, or network-connection failures. [Bahorsky]

deadlock: 1. Unresolved contention for the use of a system or component. [From Weik '89] **2.** In computer and data processing systems, an error condition such that processing cannot continue because each of two components or processes is waiting for an action or response from the other. [From Weik '89] **3.** A permanent condition in which a system cannot continue to function unless some corrective action is taken. [From Weik '89]

dead sector: In facsimile, the interval between (a) the end of scanning of one object line and (b) the start of scanning of the following line.

dead space: The area, zone, or volume of space that is within the expected range of a radio, radar, or other transmitted signal but in which the signal is not detectable and therefore cannot be received. [From Weik '89]

DEA key: A 64-bit parameter consisting of 56 independent bits and 8 parity bits operating in concert as a data encryption algorithm key. [After X9.52]

debug: To detect, trace, and eliminate mistakes.

deception: *See* **electronic deception.**

deception repeater: A device that can (a) receive a signal, (b) amplify, delay, or otherwise manipulate the signal, and (c) retransmit it solely for creating deception. [From Weik '89]

decertification: [In security, the] Revocation of the certification of an information-system (IS) item or equipment for cause. [INFOSEC-99]

decibel: *See* **dB.**

decipher: [To] convert enciphered text to the equivalent plain text by means of a cryptographic system. [INFOSEC-99] *Note:* This does not include solution by cryptanalysis.

decision circuit: A circuit that measures the probable value of a signal element and makes an output signal decision based on the value of the input signal and a predetermined criterion or criteria.

decision instant: In the reception of a digital signal, the instant at which a decision is made by a receiving device as to the probable value of a signal condition. *Synonym* **selection position.**

decode: 1. To convert data by reversing the effect of previous encoding. **2.** To interpret a code. **3.** [To] convert encoded text into plain text by means of a code. [INFOSEC-99] *Note:* Decoding does not include deriving plain text by cryptanalysis.

decollimation: In a beam with the minimum possible ray divergence or convergence, any mechanism by which rays are caused to diverge or converge from parallelism. *Note 1:* Decollimation may be deliberate for systems reasons, or may be caused by many factors, such as refractive index inhomogeneities, occlusions, scattering, deflection, diffraction, reflection, and refraction. *Note 2:* Decollimation occurs in applications such as radio, radar, sonar, and optical communications.

decompression: The reversal of the procedure conducted by the compression algorithm, which reversal returns [expands] the data to its original size and condition. [After Silicon]

decrypt: 1. [A] generic term encompassing decode and decypher. [INFOSEC-99] **2.** To convert encrypted text into its equivalent plain text by means of a cryptosystem. (This does not include solution by cryptanalysis.) *Note:* The term *"decrypt"* covers the meanings of *" decipher "* and *"decode."* [JP1-02]

dedicated circuit: A circuit designated for exclusive use by specified users. *Note:* DOD normally considers a dedicated circuit to be between two users only.

dedicated mode: An information-system (IS) security mode of operation wherein each user with direct or indirect access to the system, its peripherals, remote terminals, or remote hosts, has all of the following: (a) a valid security clearance for all information within the system; (b) formal access approval and signed nondisclosure agreements for all the information stored and/or processed (including all compartments, subcompartments, and/or special access programs); and (c) a valid need-to-know for all information contained within the IS. When in the dedicated security mode, a system is specifically and exclusively dedicated to and controlled for the processing of one particular type or classification of information, either for full-time operation or for a specified period of time. [INFOSEC-99]

dedicated service: In a communications system, a specified set of functions provided to designated users. *Note:* Dedicated service is usually specified in a communications format, such as voice, digital data, facsimile, or video.

dedicated service link connection: A link connection that is for the exclusive use of a single service customer. [T1.263-1998]

deemphasis: In FM transmission, the process of restoring (after detection) the amplitude-vs.-frequency characteristics of the signal.

deep linking: In hypertext systems, such as the World Wide Web, bypassing the main (home) page and linking directly to a subordinate page.

deeply depressed cladding fiber: An optical fiber construction, usually a single-mode fiber, that has an outer cladding of approximately the same refractive index as the core, and an inner cladding of very low (depressed) refractive index material between them.

deep space: Space at distances from the Earth equal to or greater than 2×10^6 kilometers. [NTIA] [RR]

***de facto* standard:** A standard that is widely accepted and used, but lacks formal approval by a recognized standards organization.

default: Pertaining to the pre-defined initial, original, or specific setting, condition, value, or action a system will assume, use, or take in the absence of instructions from the user. [From Weik '89]

Defense Communications System (DCS): Department of Defense long-haul voice, data, and record traffic system which includes the Defense Data Network, Defense Satellite Communications Systems, and Defense Switched Network.

Defense Data Network (DDN): A component of the Defense Communications System used for switching Department of Defense automated data processing systems. [JP 1-02]

Defense Switched Network (DSN): A component of the Defense Communications System that handles Department of Defense voice, data, and video communications.

definition: A figure of merit for image quality. *Note:* In an image, definition is usually expressed in terms of the smallest resolvable element, such as lines per inch, or pels per square

inch.

deflection: 1. A change in the direction of a traveling particle, usually without loss of particle kinetic energy, representing a change in velocity without a change in the scalar speed of the particle. **2.** A change in the direction of a wave, beam, electron, or other entity, such as might be accomplished by an electric or magnetic field. *Note:* If the deflection is caused by a prism (refraction), a mirror (reflection), or optical grating (diffraction), the specific applicable term should be used. [From Weik '89]

degauss: 1. To remove a residual magnetic field from a magnetized object, usually by introducing much stronger and gradually diminishing magnetic fields of alternating polarity. **2.** Specifically, to erase information from a magnetic storage medium by degaussing.

degaussing: [A] procedure that reduces the magnetic flux to virtual zero by applying a reverse magnetizing field. *Synonym* **demagnetizing.** [INFOSEC-99]

degradation: 1. The deterioration in quality, level, or standard of performance of a functional unit. **2.** In communications, a condition in which one or more of the required performance parameters fall outside predetermined limits, resulting in a lower quality of service. *Note:* Degradation is usually categorized as either *"graceful"* or *"catastrophic."*

degraded minute (DM): A 1-minute interval with a BER (bit error ratio) worse than 10:6. The 1-minute intervals are derived by removing severely errored seconds from the total time and then consecutively grouping the remaining seconds into blocks of 60. [T1.507-1996]

degraded service state: The condition that exists when one or more of the required service performance parameters fall outside predetermined limits, resulting in a lower quality of service. *Note:* A degraded service state is considered to exist when a specified level of degradation persists for a specified period of time.

degraded unit of time: A specified period of time during which bits are transferred from a source to a destination, where a bit error ratio worse than a specified threshold occurs. Severely errored units of time are excluded from the calculation. An example of a degraded unit of time is a degraded minute (DM). [T1.507-1996]

degree of coherence: A dimensionless unit, expressed as a ratio, used to indicate the extent of coherence of an electromagnetic wave such as a lightwave. [After 2196] *Note 1:* For lightwaves, the magnitude of the degree of coherence is equal to the visibility, V, of the fringes of a two-beam interference test, as given by

$$V = \frac{I_{max} - I_{min}}{I_{max} + I_{min}},$$

where I_{max} is the intensity at a maximum of the interference pattern, and I_{min} is the intensity at a minimum. *Note 2:* Light is considered to be highly coherent when the degree of coherence exceeds 0.88, partially coherent for values less than 0.88 but more than nearly zero values, and incoherent for nearly zero and zero values.

degree of isochronous distortion: In data transmission, the ratio of (a) the absolute value of the maximum measured difference between the actual and the theoretical intervals separating any two significant instants of modulation (or demodulation) to (b) the unit interval. *Note 1:* These instants are not necessarily consecutive. *Note 2:* The degree of isochronous distortion is usually expressed as a percentage. *Note 3:* The result of the measurement should be qualified by an indication of the period, usually limited, of the observation. For a prolonged modulation (or demodulation), it will be appropriate to consider the probability that an assigned value of the degree of distortion will be exceeded.

degree of start-stop distortion: 1. In asynchronous data transmission, the ratio of (a) the absolute value of the maximum measured difference between the actual and theoretical intervals separating any significant instant of modulation (or demodulation) from the significant instant of the start element immediately preceding it to (b) the unit interval. **2.** The highest absolute value of individual distortion affecting the significant instants of a start-stop modulation. *Note:* The degree of distortion of a start-stop modulation (or demodulation) is usually expressed as a percentage. Distinction can be made between the degree of late (positive) distortion and the degree of early (negative) distortion.

dehop: To modify a frequency-hopping signal so that it has a constant center frequency.

dejitterizer: A device that reduces jitter in a digital signal. *Note 1:* A dejitterizer usually consists of an elastic buffer in which the signal is temporarily stored and then retransmitted at a rate based on the average rate of the incoming signal. *Note 2:* A dejitterizer is usually ineffective in dealing with low-frequency jitter, such as waiting-time jitter.

delay: 1. The amount of time by which an event is retarded. **2.** The time between the instant at which a given event occurs and the instant at which a related aspect of that event occurs. *Note 1:* The events, relationships, and aspects of the entity being delayed must be precisely specified. *Note 2:* Total delay may be demonstrated by the impulse response of a device or system. *Note 3:* In analog systems, total delay is described in terms of the transfer functions in the frequency domain. *Synonym* **delay time. 3.** In radar, the electronic delay of the start of the time base used to select a particular segment of the total.

delay distortion: In a waveform consisting of two or more wave components at different frequencies, distortion caused by the difference in arrival times of the frequency components at the output of a transmission system. *Synonym* **time-delay distortion.**

delayed-delivery facility: In a communications network, a facility that stores data, destined for delivery to one or more addresses, for delivery at a later time.

delay encoding: The encoding of binary data to form a two-level signal such that (a) a "0" causes no change of signal level unless it is followed by another "0" in which case a transition to the other level takes place at the end of the first bit period; and (b) a "1" causes a transition from one level to the other in the middle of the bit period. *Note:* Delay encoding is used primarily for encoding radio signals because the frequency spectrum of the encoded signal contains less low-frequency energy than a conventional non-return-to-zero (NRZ) signal and less high-frequency energy than a biphase signal.

delay equalizer: A corrective network designed to make the phase delay or envelope delay of a circuit or system substantially constant over a desired frequency range.

delay line: 1. A transmission line, or equivalent device, used to delay a signal. **2.** A single-input-channel device, such as a single-input sequential logic element, in which the output channel state at a given instant, *t,* is the same as the input channel state at the instant *t-n* , where *n* is a number of time units, *i.e.* , the input sequence undergoes a delay of *n* time units, such as *n* femtoseconds, nanoseconds, or microseconds. *Note:* The delay line may have additional taps yielding output channels with values less than *n* .

delay modulation: *See* **delay encoding.**

delay time: *Synonym* **delay.**

delay working: In telephone switchboard operations, operation intended to ensure fair distribution of the time of one or more lines among groups of call originators.

delegated accrediting authority: *Synonym* **designated approving authority.**

deleted bit: A bit not delivered to the intended destination.

deleted block: A block not delivered to the intended destination.

delimiter: 1. A character used to indicate the beginning and end of a character string, *i.e.,* a symbol stream, such as words, groups of words, or frames. **2.** A flag that separates and organizes items of data.

delivered block: A successfully transferred block.

delivered duplicated frame: A frame D received by a particular destination user when both of the following conditions are true:

D was not generated by the source user;

D is exactly the same as a frame that was previously delivered to that destination.

[after T1.615-1992]

delivered errored frame: A delivered frame when the value of one or more bits in the frame is in error, or when some, but not all, bits in the frame are lost bits or extra bits (*i.e.,* bits that were not present in the original signal). [After T1.615-1992]

delivered out-of-sequence frame: A delivered frame, F_i, that arrives at the destination user after any of the frames $F_{(i+1)}, F_{(i+2)}, \ldots F_n$, assuming that F_1 is transmitted first, F_2, second, *etc.* [After T1.615-1992]

delivered overhead bit: A bit that (a) is successfully transferred to a destination user, (b) performs its primary function within the telecommunications system, and (c) does not represent user information.

delivered overhead block: A block that (a) is successfully transferred to a destination user, (b) performs its primary function within the telecommunications system, and (c) does not contain user information bits.

delivery confirmation: Information returned to the originator indicating that a given unit of information has been delivered to the intended addressee(s).

Dellinger effect: An effect--lasting from several minutes to several hours--that causes electromagnetic sky wave signals to disappear rapidly as a result of greatly increased ionization in the ionosphere caused by increased noise from solar storms. *Synonyms:* **Dellinger fadeout, Dellinger fading.** [From Weik '89]

Dellinger fadeout: *Synonym* **Dellinger effect.**

Dellinger fading: *Synonym* **Dellinger effect.**

delta frame: In digital television technology, a video frame created from the preceding key frame by modifying only those pixels that have changed. *Note:* The use of delta frames reduces (a) the data rate required to transmit a given number of video frames per second (frame rate), or (b) the storage capacity required to store multiple video frames. *Synonym* **difference frame.**

delta modulation (DM): Analog-to-digital signal conversion in which (a) the analog signal is approximated with a series of segments, (b) each segment of the approximated signal is compared to the original analog wave to determine the increase or decrease in relative amplitude, (c) the decision process for establishing the state of successive bits is determined by this comparison, and (d) only the change of information is sent, *i.e.,* only an increase or decrease of the signal amplitude from the previous sample is sent whereas a no-change condition causes the modulated signal to remain at the same 0 or 1 state of the previous sample. *Note:* Examples of delta modulation are continuously variable slope delta modulation, delta-sigma modulation, and differential modulation.

delta-sigma modulation: Delta modulation in which the integral of the input signal is encoded rather than the signal itself. *Note:* Delta-sigma modulation may be achieved by preceding a conventional delta-modulation encoder with an integrating network.

demagnetizing: *Synonym* **degaussing.**

demand assignment: An operation in which several users share access to a communications channel on a real-time basis, *i.e.* , a user needing to communicate with another user on the same network requests the required circuit, uses it, and when the call is finished, the circuit is released, making the circuit available to other users. *Note:* Demand assignment is similar to conventional telephone switching, in which common trunks are provided for many users, on a demand basis, through a limited-size trunk group.

demand assignment multiple access (DAMA): In a communications system, a technique for allocating use of bandwidth among multiple users, based on demand. *Note:* DAMA can be implemented in many ways including TDM and FDM.

demand factor: 1. The ratio of (a) the maximum real power consumed by a system to (b) the maximum real power that would be consumed if the entire load connected to the system were to be activated at the same time. *Note:* The maximum real power is usually integrated over a specified time interval, such as 15 or 30 minutes, and is usually expressed in kilowatts. The real power that would be consumed if the entire load connected to the system were to be activated at the same time is obtained by summing the power required by all the connected equipment. This load is expressed in kilowatts if the consumed real power is expressed in kilowatts. **2.** The ratio of (a) the maximum power, integrated over a specified time interval, such as 15 or 30 minutes, and usually expressed in kilowatts, consumed by a system, to (b) the maximum volt-amperes, expressed in kilovolt-amperes if the power is expressed in kilowatts, integrated over a time interval of the same duration, though not necessarily during the same interval. *Note:* Charges for electrical power may be based on the demand factor as well as the kilowatt-hours of electrical energy consumed.

demand load: 1. In general, the total power required by a facility. *Note:* The demand load is the sum of the operational load (including any tactical load) and nonoperational demand loads. It is determined by applying the proper demand factor to each of the connected loads and a diversity factor to the sum total. **2.** At a communications center, the power required by all automatic switching, synchronous, and terminal equipment (operated simultaneously on-line or in standby), control and keying equipment, plus lighting, ventilation, and air-conditioning equipment required to maintain full continuity of communications. **3.** The power required for ventilating equipment, shop lighting, and other support items that may be operated simultaneously with the technical load. **4.** The sum of the technical demand and nontechnical demand loads of an operating facility. **5.** At a receiver facility, the power required for all receivers and auxiliary equipment that may be operated on prime or spare antennas simultaneously, those in standby condition, multicouplers, control and keying equipment, plus lighting, ventilation, and air conditioning equipment required for full continuity of communications. **6.** At a transmitter facility, the power required for all transmitters and auxiliary equipment that may be operated on prime or spare antennas or dummy loads simultaneously, those in standby condition, control and keying equipment, plus lighting, ventilation, and air conditioning equipment required for full continuity of communications.

demand service: In ISDN applications, a telecommunications service that establishes an immediate communication path in response to a user request made through user-network signaling.

demarc: *Acronym for* **demarcation point.**

demarcation point (demarc): That point at which operational control or ownership of communications facilities changes from one organizational entity to another. *Note:* The demarcation point is usually the interface point between customer-premises equipment and external network service provider equipment. *Synonym* **network terminating interface.**

democratically synchronized network: A mutually synchronized network in which all clocks in the network are of equal status and exert equal amounts of control on the others, the network operating clock pulse repetition rate being the mean of the natural (uncontrolled) clock pulse repetition rates of the population of clocks.

demodulation: The recovery, from a modulated carrier, of a signal having substantially the same characteristics as the original modulating signal.

demon: *See* **daemon.**

demultiplex (DEMUX): *See* **demultiplexing.**

demultiplexing: The separation of two or more channels previously multiplexed; *i.e.* , the reverse of multiplexing.

deMUX: *Acronym for* **demultiplex** and **demultiplexer.**

denial of service: 1. The prevention of authorized access to resources or the delaying of time-critical operations. [2382-pt.8] **2.** The result of any action or series of actions that prevents any part of an information system (IS) from functioning. [INFOSEC-99]

dense binary code: A binary code in which all possible bit patterns that can be made from a fixed number of bits are used to encode user information but no overhead information. *Note:* Examples of dense binary codes are (a) a pure binary representation for sexadecimal digits using all sixteen possible patterns and (b) an octal representation using all eight patterns. A binary representation of decimal numbers using four binary digits of which only 10 of the possible 16 patterns are used is not a dense binary code. If a binary code is not dense, the unused patterns can be used to detect errors inasmuch as they should only occur if there is an error. [From Weik '89]

dense wavelength division multiplexing (DWDM): Multiplexing using close spectral spacing of individual optical carriers (wavelengths) to take advantage of desirable transmission characteristics (*e.g.,* minimum dispersion or attenuation) within a given fiber, while reducing the total fiber count needed to provide a given amount of information-carrying capacity. [FAA]

density: 1. In a facsimile system, a measure of the light transmission or reflection properties of an area of an object. *Note 1:* Density is usually expressed as the logarithm to the base 10 of the ratio of incident to transmitted or reflected irradiance. *Note 2:* There are many types of density, such as diffuse, double diffuse, and specular density, each of which will usually have different numerical values for different materials. The relevant type of density depends on the type of optical system, the component materials of the object, and the surface characteristics of the object. **2.** In video, the degree of darkness of an image, or the percent of the screen used in an image. **3.** In optics, a figure of merit that describes the degree of attenuation introduced by a filter.

Department of Defense (DOD) master clock: *See* **DOD master clock.**

departure angle: The angle between the axis of the main lobe of an antenna pattern and the horizontal plane at the transmitting antenna. *Synonym* **takeoff angle.**

dependency: In security, a relationship between requirements such that one requirement must be satisfied before others can meet their own objectives.

depolarization: 1. Reducing or randomizing the polarization of an electromagnetic wave. *Note:* Depolarization may be caused by transmission through a nonhomogeneous medium or a depolarizer. **2.** Prevention of polarization in an electric cell or battery.

depressed-cladding fiber: *Synonym* **doubly clad fiber.**

depressed-inner-cladding fiber: *Synonym* **doubly clad fiber.**

dequeue: *Abbreviation for* **double-ended queue.**

deregulation: A reduction in regulation of (a) tariffs, (b) market entry and exit, and/or (c) facilities in public telecommunication services.

derivation key: A double-length key used to compute another key cryptographically. *Note:* The derivation key is normally used (in receiving a transaction) to derive or decrypt the transaction keys used by a great number of originating terminals. [After X9.24]

derived unique key per transaction (DUKPT): In cryptography, a key-management technique that uses a unique key for each separate transaction to prevent the disclosure of any past key used by the transaction-originating tamper-resistant security mode (TRSM). *Note:* The unique transaction keys are derived from a base derivation key using only non-secret data transmitted as part of each transaction. [After X9.24]

DES: *Abbreviation for* **Data Encryption Standard.**

descrambler: The inverse of a scrambler. *Note:* The descrambler output is a signal restored to the state that it had when it entered the associated scrambler, provided that no errors have occurred.

desensitation: The reduction of desired signal gain as a result of receiver reaction to an undesired signal. *Note:* The gain reduction is generally due to overload of some portion of the receiver (*e.g.* , the AGC circuitry) resulting in desired signal suppression because the receiver will no longer respond linearly to incremental changes in input voltage.

designated accrediting authority: *Synonym* **designated approving authority.**

designated approving authority (DAA): [The] official with the authority to formally assume responsibility for operating a system at an acceptable level of risk. *Synonyms* **accrediting authority, delegated accrediting authority, designated accrediting authority.** [INFOSEC-99]

design margin: The additional performance capability above required standard basic system parameters that may be specified by a system designer to compensate for uncertainties.

design objective (DO): In communications systems, a desired performance characteristic for communications circuits and equipment that is based on engineering analyses, but (a) is not considered feasible to mandate in a standard, or (b) has not been tested. *Note 1:* DOs are used because applicable systems standards are not in existence. *Note 2:* Examples of reasons for designating a performance characteristic as a DO rather than as a standard are (a) it may be bordering on an advancement in the state of the art, (b) the requirement may not have been fully confirmed by measurement or experience with operating circuits, and (c) it may not have been demonstrated that the requirement can be met considering other constraints, such as cost and size. *Note 3:* A DO is sometimes established in a standard for developmental consideration. A DO may also specify a performance characteristic that may be used in the preparation of specifications for development or procurement of new equipment or systems.

desktop publishing: The use of computers and associated application software to compose, lay out, model, and develop prototypes of documents that are usually intended to be produced and distributed in some non-interactive medium, usually paper, but including film or other multimedia formats. *Note:* Unlike electronic publishing, desktop publishing almost always results in some form of hard copy.

desktop video: The application of nondedicated personal computers to the performance of video auditioning (viewing) or editing. *Note:* For desktop video teleconferencing, *see* **video teleconference.**

desktop video teleconferencing: *See* **video teleconference.**

despotically synchronized network: A synchronized network in which a unique master clock controls all other clocks in the network. [From Weik '89]

despun antenna: In a rotating communications satellite, an antenna with a main beam that is continuously redirected with respect to the satellite so that the antenna illuminates a given area on the surface of the Earth, *i.e.* , the footprint does not move with respect to the Earth. *Note:* An antenna may be despun mechanically or electrically.

destination node: A node having the network address, as determined by the release node, to be where an existing call should be routed. The destination node may or may not be a Signaling System 7 signaling point. [After T1.661-1997]

destination routing: In communications system operations, the routing of messages based on the name of the destination office, the destination user, or the address on the message, *i.e.,* the addressee. [From Weik '89]

destination routing address: A list of called party numbers (primary and alternative). [T1.667-1999]

destination user: In an information transfer transaction, the user that receives information from the source, *i.e.,* from the originating user.

de-stuffing: The controlled deletion of stuffing bits from a stuffed digital signal, to recover the original signal. *Synonyms* **negative justification, negative pulse stuffing.**

desynchronizer: That portion of a network element (NE) that attempts to recreate a signal's original clock and attenuates the high-frequency phase variations that result from this process. Typically, the desynchronizer follows a demultiplex operation. [T1.105.03-1994]

detection: 1. The recovery of information from an electrical or electromagnetic signal. *Note:* Conventional radio waves are usually detected by heterodyning, *i.e.* , coherent reception/detection. In this method of reception/detection, the received signal is mixed, in some type of nonlinear device, with a signal from a local oscillator, to produce an intermediate frequency, *i.e.* , beat frequency, from which the modulating signal is recovered, *i.e.* , detected. The inherent instabilities of available optical sources have, until relatively recently, prevented practical use of coherent reception/detection in optical communication receivers. At present, coherent optical receivers, using sophisticated technology, are just beginning to emerge from the laboratory into the field. Virtually all existing optical receivers employ direct detection; that is, the received optical signal impinges directly onto a detector. Direct detection is less sensitive than coherent detection. [After FAA] **2.** In tactical operations, the perception of an object of possible military interest but unconfirmed by recognition. [JP1] **3.** In surveillance, the determination and transmission by a surveillance system that an event has occurred. [JP1]

detectivity: The reciprocal of noise equivalent power.

detector: 1. A device that is responsive to the presence or absence of a stimulus. **2.** In an AM radio receiver, a circuit or device that recovers the signal of interest from the modulated wave. *Note:* In FM reception, a circuit called a discriminator is used to convert frequency variations to amplitude variations. **3.** In an optical communications receiver, a device that converts the received optical signal to another form. *Note:* Currently, this conversion is from optical to electrical power; however, optical-to-optical techniques are under development.

deterministic routing: 1. In a switched network, switching in which the routes between given pairs of nodes are pre-programmed, *i.e.,* are determined, in advance of transmission. *Note:* The routes used to complete a given call through a network are identified, in advance of transmission, in routing tables maintained in each switch database. The tables assign the trunks that are to be used to reach each switch code, area code, and International Access Prefix (IAP), usually with one or two alternate routes. **2.** In a non-switched network, routing in which the routes between given pairs of nodes are determined in advance. *Note:* The routes used to send a given message through a network are identified in advance in routing tables maintained in a database.

deterministic transfer mode: An asynchronous transfer mode in which the maximum information transfer capacity of a telecommunication service is provided throughout a call.

Deutsches Institut für Normung (DIN): Germany's standards-setting organization, equivalent to the American National Standards Institute (ANSI).

deviation ratio: In a frequency modulation system, the ratio of the maximum frequency deviation of the carrier to the maximum modulating frequency of the system under specified conditions.

device certificate: In cryptography, a public key certificate or an attribute certificate, issued by a device manufacturer, tying the identity of the device to its attributes. [After X9.45]

device driver: Software that interfaces a computer with a specific peripheral device, *e.g.* a videodisk player or a printer.

D4: *See* **channel bank.**

D-4: A framing standard for traditional time-division multiplexing, which standard describes user channels multiplexed onto a trunk that has been segmented (framed) into 24 bytes of 8 bits each. *Note:* The multiplexing function is performed in the D-4 framing structure by interleaving bits of consecutive bytes as they are presented from individual circuits into each D-4 frame.

DFSK: *Abbreviation for* **double-frequency shift keying.**

dHTML: *Abbreviation for* **dynamic Hypertext Markup Language.** A form of HTML used to create Web-page content that, as perceived by the viewer, appears to change each time it is viewed, without further interaction with the server. *Note:* The Web-page content may use any of several technologies including CGI (computer graphics interface) scripts.

diad: *Synonym* **dibit.**

diagnostic program: 1. A program used to investigate the cause or the nature of conditions or problems within specified elements of a system. **2.** A computer program that detects, locates, or identifies a fault in equipment, an error in input data, or an error in a computer program.

dial-around: Pertaining to long-distance services that require consumers to dial a long-distance provider's access code (or a "10-10" number) before dialing a long-distance number to bypass (to "dial around") the consumer's chosen long-distance carrier, usually to get a better rate. [After FCC]

dial back: *Synonym* **call back.**

dialed digits: Untranslated address information collected/received from the originating line/trunk. [T1.667-1999]

dialing: In a communications system, using a device that generates signals for selecting and establishing connections. *Note:* The term *dialing* is often used to designate or refer to all calling devices used for inserting data to establish connections. [From Weik '89]

dial mode: Operation of data circuit-terminating equipment (DCE) so that circuitry, such as data terminal equipment (DTE), associated with call origination is directly connected to a communications channel.

dial pulse: A dc pulse produced by an end instrument that interrupts a steady current at a sequence and rate determined by the selected digit and the operating characteristics of the instrument.

dial-pulse period: One complete cycle of a dial pulse, consisting of fall time, break interval, rise time, and make interval. [T1.409-1996]

dial-pulse signaling: A method of transmitting a telephone address over a direct-current path. The dc current is interrupted at the transmitting end in a defined pattern representing a particular digit in a telephone number. The number of interruptions in the dc current specifies the address digit. [After T1.409-1996]

dial pulsing: Pulsing in which a direct-current pulse train is produced by interrupting a steady signal according to a fixed or formatted code for each digit and at a standard pulse repetition rate. *Note:* Dial pulsing originated with rotary mechanical devices integrated into telephone instruments, for the purpose of signaling. Subsequent applications use electronic circuits to generate dial pulses. *Synonym* **pulsing.**

dial service assistance (DSA): A network-provided service feature, associated with the switching center equipment, in which services, such as directory assistance, call interception, random conferencing, and precedence calling assistance, are rendered by an attendant.

dial signaling: Signaling in which dual tone multifrequency (DTMF) signals or pulse trains are transmitted to a switching center. *Note 1:* Rotary dials produce pulse trains. Keypads may produce either DTMF signals or pulse trains. *Note 2:* Dial signaling traditionally refers to pulse trains only.

dial switching equipment: Switching equipment actuated by electrical impulses generated by a dial or key pulsing arrangement. [47 CFR Pt.36-A]

dial through: A technique, applicable to access circuits, that permits an outgoing routine call to be dialed by the PBX user after the PBX attendant has established the initial connection.

dial tone: A tone employed in a dial telephone system to indicate to the calling party that the equipment is ready to receive dial or tone pulses.

dial-tone delay: The time between the instant of going off-hook and the instant of receiving a dial tone.

dial-up: 1. A service feature in which a user initiates service on a previously arranged trunk or transfers, without human intervention, from an active trunk to a standby trunk. **2.** A service feature that allows a computer terminal to use telephone systems to initiate and effect communications with other computers.

diametral index of cooperation: *Synonym* **index of cooperation.**

dibit: A group of two bits. *Note:* The four possible states for a dibit are 00, 01, 10, and 11. *Synonym* **diad.**

dichroic filter: An optical filter that reflects one or more optical bands or wavelengths and transmits others, while maintaining a nearly zero coefficient of absorption for all wavelengths of interest. *Note:* A dichroic filter may be high-pass, low-pass, band-pass, or band rejection.

dichroic mirror: A mirror used to reflect light selectively according to its wavelength.

DID: *Abbreviation for* **direct inward dialing.**

dielectric: 1. A substance in which an electric field may be maintained with zero or near-zero power dissipation, *i.e.* , the electrical conductivity is zero or near zero. *Note 1:* A dielectric material is an electrical insulator. *Note 2:* In a dielectric, electrons are bound to atoms and molecules, hence there are few free electrons. **2.** Pertaining to a substance that has a zero or near zero electrical conductivity.

dielectric filter: *See* **interference filter.**

dielectric lens: In the radio regime, a lens made of dielectric material that refracts radio waves in the same manner that an optical lens refracts light waves.

dielectric strength: 1. Of an insulating material, the maximum electric field strength that it can withstand intrinsically without breaking down, *i.e.* , without experiencing failure of its insulating properties. *Note:* The theoretical dielectric strength of a material is an intrinsic property of the bulk material and is not dependent on the configuration of the material or the electrodes with which the field is applied. **2.** For a given configuration of dielectric material and electrodes, the minimum electric field that produces breakdown. *Note 1:* At breakdown, the electric field frees bound electrons, turning the material into a conductor. *Note 2:* The field strength at which breakdown occurs in a given case is dependent on the respective geometries of the dielectric (insulator) and the electrodes with which the electric field is applied, as well as the rate of increase at which the electric field is applied. *Note 3:* The electric field strength is usually expressed in volts per meter.

dielectric waveguide: A waveguide that consists of a dielectric material surrounded by another dielectric material, such as air, glass, or plastic, with a lower refractive index. *Note 1:* An example of a dielectric waveguide is an optical fiber. *Note 2:* A metallic waveguide filled with a dielectric material is not a dielectric waveguide.

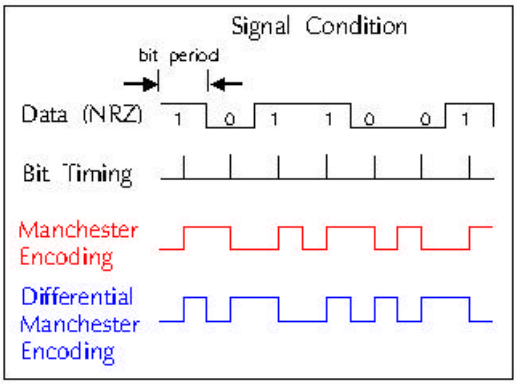
difference frame: *Synonym* **delta frame.**

differential encoding: Encoding in which signal significant conditions represent binary data, such as "0" and "1", and are represented as changes to succeeding values rather than with respect to a given reference. *Note:* An example of differential encoding is phase-shift keying (PSK) in which the information is not conveyed by the absolute phase of the signal with respect to a reference, but by the difference between phases of successive symbols, thus eliminating the requirement for a phase reference at the receiver.

differentially coherent phase-shift keying: *See* **coherent differential phase-shift keying.**

differentially encoded baseband: *Synonym* **non-return-to-zero mark.**

differential Manchester encoding: Encoding in which (a) data and clock signals are combined to form a single self-synchronizing data stream, (b) one of the two bits, *i.e.,* "0" or "1", is represented by no transition at the beginning of a pulse period and a transition in either direction at the midpoint of a pulse period, and (c) the other is represented by a transition at the beginning of a pulse period and a transition at the midpoint of the pulse period. *Note:* In differential Manchester encoding, if a "1" is represented by one transition, a "0" is represented by two transitions, and vice versa.



differential Manchester encoding

differential mode attenuation: In an optical fiber, the variation in attenuation among the propagating modes.

differential mode delay: In an optical fiber, the variation in propagation delay that occurs because of the different group velocities of different modes. *Synonym* **multimode group delay.**

differential mode interference: 1. Interference that causes a change in potential of one side of a signal transmission path relative to the other side. **2.** Interference resulting from an interference current path coinciding with the signal path.

differential modulation: Modulation in which the choice of the significant condition for any signal element is dependent on the significant condition for the previous signal element. *Note:* An example of differential modulation is delta modulation.

differential phase-shift keying (DPSK): Phase-shift keying that is used for digital transmission in which the phase of the carrier is discretely varied (a) in relation to the phase of the immediately preceding signal element and (b) in accordance with the data being transmitted.

differential pulse-code modulation (DPCM): Pulse-code modulation in which an analog signal is sampled and the difference between the actual value of each sample and its predicted value, derived from the previous sample or samples, is quantized and converted, by encoding, to a digital signal. *Note:* There are several variations of differential pulse-code modulation.

differential quantum efficiency: In an optical source or detector, the slope of the curve relating output quanta to input quanta.

differentiating network: A network, or circuit, that produces an output waveform that is the time derivative of the input waveform. *Note:* Differentiating networks are used in signal processing, such as for producing short timing pulses from square waves.

diffraction: The deviation of an electromagnetic wavefront from the path predicted by geometric optics when the wavefront interacts with, *i.e.* , is restricted by, a physical object such as an opening (aperture) or an edge. *Note:* Diffraction is usually most noticeable for openings of the order of a wavelength. However, diffraction may still be important for apertures many orders of magnitude larger than the wavelength.

diffraction grating: An array of fine, parallel, equally spaced grooves ("rulings") on a reflecting or transparent substrate, which grooves result in diffractive and mutual interference effects that concentrate reflected or transmitted electromagnetic energy in discrete directions, called *"orders,"* or *"spectral orders." Note 1:* The groove dimensions and spacings are on the order of the wavelength in question. In the optical regime, in which the use of diffraction gratings is most common, there are many hundreds, or thousands, of grooves per millimeter. *Note 2:* Order zero corresponds to direct transmission or specular reflection. Higher orders result in deviation of the incident beam from the direction predicted by geometric (ray) optics. With a normal angle of incidence, the angle θ, the deviation of the diffracted ray from the direction predicted by geometric optics, is given by

$$\theta = \pm \sin^{-1}\left(\frac{n\lambda}{d}\right),$$

where *n* is the spectral order, λ is the wavelength, and *d* is the spacing between corresponding parts of adjacent grooves. *Note 3:* Because the angle of deviation of the diffracted beam is wavelength-dependent, a diffraction grating is dispersive, *i.e.,* it separates the incident beam spatially into its constituent wavelength components, producing a spectrum. *Note 4:* The spectral orders produced by diffraction gratings may overlap, depending on the spectral content of the incident beam and the number of grooves per unit distance on the grating. The higher the spectral order, the greater the overlap into the next-lower order. *Note 5:* By controlling the cross-sectional shape of the grooves, it is possible to concentrate most of the diffracted energy in the order of interest. This technique is called *"blazing."*

diffraction limited: 1. In optics, pertaining to a light beam in which the far-field beam divergence is equal to that predicted by diffraction theory. **2.** In focusing optics, pertaining to a light beam in which the impulse response or resolution limit is equal to that predicted by diffraction theory. [After 2196]

diffraction region: In radio propagation, a region that is in the geometric shadow of an electromagnetic source, but into which propagation nonetheless takes place by virtue of the knife-edge effect described in Hygens' principle. [JSB]

diffuse reflection: Reflection from a rough or irregular surface which does not maintain the integrity of the incident wavefront.

digerati: Knowledgeable individuals at the forefront of Internet development and implementation. [Bahorsky] *Note:* Derived from the word "literati."

digest: 1. In e-mail, a periodic mailing of a collection of messages compiled from a mailing list or interest group. [Bahorsky] **2.** A command issued to a list server or to a list processor requesting that postings be delivered to a subscriber in summary form. [Bahorsky]

digicash: *Abbreviation for* **digital cash.** [After ANSDIT] *Synonyms* **digital cash, e-cash, electronic cash.**

digit: A symbol, numeral, or graphic character that represents an integer. *Note 1:* Examples of digits include any one of the decimal characters "0" through "9" and either of the binary characters "0" or "1." *Note 2:* In a given numeration system, the number of allowable different digits, including zero, is always equal to the base (radix).

digital: Characterized by discrete states.

digital access and cross-connect system (DACS): In communications systems, a digital system in which (a) access is performed by T-1 hardware architecture in private and public networks with centralized switching and (b) cross-connection is performed by D3/D4 framing for switching digital-signal-0 (DS-0) channels to other DS-0 channels. *Note:* Modern digital access and cross-connect systems are not limited to the T-carrier system, and may accommodate high data rates such as those of SONET.

digital access line: An access line composed of digital facilities, containing no analog sections, and having a digital interface at the local digital exchange office (DEO) and a digital interface at the end-user voice terminal, voiceband data terminal, PBX, or interconnecting network. [T1.508-1998]

digital alphabet: A coded character set in which the characters of an alphabet have a one-to-one relationship with their digitally coded representations.

digital audio tape (DAT): *See* **DAT.**

digital cash (digicash): A bank-issued number that can be used in place of cash for Internet transactions. *Note:* The use of digital cash allows a vendor to check the validity of the transaction by contacting the issuing bank, but it does not allow additional information to be obtained about the buyer. [Bahorsky] *Synonyms* **e-cash, electronic cash.**

digital certificate: *Synonym* **certificate.**

digital channel: A means for conveying information from one point to another in digital form. A digital channel may be implemented on a network composed of digital communications components. [T1.801.04-1997]

digital circuit: A combination of two digital transmission channels permitting bidirectional digital transmission in both directions between two points, to support a single communication. [T1.206-1988]

digital circuit patch bay: A patch bay in which low-level digital data circuits can be patched, monitored, and tested. *Note:* A digital circuit patch bay can be either "D" type (unbalanced) or "K" type (balanced).

digital combining: A method of interfacing digital data signals, in either synchronous or asynchronous mode, without converting the data into a quasi-analog signal.

digital computer: A computer that consists of one or more central processing units (CPUs), that is controlled by internally stored programs, and that stores and processes data in digital form.

digital crossconnect system (DCS): A network element that is used to arrange lower level digital signals among higher level digital bit streams. For example, DS0s among DS1s, DS1s among DS3s, or DS3s among OC3s, *etc.* [After T1.217-1991]

digital data: 1. Data represented by discrete values or conditions, as opposed to analog data. **2.** Discrete representations of quantized values of variables, *e.g.* , the representation of numbers by digits, perhaps with special characters and the "space" character.

digital data service (DDS): A generic description for synchronous digital transmission operating up to 64 kb/s. [T1.Rpt39-1995]

digital data system (DDS): A synchronous system providing for full-duplex, end-to-end transmission of digital data at the subrate data channel rates of 2.4, 4.8, 9.6, 19.2, 56 and 64 kb/s rates on dedicated private line and multipoint circuits. [After T1.Rpt25-1993]

digital end office (DEO) complex: A complex that includes the DEO and all connected remote switching units (RSUs), remote digital terminals (RDTS) and optical network units (ONUs). [T1.508-1998]

digital envelope: In cryptosystems, data appended to a message, that allow the intended recipient to verify the integrity of the content of the message. [2382-pt.8]

digital error: An inconsistency between the digital signal actually received and the digital signal that should have been received.

digital exchange: An exchange that switches digital signals by means of digital switching. [T1.206-1988]

digital facsimile equipment: Facsimile equipment that digitally encodes the picture signal, *i.e.,* encodes the baseband signal resulting from scanning the object. *Note:* The facsimile equipment output may be either (a) analog, as defined by CCITT Group 3 protocol, or (b) digital, as defined by CCITT Group 4, STANAG 5000 Type I, and STANAG 5000 Type II protocols.

digital filter: A filter (usually linear), in discrete time, that is normally implemented through digital electronic computation. *Note:* Digital filters differ from continuous time filters only in application. The parameters of digital filters are generally more stable than the parameters of commonly used analog (continuous) filters. Digital filters can be applied as optimal estimators. Commonly used forms are finite impulse response (FIR) and infinite impulse response (IIR).

digital frequency modulation: The transmission of digital data by frequency modulation of a carrier, as in binary frequency-shift keying.

digital group: *See* **digroup.**

digital link: A means of digital transmission with specified characteristics between two points. [T1.206-1988]

digital loopback: A mechanism incorporated into a terminal or into equipment in the network whereby a duplex communication path may be connected back upon itself so that the digits sent on the transmit path are returned on the receive path. [After T1.206-1994] *Note:* Loopback tests should be used only to check for circuit continuity and not for more subtle performance problems.

digital loop carrier (DLC): The equipment, including lines, that is used for digital multiplexing of telephone circuits, and that is provided by the network as part of the subscriber access.

digital milliwatt: 1. In digital telephony, a test signal consisting of eight 8-bit words corresponding to one cycle of a sinusoidal signal approximately 1 kHz in frequency and one milliwatt, rms, in power. *Note 1:* The digital milliwatt is stored in ROM. A continuous signal of arbitrary length, *i.e.,* an indefinite number of cycles, may be realized by continually reading out and concatenating the stored information into a data stream to be converted into analog form. *Note 2:* The digital milliwatt is used in lieu of separate test equipment. It has the advantage of being tied in frequency and amplitude to the relatively stable digital clock signal and power (voltage) supply, respectively, that are used by the digital channel bank. **2.** A digital signal that is the coded representation of a 0-dBm, 1000-Hertz sine wave. [47CFR]

digital modulation: 1. The process of varying one or more parameters of a carrier wave as a function of two or more finite and discrete states of a signal. **2.** The process by which some characteristic (frequency, phase, amplitude, or combinations thereof) of a carrier frequency is varied in accordance with a digital signal, *e.g.,* one consisting of coded pulses or states. [47CFR]

digital multiplexer: A device for combining several digital signals into an aggregate bit stream. *Note:* Digital multiplexing may be implemented by interleaving bits, in rotation, from several digital bit streams either with or without the addition of extra framing, control, or error detection bits.

digital multiplex hierarchy: A hierarchy consisting of an ordered repetition of tandem digital multiplexers that produce signals of successively higher data rates at each level of the hierarchy. *Note 1:* Digital multiplexing hierarchies may be implemented in many different configurations depending on (a) the number of channels desired, (b) the signaling system to be used, and (c) the bit rate allowed by the communications media. *Note 2:* Some currently available digital multiplexers have been designated as Dl-, DS-, or M-series, all of which operate at T-carrier rates. *Note 3:* In the design of digital multiplex hierarchies, care must be exercised to ensure interoperability of the multiplexers used in the hierarchy.

digital network: *See* **integrated digital network.**

digital path: The whole of the means of transmitting and receiving a digital signal of specified rate between the two digital distribution frames (or equivalent) at which terminal equipment or digital exchanges will be connected. [T1.206-1988]

digital phase-locked loop: A phase-locked loop in which the reference signal, the controlled signal, or the controlling signal, or any combination of these, is in digital form.

digital phase modulation: Modulation in which the instantaneous phase of the modulated wave is shifted between a set of predetermined discrete values in accordance with the significant conditions of the modulating signal.

digital primary patch bay: A patch bay that provides (a) the first access of most local user digital circuits in a technical control facility and (b) patching, monitoring, and testing capabilities for both high-level and low-level digital circuits.

digital radio: *See* **software defined radio.**

digital reference signal (DRS): A digital representation of a 0-dBmO 1004-Hz analog sinusoid, such that it will be decoded into an analog signal equal in level to the analog signal obtained by decoding a digital milliwatt using the same decoder. [T1.508-1998]

digital selective calling (DSC): 1. A synchronous system developed by the International Radio Consultative Committee (CCIR), used to establish contact with a station or group of stations automatically by means of radio. The operational and technical characteristics of this system are contained in CCIR Recommendation 493. [47CFR] **2.** *See* **selcall.**

digital service unit (DSU): A replacement for the modem in synchronous connections to the Internet, and which formats data for transmission.

digital signal (DS): A signal in which discrete steps are used to represent information. *Note 1:* In a digital signal, the discrete steps may be further characterized by signal elements, such as significant conditions, significant instants, and transitions. *Note 2:* Digital signals contain m-ary significant conditions.

digital signal 0 (DS0): In T-carrier, a basic digital signaling rate of 64 kb/s, corresponding to the capacity of one voice-frequency-equivalent channel. *Note 1:* The DS0 rate forms the basis for the North American digital multiplex transmission hierarchy. *Note 2:* The DS0 rate may support twenty 2.4-kb/s channels, or ten 4.8-kb/s channels, or five 9.67-kb/s channels, or one 56-kb/s channel, or one 64-kb/s clear channel.

digital signal 1 (DS1): A digital signaling rate of 1.544 Mb/s, corresponding to the North American and Japanese T1 designator.

digital signal 1C (DS1C): A digital signaling rate of 3.152 Mb/s, corresponding to the North American T1C designator.

digital signal 2 (DS2): A digital signaling rate of 6.312 Mb/s, corresponding to the North American and Japanese T2 designator.

digital signal 3 (DS3): 1. A digital signal rate of 44.736 Mb/s, corresponding to the North American T3 designator. **2.** A digital signaling rate of 32.064 Mb/s, corresponding to the Japanese T3 designator.

digital signal 4 (DS4): 1. A digital signal rate of 274.176 Mb/s, corresponding to the North American T4 designator. **2.** A digital signaling rate of 97.728 Mb/s, corresponding to the Japanese T4 designator.

digital signal level 1 (DS1): *See* **digital signal 1.**

digital signature: 1. A cryptographic modification of data that provides: (a) origin authentication, (b) data integrity , and (c) signer nonrepudiation (when associated with a data unit and accompanied by the corresponding public-key certificate). [After X9.49] **2.** [A] cryptographic process used to assure message originator authenticity, integrity, and nonrepudiation. *Synonym* **electronic signature.** [INFOSEC-99]

digital signature algorithm: [A] procedure that appends data to, or performs a cryptographic transformation of, a data unit. The appended data or cryptographic transformation allows reception of the data unit and protects against forgery, *e.g.,* by the recipient. [INFOSEC-99]

Digital Signature Standard (DSS): A 1994-approved specification (FIPS-186-1) ruling the use of a single technique for generating signatures using the Digital Signature Algorithm.

digital slip: In the reception of a digital data stream, the loss of a bit, or the insertion by the receiver of a bit that was not transmitted, because of a difference in the bit rates of the incoming data stream and the local clock.

digital speech interpolation (DSI): 1. In digital speech transmission, the use of periods of inactivity or constant signal level to increase the transmission efficiency by insertion of additional signals. **2.** A process that takes advantage of inactive periods of a conversation to insert speech from other conversations and to remove silent periods. [T1.509-1995]

digital subscriber line (DSL): In Integrated Services Digital Networks (ISDN), equipment that provides full-duplex service on a single twisted metallic pair at a rate sufficient to support ISDN basic access and additional framing, timing recovery, and operational functions. *Note:* The physical termination of the DSL at the network end is the line termination; the physical termination at the customer end is the network termination.

digital switch: A switch that performs time-division-multiplexed switching of digitized signals. *Note 1:* When used with analog inputs, analog-to-digital and digital-to-analog conversion are required. These functions may be performed by the digital switch. *Note 2:* Implementation is accomplished by the interchange of time slots between input and output ports on a sequential basis under the direction of control systems. The control systems may be automatic, semiautomatic, or manual.

digital switching: Switching in which digitized signals are switched without converting them to or from analog signals.

digital synchronization: Synchronization based on the start of a transmitted digital data unit, such as a bit, character, block, or frame.

digital television (DTV): Any technology, using any of several digital encoding schemes, used in connection with the transmission and reception of television signals. Depending on the transmission medium, DTV often uses some type of digital compression to reduce the required digital data rate. Except for artifacts of the compression, DTV is more immune (than analog television) to degradation in transmission, resulting in a higher quality of both audio and video, to the limits of signal reception. Digital enhancement techniques, which are not to be confused with the above digital transmission techniques, may also be used in an analog television receiver to improve subjective viewer perception of picture quality.

digital test access unit (DTAU): A generic term for the functions associated with accessing one or more channels within a digital signal for the purpose of testing. DTAU functionality may be embedded within a network element (NE) or may consist of stand-alone equipment. [T1.216-1998]

digital-to-analog (D-A) converter: A device that converts a digital input signal to an analog output signal carrying equivalent information.

digital transmission group: A group of digitized voice or data channels or both with bit streams that are combined into a single digital bit stream for transmission over communications media. *Note:* Digital transmission groups usually are categorized by their maximum capacity, not by a specific number of channels. However, the maximum digital transmission group capacity must be equal to or greater than the sum of the individual multiplexer input channel capacities.

digital transmission system: A transmission system in which (a) all circuits carry digital signals and (b) the signals are combined into one or more serial bit streams that include all framing and supervisory signals. *Note:* A-D/D-A conversion, if required, is accomplished external to the system.

digital transport: *See* **digital transmission system.**

digital versatile disk: *See* **DVD.**

digital video: A video (television) signal represented by computer-readable binary numbers that describe luminance levels as well as a finite set of colors.

digital video disk: *See* **DVD.**

digital voice transmission: Transmission of analog voice signals that have been converted into digital signals. *Note:* An example of digital voice transmission is transmission of pulse-code modulated (PCM) analog voice signals.

digital watermark: An identification code or bit pattern integrated into multimedia data that aids copyright owners in identifying illegally distributed audio, video, or image data. [Bahorsky]

digitize: To convert an analog signal into a digital signal carrying equivalent information.

digitizer: 1. A device that converts an analog signal into a digital representation of the analog signal. *Note:* A digitizer usually samples the analog signal at a constant sampling rate and encodes each sample into a numeric representation of the amplitude value of the sample. **2.** A device that converts the position of a point on a surface into digital coordinate data.

digitizer tablet: A graphics drawing tablet used with a puck or stylus.

digit time slot: In a digital data stream, a time interval that is allocated to a single digit and that can be uniquely recognized and defined.

digroup: *Abbreviation for* **digital group.** In telephony, a basic digital multiplexing group. *Note 1:* In the North American and Japanese T-carrier digital hierarchies, each digroup supports 12 PCM voice channels or their equivalent in other services. The DS1 line rate (2 digroups plus overhead bits) is 1.544 Mb/s, supporting 24 voice channels or their equivalent in other services. *Note 2:* In the European hierarchy, each digroup supports 15 PCM channels or their equivalent in other services. The DS1 line rate (2 digroups plus overhead bits) is 2.048 Mb/s, supporting 30 voice channels or their equivalent in other services.

DIN: *Abbreviation for* **Deutsches Institut für Normung.**

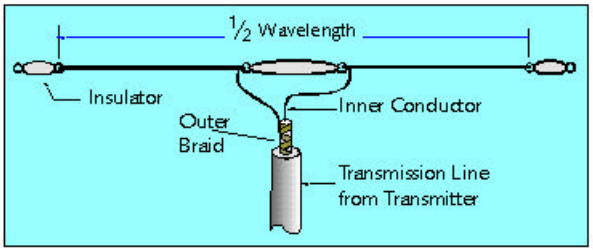
diode laser: *Synonym* **injection laser diode.**

DIP: *Abbreviation for* **dual in-line package.**

diplexer: A three-port frequency-dependent device that may be used as a separator or a combiner of signals. *Note:* Duplex transmission through a diplexer is not possible.

diplex operation: The sharing of one common element, such as a single antenna or channel, for transmission or reception of two simultaneous, independent signals on two different frequencies. *Note:* An example of diplex operation is the use of one antenna for two radio transmitters on different frequencies.

dipole antenna: Usually a straight, center-fed, one-half wavelength antenna.



dipole antenna

DIP switch: A group of subminiature switches mounted in a package compatible with standard integrated-circuit sockets. *Note:* DIP switches are usually composed of rocker or slide-type switches.

dipulse coding: The coding of "1's" and "0's" in a message in which one full cycle of a square wave, *i.e.,* a positive pulse followed by a negative pulse in the same bit period, is transmitted when the message bit is a "1" and nothing is transmitted when the bit is a "0", or vice versa. *Note:* A dipulse signal can be generated by encoding the data into 50% return-to-zero (RZ) unipolar data and sending the bits through an AND gate with the system clock pulse. This RZ bit stream is then delayed one half-bit period and then added to the undelayed RZ stream. This produces the final dipulse waveform. The dipulse power spectrum is similar to that of the biphase coding power spectrum except dipulse coding produces a pulse-repetition rate equal to the bit rate. [From Weik '89]

Dirac delta function: *Synonym* **unit impulse.**

direct access: 1. The capability to obtain data from a storage device, or to enter data into a storage device, in a sequence independent of their relative positions by means of addresses that indicate the physical location of the data. **2.** Pertaining to the organization and access method that must be used for a storage structure in which locations of records are determined by their keys, without reference to an index or to other records that may have been previously accessed.

direct address: In computing, an address that designates the storage location of an item of data to be treated as an operand.

direct bond: An electrical connection using continuous metal-to-metal contact between the members being joined.

direct broadcast satellite radio: *See* **satellite digital audio radio service.**

direct-buried cable: A communication cable manufactured or produced for the purpose of burial in direct contact with the earth.

direct call: A facility-handled call in which the network interprets the call request signal as an instruction to establish a connection based on previously designated user information.

direct connect: 1. In computer systems, a permanent communications link that connects directly to a mainframe computer through a terminal controller, usually at binary synchronous (bi-sync) transmission rates. **2.** In computer systems, a temporary connection between a microcomputer, *i.e.,* a desktop workstation, and a host bulletin board system or server.

direct coupling: *Synonym* **conductive coupling.**

direct current signaling (DX signaling): In telephony, a method whereby the signaling circuit E & M leads use the same cable pair(s) as the voice circuit and no filter is required to separate the control signals from the voice transmission.

direct detection: *See* **detection.**

direct dialing service: A service feature that permits a user to place information concerning credit card calls, collect calls, and special billing calls into the public telephone network without operator assistance.

direct distance dialing (DDD): A network-provided service feature in which a call originator may, without operator assistance, call any other user outside the local calling area. *Note 1:* DDD extends beyond the boundaries of national public telephone networks. *Note 2:* DDD requires more digits in the number dialed than are required for calling within the local area.

directed broadcast address: An Internet Protocol address that specifies "all hosts" on a specified network. *Note:* A single copy of a directed broadcast is routed to the specified network, where it is broadcast to all terminals on that network.

directed net: A radio net in which no station other than the net control station may communicate with any other station without first obtaining permission from the net control station. *Note:* A directed net is established by the net control station. The net control station may restore the net to a free net. [From Weik '89]

direct inward dialing (DID): A service feature that allows inward-directed calls to a PBX to reach a specific PBX extension without human intervention. *Synonym* **network inward dialing.**

directional antenna: An antenna in which the radiation pattern is not omnidirectional, *i.e.* , a nonisotropic antenna.

directional coupler: A transmission coupling device for separately sampling (through a known coupling loss) either the forward (incident) or the backward (reflected) wave in a transmission line. *Note:* A directional coupler may be used to sample either a forward or backward wave in a transmission line. A unidirectional coupler has available terminals or connections for sampling only one direction of transmission; a bidirectional coupler has available terminals for sampling both directions. *Synonyms* **splitter, T-coupler, tee coupler.**

directionalization: The temporary conversion of a portion or all of a two-way trunk group to one-way trunks favoring traffic flowing away from a congested switch. *Note:* Adjacent nodes must cooperate to accomplish directionalization.

direction finding: A procedure for obtaining bearings of radio frequency emitters by using a highly directional antenna and a display unit on an intercept receiver or ancillary equipment. [JP1]

direction of scanning: In a facsimile transmitting apparatus, the scanning of the plane (developed in the case of a drum transmitter) of the message surface along lines running from right to left commencing at the top so that scanning commences at the top right-hand corner of the surface and finishes at the bottom left-hand corner; this is equivalent to scanning over a right-hand helix on a drum. *Note 1:* The orientation of the message on the scanning plane will depend upon its dimensions and is of no consequence. At the receiving apparatus, scanning takes place from right to left and top to bottom (in the above sense) for "positive" reception and from left to right and top to bottom (in the above sense) for "negative" reception. *Note 2:* This is the ITU-T Recommendation for phototelegraphic equipment.

directive gain: 1. Of an antenna, the ratio of (a) 4π times the radiance, *i.e.* , power radiated per unit solid angle (watts per steradian), in a given direction to (b) the total power, *i.e.,* the power radiated to 4π steradians. *Note 1:* The directive gain is usually expressed in dB. *Note 2:* The directive gain is relative to an isotropic antenna. *Note 3:* The power radiated to 4π steradians is the total power radiated by the antenna because 4π steradians constitute an entire sphere. **2.** Of an antenna, for a given direction, the ratio of the radiance, *i.e.* , the radiation intensity, produced in the given direction to the average value of the radiance in all directions. *Note 1:* If the direction is not specified, the direction of maximum radiance is assumed. *Note 2:* The directive gain is usually expressed in dB.

directivity pattern: *Synonym* **radiation pattern.**

direct orbit: For a satellite orbiting the Earth, an orbit in which the projection of the satellite on the equatorial plane revolves about the Earth in the same direction as the rotation of the Earth.

directory access protocol (DAP): A directory protocol that defines the exchange of requests and outcomes between user and system. [T1.667-1999]

directory number: A network (sub)address (from a telephone user perspective) such as the telephone number in the telecommunication network. For the purpose of this configuration management model, the directory number is described in a managed object that contains references to other objects or attributes related to the services of subscribers. For service providers, the directory number is the key element used to manage subscriber services. [T1.250-1996]

directory server (DS): A unit consisting of a DSA (directory system agent) and possibly other application processes (such as registration management) to provide the directory service with additional features such as automatic registration of a network element in a directory information tree (DIT). [After T1.245-1997]

directory system agent (DSA): The software that provides the X.500 directory service for a portion of the directory information base. *Note:* Generally, each DSA is responsible for the directory information for a single organization or organizational unit. [Bahorsky]

directory user agent (DUA): The software that accesses the X.500 directory service on behalf of the directory user. *Note:* The directory user may be a person or another software element. [Bahorsky]

direct outward dialing (DOD): An automated PBX service feature that provides for outgoing calls to be dialed directly from the user terminal. *Synonym* **network outward dialing.**

direct ray: A ray of electromagnetic radiation that follows the path of least possible propagation time between transmitting and receiving antennas. *Note:* The path of least propagation time is not always the shortest distance path.

direct recording: In facsimile systems, recording in which a visible record is produced, without subsequent processing, in response to received signals.

direct-sequence modulation: In spread-spectrum systems, modulation in which a sequence of binary pulses is used directly to modulate a carrier, usually by phase-shift keying. *Synonym* **direct-spread modulation.** [From Weik '89]

direct-sequence spread spectrum: 1. A system (a) for generating spread-spectrum transmissions by phase-modulating a sine wave pseudorandomly with a continuous string of pseudonoise code symbols, each of duration much smaller than a bit and (b) that may be time-gated, where the transmitter is keyed periodically or randomly within a specified time interval. **2.** A signal structuring technique utilizing a digital code sequence having a chip rate much higher than the information signal bit rate. Each information bit of a digital signal is transmitted as a pseudorandom sequence of chips. [NTIA]

direct-spread modulation: *Synonym* **direct-sequence modulation.**

disabling tone: A tone, transmitted over a communications path, used to control equipment. *Note:* An example of a disabling tone is a tone that places an echo suppressor in a nonoperative condition during data transmission over a telephone circuit.

disaster recovery plan: *Synonym* **contingency plan.**

disc: *See* **diskette.**

DISC: *Abbreviation for* **disconnect command.**

disclosure: A violation of computer security whereby data have been made available to unauthorized entities. [2382-pt.8]

discone antenna: *See* **biconical antenna.**

disconnect: In telephony, the disassociation or release of a switched circuit between two stations.

disconnect command (DISC): In Link-Layer protocols, such as high-level data link control (HDLC), synchronous data link control (SDLC), and advanced data communication control procedure (ADCCP), an unnumbered command used to terminate the operational mode previously set.

disconnect-control office: The switching entity that performs disconnect timing and that decides when the connection is to be cleared. It is usually the calling end office; however, it may be another switching entity such as an office performing centralized automatic message accounting (CAMA) or an operator service system. [T1.104-1988]

disconnect signal: In a switched telephone network, a supervisory signal transmitted from one end of a user line or trunk to indicate at the other end that the established connection should be disconnected.

disconnect switch: In a power system, a switch used for closing, opening, or changing the connections in a circuit or system or for purposes of isolation. *Note:* It has no interrupting rating and is intended to be operated only after the circuit has been opened by some other means, such as by a circuit breaker or variable transformer.

disconnect timing: The timing of the period during which a hang-up signal is being received from the called end office and an off-hook signal is being received from the calling end office. [T1.104-1991]

discretionary access control (DAC): [A] means of restricting access to objects based on the identity and need-to-know of users and/or groups to which the object belongs. Controls are discretionary in the sense that a subject with a certain access permission is capable of passing that permission (directly or indirectly) to any other subject. *Synonym* **surrogate access.** [INFOSEC-99]

discriminator: The part of an FM receiver that extracts the desired signal from an incoming FM wave by changing frequency variations into amplitude variations.

discussion group: *Synonym* **forum.**

discussion list: *Synonym* **forum.**

discussion thread: *Synonym* **thread.**

disengagement attempt: An attempt to terminate a telecommunications system access. *Note:* Disengagement attempts may be initiated by a user or the telecommunications system.

disengagement denial: After a disengagement attempt, a failure to terminate the telecommunications system access. *Note:* Disengagement denial is usually caused by excessive delay in the telecommunications system.

disengagement-denial probability: The ratio of disengagement attempts that result in disengagement denial to the total disengagement attempts counted during a measurement period.

disengagement failure: Failure of a disengagement attempt to return a communication system to the idle state, for a given user, within a specified maximum disengagement time.

disengagement originator: The user or functional unit that initiates a disengagement attempt. *Note 1:* A disengagement originator may be the originating user, the destination user, or the communications system. *Note 2:* The communications system may deliberately originate the disengagement because of preemption or inadvertently because of system malfunction.

disengagement phase: In an information transfer transaction, the phase during which successful disengagement occurs. *Note:* The disengagement phase is the third phase of an information transfer transaction.

disengagement request: A control or overhead signal issued by a disengagement originator for the purpose of initiating a disengagement attempt.

disengagement time: 1. The average value of elapsed time between the start of a disengagement attempt for a particular source or destination user and the successful disengagement of that user. **2.** Elapsed time between the start of a disengagement attempt and successful disengagement.

disk and execution monitor (daemon): *See* **daemon.**

diskette: In computer technology, a small disk of flexible plastic, coated with a magnetizable material and enclosed in a protective jacket, used to store digital data. *Note:* A diskette is distinguished from a hard disk by virtue of the fact that it is flexible, and unlike most hard disks, is removable from its drive. *Synonyms* **flexible disk, floppy disk.**

disk pack: An assembly of magnetic disks that can be removed as a whole from a disk drive together with a container from which the assembly must be separated when operating.

disparity: In pulse-code modulation (PCM), the digital sum, *i.e.* , the algebraic sum, of a set of signal elements. *Note:* The disparity will be zero and there will be no cumulative or drifting polarization if there are as many positive elements (those that represent 1) as there are negative elements (those that represent 0).

dispersion: Any phenomenon in which the velocity of propagation of an electromagnetic wave is wavelength dependent. *Note 1:* In communication technology, *"dispersion"* is used to describe any process by which an electromagnetic signal propagating in a physical medium is degraded because the various wave components (*i.e.,* frequencies) of the signal have different propagation velocities within the physical medium. *Note 2:* In an optical fiber, there are several significant dispersion effects, such as material dispersion, profile dispersion, and waveguide dispersion, that degrade the signal. *Note 3:* In optical fiber communications, the incorrect terms *"multimode dispersion"* and *"intermodal dispersion"* should not be used as synonyms for the correct term *"multimode distortion." Note 4:* In classical optics, *"dispersion"* is used to denote the wavelength dependence of refractive index in matter, ($dn/d\lambda$, where n is the refractive index and λ is the wavelength) caused by interaction between the matter and light. *"Dispersion,"* as used in fiber optic communications, should not be confused with *"dispersion"* as used by optical lens designers. *Note 5:* Three types of dispersion, relating to optical fibers, are defined as follows:

- **material dispersion:** In optical fiber communication, the wavelength dependence of the velocity of propagation (of the optical signal) on the bulk material of which the fiber is made. *Note 1:* Because every optical signal has a finite spectral width, material dispersion results in spreading of the signal. *Note 2:* Use of the redundant term *"chromatic dispersion"* is discouraged. *Note 3:* In pure silica, the basic material from which the most common telecommunication-grade fibers are made, material dispersion is minimum at wavelengths in the vicinity of 1.27 μm (slightly longer in practical fibers).
- **profile dispersion:** In an optical fiber, that dispersion attributable to the variation of refractive index contrast with wavelength. Profile dispersion is a function of the profile dispersion parameter.
- **waveguide dispersion:** Dispersion, of importance only in single-mode fibers, caused by the dependence of the phase and group velocities on core radius, numerical aperture, and wavelength. *Note 1:* For circular waveguides, the dependence is on the ratio, a/λ, where a is the core radius and λ is the wavelength. *Note 2:* Practical single-mode fibers are designed so that material dispersion and waveguide dispersion cancel one another at the wavelength of interest.

dispersion coefficient: *See* **material dispersion coefficient.**

dispersion-limited operation: Operation of a communications link in which signal waveform degradation attributable to the dispersive effects of the communications medium is the dominant mechanism that limits link performance. *Note 1:* The amount of allowable degradation is dependent on the quality of the receiver. *Note 2:* In fiber optic communications, *"dispersion-limited operation"* is often confused with *"distortion-limited operation."*

dispersion-shifted fiber: A single-mode optical fiber that has its minimum-dispersion wavelength shifted, by the addition of dopants, toward its minimum-loss wavelength. *Synonym* **EIA Class IVb fiber.**

dispersion-unmodified fiber: *Synonym* **dispersion-unshifted fiber.**

dispersion-unshifted fiber: A single-mode optical fiber that has a nominal zero-dispersion wavelength in the 1.3-μm transmission window. *Synonyms* **dispersion-unmodified fiber, EIA Class IVa fiber, nonshifted fiber.**

display device: An output unit that gives a visual representation of data.

dissolve: In television, video, or motion-picture programming or production, a process in which one scene is gradually faded out while simultaneously being replaced by another.

distance learning: *Synonym* **teletraining.**

distance measuring equipment (DME): In radio location systems, equipment that ascertains the distance between an interrogator and a transponder. [From Weik '89]

distance training: *Synonym* **teletraining.**

distinctive alerting: Special ringing or call-waiting tone patterns sent by the network to convey information to a customer installation (CI) about the called number, the calling number, or the status of an automatic call request. [T1.401-1998]

distinguished name: [A] globally unique identifier representing an individual's identity. [INFOSEC-99]

distortion: 1. In a system or device, any departure of the output signal waveform from that which should result from the input signal waveform's being operated on by the system's specified, *i.e.* , ideal, transfer function. *Note:* Distortion may result from many mechanisms. Examples include nonlinearities in the transfer function of an active device, such as a vacuum tube, transistor, or operational amplifier. Distortion may also be caused by a passive component such as a coaxial cable or optical fiber, or by inhomogeneities, reflections, *etc.,* in the propagation path. **2.** In start-stop teletypewriter signaling, the shifting of the significant instants of the signal pulses from their proper positions relative to the beginning of the start pulse. *Note:* The magnitude of the distortion is expressed in percent of an ideal unit pulse length.

distortion-limited operation: The condition prevailing when distortion of a received signal, rather than its attenuated amplitude (or power), limits performance under stated operational conditions and limits. *Note:* Distortion-limited operation is reached when the system distorts the shape of the waveform beyond specified limits. For linear systems, distortion-limited operation is equivalent to bandwidth-limited operation.

distributed computing environment: *See* **DCE.**

distributed control: Control of a network from multiple points. *Note:* Each point controls a portion of the network, using local information or information transmitted over the network from distant points.

distributed database: 1. A database that is not entirely stored at a single physical location, but rather is dispersed over a network of interconnected computers. **2.** A database that is under the control of a central database management system in which storage devices are not all attached to a common processor.

distributed frame-alignment signal: A frame-alignment signal in which the signal elements occupy digit positions that are not consecutive.

distributed network: A network structure in which the network resources, such as switching equipment and processors, are distributed throughout the geographical area being served. *Note:* Network control may be centralized or distributed.

distributed processing: Data processing in which an integrated set of functions is performed within multiple, physically separated devices.

distributed-queue dual-bus (DQDB) [network]: A distributed multi-access network that (a) supports integrated communications using a dual bus and distributed queuing, (b) provides access to local or metropolitan area networks, and (c) supports connectionless data transfer, connection-oriented data transfer, and isochronous communications, such as voice communications.

distributed switching: Switching in which many processor-controlled switching units are distributed, usually close to concentrations of users, and operated in conjunction with a host switch. *Note:* Distributed switching provides improved communications services for concentrations of users remote from the host switch, and reduces the transmission

requirements, *i.e.* , the traffic, between such concentrations and the host switch.

distribution: In ISDN applications, the use of broadband transmission of audio or video information to the user without applying any post-production processing to the information. *Note: "Distribution"* is in contrast to *"contribution."*

distribution amplifier: An active linear device that accepts, at its input port, one signal source (*e.g.,* audio, video, or rf) and presents it, usually in lossless or amplified form, at two or more output ports. *Note:* A distribution amplifier may also serve as an impedance-matching device.

distribution frame: In communications, a structure with terminations for connecting the permanent wiring of a facility in such a manner that interconnection by cross-connections may readily be made.

distribution list server: *Synonym* **list server.**

distribution-quality television: Television conforming to the NTSC standard, the SECAM standard, the PAL standard, or the PAL-M standard. *Synonym [in ITU-T usage]* **existing quality television.**

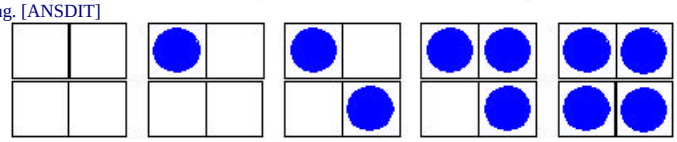
distribution service: In ISDN applications, a telecommunications service that allows one-way flow of information from one point in the network to other points in the network with or without user individual presentation control.

distribution voltage drop: The voltage drop between any two defined points of interest in a power distribution system.

distributor: In data transmission, a device that accepts a data stream from one line and places a sequence of signals, one or more at a time, on several lines, thus performing a spatial multiplexing of the original stream. *Note:* Examples of a distributor are (a) a mechanical unit with input to a rotor and output through many contacts wiped by the rotor and (b) a set of combinational logic circuits, such as a series of AND gates, that are sequentially enabled by a set of pulses and that are all connected to a common bus carrying the input signals. [From Weik '89]

disturbance voltage: An unwanted voltage induced in a system by natural or man-made sources. *Note:* In telecommunications systems, the disturbance voltage creates currents that limit or interfere with the interchange of information. An example of a disturbance voltage is a voltage that produces (a) false signals in a telephone, (b) noise in a radio receiver, or (c) distortion in a received signal.

dithering: 1. Simulating a gray scale by using a group of pixels each capable of displaying only black and white. **2.** A technique for varying raster color or intensity by illuminating and blanking pixels in patterns to produce a blurred transition from one color to another in a computer picture. *Note:* Dithering is used to create a wide variety of patterns for use as backgrounds, fills and shadings, as well as for creating halftones, and for correcting aliasing. [ANSDIT]



diurnal phase shift: The phase shift of electromagnetic signals associated with daily changes in the ionosphere. *Note 1:* The major changes usually occur during the period of time when sunrise or sunset is present at critical points along the path. *Note 2:* Significant phase shifts may occur on paths wherein a reflection area of the path is subject to a large tidal range. *Note 3:* In cable systems, significant phase shifts can be occasioned by diurnal temperature variance.

divergence: *See* **beam divergence.**

diversity: The property of being made up of two or more different elements, media, or methods. *Note:* In communications, diversity is usually used to provide robustness, reliability, or security.

diversity combiner: A circuit or device for combining two or more signals carrying the same information received via separate paths or channels with the objective of providing a single resultant signal that is superior in quality to any of the contributing signals.

diversity factor: The ratio of the sum of the individual maximum demands of the various parts of a power distribution system to the maximum demand of the whole system. *Note:* The diversity factor is always greater than unity.

diversity gain: In radio communications, the ratio of the signal field strength obtained by diversity combining to the signal strength obtained by a single path. *Note:* Diversity gain is usually expressed in dB. [From Weik '89]

diversity reception: Radio reception in which a resultant signal is obtained by combining or selecting signals, from two or more independent sources, that have been modulated with identical information-bearing signals, but which may vary in their fading characteristics at any given instant. *Note 1:* Diversity reception is used to minimize the effects of fading. *Note 2:* The amount of received signal improvement when using diversity reception is directly dependent on the independence of the fading characteristics.

diversity transmission: Radio communication using a reception technique in which a resultant signal is obtained by combining signals (a) that originate from two or more independent sources that have been modulated with identical information-bearing signals and (b) that may vary in their transmission characteristics at any given instant. *Note 1:* Diversity transmission and reception are used to obtain reliability and signal improvement by overcoming the effects of fading, outages, and circuit failures. *Note 2:* When using diversity transmission and reception, the amount of received signal improvement depends on the independence of the fading characteristics of the signal as well as circuit outages and failures.

divestiture: The court-ordered separation of the Bell Operating Telephone Companies from AT&T.

D layer: *See* **D region, ionosphere.**

DLE: *Abbreviation for* **data link escape character.**

DM: *Abbreviation for* **delta modulation.**

DNS: *Abbreviation for* **domain name server, domain name system.** A database of Internet names and addresses that translates the names to the official Internet Protocol numbers and vice versa; the distributed name-and-address mechanism used in the Internet. [After Bahorsky]

DO: *Abbreviation for* **design objective.**

document window: *See* **window.**

DOD: *Abbreviation for* **Department of Defense, direct outward dialing.**

DOD master clock: The master clock to which time and frequency measurements for the U.S. Department of Defense are referenced, *i.e.* , are traceable. *Note 1:* The U.S. Naval Observatory master clock is designated as the DOD Master Clock. *Note 2:* The U.S. Naval Observatory master clock is one of the two standard time and frequency references for the U.S. Government in accordance with Federal Standard 1002-A. The other standard time and frequency reference for the U.S. Government is the National Institute of Standards and Technology (NIST) master clock.

domain: 1. The independent variable used to express a function. *Note:* Examples of domains are time, frequency, and space. **2.** In distributed networks, all the hardware and software under the control of a specified set of one or more host processors. [From Weik '89] **3.** [A] unique context (*e.g.,* access control parameters) in which a program is operating; in effect, the set of objects a subject has the privilege to access. [INFOSEC-99]

domain name: The conventional Internet name for a network or computer system, which name consists of a sequence of two or more groups of characters separated by periods; *e.g.,* the "govinst.com" groups of characters in the host name "www.govinst.com", where the ".com" is the first-level domain name (or top-level domain name), and the "govinst" characters represent the second level. *Note:* In the United States, nonprofit organizations are identified (with exceptions) by the suffix ".org", government entities by ".gov", educational institutions by ".edu", commercial organizations are identified by the suffix ".com", and military bodies by ".mil". Outside of the United States, domain names contain an ISO-standard country code suffix to indicate the country of origin of the computer or network.

domain name server (DNS): 1. A server within the Internet network that performs translation between fully qualified domain names and IP addresses according to the domain name system. [2382-pt.35] **2.** A server that retains the addresses and routing information for TCP/IP LAN users.

domain name service (DNS): A service to map fully qualified domain names to IP addresses and vice versa. [2382-pt.35]

domain name system (DNS): 1. The set of databases that performs the correspondence between an IP address and the fully qualified domain name. *Note:* The domain name system contains a kind of naming tree for IP addresses, hosts, and domains, identifying each Internet node unambiguously. [2382-pt.35] **2.** The online distributed database system that (a) is used to map human-readable addresses into Internet Protocol (IP) addresses, (b) has servers throughout the Internet to implement hierarchical addressing that allows a site administrator to assign machine names and addresses, (c) supports separate mappings between mail destinations and IP addresses, and (d) uses domain names that (i) consist of a sequence of names, *i.e.,* labels, separated by periods, *i.e.,* dots, (ii) usually are used to name Internet host computers uniquely, (iii) are hierarchical, and (iv) are processed from right to left, such as the host nic.ddn.mil has a name (nic -- the Network Information Center), a subdomain (ddn -- the Defense Data Network), and a primary domain (mil -- the MILNET).

domestic fixed public service: A fixed service, the stations of which are open to public correspondence, for radiocommunications originating and terminating solely at points all of which lie within [. . . the entire United States and certain other geographic areas as specified in 47CFR]. [47CFR]

domestic public radio services: The land mobile and domestic fixed public services, the stations of which are open to public correspondence. [47CFR]

dominant mode: In a waveguide that can support more than one propagation mode, the mode that propagates with the minimum degradation, *i.e.* , the mode with the lowest cutoff frequency. *Note:* Designations for the dominant mode are TE_{10} for rectangular waveguides and TE_{11} for circular waveguides.

D1: *See* **channel bank.**

donor: The switch or network from which the subscriber has ported. If the subscriber has ported more than once, the first switch or network to release the subscriber is referred to as the original donor switch or donor network. The original donor switch is the switch to which the call will be routed in the absence of number portability information, as it is the owner of the directory number. [T1.708-1998]

dopant: An impurity added to an optical medium to change its optical properties. *Note:* Dopants are used in optical fibers to control the refractive index profile and other refractive properties of the fiber. [FAA]

doppler effect: The change in the observed frequency (or wavelength) of a wave, caused by a time rate of change in the effective path length between the source and the point of observation.

doppler shift: The degree of observed change in frequency (or wavelength) of a wave due to the doppler effect.

dot address: *Synonym* **IP address.**

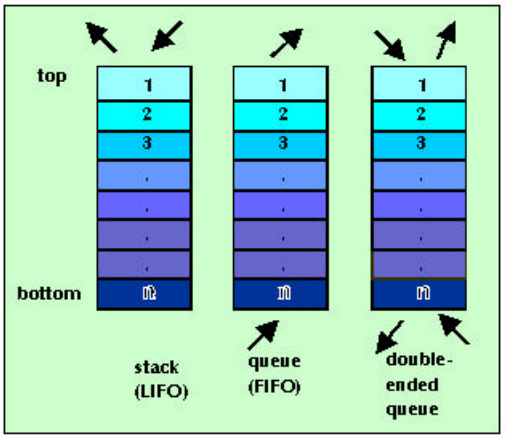
dot pitch: 1. Of a monitor screen, the physical size (width) of an individual tristimulus optoelectronic element (*e.g.,* phosphor triad, stripe triad, LCD element), usually expressed in millimeters (*e.g.,* "0.28 mm dot pitch"), in the direction of scanning. *Note:* The width of one tristimulus optoelectronic element determines the maximum resolution of a monitor screen. **2.** Of a dot-matrix printer, the maximum number of dots per inch that can be printed in the highest resolution setting.

dotted decimal notation: The syntactic representation for a 32-bit integer that consists of four 8-bit numbers written in base 10 with periods (dots) separating them. *Note:* The dotted decimal notation is used to represent IP addresses in the Internet. [2382-pt.35]

double-current transmission: *Synonym* **polar direct-current telegraph transmission.**

double-ended control: *Synonym* **double-ended synchronization.**

double-ended queue (dequeue): A queue in which the contents may be changed by adding or removing items at either end.



double-ended queue

double-ended synchronization: For two connected exchanges in a communications network, a synchronization control scheme in which the phase error signals used to control the clock at one exchange are derived by comparison with the phase of the incoming digital signal and the phase of the internal clocks at both exchanges. *Synonym* **double-ended control.**

double-frequency shift keying (DFSK): Frequency-shift keying in which two telegraph signals are multiplexed and transmitted simultaneously by frequency shifting among four frequencies.

double length key: A cryptographic key having a length of 112 bits plus 16 parity bits. [After X9.24]

double modulation: Modulation in which (a) a subcarrier is modulated with an information-bearing signal and (b) the resulting modulated subcarrier is then used to modulate another carrier that has a higher frequency.

double refraction: *Synonym* **birefringence.**

double resolution still image: A still image transmitted in the standardized video stream encoded to twice the horizontal and twice the vertical resolution as the previous motion video (*i.e.,* full common intermediate format (FCIF) or 4*FCIF). This mode uses bit 5 "Hi-Res" bit. [After T1.800.09-1995]

double-sideband reduced carrier (DSB-RC) transmission: Transmission in which (a) the frequencies produced by amplitude modulation are symmetrically spaced above and below the carrier and (b) the carrier level is reduced for transmission at a fixed level below that which is provided to the modulator. *Note:* In DSB-RC transmission, the carrier is usually transmitted at a level suitable for use as a reference by the receiver, except for the case in which it is reduced to the minimum practical level, *i.e.* , the carrier is suppressed.

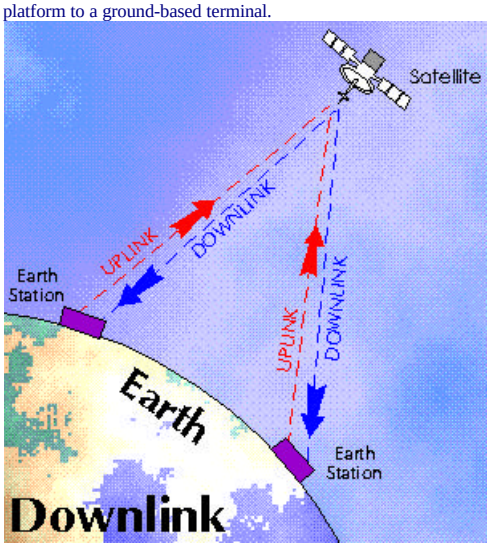
double-sideband suppressed-carrier (DSB-SC) transmission: Transmission in which (a) frequencies produced by amplitude modulation are symmetrically spaced above and below the carrier frequency and (b) the carrier level is reduced to the lowest practical level, ideally completely suppressed. *Note:* DSB-SC transmission is a special case of double-sideband reduced carrier transmission.

double-sideband (DSB) transmission: AM transmission in which both sidebands and the carrier are transmitted.

doubly clad fiber: A single-mode fiber that has two claddings. *Note 1:* Each cladding has a refractive index that is lower than that of the core. Of the two claddings, inner and outer, the inner cladding has the lower refractive index. *Note 2* : A doubly clad fiber has the advantage of very low macrobending losses. It also has two zero-dispersion points, and low dispersion over a much wider wavelength range than a singly clad fiber. *Synonyms* **depressed-cladding fiber, depressed-inner-cladding fiber, W-profile fiber** (from the fact that a symmetrical plot of its refractive index profile superficially resembles the letter W).

down-converter: A device for performing frequency translation in such a manner that the output frequencies are lower in the spectrum than the input frequencies.

downlink: 1. A data link from a satellite or other spacecraft to a terrestrial terminal. **2.** A data link from an airborne platform to a ground-based terminal.



download: To transfer a copy of a file residing on a remote computer to a user's computer.

downstream: 1. In communications, the direction of transmission flow from the source toward the sink. **2.** With respect to the flow of data in a communications path: at a specified point, the direction toward which data are received later than at the specified point.

downtime: The interval during which a functional unit is inoperable.

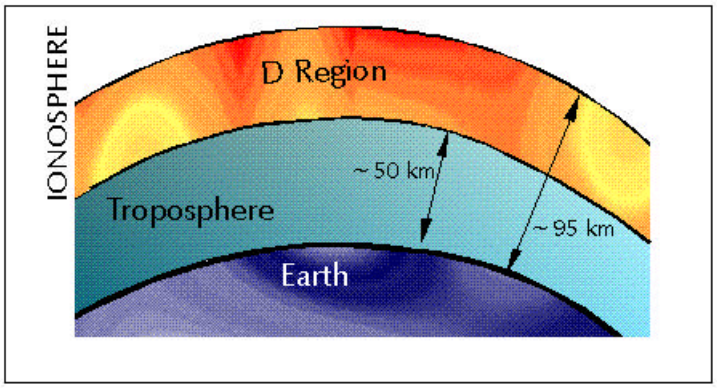
DPCM: *Abbreviation for* **differential pulse-code modulation.**

DPSK: *Abbreviation for* **differential phase-shift keying.**

DQDB: *Abbreviation for* **distributed-queue dual-bus.**

dragging: The act of modifying all or part of the display on a monitor by selecting some object and moving the pointing device such that the displayed object moves in conjunction with the pointer. [T1.232-1996]

D region: That portion of the ionosphere existing approximately 50 to 95 km above the surface of the Earth. *Note:* Attenuation of radio waves, caused by ionospheric free-electron density generated by solar radiation, is pronounced during daylight hours. Because solar radiation is not present at night, ionization ceases, and hence attenuation of radio waves ceases.



D region

drift: A comparatively long-term change in an attribute or value of a system or equipment operational parameter. *Note 1:* The drift should be characterized, such as "diurnal frequency drift" and "output level drift." *Note 2:* Drift is usually undesirable and unidirectional, but may be bidirectional, cyclic, or of such long-term duration and low excursion rate as to be negligible.

driver: *See* **device driver.**

droid: 1. In the Internet, an intelligent search tool that automatically seeks out relevant online information based on the user's specifications. *Synonyms* **agent, bot, crawler, hotbot, infobot, information agent, intelligent agent, Internet search engine, knowbot, knowledge robot, personal agent, robotic librarian, search robot, spider, Web crawler, Web spider, wizard. 2.** In artificial intelligence, an entity with the ability to sense its environment and to act in such a way or to affect that environment; typically knowledge-based entities that can communicate with each other through some message-passing scheme.

drop: 1. In a communications network, the portion of a device directly connected to the internal station facilities, such as toward a switchboard or toward a switching center. **2.** The central office side of test jacks. **3.** A wire or cable from a pole or cable terminus to a building. **4.** To delete, intentionally or unintentionally, or to lose part of a signal, such as dropping bits from a bit stream.

drop and insert: In a multichannel transmission system, a process that diverts (drops) a portion of the multiplexed aggregate signal at an intermediate point, and introduces (inserts) a different signal for subsequent transmission in the same position, *e.g.* , time slot or frequency band, previously occupied by the diverted signal. *Note 1:* Signals not of interest at the drop-and-insert point are not diverted. *Note 2:* The diverted signal may be demodulated or reinserted into another transmission system in the same or another time slot or frequency band. *Note 3:* The time slot or frequency band vacated by the diverted signal need not necessarily be re-occupied by another signal. Likewise, a previously unoccupied time slot or frequency band may be occupied by a signal inserted at the drop-and-insert point.

drop channel operation: Operation in which one or more channels of a multichannel system are terminated, *i.e.* , dropped, at an intermediate point between the end terminals of the system.

dropout: 1. In a communications system, a momentary loss of signal. *Note:* Dropouts are usually caused by noise, propagation anomalies, or system malfunctions. **2.** A failure to read properly a binary character from data storage. *Note:* A dropout is usually caused by a defect in the storage medium or by a malfunction of the read mechanism. **3.** In magnetic tape, disk, card, or drum systems, a recorded signal with an amplitude less than a predetermined percentage of a reference signal.

drop repeater: In a multichannel communications system, a repeater that has the necessary equipment for the local termination, *i.e.* , the dropping, of one or more channels.

drum factor: 1. In facsimile systems in which drums are used, the ratio of drum length to drum diameter. **2.** In facsimile systems in which drums are not used, the ratio of (a) the page width to (b) the page length divided by π.

drum speed: In facsimile systems, the rotation rate of the facsimile transmitter or recorder drum. *Note:* Drum speed is usually expressed in revolutions per minute.

DS: *Abbreviation for* **digital signal.**

DSA: *Abbreviation for* **dial service assistance, directory system agent.**

DSA board: A local dial office switchboard at which are handled assistance calls, intercepted calls, and calls from miscellaneous lines and trunks. It may also be employed for handling certain toll calls. [47 CFR Pt.36-A]

DSB: *Abbreviation for* **double sideband.** *See* **double-sideband transmission.**

DSB board: A switchboard of a dial system for completing incoming calls received from manual offices. [47CFR]

DSB-SC: *Abbreviation for* **double-sideband suppressed carrier.** *See* **double-sideband suppressed-carrier transmission.**

DSC: *Abbreviation for* **digital selective calling.**

DSE: *Abbreviation for* **data switching exchange.**

DSI: *Abbreviation for* **digital speech interpolation.**

DS0: *Abbreviation for* **digital signal 0.**

DS1 . . . DS4: *Abbreviations for* **digital signal 1. . . digital signal 4.**

DS1C: *Abbreviation for* **digital signal 1C.**

DSN: *Abbreviation for* **Defense Switched Network.**

DSP: *Abbreviation for* **digital signal processor.** A specialized, programmable computer processing unit that is able to perform high-speed mathematical processing. *Note:* A DSP is ideal for use in compression algorithms. [After Silicon]

DSR: *Abbreviation for* **data signaling rate.**

D-Star(D*): *Synonym* **specific detectivity.**

DSU: *Abbreviation for* **data service unit, digital service unit.**

DTE: *Abbreviation for* **data terminal equipment. 1.** An end instrument that converts user information into signals for transmission or reconverts the received signals into user information. **2.** The functional unit of a data station that serves as a data source or a data sink and provides for the data communication control function to be performed in accordance with link protocol. *Note 1:* The data terminal equipment (DTE) may be a single piece of equipment or an interconnected subsystem of multiple pieces of equipment that perform all the required functions necessary to permit users to communicate. *Note 2:* A user interacts with the DTE, or the DTE may be the user. The DTE interacts with the data circuit-terminating equipment (DCE).

DTE clear signal: A call control signal sent by data terminal equipment (DTE) to initiate clearing.

DTE waiting signal: A call control signal, sent by the data-circuit-terminating-equipment/data-terminal-equipment (DCE/DTE) interface, that indicates that the DTE is waiting for a call control signal from the DCE.

DTMF: *Abbreviation for* **dual-tone multifrequency (signaling).**

D2: *See* **channel bank.**

D3: *See* **channel bank.**

D-type patch bay: A patch bay designed for patching and monitoring of unbalanced data circuits at rates up to 1 Mb/s.

DUA: *Abbreviation for* **directory user agent.**

dual access: 1. The connection of a user to two switching centers by separate access lines using a single message routing indicator or telephone number. **2.** In satellite communications, the transmission of two carriers simultaneously through a single communication satellite repeater.

dual bus: A pair of parallel buses arranged such that the direction of data flow in one bus is opposite to the direction of data flow in the other bus.

dual control: In security systems, a process of using two or more separate individuals (or entities), operating together (but with split knowledge) to protect sensitive functions or information so that no single person is able to access or use the materials (such as a cryptographic key). [After X9.49]

dual diversity: The simultaneous combining of (or selection from) two independently fading signals, so that the resultant signal can be detected through the use of space, frequency, angle, time, or polarization characteristics.

dual-homed gateway: *Synonym* **dual-homed host.**

dual-homed host: A host computer that participates in two separate networks. *Note:* A dual-homed host can provide security functions as a firewall. [2382-pt.35] *Synonym* **dual-homed gateway.**

dual homing: The connection of a terminal so that it is served by either of two switching centers. *Note:* In dual homing, a single directory number or a single routing indicator is used.

dual in-line package (DIP): An electronic package with a rectangular housing and a row of pins along each of two opposite sides. *Note:* DIP packages may be used for integrated circuits, or for discrete components, such as resistors or toggle switches. An example of a DIP is a microcircuit package with two rows of seven vertical leads that is specially designed for mounting on a printed circuit board.

dual in-line package switch: *See* **DIP switch.**

dual-precedence message: A message that contains two precedence designations. *Note:* Usually the higher precedence message is for all action addressees and the lower for all information addressees. [From Weik '89]

dual seizure: The condition that occurs when, in both-way operation, two exchanges attempt to seize the same circuit at approximately the same time. [T1.110-1987] *Synonyms* **call collision, glare** *[deprecated].*

dual-tone multifrequency (DTMF) signaling: In telephone systems, multifrequency signaling in which standard set combinations of two specific voice band frequencies, one from a group of four low frequencies and the other from a group of four higher frequencies, are used. *Synonyms* **multifrequency pulsing, multifrequency signaling.** *Note 1:* DTMF signals, unlike dial pulses, can pass through the entire connection to the destination user, and therefore lend themselves to various schemes for remote control after access, *i.e.* , after the connection is established. *Note 2:* Telephones using DTMF usually have 12 keys. Each key corresponds to a different pair of frequencies. Each pair of frequencies corresponds to one of the ten decimal digits, or to the symbol "#" or "*", the "*" being reserved for special purposes. *Note 3:* The standard signal frequency pairs transmitted by DTMF equipment used by the public exchange carriers are as follows:

Button or Digit	Frequencies (Hz)
1	697/1209
2	697/1336
3	697/1477
4	770/1209
5	770/1336
6	770/1477
7	852/1209
8	852/1336
9	852/1477
0	941/1336
*	941/1209
#	941/1477

Note 4: Tactical telephones have 16 keys, the extra 4 being used for precedence. For DSN (Defense Switched Network) the signal frequency pairs transmitted for the ten decimal digits and the * and # are the same as those used by the public exchange carriers. The additional four keys, corresponding to four different frequency pairs and the precedence, are as follows:

Button or Key	Frequencies (Hz)
FO (Flash Override)	697/1633
F (Flash)	770/1633
I (Immediate)	852/1633
P (Priority)	941/1633

dual-use access line: A user access line normally used for analog voice communication, but which has special conditioning for use as a digital transmission circuit.

dub: 1. A duplicate copy made in the same format from one recording medium to another. **2.** *See* **audio dubbing.**

duct: 1. In interfacility cabling, a conduit, which may be direct-earth buried or encased in concrete, used to enclose communications or power cables. *Note:* For maximum resistance to rodent attack, direct-earth-buried conduit should have an outside diameter equal to or greater than 6 cm (2.25 in.). **2.** *See* **atmospheric duct.**

ducting: The propagation of radio waves within an atmospheric duct.

dumb terminal: An asynchronous terminal that (a) does not use a transmission control protocol and (b) sends or receives data sequentially one character at a time. *Note:* Dumb terminals usually handle ASCII characters.

dummy load: A dissipative impedance-matched network, usually used at the end of a transmission line to absorb all incident energy. *Note:* The dummy load usually converts the incident energy to thermal energy.

duobinary signal: A pseudobinary-coded signal in which a "0" *("zero")* bit is represented by a zero-level electric current or voltage; a "1" *("one")* bit is represented by a positive-level current or voltage if the quantity of "0" bits since the last "1" bit is even, and by a negative-level current or voltage if the quantity of "0" bits since the last "1" bit is odd. *Note 1:* Duobinary signals require less bandwidth than NRZ. *Note 2:* Duobinary signaling also permits the detection of some errors without the addition of error-checking bits.

duplex cable: A fiber-optic cable that contains two optical fibers. [After FAA]

duplex circuit: A circuit that permits transmission in both directions. *Note:* For simultaneous two-way transmission, *see* **full-duplex circuit.**

duplexer: In radar systems, a device that isolates the receiver from the transmitter while permitting them to share a common antenna. *Note 1:* A duplexer must be designed for operation in the frequency band used by the receiver and transmitter, and must be capable of handling the output power of the transmitter. *Note 2:* A duplexer must provide adequate rejection of transmitter noise occurring at the receive frequency, and must be designed to operate at, or less than, the frequency separation between the transmitter and receiver. *Note 3:* A duplexer must provide sufficient isolation to prevent receiver desensitization.

duplex operation: Operating method in which transmission is possible simultaneously, in both directions of a telecommunication channel. [NTIA] [RR] *Note 1:* This definition is not limited to radio transmission. *Note 2:* In general, duplex operation and semi-duplex operation require two frequencies in radiocommunication; simplex operation may use either one or two. *Synonyms* **full-duplex operation, two-way simultaneous operation.**

duty cycle: 1. In an ideal pulse train, *i.e.* , one having rectangular pulses, the ratio of the pulse duration to the pulse period. *Note:* For example, the duty cycle is 0.25 for a pulse train in which the pulse duration is 1 μs and the pulse period is 4 μs. **2.** The ratio of (a) the sum of all pulse durations during a specified period of continuous operation to (b) the total specified period of operation. **3.** In a continuously variable slope delta (CVSD) modulation converter, the mean proportion of binary "1" digits at the converter output in which each "1" indicates a run of a specified number of consecutive bits of the same polarity in the digital output signal. **4.** In a periodic phenomenon, the ratio of the duration of the phenomenon in a given period to the period. *Note:* In a piece of electrical equipment, *e.g.* , an electric motor, the period for which it may be operated without deleterious effects, *e.g.* , from overheating.

dvd: *Abbreviation for* **digital versatile disk,** *formerly* **digital video disk.** A disk, recorded with optical technology, that contains full-length (2-hour) motion pictures for viewing on a personal computer or on a TV screen (through a set-top box). *Note:* A dvd drive can also be used to access data files on a CD or to play an audio CD-ROM or an audio compact disk. *Also written* **DVD.**

dvi: *Abbreviation for* **digital video interface.** A standard for computer-generated multimedia text and graphics merged in video production.

DWDM: *Abbreviation for* **dense wavelength division multiplexing.**

dwell time: The period during which a dynamic process remains halted in order that another process may occur.

DX signaling: *Abbreviation for* **direct current signaling.**

DX signaling unit: A duplex signaling unit that repeats "E" and "M" lead signals into a cable pair(s) via "A" and "B" leads. These signals are transmitted on the same cable pair(s)

that transmit(s) the message.

dynamically adaptive routing: In route determination for packet-switched networks, adaptive routing in which an algorithm is used that (a) automatically routes traffic around congested, damaged, or destroyed switches and trunks and (b) allows the system to continue to function over the remaining portions of the network.

dynamically created Web page: A Web page designed to deliver content to users based on information obtained from users, from cookies, or from choices made by users as they access and click through a particular site.

dynamic arming/disarming: Enabling/disabling of a detection point by a service control function in the course of service control execution for a particular call/service attempt. [T1.667-1999]

dynamic HTML: *See* **dHTML.**

dynamicizer: *See* **parallel-to-serial conversion.**

dynamic range: 1. In a system or device, the ratio of (a) a specified maximum level of a parameter, such as power, current, voltage, or frequency to (b) the minimum detectable value of that parameter. *Note:* The dynamic range is usually expressed in dB. **2.** In a transmission system, the ratio of (a) the overload level, *i.e.* , the maximum signal power that the system can tolerate without distortion of the signal, to (b) the noise level of the system. *Note:* The dynamic range of transmission systems is usually expressed in dB. **3.** In digital systems or devices, the ratio of maximum and minimum signal levels required to maintain a specified bit error ratio.

dynamic variation: A short-term variation (as opposed to long-term drift) in the characteristics of power delivered to electrical equipment. *Note:* Dynamic variations indicate a short-term departure from steady-state conditions.

dynamic window control: A procedure to modify the transmitter's transmit window in response to the user's perception of congestion conditions in the network. [T1.615-1992]

e- : *Abbreviation for* **electronic.** A prefix generally indicating an association with The Internet or computerized business or office functions; *e.g.* , an *"e-file"* (electronic file) or *"e-commerce,"* (electronic commerce).

E & M signaling: In telephony, an arrangement that uses separate leads, called the "E" lead and "M" lead, for signaling and supervisory purposes. *Note 1:* The near end signals the far end by applying -48 Vdc to the "M" lead, which results in a ground being applied to the far end's "E" lead. When -48 Vdc is applied to the far end "M" lead, the near-end "E" lead is grounded. *Note 2:* The "E" originally stood for "ear," *i.e.* , when the near-end "E" lead was grounded, the far end was calling and "wanted your ear." The "M" originally stood for "mouth," because when the near-end wanted to call (*i.e.* , speak to) the far end, -48 Vdc was applied to that lead.

earth: *See* **ground.**

Earth coverage (EC): In satellite communications, the coverage that occurs when the satellite-to-Earth beam is sufficiently wide to cover all of the surface of the Earth exposed to the satellite, *i.e.,* the footprint is as large as it can possibly be from a geographic standpoint.

earth electrode subsystem: A network of electrically interconnected rods, plates, mats, or grids, installed and connected, for the purpose of establishing a low-resistance contact with earth.

Earth exploration-satellite service: A radiocommunication service between Earth stations and one or more space stations, which may include links between space stations, in which:

- information relating to the characteristics of the Earth and its natural phenomena is obtained from active sensors or passive sensors on Earth satellites;
- similar information is collected from airborne or Earth-based platforms;
- such information may be distributed to Earth stations within the system concerned;
- platform interrogation may be included.

This service may also include feeder links necessary for its operation. [NTIA] [RR]

earth ground: *See* **ground.**

Earth station: A station located either on the Earth's surface or within the major portion of the Earth's atmosphere and intended for communication:

- with one or more space stations; or
- with one or more stations of the same kind by means of one or more reflecting satellites or other objects in space. [NTIA] [RR] [47CFR]

Earth terminal: In a satellite link, one of the non-orbiting communications stations that receives, processes, and transmits signals between itself and a satellite. *Note:* Earth terminals may be at mobile, fixed, airborne, and waterborne Earth terminal complexes. *Synonym* **satellite Earth terminal.**

Earth terminal complex: In satellite communications systems, the assembly of equipment and facilities necessary to integrate an Earth terminal into a communications network. *Note:* The Earth terminal complex includes the Earth terminal and its support equipment and any required interconnect facilities and their support equipment. It does not include facilities at the site that are not necessary to establish and integrate the satellite links with the network.

EAS: *Abbreviation for* **extended area service.**

eavesdropping: The unauthorized interception of information-bearing emanations. [2382-pt.8]

EBCDIC: *Acronym for* **extended binary coded decimal interchange code.** An 8-bit alphanumeric coded character set.

E-bend: A smooth change in the direction of the axis of a waveguide, throughout which the axis remains in a plane parallel to the direction of electric E-field (transverse) polarization. *Synonym* **E-plane bend.**

E_bN_0: *See* **signal-to-noise ratio per bit.**

EBS: *Abbreviation for* **Emergency Broadcast System.**

EC: *Abbreviation for* **Earth coverage, electronic commerce, exchange carrier.**

e-cash: *Abbreviation for* **electronic cash.** Data representing money, which data can be transferred by means of a computer network and can be traded as a token exchangeable for real money. *Synonyms* **digicash, digital cash.** [After 2382-pt.35]

ECCM: *Abbreviation for* **electronic counter-countermeasures.**

echo: 1. A wave that has been reflected by a discontinuity in the propagation medium. **2.** A wave that has been reflected or otherwise returned with sufficient magnitude and delay to be perceived. *Note 1:* Echoes are frequently measured in dB relative to the directly transmitted wave. *Note 2:* Echoes may be desirable (as in radar) or undesirable (as in telephone systems). **3.** In computing, to print or display characters (a) as they are entered from an input device, (b) as instructions are executed, or (c) as retransmitted characters received from a remote terminal. **4.** In computer graphics, the immediate notification of the current values provided by an input device to the operator at the display console.

echo area: *See* **scattering cross section.**

echo attenuation: In a communication circuit (4- or 2-wire) in which the two directions of transmission can be separated from each other, the attenuation of echo signals that return to the input of the circuit under consideration. *Note:* Echo attenuation is expressed as the ratio of the transmitted power to the received echo power in dB.

echo cancellation: In a system, the reduction of the power level of an echo or the elimination of an echo. *Note:* Echo cancellation is usually an active process in which echo signals are measured and canceled or eliminated by combining an inverted signal with the echo signal.

echo canceler: *See* **echo suppressor.**

echo check: A check to determine the integrity of transmission of data, whereby the received data are returned to the source for comparison with the originally transmitted data. *Synonym* **loop check.**

echo command: A programming language command that causes an echo response from a computer to be displayed on a monitor or printer for analysis or monitoring of the progress of processing.

echo effect: *See* **ghost.**

echo line: In computer systems, on a hard-output or display device, a line of information that verifies (reflects) data entered into the computer.

echo loss: The ratio in dB of the power of a transmitted signal that is echo loss weighted (as specified in ITU-T Recommendation G.122) to the power of its reflected echo. [T1.255-1997]

echo path capacity: The maximum echo path delay for which an echo canceler is designed to operate. [T1.508-1998]

echo path delay (EPD): The time in milliseconds (ms) between the incidence of a signal and the incidence of that signal's echo at a measurement point. [T1.255-1997]

echoplex: An echo check used in public switched networks operating in the full-duplex transmission mode, *i.e.,* the two-way-simultaneous mode.

echo return loss: *See* **return loss.**

echo sounding: The measurement of the depth of a body of water or the distance to an object in a body of water by measuring the time it takes sound or electromagnetic waves of known velocity to reflect from the bottom of the water body or from the distant object. *Note:* In echo sounding, damped cw transmission is usually used.

echo suppressor: A device for connection to a two-way telephone circuit to attenuate echo signals in one direction caused by signals in the other direction.

ECM: *Abbreviation for* **electronic countermeasures.**

e-commerce: *Abbreviation for* **electronic commerce.** A way of doing real-time business transactions via telecommunications networks, when the customer and the merchant are in different geographical places. [Mattila] *Note:* Electronic commerce is a broad concept that includes virtual browsing of goods on sale, selection of goods to buy, and payment methods. Electronic commerce operates on a bona fide basis, without prior arrangements between customers and merchants. E-commerce operates via the Internet using all or any combination of technologies designed to exchange data (such as EDI or e-mail), to access data (such as shared databases or electronic bulletin boards), and to capture data (through the use of bar coding and magnetic or optical character readers).

edge busyness: In a video display, distortion that is concentrated at or near the edge of objects, and that is categorized further by its temporal and spatial characteristics.

edge-emitting LED: An LED that has a physical structure superficially resembling that of an injection laser diode, operated below the lasing threshold and emitting incoherent light. *Note:* Edge-emitting LEDs have a relatively small beam divergence, and thus are capable of launching more optical power into a given fiber than are the conventional surface-emitting LEDs. [After FAA]

EDI: *Abbreviation for* **electronic document interchange.** A computerized system that allows linked computers to conduct business transactions, such as invoicing and ordering, over a telecommunications network.

EDTV: *Abbreviation for* **extended-definition television.**

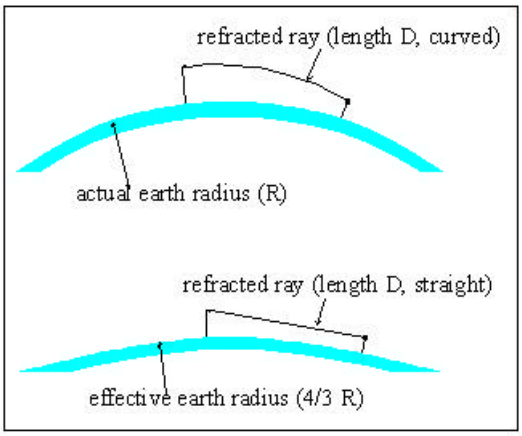
edu: In a URL, a domain-name suffix indicating an education institution.

effective antenna gain contour (of a steerable satellite beam): An envelope of antenna gain contours resulting from moving the boresight of a steerable satellite beam along the limits of the effective boresight area. [NTIA] [RR]

effective boresight area (of a steerable satellite beam): An area on the surface of the Earth within which the boresight of a steerable satellite beam is pointed. There may be more than one unconnected effective boresight area to which a single steerable satellite beam can be pointed. [NTIA] [RR]

effective data transfer rate: The average number of units of data, such as bits, characters, blocks, or frames, transferred per unit time from a source and accepted as valid by a sink. *Note:* The effective data transfer rate is usually expressed in bits, characters, blocks, or frames per second. The effective data transfer rate may be averaged over a period of seconds, minutes, or hours.

effective Earth radius: The radius of a hypothetical Earth for which the distance to the radio horizon, assuming rectilinear propagation, is the same as that for the actual Earth with an assumed uniform vertical gradient of atmospheric refractive index. *Note:* For the standard atmosphere, the effective Earth radius is 4/3 that of the actual Earth radius.



effective Earth radius

effective height: 1. The height of the center of radiation of an antenna above the effective ground level. **2.** In low-frequency applications involving loaded or nonloaded vertical antennas, the moment of the current distribution in the vertical section divided by the input current. *Note:* For an antenna with symmetrical current distribution, the center of radiation is the center of distribution. For an antenna with asymmetrical current distribution, the center of radiation is the center of current moments when viewed from points near the direction of maximum radiation.

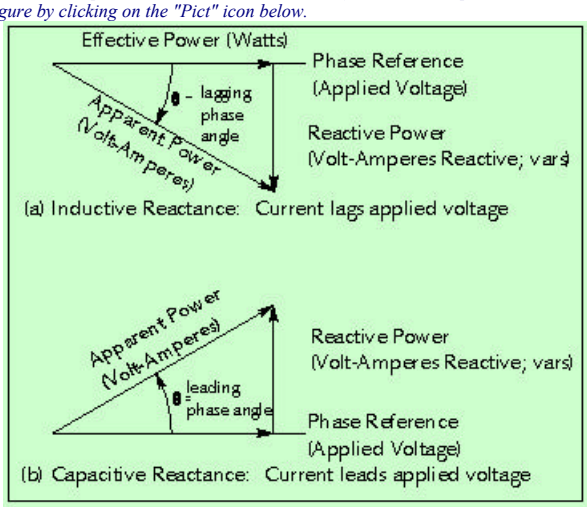
effective input noise temperature: The source noise temperature in a two-port network or amplifier that will result in the same output noise power, when connected to a noise-free network or amplifier, as that of the actual network or amplifier connected to a noise-free source. *Note:* If *F* is the noise figure numeric and 290 K the standard noise temperature, then the effective noise temperature is given by $T_n = 290(F\text{-}1)$.

effective isotropically radiated power (e.i.r.p.): The arithmetic product of (a) the power supplied to an antenna and (b) its gain.

effective mode volume: For an optical fiber, the square of the product of the diameter of the near-field pattern and the sine of the radiation angle of the far-field pattern. The diameter of the near-field radiation pattern is defined here as the full width at half maximum and the radiation angle at half maximum intensity. *Note:* Effective mode volume is proportional to the breadth of the relative distribution of power amongst the modes in a multimode fiber. It is not truly a spatial volume but rather an *"optical volume"* equal to the product of area and solid angle.

effective monopole radiated power (e.m.r.p.): The product of the power supplied to the antenna and its gain relative to a short vertical antenna in a given direction. [RR]

effective power: In alternating-current power transmission and distribution, the product of the rms voltage and amperage, *i.e.,* the apparent power, multiplied by the power factor, *i.e.,* the cosine of the phase angle between the voltage and the current. *Note:* Only effective power, *i.e.,* the actual power delivered to or consumed by the load, is expressed in watts. Apparent power is properly expressed only in volt-amperes, never watts. *Synonym* **true power.** *See figure by clicking on the "Pict" icon below.*



effective power

effective radiated power (e.r.p.) (in a given direction): 1. The power supplied to an antenna multiplied by the antenna gain in a given direction. *Note 1:* If the direction is not specified, the direction of maximum gain is assumed. *Note 2:* The type of reference antenna must be specified. **2.** The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction. [NTIA] [RR] [47CFR] *Note:* If the direction is not specified, the direction of maximum gain is assumed. **3.** The effective radiated power of a transmitter (with antenna, transmission line, duplexers, *etc.,*) is the power that would be necessary at the input terminals of a reference half-wave dipole antenna in order to produce the same maximum field intensity. ERP is usually calculated by multiplying the measured transmitter output power by the specified antenna system gain, relative to a half-wave dipole, in the direction of interest. [47CFR]

effective speed of transmission: *Synonym* **effective transmission rate.**

effective transmission rate: The rate at which information is processed by a transmission facility. *Note 1:* The effective transmission rate is calculated as (a) the measured number of units of data, such as bits, characters, blocks, or frames, transmitted during a significant measurement time interval divided by (b) the measurement time interval. *Note 2:* The effective transmission rate is usually expressed as a number of units of data per unit time, such as bits per second or characters per second. *Synonyms* **average rate of transmission, effective speed of transmission.**

efficiency factor: In data communications, the ratio of (a) the time to transmit a text automatically at a specified modulation rate to (b) the time actually required to receive the same text at a specified maximum error rate. *Note 1:* All of the communication facilities are assumed to be in the normal condition of adjustment and operation. *Note 2:* Telegraph communications may have different temporal efficiency factors for the two directions of transmission. *Note 3:* The practical conditions of measurement should be specified, especially the duration of the measurement.

EFT: *Abbreviation for* **electronic funds transfer.** The technology that allows for funds to be transferred securely and instantaneously by electronic means from one bank account to another.

EGA: *Abbreviation for* **enhanced graphics adapter.** A display technology with pixel resolution of 640 x 350, used with early personal computers. *Note:* EGA has been replaced by newer display technologies.

EHF: *Abbreviation for* **extremely high frequency.**

EIA: *Abbreviation for* **Electronic Industries Association.**

EIA Class IVa fiber: *Synonym* **dispersion-unshifted fiber.**

EIA Class IVb fiber: *Synonym* **dispersion-shifted fiber.**

EIA interface: Any of a number of equipment interfaces compliant with voluntary industry standards developed by the Electronic Industries Association (EIA) to define interface parameters. *Note 1:* Some of the EIA interface standards have been adopted by the Federal Government as Federal Standards or Federal Information Processing Standards. *Note 2:* The telecommunication-standards-developing bodies of the EIA are now part of the Telecommunications Industry Association (TIA), and the standards are designated TIA/EIA-XXX.

eight-hundred (800) service: A service that allows call originators to place toll telephone calls to 800-service subscribers, from within specified rate areas, without a charge to the call originator. *Note:* The 800 series denotes the service access codes of 800, 888, 877, 866, 855, 844, 833, and 822. [After FCC]

EISA: *Abbreviation for* **Extended Industry Standard Architecture.** A 32-bit bus standard that supports the features of microchannel architecture and that requires a special card for 32-bit operations, while maintaining compatibility with the older ISA (Industry Standard Architecture).

elastic buffer: 1. A buffer that has an adjustable capacity for data. **2.** A buffer that introduces an adjustable delay of signals.

E layer: *See* **E region, ionosphere.**

electrical length: 1. Of a transmission medium, its length expressed as a multiple or submultiple of the wavelength of a periodic electromagnetic or electrical signal propagating within the medium. *Note 1:* The wavelength may be expressed in radians or in artificial units of angular measure, such as degrees. *Note 2* : In both coaxial cables and optical fibers, the velocity of propagation is approximately two-thirds that of free space. Consequently, the wavelength will be approximately two-thirds that in free space, and the electrical length, approximately 1.5 times the physical length. **2.** Of a transmission medium, its physical length multiplied by the ratio of (a) the propagation time of an electrical or electromagnetic signal through the medium to (b) the propagation time of an electromagnetic wave in free space over a distance equal to the physical length of the medium in question. *Note:* The electrical length of a physical medium will always be greater than its physical length. For example, in coaxial cables, distributed resistances, capacitances and inductances impede the propagation of the signal. In an optical fiber, interaction of the lightwave with the materials of which the fiber is made, and fiber geometry, affect the velocity of propagation of the signal. **3.** Of an antenna, the effective length of an element, usually expressed in wavelengths. *Note 1:* The electrical length is in general different from the physical length. *Note 2:* By the addition of an appropriate reactive element (capacitive or inductive), the electrical length may be made significantly shorter or longer than the physical length.

electrically powered telephone: A telephone in which the operating power is obtained either from a battery located at the telephone, *i.e.,* a local battery, or from a telephone central office, *i.e.,* a common battery.

electric field: The effect produced by the existence of an electric charge, such as an electron, ion, or proton, in the volume of space or medium that surrounds it. *Note:* Each of a distribution of charges contributes to the whole field at a point on the basis of superposition. A charge placed in the volume of space or in the surrounding medium has a force exerted on it.

electrochemical recording: Facsimile recording by means of a chemical reaction brought about by the passage of a signal-controlled current through the sensitized portion of the record sheet.

electrographic recording: *See* **electrostatic recording.**

electroluminescence: Nonthermal conversion of electrical energy into light. *Note 1:* Electroluminescence is distinguished from incandescence, which is a thermal process. *Note 2:* One example of electroluminescence is the photon emission resulting from electron-hole recombination in a pn junction, as in a light-emitting diode (LED).

electrolytic recording: Electrochemical facsimile recording in which the recorded copy is made by the passage of a signal-controlled current through an electrolyte which causes metallic ions to be deposited, thus forming an image of the object.

electromagnetic compatibility (EMC): 1. Electromagnetic compatibility is the condition which prevails when telecommunications equipment is performing its individually designed function in a common electromagnetic environment without causing or suffering unacceptable degradation due to unintentional electromagnetic interference to or from other equipment in the same environment. [NTIA] **2.** The ability of systems, equipment, and devices that utilize the electromagnetic spectrum to operate in their intended operational environments without suffering unacceptable degradation or causing unintentional degradation because of electromagnetic radiation or response. It involves the application of sound electromagnetic spectrum management; system, equipment, and device design configuration that ensures interference-free operation; and clear concepts and doctrines that maximize operational effectiveness. [JP 1-02]

electromagnetic emission control: The control of friendly electromagnetic emissions, such as radio and radar transmissions, for the purpose of preventing or minimizing their use by unintended recipients.

electromagnetic environment (EME): 1. For a telecommunications system, the spatial distribution of electromagnetic fields surrounding a given site. *Note:* The electromagnetic environment may be expressed in terms of the spatial and temporal distribution of electric field strength (volts/meter), irradiance (watts/meter^2), or energy density (joules/meter^3). **2.** The resulting product of the power and time distribution, in various frequency ranges, of the radiated or conducted electromagnetic emission levels that may be encountered by a military force, system, or platform when performing its assigned mission in its intended operational environment. It is the sum of electromagnetic interference; electromagnetic pulse; hazards of electromagnetic radiation to personnel, ordnance, and volatile materials; and natural phenomena effects of lightning and p-static. [JP 1-02]

electromagnetic interference (EMI): 1. Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. It can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like. [JP 1-02] **2.** An engineering term used to designate interference in a piece of electronic equipment caused by another piece of electronic or other equipment. EMI sometimes refers to interference caused by nuclear explosion. [JP 1-02]

electromagnetic interference (EMI) control: The control of radiated and conducted energy such that emissions that are unnecessary for system, subsystem, or equipment operation

are reduced, minimized, or eliminated. *Note:* Electromagnetic radiated and conducted emissions are controlled regardless of their origin within the system, subsystem, or equipment. Successful EMI control with effective susceptibility control leads to electromagnetic compatibility.

electromagnetic intrusion: The intentional insertion of electromagnetic energy into transmission paths in any manner, with the objective of deceiving operators or of causing confusion. [JP 1-02]

electromagnetic pulse (EMP): 1. The electromagnetic radiation from a nuclear explosion caused by Compton-recoil electrons and photoelectrons from photons scattered in the materials of the nuclear device or in a surrounding medium. The resulting electric and magnetic fields may couple with electrical/electronic systems to produce damaging current and voltage surges. EMP may also be caused by non-nuclear means. [JP 1-02] **2.** A broadband, high-intensity, short-duration burst of electromagnetic energy. *Note:* In the case of a nuclear detonation, the electromagnetic pulse consists of a continuous frequency spectrum. Most of the energy is distributed throughout the lower frequencies between 3 Hz and 30 kHz.

electromagnetic radiation (EMR): Radiation made up of oscillating electric and magnetic fields and propagated with the speed of light. Includes gamma radiation, X-rays, ultraviolet, visible, and infrared radiation, and radar and radio waves. [JP 1-02]

electromagnetic radiation hazards (RADHAZ *or* EMR hazards): Hazards caused by a transmitter/antenna installation that generates electromagnetic radiation in the vicinity of ordnance, personnel, or fueling operations in excess of established safe levels or increases the existing levels to a hazardous level; or a personnel, fueling, or ordnance installation located in an area that is illuminated by electromagnetic radiation at a level that is hazardous to the planned operations or occupancy. These hazards will exist when an electromagnetic field of sufficient intensity is generated to:

- (a) Induce or otherwise couple currents and/or voltages of magnitudes large enough to initiate electro-explosive devices or other sensitive explosive components of weapon systems, ordnance, or explosive devices.
- (b) Cause harmful or injurious effects to humans and wildlife.
- (c) Create sparks having sufficient magnitude to ignite flammable mixtures of materials that must be handled in the affected area. [JP 1-02]

electromagnetic spectrum: The range of frequencies of electromagnetic radiation from zero to infinity. *Note:* The electromagnetic spectrum was, by custom and practice, formerly divided into 26 alphabetically designated bands. This usage still prevails to some degree. However, the ITU formally recognizes 12 bands, from 30 Hz to 3000 GHz. New bands, from 3 THz to 3000 THz, are under active consideration for recognition. *Refer to the figure below.*

electromagnetic survivability: The ability of a system, subsystem, or equipment to resume functioning without evidence of degradation following temporary exposure to an adverse electromagnetic environment. *Note:* The system, subsystem, or equipment performance may be degraded during exposure to the adverse electromagnetic environment, but the system will not experience permanent damage, such as component burnout, that will prevent proper operation when the adverse electromagnetic environment is removed.

electromagnetic susceptibility: Of an electronic circuit or device, the degree to which it is subject to malfunction or failure under the influence of electromagnetic radiation.

electromagnetic vulnerability (EMV): The characteristics of a system that cause it to suffer a definite degradation (incapability to perform the designated mission) as a result of having been subjected to a certain level of electromagnetic environmental effects. [JP 1-02]

electromagnetic wave (EMW): A wave produced by the interaction of time-varying electric and magnetic fields.

electromechanical recording: Recording by means of a signal-actuated mechanical device.

electronically controlled coupling (ECC): The coupling of a lightwave from one dielectric waveguide into another dielectric waveguide upon the application of an electric field or electrical signal. *Note:* Devices that perform ECC can be used as switches.

electronically generated key: [A] key generated in a COMSEC device by introducing (either mechanically or electronically) a seed key into the device and then using the seed, together with a software algorithm stored in the device, to produce the desired key. [INFOSEC-99]

electronic bulletin board: *Synonym* **bulletin board.**

electronic cash: *See* **e-cash.**

electronic classroom: *Synonym* **teletraining.**

electronic commerce: *See* **e-commerce.**

electronic counter-countermeasures (ECCM): That division of electronic warfare involving actions taken to ensure friendly effective use of the electromagnetic spectrum despite the enemy's use of electronic warfare.

electronic countermeasures (ECM): That division of electronic warfare involving actions taken to prevent or reduce an enemy's effective use of the electromagnetic spectrum.

electronic data interchange: *See* **EDI.**

electronic deception: 1. The deliberate radiation, reradiation, alteration, suppression, absorption, denial, enhancement, or reflection of electromagnetic energy in a manner intended to convey misleading information and to deny valid information to an enemy or to enemy electronics-dependent weapons. *Note:* Among the types of electronic deception are: (a) manipulative electronic deception--Actions to eliminate revealing or convey misleading, telltale indicators that may be used by hostile forces; (b) simulative electronic deception--Actions to represent friendly notional or actual capabilities to mislead hostile forces; (c) imitative electronic deception--The introduction of electromagnetic energy into enemy systems that imitates enemy emissions. **2.** Deliberate activity designed to mislead an enemy in the interpretation or use of information received by his electronic systems.

electronic distribution: In encryption, the distribution of keying materials among entities by means of an electronic communication. *Note:* Electronic distribution does not include electronic key loaders, such as smart cards. [After X9.17]

electronic emission security: Those measures taken to protect all transmissions from interception and electronic analysis.

electronic equipment enclosure (EEE): An enclosure housing telecommunications electronics equipment. It may consist of a weatherproof enclosure, equipment pad or an equipment hut. Types of equipment contained in an EEE might be switches, carrier electronics, or remote terminals. The EEE may be located remote from a central office, and may be located above or below ground. The temperature and humidity within the EEE may be controlled. The EEE, like the central office, is served by telecommunications outside plant cable, which may be aerial, direct-buried, or placed in underground conduit. It may also be served by commercial ac power facilities, and may have provisions for standby power. [T1.328-1995]

electronic funds transfer: *See* **EFT.**

electronic jamming: *See* **jamming.**

electronic key management system (EKMS): [An] interoperable collection of systems being developed by services and agencies of the U.S. government to automate the planning, ordering, generating, distributing, storing, filling, using, and destroying of electronic key, and management of other types of COMSEC material. [INFOSEC-99]

electronic line of sight: The path traversed by electromagnetic waves that is not subject to reflection or refraction by the atmosphere. [JP 1-02]

electronic line scanning: In facsimile, a method of scanning that provides motion of the scanning spot along the scanning line by electronic means.

electronic magazine: *See* **e-zine.**

electronic mail: *See* **e-mail.**

electronic message system (EMS): A message system incorporating electronic mail to a central facility which then assumes responsibility for delivering the message in hard copy form. *Note:* In DOD, these messages have a specific format known as message text format (MTF). *Synonym [loosely]* **messaging service.**

electronic messaging service: [A] service providing interpersonal messaging capability; meeting specific functional, management, and technical requirements; and yielding a business-quality electronic mail [e-mail] service suitable for the conduct of official government business. [INFOSEC-99] *Synonym* **messaging service.**

electronic payment gateway: Software and hardware interfacing merchants and credit-card authorization networks. [Mattila]

electronic publishing (e-publishing): The process of creating messages, distributing them, and reproducing them entirely online, often with a capability for feedback. *Note:* Unlike *desktop publishing,* electronic publishing does not usually generate hardcopy.

electronic reconnaissance: The detection, identification, evaluation, and location of foreign electromagnetic radiations emanating from other than nuclear detonations or radioactive sources. [JP 1-02]

electronic signature: *See* **digital signature.**

electronics intelligence (ELINT): Technical and geolocation intelligence information derived from foreign noncommunications electromagnetic radiations emanating from other than nuclear detonations or radioactive sources. [JP 1-02]

electronics security (ELSEC): 1. Protection resulting from measures designed to deny unauthorized persons information derived from the interception and analysis of noncommunications electromagnetic radiations. [INFOSEC-99] **2.** The protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from their interception and study of noncommunications electromagnetic radiations, *e.g.,* radar. [JP 1-02]

electronic switching system (ESS): 1. A telephone switching system based on the principles of time-division multiplexing of digitized analog signals. *Note:* An electronic switching system digitizes analog signals from subscribers' loops, and interconnects them by assigning the digitized signals to the appropriate time slots. It may also interconnect digital data or voice circuits. **2.** A switching system with major devices constructed of semiconductor components. *Note:* A semi-electronic switching system that has reed relays or crossbar matrices, as well as semiconductor components, is also considered to be an ESS.

electronic till: The part of e-commerce (electronic commerce) software that processes real-time credit card payments. [After Mattila]

electronic wallet: A Web-browser plug-in that handles and stores a user's credit card and payment information. [Mattila]

electronic warfare (EW): Any military action involving the use of electromagnetic and directed energy to control the electromagnetic spectrum or to attack the enemy. The three major subdivisions within electronic warfare are: electronic attack, electronic protection, and electronic warfare support. [After JP1]

electronic warfare support measures (ESM): 1. That division of electronic warfare involving actions taken under direct control of an operational commander to search for, intercept, identify, and locate sources of radiated electromagnetic energy for the purpose of immediate threat recognition. Thus, electronic warfare support measures (ESM) provide a source of information required for immediate decisions involving electronic countermeasures (ECM), electronic counter-countermeasures (ECCM), avoidance, targeting, and other tactical employment of forces. Electronic warfare support measures data can be used to produce signals intelligence (SIGINT), both communications intelligence (COMINT) and electronics intelligence (ELINT). **2.** That division of electronic warfare involving action taken to search for, intercept, identify, and locate radiated electromagnetic energy for the purpose of immediate threat recognition. It provides a source of information required for immediate decisions involving electronic countermeasures, electronic counter-countermeasures, and other tactical actions such as avoidance, targeting and homing.

electro-optical intelligence (ELECTRO-OPTINT): Intelligence information other than signals intelligence derived from the optical monitoring of the electromagnetic spectrum from ultraviolet (0.01 μm) through the far infrared (1000 μm). [JP1]

electro-optic detector: *Deprecated term* . *See* **optoelectronic.**

electro-optic effect: Any one of a number of phenomena that occur when an electromagnetic wave in the optical spectrum interacts with an electric field, or with matter under the influence of an electric field. *Note 1:* Two of the most important electro-optic effects having application as modulation mechanisms in optical communication are the Kerr effect and the Pockels effect, in which birefringence is induced or modified in a liquid (Kerr effect) or solid (Pockels effect). *Note 2:* The term *"electro-optic"* is often erroneously used as a synonym for *"optoelectronic."*

electro-optic modulator: An optical device in which a signal-controlled element is used to modulate a beam of light. *Note 1:* The modulation may be imposed on the phase, frequency, amplitude, or direction of the modulated beam. *Note 2:* Modulation bandwidths into the gigahertz range are possible using laser-controlled modulators.

electro-optics: The technology associated with those components, devices and systems which are designed to interact between the electromagnetic (optical) and the electric (electronic) state. [JP1] *Note 1:* The operation of electro-optic devices depends on modification of the refractive index of a material by electric fields. *Note 2:* In a Kerr cell, the refractive index change is proportional to the square of the electric field, and the material is usually a liquid. *Note 3:* In a Pockels cell, the refractive index change varies linearly with the electric field, and the material is a crystal. *Note 4: "Electro-optic"* is often erroneously used as a synonym for "*optoelectronic"* .

ELECTRO-OPTINT: *Acronym for* **electro-optical intelligence.**

electrophotographic recording: Recording in which light is used to produce a change in electrostatic charge distribution to form a photographic image. *Note:* Subsequent processing is usually required to make the image visible.

electrosensitive recording: Recording in which an electrical signal is directly impressed on the record medium.

electrostatic discharge (ESD): The rapid, spontaneous transfer of electrostatic charge induced by a high electrostatic field. Usually the charge flows through a spark (static discharge) between two bodies at different electrostatic potentials as they approach one another. [T1.321-1995]

electrostatic discharge (ESD) protective: Having the capability of dissipating or limiting the generation of electrostatic charge, or of providing shielding from electrostatic discharges or electrostatic fields. [T1.321-1995]

electrostatic field: The electric field produced by an electrostatic charge. [T1.308-1996]

electrostatic recording: Recording by means of a signal-controlled electrostatic field. *Note:* Subsequent processing is usually required to make the image visible.

electrostatic shield: A barrier or enclosure that attenuates an electrostatic field. [T1.321-1995]

electrothermal recording: That type of recording produced principally by signal-controlled thermal action.

elemental area: In facsimile transmission systems, any segment of a scanning line, the dimension of which along the line is exactly equal to the nominal line width. *Note:* An elemental area is not necessarily the same as the scanning spot.

elementary signaling element: *See* **unit interval.**

elevated duct: An atmospheric duct consisting of a high-density air layer that starts at high altitudes and continues upward or remains at high altitudes, thus affecting primarily very-high-frequency (VHF) transmission. [From Weik '89]

ELF: *Abbreviation for* **extremely low frequency.**

ELINT: *Acronym for* **electronics intelligence.**

elliptical polarization: In electromagnetic wave propagation, polarization such that the tip of the electric field vector describes an ellipse in any fixed plane intersecting, and normal to, the direction of propagation. *Note 1:* An elliptically polarized wave may be resolved into two linearly polarized waves in phase quadrature with their polarization planes at right angles to each other. [2196] *Note 2:* Circular and linear polarization are special cases of elliptical polarization.

elliptic curve private key (d): In cryptology and within particular elliptic curve parameters, a statistically unique and unpredictable integer in the interval *[1, n - 1],* where *n* is the prime order of the base point *G.* [After X9.62]

elliptic curve public key: In cryptography, given particular elliptic curve parameters (and an elliptic curve private key *d*), the elliptic curve point $Q = dP$. [After X9.62]

ELSEC: *Acronym for* **electronics security.**

e-mail: *also* **E-mail** , and **email** , *Abbreviation for* **electronic mail.** An electronic means for communication in which (a) usually text is transmitted (but sometimes also graphics and/or audio information), (b) operations include sending, storing, processing, and receiving information, (c) users are allowed to communicate under specified conditions, and (d) messages are held in storage until called for by the addressee. Some e-mail software permits the attachment of separate electronic files, *e.g.,* word-processor files, graphics files, audio files.

e-mail address: A character string that identifies, on a network, the point of presence of a user or account, and includes all information needed to direct a communication. An Internet e-mail address includes: (a) a user name that identifies a network account; (b) the channel operator @ (pronounced "at"); and (c) a domain name indicating the server computer. An e-mail address outside the United States also contains a two-letter suffix that identifies the country in which the server is located (*e.g.,* .jp = Japan, .de = Germany, .uk = United Kingdom). An example of the Internet e-mail address format is *john.doe@usagency.gov* . In this example, the addressee is John Doe at some federal agency, which is a government entity.

e-mail exploder: *Synonym* **mail exploder.**

emanations security (EMSEC): The protection resulting from all measures designed to deny unauthorized persons information of value that might be derived from intercept and analysis of compromising emanations from other than crypto-equipment and telecommunications systems.

embed: 1. In Web page design, to link or to insert an inline video image or sound file into the page so that it is hyperlinked and clickable. **2.** In a Web page, an HTML tag indicating an embedded object in a Web page.

embedded adaptive differential pulse code modulation (embedded ADPCM): Modulation achieved using algorithms that quantize the difference between the input and the estimated signal into core bits and enhancement bits. [T1.310-1991]

embedded base equipment: Customer-premises equipment that had been provided by the Bell Operating Companies prior to January 1, 1984, that was ordered transferred from the BOCs to AT&T by court order.

embedded computer: [A] computer system that is an integral part of a larger system. [INFOSEC-99]

embedded cryptographic system: [A] cryptosystem performing or controlling a function as an integral element of a larger system or subsystem. [INFOSEC-99]

embedded cryptography: Cryptography engineered into an equipment or system whose basic function is not cryptographic. [INFOSEC-99]

embedded customer-premises equipment: Telephone-company-provided premises equipment in use or in inventory of a regulated telephone utility as of divestiture (December 31, 1983).

embedded operations channel (EOC): A channel provided on telecommunications facilities to support administration and maintenance. For primary rate access, the EOC is the extended superframe (ESF) data link. [T1.408-1990]

embedded processor: In non-ADP equipment, a CPU and firmware that are critical to the operation of the equipment. *Note:* An embedded processor is not subject to FIRMR regulation when used for control of devices such as weapons systems, communications devices, home appliances, automobile diagnostics, *etc.*

EMC: *Abbreviation for* **electromagnetic compatibility.**

EMC analysis: Analysis of a system, subsystem, facility, or equipment to determine its electromagnetic compatibility (EMC) status. *Note:* The EMC analysis may be theoretical analysis before construction or an empirical analysis after construction.

EMCON: *Abbreviation for* **emission control.**

EMD: *Abbreviation for* **equilibrium mode distribution.**

EME: *Abbreviation for* **electromagnetic environment.**

Emergency Broadcast System (EBS): The EBS is composed of AM, FM, and TV broadcast stations; low-power TV stations; and non-Government industry entities operating on a

voluntary, organized basis during emergencies at national, state, or operational (local) area levels. [47CFR]

emergency changeover: A modified changeover procedure that is used whenever the normal changeover procedure cannot be used because of failure(s) in the signaling terminal equipment or inaccessibility between the two involved signaling points. [T1.226-1992]

emergency locator transmitter (ELT): A transmitter of an aircraft or survival craft actuated manually or automatically that is used as an alerting and locating aid for survival purposes. [NTIA] [RR]

emergency position-indicating radiobeacon station: A station in the mobile service the emissions of which are intended to facilitate search and rescue operations. [NTIA] [RR]

emergency response link (ERlink): A web site intended for information sharing by the Federal Response Plan (FRP) community.

emergency service attendant position (ESAP): A special attendant position used to terminate emergency calls. It provides sufficient signaling and display capabilities to support the functionality of routed, bridged and transferred emergency calls. [After T1.628-1993]

emergency service call: A call identified as receiving emergency service treatment. The call has an associated CESID (caller's emergency service ID), bridging, and transfer numbers. [T1.628-1993]

emergency service routing exchange: The first exchange in the call connection capable of invoking the routing portion of the RBTESC service. This may be a local exchange or a transit exchange. It recognizes the emergency call and determines the caller's emergency service zone (ESZ), the transfer number(s), and the priority of the call. [T1.628-1993]

emergency service transfer exchange: A local exchange that is capable of invoking the bridging and transfer portions of the RBTESC (routing, bridging and transfer of emergency service calls) service. The served user is directly connected to this exchange. [T1.628-1993]

emergency service zone (ESZ): A geographical area within the emergency service serving area in which all callers are served by the same set of emergency service agencies. [T1.628-1993]

emergency short-term: A period of not more than 72 consecutive hours (the aggregate of which do not exceed 15 days per year) during which emergency calls and services are expedited by emergency response teams. [After T1.304-1989]

EMI: *Abbreviation for* **electromagnetic interference.**

emission: 1. Electromagnetic energy propagated from a source by radiation or conduction. *Note:* The emission may be either desired or undesired and may occur anywhere in the electromagnetic spectrum. **2.** Radiation produced, or the production of radiation, by a radio transmitting station. For example, the energy radiated by the local oscillator of a radio receiver would not be an emission but a radiation. [NTIA] [RR] **3.** The electromagnetic energy radiated from an antenna. [47CFR]

emission control (EMCON): The selective and controlled use of electromagnetic, acoustic, or other emitters to optimize command and control capabilities while minimizing, for operations security (OPSEC): (a) detection by enemy sensors; (b) to minimize mutual interference among friendly systems; and/or (c) to execute a military deception plan. [After JP1]

emission security: Protection resulting from measures taken to deny unauthorized persons information derived from intercept and analysis of compromising emanations from crypto-equipment or an information system (IS). [INFOSEC-99] *Synonym [in INFOSEC]* **emissions security.**

emission spectrum: Of a radio emission, the distribution of power or energy as a function of frequency.

emissions security: *See* **emission security.**

emissivity: The ratio of power radiated by a substance to the power radiated by a blackbody at the same temperature.

emoticon: *Abbreviation for* **emotion icon.** In electronic communication, a multi-character symbol, created with ASCII characters, to express emotions and physical characteristics that would normally be communicated by body language and facial expressions in face-to-face communication. *Note:* Emoticons are most often used in informal e-mail messages and newsgroup postings and are usually designed to be viewed sideways. Some examples of emoticons are:

Symbol	Meaning	Why?
:-)	happiness	a smiley face
:-(	unhappiness, disappointment	a frown
;-)	slyness, "just kidding"	a wink
:-o	surprise, shock	open mouth
:-\	irony	tilted mouth

EMP: *Abbreviation for* **electromagnetic pulse.**

emphasis: In FM transmission, the intentional alteration of the amplitude-vs.-frequency characteristics of the signal to reduce adverse effects of noise in a communication system. *Note:* The high-frequency signal components are emphasized to produce a more equal modulation index for the transmitted frequency spectrum, and therefore a better signal-to-noise ratio for the entire frequency range.

EMR: *Abbreviation for* **electromagnetic radiation.**

EMR hazards: *Abbreviation for* **electromagnetic radiation hazards.**

e.m.r.p.: *Abbreviation for* **effective monopole radiated power.**

EMS: *Abbreviation for* **electronic message system.**

EMSEC: *Acronym for* **emanations security.**

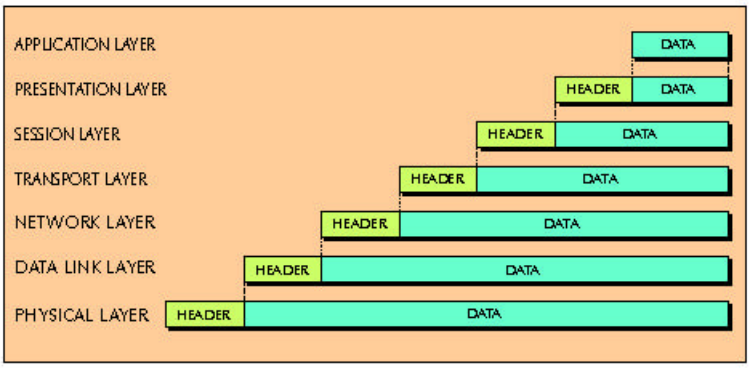
emulate: To duplicate the functions of one system with a different system, so that the second system appears to behave like the first system. *Note:* For example, a computer emulates another, different computer by accepting the same data, executing the same programs, and achieving the same results.

EMV: *Abbreviation for* **electromagnetic vulnerability.**

enabling signal: A signal that permits the occurrence of an event.

en-bloc signaling: Signaling in which address digits are transmitted in one or more blocks, each block containing sufficient address information to enable switching centers to carry out progressive onward routing.

encapsulation: In open systems, the technique used by layered protocols in which a lower layer protocol accepts a message from a higher layer protocol and places it in the data portion of a frame in the lower layer.



OSI--Reference Model example of data encapsulation

encipher: 1. [To] Convert plain text into an unintelligible form by means of a cipher. [NIS] **2.** [To] convert plain text to cipher text by means of a cryptographic system. [INFOSEC-99]

encode: 1. To convert data by the use of a code, frequently one consisting of binary numbers, in such a manner that reconversion to the original form is possible. **2.** [To] Convert plain text to cipher text by means of a code. [INFOSEC-99] **3.** To append redundant check symbols to a message for the purpose of generating an error detection and correction code.

encoder: *See* **analog-to-digital converter.**

encoding: *See* **analog encoding.**

encoding law: A law defining the relative values of the quantum steps used in quantizing and encoding signals.

encrypt: 1. [A] generic term encompassing encipher and encode. [INFOSEC-99] **2.** To convert plain text into unintelligible forms by means of a cryptosystem. *Note:* The term *encrypt* covers the meanings of *encipher* and *encode.* [JP1-02]

encryption algorithm: 1. In cryptography, a set of mathematically expressed processes for rendering information into apparently meaningless form by developing a series of transformations to the normal representation of the information through the use of variable elements controlled by the use of a key. [After X9.65] **2.** [A] set of mathematically expressed rules for rendering data unintelligible by executing a series of conversions controlled by a key. [INFOSEC-99]

encryption element: A group of contiguous characters to be encrypted. [After X9.23]

end certificate: The last certificate considered in a certificate chain.

end distortion: In start-stop teletypewriter operation, the shifting of the end of all marking pulses, except the stop pulse, from their proper positions in relation to the beginning of the next start pulse. *Note 1:* Shifting of the end of the stop pulse is a deviation in character time and rate rather than an end distortion. *Note 2:* Spacing end distortion is the termination of marking pulses before the proper time. *Note 3:* Marking end distortion is the continuation of marking pulses past the proper time. *Note 4:* The magnitude of the distortion is expressed as a percentage of an ideal pulse length.

end entity: 1. In cryptography, a certificate subject that (a) uses its private key for purposes other than signing certificates, or (b) uses its public key for purposes other than signing certificates. [After X.509] **2.** The subject of the final certificate in a certification path, *i.e.,* that subject which is not a certificate authority. [After X9.5]

end exchange: *Synonym* **end office.**

end finish: For an optical fiber, the optical quality of the surface at the end of the fiber.

end instrument: A communication device that is connected to the terminals of a circuit.

end office (EO): A central office at which user lines and trunks are interconnected. *Synonym* **end exchange.**

end-of-medium character: A control character that may be used to identify either the physical end of a data medium or the end of the usable or used portion of a data medium. [From Weik '89]

end-of-message function: In tape relay procedure, the letter and key functions, including the end-of-message indicator, that constitute the last format line.

end-of-selection character: The character that indicates the end of the selection signal.

end-of-text character (ETX): A transmission control character used to terminate text.

end-of-transmission-block character (ETB): A transmission control character used to indicate the end of a transmission block of data when data are divided into such blocks for transmission purposes.

end-of-transmission character (EOT): A transmission control character used to indicate the conclusion of a transmission that may have included one or more texts and any associated message headings. *Note:* An EOT is often used to initiate other functions, such as releasing circuits, disconnecting terminals, or placing receive terminals in a standby condition.

endpoint node: In network topology, a node connected to one and only one branch. *Synonym* **peripheral node.**

end system (ES): A system containing the application processes that are the ultimate source and sink of user traffic. *Note:* The functions of an end system can be distributed among two or more processors or computers.

end-to-end communication: A direct peer to peer communication of terminal equipment (TE) to TE, or TE to a network gateway supporting, for example, PSPDN interworking (public switched packet data network interworking). [T1.606-1990]

end-to-end confidentiality/integrity: 1. A characteristic of preserving the privacy and/or unadulterated nature of communicated data across networks which may include, *e.g.,* application relays in store-and-forward or chained applications. **2.** The capability that the application relay should be able to forward data (or parts thereof) as received at the relay without needing to completely decode/decrypt that data. (*See also* ISO/IEC 10745.) [After T1.243-1995]

end-to-end encryption: [The] encryption of information at its origin and decryption at its intended destination without intermediate decryption. [INFOSEC-99]

end-to-end security: 1. Safeguarding information in a secure telecommunication system by cryptographic or protected distribution system means from point of origin to point of destination. [NIS] **2.** Safeguarding information in an information system (IS) from point of origin to point of destination. [INFOSEC-99]

end-to-end signaling: The capability changeover procedure to be used whenever the normal one cannot be accomplished (*i.e.,* in case of some failure in the signaling terminal equipment or in case of inaccessibility between the two involved signaling points). [T1.110-1987]

endurability: The property of a system, subsystem, equipment, or process that enables it to continue to function within specified performance limits for an extended period of time, usually months, despite a severe natural or man-made disturbance, such as a nuclear attack, or a loss of external logistic or utility support. *Note:* Endurability is not compromised by temporary failures when the local capability exists to restore and maintain the system, subsystem, equipment, or process to an acceptable performance level.

endurable operation: *See* **endurability.**

end user: The ultimate user of a telecommunications service.

engineering channel: *Synonym* **orderwire circuit.**

engineering orderwire (EOW): *Synonym* **orderwire circuit.**

enhanced 911 (E911) system: A system that establishes connections between customer installations (CIs) and constituent public service access points (PSAPs), provides automatic location information (ALI), and has provisions for selective routing. [T1.414-1998]

enhanced-quality television: *Synonym [in ITU-T usage]* **improved-definition television.**

enhanced service: Service, offered over commercial carrier transmission facilities used in interstate communications, that employs computer processing applications that act on the format, content, code, protocol, or similar aspects of the subscriber's transmitted information; provides the subscriber with additional, different, or restructured information; or involves subscriber interaction with stored information.

enhanced service provider: A company that provides, via a connection to an exchange carrier, services that add value to voice and/or data information. [T1.251-1996]

ENQ: *Abbreviation for* **enquiry character.**

enquiry character (ENQ): A transmission control character used as a request for a response from the station with which a connection has been set up. *Note:* The response may include station identification, the type of equipment in service, and the status of the remote station.

***E* /*N* ratio:** In the transmission of a pulse of an electromagnetic wave representing a bit, the ratio of (a) the energy in each bit, E , to (b) the noise energy density per hertz, N . *Note: E* is usually expressed in joules per bit and *N* is usually expressed in watts per hertz. Thus, the *E* /*N* ratio is hertz-seconds per bit. A joule is a watt-second and a hertz is a cycle per second. Thus, the *E* /*N* ratio is actually cycles per bit. However, if a cycle is a bit, then the *E* /*N* ratio is dimensionless. [From Weik '89]

entity: The OSI term for a layered-protocol machine.

entrance facility: The entrance to a building for both public and private network service cables (including antenna transmission lines, where applicable), including the entrance point at the building wall or floor, and continuing to the entrance room or entrance space. [After ANSI/TIA/EIA-568A]

entrance point: In a building, the point of emergence of telecommunications service cables through an exterior wall, floor slab, or from a rigid metal conduit or intermediate metal conduit. [After ANSI/TIA/EIA-568A]

entrance room: In a building, a space in which the joining of inter- and/or intrabuilding telecommunications backbone facilities takes place. *Note:* An entrance room may serve also as an equipment room. [After ANSI/TIA/EIA-568A]

entrapment: 1. In cryptosystems, the deliberate planting of apparent flaws in a data processing system for the purpose of detecting attempted penetrations or for confusing an intruder about which flaws to exploit. [2382-pt.8] **2.** [The] deliberate planting of apparent flaws in an information system (IS) for the purpose of detecting attempted penetrations. [INFOSEC-99]

envelope: The boundary of the family of curves obtained by varying a parameter of a wave. *See figure under* **amplitude modulation.**

envelope delay distortion: Signal distortion that results when the rate of change of phase shift with frequency over the necessary bandwidth of the signal is not constant. *Note:* Envelope delay distortion is usually expressed as one-half the difference between the delays of the two extremes of the necessary bandwidth.

environmental control: *See* **air-conditioning.**

environmental security: 1. The security that is inherent in the physical surroundings in which a facility or functional unit is located, such as on ships, on aircraft, and in underground vaults, where locations by their nature provide a certain amount of protection against exploitation of compromising emanation even before other protective measures are implemented. **2.** The application of electrical, acoustic, physical, and other safeguards to an area to minimize the risk of unauthorized interception of information from the area. [From Weik '89]

EO: *Abbreviation for* **end office.**

EOT: *Abbreviation for* **end-of-transmission character.**

EOW: *Abbreviation for* **engineering orderwire.**

ephemeris: A electronic or hard-copy table or listing of the predicted positions of astronomical bodies such as the planets or the Moon; and by extension, the predicted positions of artificial satellites, such as communications satellites, orbiting the Earth. *Plural* **ephemerides.** *Note 1:* Ephemerides are essential tools for accurate aiming of movable high-gain antennas at, *e.g.,* communications satellites, especially ones that exhibit significant movement relative to a fixed position on the Earth. *Note 2:* Precise ephemerides of the satellites used in global navigation systems, such as GPS, are required for the proper functioning of these systems. [FAA]

E-plane bend: *Synonym* **E-bend.**

epoch date: A date in history, chosen as the reference date from which time is measured. *Note 1:* An example of an epoch date is the beginning instant of January 1, 1900, Universal Time, for Transmission Control Protocol/Internet Protocol (TCP/IP). *Note 2:* TCP/IP programs exchange date or time-of-day information with time expressed as the number of seconds past the epoch date.

equal access costs: Include only initial incremental presubscription costs and initial incremental expenditures for hardware and software related directly to the provision of equal access which would not be required to upgrade the switching capabilities of the office involved absent the provisions of equal access. [47 CFR Pt.36-A]

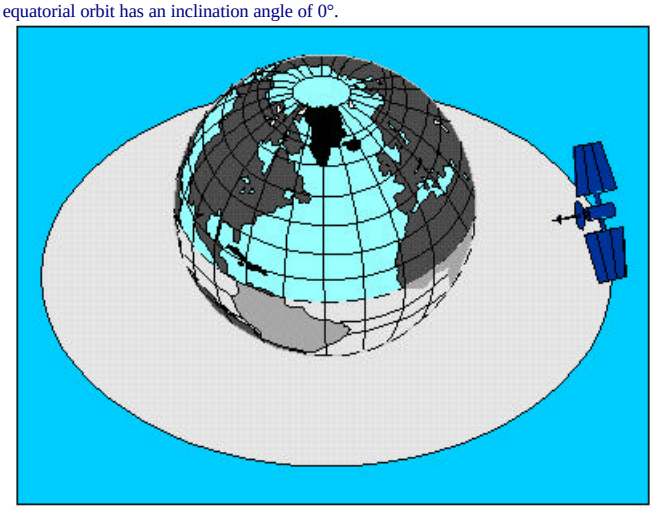
equal gain combiner: A diversity combiner in which the signals on each channel are added. *Note:* The channel gains can be made to remain always and everywhere equal so that the resultant signal remains approximately constant.

equalization: The maintenance of system transfer function characteristics within specified limits by modifying circuit parameters. *Note:* Equalization includes modification of circuit parameters, such as resistance, inductance, or capacitance.

equal-length code: A telegraph or a data code in which (a) all the words or code groups are composed of the same number of unit elements, (b) each element has the same duration or spatial length, (c) each word or code group has the same duration or spatial length, and (d) usually each word or code group has the same number of characters. [From Weik '89]

equal-level patch bay: An analog patching facility at which all nominal input and output voice frequency levels are uniform. *Note:* The use of an equal-level patch bay permits patching without making transmission level adjustments.

equatorial orbit: For a satellite orbiting the Earth, an orbit in the equatorial plane. *Note:* An equatorial orbit has an inclination angle of 0°.



equatorial orbit

equilibrium coupling length: *Synonym* **equilibrium length.**

equilibrium length: For a specific excitation condition, the length of multimode optical fiber necessary to attain equilibrium mode distribution. *Note:* Equilibrium length is sometimes used to refer to the longest such length, as would result from a worst-case, but undefined, excitation. *Synonyms* **equilibrium coupling length, equilibrium mode distribution length.**

equilibrium mode distribution (EMD): That condition in a multimode fiber wherein after propagation has taken place for a certain distance, called the *"equilibrium length,"* the relative power distribution among modes becomes statistically constant and remains so for the course of further propagation down the fiber. *Note 1:* In practice, the equilibrium length may vary from a fraction of a kilometer to more than a kilometer. *Note 2:* After the equilibrium length has been traversed, the numerical aperture of the fiber's output is independent of the numerical aperture of the optical source, *i.e .*, beam, that drives the fiber. This is because of mode coupling and stripping, primarily by small perturbations in the fiber's geometry which result from the manufacturing and cabling processes. *Note 3:* In the ray-optics analogy, the equilibrium mode distribution may be loosely thought of as a condition in which the "outermost rays" in the fiber core are stripped off by such phenomena as microbends, and only the "innermost rays" continue to propagate. In a typical 50-μm core multimode graded-index fiber, light propagating under equilibrium conditions occupies essentially the middle seven-tenths of the core and has a numerical aperture approximately seven-tenths that of the full numerical aperture of the fiber. This is why in-line optical attenuators based on the principle of gap loss may be ineffective or induce a lower-than-rated loss if they are inserted near the optical receiver. To be fully effective, gap-loss attenuators should be inserted near the optical transmitter, where the core is fully filled. [After FAA] *Synonyms* **equilibrium mode power distribution, steady-state condition.**

equilibrium mode distribution length: *Synonym* **equilibrium length.**

equilibrium mode power distribution: *Synonym* **equilibrium mode distribution.**

equilibrium mode simulator: For an optical fiber, a device or optical system used to create an approximation of the equilibrium mode distribution.

equipment clock: A clock that satisfies the particular needs of equipment and, in some cases, may control the flow of data at the equipment interface.

equipment intermodulation noise: Intermodulation noise introduced into a system by a specific piece of equipment.

equipment room: In a building, a centralized space for telecommunications equipment that serves the occupants of the building. *Note:* An equipment room is considered distinct from a telecommunications closet because of the nature or complexity of the equipment housed by the equipment room. [After ANSI/TIA/EIA-568A]

equipment side: The portion of a device that is directly connected to facilities internal to a station, such as the data terminal equipment (DTE) side of the DTE/data-circuit-terminating (DCE) interface, switches, and user end instruments.

equipotential ground plane: A mass, or bonded masses, of conducting material that offer a negligible impedance to current flow. *Note:* Equipotential ground planes may be in direct contact with the earth or may be physically isolated from the earth and suitably connected to it.

equivalent gauge: A standard cross section of cable conductors for use in equating the metallic content of cable conductors of all gauges to a common base. [47 CFR Pt.36-A]

equivalent network: 1. In a system, a network that may replace another network without altering the performance of the system. **2.** A network with external characteristics that are identical to those of another network. **3.** A theoretical representation of an actual network.

equivalent noise resistance: A quantitative representation in resistance units of the spectral density of a noise-voltage generator, given by $R_n = (\pi W_n)/(kT_0)$, where W_n is the spectral density, k is Boltzmann's constant, T_0 is the standard noise temperature (290 K), and $kT_0 = 4.00 \times 10^{-21}$ watt-seconds. *Note:* The equivalent noise resistance in terms of the mean-square noise-generator voltage, e^2, within a frequency increment, Δf, is given by $R_n = e^2/(4kT_0\Delta f)$.

equivalent noise temperature: The temperature, usually expressed in kelvins, of a hypothetical matched resistance at the input of an assumed noiseless device, such as a noiseless amplifier, that would account for the measured output noise. [From Weik '89]

equivalent pair kilometers: The product of sheath kilometers and the number of equivalent gauge pairs of conductors in a cable. [47 CFR Pt.36-A]

equivalent pulse code modulation (PCM) noise: The amount of thermal noise power on a frequency-division multiplexed (FDM) or wire channel necessary to approximate the same judgment of speech quality created by quantizing noise in a PCM channel. *Note 1:* The speech quality judgment is based on comparative tests. *Note 2:* Generally, 33.5 dBrnC ±2.5 dB is considered the approximate equivalent PCM noise of a 7-bit PCM system.

equivalent satellite link noise temperature: The noise temperature referred to the output of the receiving antenna of the Earth station corresponding to the radio-frequency noise power which produces the total observed noise at the output of the satellite link excluding noise due to interference coming from satellite links using other satellites and from terrestrial systems. [NTIA] [RR]

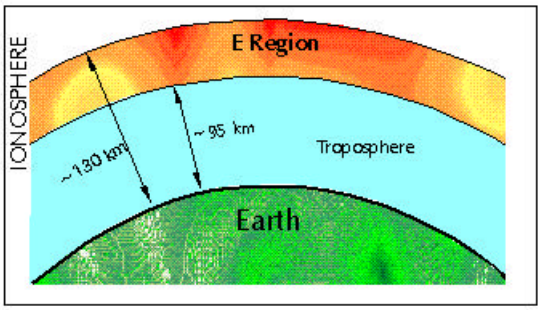
equivalent sheath kilometers: The product of (a) the length of a section of cable in kilometers (sheath kilometers) and (b) the ratio of the metallic content applicable to a particular group of conductors in the cable (*e.g.,* conductors assigned to a category) to the metallic content of all conductors in the cable. [47 CFR Pt.36-A]

erase: 1. To obliterate information from a storage medium, such as to clear or to overwrite. **2.** In a magnetic storage medium, to remove all stored data by (a) changing the medium to an unmagnetized state or (b) changing the medium to a predetermined magnetized state. **3.** In paper tape and punched card storage, to punch a hole at every punch position.

erasure: [A] process intended to render magnetically stored information irretrievable by normal means. [INFOSEC-99]

erect position: In frequency-division multiplexing, a position of a translated channel in which an increase signal frequency in the untranslated channel causes an increase signal frequency in the translated channel. *Synonym* **upright position.**

E region: That portion of the ionosphere existing between approximately 95 and 130 km above the surface of the Earth. *Note:* The E Region lies between the D and F regions. *Synonyms* **Heaviside layer, Kennelly-Heaviside layer.**



E region

erlang: A dimensionless unit of the average traffic intensity (occupancy) of a facility during a period of time, usually a busy hour. *Note 1:* Erlangs, a number between 0 and 1, inclusive, is expressed as the ratio of (a) the time during which a facility is continuously or cumulatively occupied to (b) the time that the facility is available for occupancy. *Note 2:* Communications traffic, measured in erlangs for a period of time, and offered to a group of shared facilities, such as a trunk group, is equal to the average of the traffic intensity, in erlangs for the same period of time, of all individual sources, such as telephones, that share and are served exclusively by this group of facilities. *Synonym* **traffic unit.**

ER link: *Abbreviation for* **emergency response link.**

erroneous block: A block in which there are one or more erroneous bits.

error: 1. The difference between a computed, estimated, or measured value and the true, specified, or theoretically correct value. **2.** A deviation from a correct value caused by a malfunction in a system or a functional unit. *Note:* An example of an error is the occurrence of a wrong bit caused by an equipment malfunction.

error blocks: In video, a form of block distortion where one or more blocks in the image bear no resemblance to the current or previous scene and often contrast greatly with adjacent blocks. [After T1.801.02-1996]

error budget: The bit-error-ratio requirement allocated to the respective segments of a communications system, such as trunking, switching, access, and terminal devices, in a manner that satisfies the specified system end-to-end bit-error-ratio requirement for transmitted traffic.

error burst: A contiguous sequence of symbols, received over a data transmission channel, such that the first and last symbols are in error and there exists no contiguous subsequence of *m* correctly received symbols within the error burst. *Note:* The integer parameter *m* is referred to as the guard band of the error burst. The last symbol in a burst and the first symbol in the following burst are accordingly separated by *m* correct bits or more. The parameter *m* should be specified when describing an error burst.

error concealment: In the receipt and processing of digitized television transmissions, a method of covering up errors from dropouts by using the redundancy in most adjacent-frame image information. *Note:* Video images are frequently nearly identical from frame to frame. Adjacent video lines frequently have almost the same detail. It becomes possible, therefore, when a "burst error" involving the modification or loss of many recorded bits occurs, to determine (from adjacent image segments) a most probable substitution. Such substitutions, when infrequent and supported by the image redundancy, are often accepted by the viewers as "correct." (This is a degree of freedom in image data recovery that is obviously not utilized when recording scientific and financial data.) [After SMPTE] The additional information needed by the algorithm for decision and substitution is usually

provided by a data-storage cache established during reproduction.

error control: Any technique that will detect or correct errors.

error-correcting code: A code in which each telegraph or data signal conforms to specific rules of construction so that departures from this construction in the received signal can generally be automatically detected and corrected. *Note 1:* If the number of errors is less than or equal to the maximum correctable threshold of the code, all errors will be corrected. *Note 2:* Error-correcting codes require more signal elements than are necessary to convey the basic information. *Note 3:* The two main classes of error-correcting codes are block codes and convolutional codes.

error-correcting system: In digital data transmission, a system employing either forward error correction (FEC) or automatic repeat-request (ARQ) techniques such that most transmission errors are automatically removed from the data unit prior to delivery to the destination facility.

error correction: In the reception or processing of digital data, the use of overhead bits and appropriate algorithms to detect, and within certain constraints, restore a corrupted data stream or block with a high degree of confidence. *Note 1:* In addition to applications having to do with conventional data processing and storage, error correction can be used in specialized applications such as the real-time correction of corrupted incoming digital television signals. *Note 2:* The addition of overhead bits (a) increases the bit rate required to transmit a given amount of digital payload, and (b) everything else being equal (*i.e.,* in the absence of subsequent data compression measures) increases the storage space (*e.g.,* disk space) required to store a given amount of digital payload.

error-detecting-and-feedback system: *Synonym* **ARQ.**

error-detecting code: A code in which each telegraph or data signal conforms to specific rules of construction, so that departures from this construction in the received signal can generally be detected automatically. *Note:* Error-detecting codes require more signal elements than are necessary to convey the basic information.

error-detecting system: A system employing an error-detecting code and so arranged that any signal detected as being in error is either deleted from the data delivered to the data sink, in some cases with an indication that such deletion has taken place, or delivered to the data sink together with an indication that the signal is in error.

errored second (ES): 1. A 1-second period with one or more errored blocks. **2.** A 1-second interval with one or more bit errors. *Note 1:* Severely errored seconds (SES) are defined as a subset of ES. *Note 2:* A period of loss of signal is considered as a period of errored blocks. [T1.514-1995]

errored unit of time: A specified period of time, during which bits are transferred from a source to a destination, that contains at least one bit in error. Examples of an errored unit of time are an errored second (ES), and a severely errored second. [After T1.507-1996]

error-free second (EFS): A 1-second interval in which no errored blocks are received. *Note:* In general, measurement is over time and is stated as a percentage, *i.e.,* % EFS. [T1.514-1995]

error message: In a computer or communications system, a message that indicates that an error has been made and, sometimes, the nature or type of error. [From Weik '89]

error rate: *Deprecated term. See* **error ratio.**

error ratio: The ratio of the number of bits, elements, characters, or blocks incorrectly received to the total number of bits, elements, characters, or blocks sent during a specified time interval. *Note:* For a given communication system, the bit error ratio will be affected by both the data transmission rate and the signal power margin.

error signal: In computer and communications systems, an audio or visual signal that indicates that an error has been made by the system or its operator. *Note:* In most systems, the error signal accompanies an error message and is used to draw operator attention to the error message. [From Weik '89]

e.r.p. [*or* ERP]: *Abbreviation for* **effective radiated power.**

ES: *Abbreviation for* **end system, expert system.**

ESC: *Abbreviation for* **escape character.**

escape character (ESC): 1. In alphabet coding schemes, a specially designated character, the occurrence of which in the data signifies that one or more of the characters to follow are from a different character code, *i.e.,* have meanings other than normal. **2.** In a text-control sequence of characters, a control character that indicates the beginning of the sequence and the end of any preceding text.

escape code: An indicator consisting of one or more digits which is defined in a given numbering plan and is used to indicate that the digits that follow are from a specific numbering plan which is different from the given number plan. *Note:* An escape code can be carried forward through the originating network and can be carried across internetwork and international boundaries. [T1.Rpt30]

ESD: *Abbreviation for* **electrostatic discharge.**

ESF: *Abbreviation for* **extended superframe.**

ESM: *Abbreviation for* **electronic warfare support measures.**

ESS: *Abbreviation for* **electronic switching system.**

essential service: A network-provided service feature in which a priority dial tone is furnished. *Note 1:* Essential service is typically provided to fewer than 10 % of network users. *Note 2:* Essential service is recommended for use in conjunction with NS/EP telecommunications services. *Synonym* **critical service.**

ETB: *Abbreviation for* **end-of-transmission-block character.**

Ethernet: A standard protocol (IEEE 802.3) for a 10-Mb/s baseband local area network (LAN) bus using carrier-sense multiple access with collision detection (CSMA/CD) as the access method, implemented at the Physical Layer in the ISO Open Systems Interconnection--Reference Model, establishing the physical characteristics of a CSMA/CD network. *Note 1:* Ethernet is a standard for using various transmission media, such as coaxial cables, unshielded twisted pairs, and optical fibers. *Note 2:* The IEEE-802.3 standard is based on a proprietary product with a similar name.

e-trade: *Synonym* **e-commerce.**

ETX: *Abbreviation for* **end-of-text character.**

evaluation: Assessment of an information technology (IT) product or system against defined security-related functional and assurance criteria, performed by a combination of testing and analytic techniques.

evaluation assurance level (EAL): One of seven increasingly rigorous packages of assurance requirements from CC *(Common Criteria)* Part 3. *Note:* Each numbered package represents a point on the CC's predefined assurance scale. An EAL can be considered a level of confidence in the security functions of an IT (information-technology) product or system. [After CC'99]

evanescent field: In a waveguide, a time-varying field having an amplitude that decreases monotonically as a function of transverse radial distance from the waveguide, but without an accompanying phase shift. *Note 1:* The evanescent field is coupled, *i.e.,* bound, to an electromagnetic wave or mode propagating inside the waveguide. *Note 2:* The evanescent field is a surface wave. *Note 3:* In fiber optics, the evanescent field may be used to provide coupling to another fiber. [After 2196]

evanescent mode: A mode of the evanescent field.

even parity: *See* **parity, parity check.**

event: 1. An occurrence or happening, usually significant to the performance of a function, operation, or task. **2.** In Integrated Services Digital Networks (ISDN), an instantaneous occurrence that changes at least one of the attributes of the global status of a managed object. *Note:* An event (a) may be persistent or temporary, thus allowing for functions, such as surveillance, monitoring, and performance measurement, (b) may generate reports, (c) may be spontaneous or planned, (d) may trigger other events, and (e) may be triggered by one or more other events.

EW: *Abbreviation for* **electronic warfare.**

exalted-carrier reception: A method of receiving either amplitude- or phase-modulated signals in which method the carrier is separated from the sidebands, filtered and amplified, and then combined with the sidebands again at a higher level prior to demodulation. *Synonym* **reconditioned carrier reception.**

exception condition: In data transmission, the condition assumed by a device when it receives a command that it cannot execute.

excess insertion loss: *Deprecated term. See* **insertion loss.** *Note: Excess insertion loss* was used to indicate that, in an optical-fiber coupler, the loss occasioned by dividing the input power among the ports is not the total insertion loss.

exchange: 1. A room or building equipped so that telephone lines terminating there may be interconnected as required. *Note:* The equipment may include manual or automatic switching equipment. **2.** In the telephone industry, a geographic area (such as a city and its environs) established by a regulated telephone company for the provision of local telephone services. **3.** In the Modification of Final Judgment (MFJ) a local access and transport area (LATA).

exchange access: In telephone networks, access in which exchange services are provided for originating or terminating interexchange telecommunications within the exchange area.

exchange area: A geographic area served by one or more central offices within which local telephone service is furnished under regulation.

exchange carrier (EC): 1. A carrier authorized to provide telecommunication services within one or more access service areas. [T1.104-1988] **2.** A company that provides telecommunications within a LATA (United States) or province (Canada). In Canada, ECs also provide telecommunications among Canadian carriers. [T1.209-1998]

exchange facilities: The facilities included within a local access and transport area.

exchange line: *Synonym* **subscriber line.**

exchange transmission plant: This is a combination of (a) exchange cable and wire facilities (b) exchange central office circuit equipment, including associated land and buildings and (c) information origination/termination equipment which forms a complete channel. [47 CFR Pt.36-A]

executive program: *Synonym* **supervisory program.**

executive state: One of several states in which an information system (IS) may operate, and the only one in which certain privileged instructions may be executed. Such privileged instructions cannot be executed when the system is operating in other (*e.g.,* user) states. *Synonym* **supervisor state.** [INFOSEC-99]

exempted addressee: An organization, activity, or person included in the collective address group of a message and deemed by the message originator as having no need for the information in the message. *Note:* Exempted addressees may be explicitly excluded from the collective address group for the particular message to which the exemption applies.

exe: (or **.exe**) **1.** A filename extension identifying executable code. **2.** An identifying extension for a form of self-extracting archive. [Bahorsky]

exercise key: [A] key used exclusively to safeguard communications transmitted over the air during military or organized civil training exercises. [INFOSEC-99]

exhaustive attack: A trial-and-error attempt to violate computer security by systematically attempting to use a very large number of possible passwords or keys. [After 2382-pt.8] *Synonym [loosely]* **brute-force attack.**

existing quality television: *Synonym [in ITU-T usage]* **distribution-quality television.**

expander: A device that restores the dynamic range of a compressed signal to its original dynamic range.

expansion: The restoration of the dynamic range of a compressed signal to its original dynamic range.

expansion capability: The inherent limit for increasing the capacity of a system beyond its installed capacity.

expedited data unit: In layered systems, a service data unit that is delivered to a peer entity in the destination open system before the delivery of any subsequent service data unit sent on that connection.

experimental station: A station utilizing radio waves in experiments with a view to the development of science or technique. This definition does not include amateur stations. [NTIA] [RR]

expert system (ES): A computer system that facilitates solving problems in a given field or application by drawing inference from a knowledge base developed from human expertise. *Note 1:* The term "*expert system* " is sometimes used synonymously with *"knowledge-based system,"* although it is usually taken to emphasize expert knowledge. *Note 2:* Some expert systems are able to improve their knowledge base and develop new inference rules based on their experience with previous problems.

explicit congestion message: A message generated by the network and sent to the user terminal to indicate a congestion condition. [T1.615-1992]

exploder: *Synonym* **mail exploder.**

exploitable channel: [A] Channel that allows the violation of the security policy governing an information system (IS) and is usable or detectable by subjects external to the trusted computing base. [INFOSEC-99]

exposed facilities: Any outside plant facilities subject to the effects of lightning; or to power contacts, power induction, or differences in ground potential any of which exceed 300 Vrms to ground. [T1.316-1997]

exposure: In INFOSEC, the potential compromise associated with an attack exploiting a corresponding vulnerability. [2382-pt.8]

express orderwire: A permanently connected voice circuit between selected stations for technical control purposes.

.ext: *Abbreviation for* **file name extension.** A label that identifies an enhanced text file format used by some digests and electronic publications. [Bahorsky]

extended area service (EAS): A network-provided service feature in which a user pays a higher flat rate to obtain wider geographical coverage without paying per-call charges for calls within the wider area.

extended binary coded decimal interchange code: *See* **EBCDIC.**

extended-definition television (EDTV): Television in which (a) improvements are made to the standard National Television System Committee (NTSC) television system, (b) the improvements are receiver-compatible with the standard NTSC television system, and (c) the improvements modify the standard NTSC television system emission standards. *Note 1:* EDTV improvements may include (a) a wider aspect ratio, (b) a higher picture definition than NTSC definition, and (c) any of the improvements used in improved-definition television (IDTV). *Note 2:* When EDTV signals are transmitted in the 4:3 aspect ratio, it is referred to as *"EDTV."* When transmitted in a wider aspect ratio, it is referred to as *"EDTV-Wide."*

extended superframe (ESF): In T-carrier, a synchronization frame that delineates 24 DS1 frames *Note:* ESF requires less frequent synchronization than the T-carrier D-4 superframe format. This frees overhead bits for on-line, real-time testing, and monitoring of circuit parameters. ESF also facilitates nonchannelized operation and clear-channel operation.

extensibility: A property of a system, format, or standard that allows changes in performance or format within a common framework, while retaining partial or complete compatibility among systems that belong to the common framework. [FCC ACATS]

eXtensible Markup Language: *See* **XML.**

extension bell: In telephony, a user end device, separate from a subscriber telephone, which device produces an audible signal indicating that there is an incoming call from a switchboard or exchange. [From Weik '89]

extension bit: The first bit of each octet of the address field of a packet. The first octet is identified by the extension bit set to 0, and the second octet is identified by the extension bit set to 1. [T1.312-1991]

extension facility: A facility that provides access to communications for a user or group of users isolated from a central communications node.

extension terminal: A terminal that is added to an existing terminal and that uses the same circuit and address, *i.e.,* port and number, as the terminal to which it is added.

external timing reference: In a given communications system, a timing reference obtained from a source, such as a navigation system, external to the given system. *Note:* External timing references are usually referenced to Coordinated Universal Time .

external viewer: A plug-in, add-on, or helper application used with a Web browser to present graphics, audio, or video files. *Note:* For example, an external-viewer program could allow the presentation of nonstandard graphics and audio files.

extinction coefficient: The sum of the absorption coefficient and the scattering coefficient. [From Weik '89]

extinction ratio (r_e): The ratio of two optical power levels,

$$r_e = \frac{P_1}{P_2},$$

of a digital signal generated by an optical source, *e.g.,* a laser diode, where P_1 is the optical power level generated when the light source is "on," and P_2 is the power level generated when the light source is "off." *Note:* The extinction ratio may be expressed as a fraction or in dB. [2196].

extra bit: *Synonym* **added bit.**

extra block: *Synonym* **added block.**

extraction resistance: [The] capability of crypto-equipment or secure telecommunications equipment to resist efforts to extract [the] key. [INFOSEC-99]

extranet: An intranet that has been extended to include access to or from selected external organizations such as customers or suppliers, but not the general public. *Note:* Connections may be via leased lines, dial-up connections, or network interconnections. The overall network may be, but is not necessarily, a virtual private network. [After 2382-pt.35]

extra sector: In information assurance, a sector that is written on a diskette track in excess of the standard number of sectors, as part of a method of copy protection. [2382-pt.8]

extra track: In information assurance, a track that is written on a diskette in excess of the standard number of tracks, as part of a method of copy protection. [2382-pt.8]

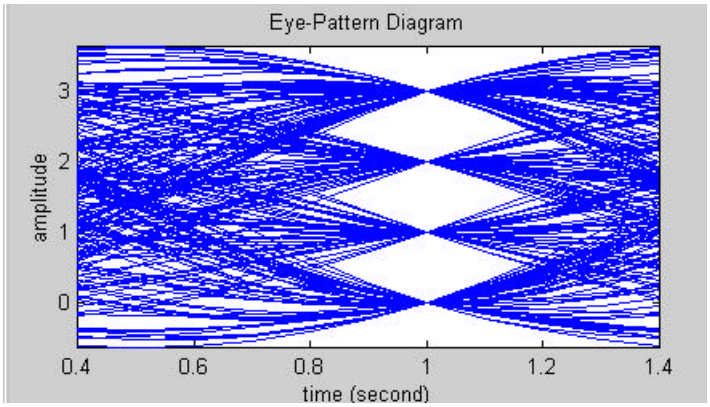
extremely high frequency (EHF): Frequencies from 30 GHz to 300 GHz. *See* **electromagnetic spectrum.**

extremely low frequency (ELF): Frequencies from 30 Hz to 300 Hz. *See* **electromagnetic spectrum.**

extrinsic joint loss: For an optical fiber, that portion of a joint loss that is not intrinsic to the fibers, *e.g.* , loss caused by end separation, angular misalignment, or lateral misalignment.

eye pattern: An oscilloscope display in which a pseudorandom digital data signal from a receiver is repetitively sampled and applied to the vertical input, while the data rate is used to trigger the horizontal sweep. *Note:* System performance information can be derived by analyzing the display. An open eye pattern corresponds to minimal signal distortion.

Distortion of the signal waveform due to intersymbol interference and noise appears as closure of the eye pattern.



eyes only: A message marker for a special-category message that is intended for delivery only to a specific person, or authorized representative of that person, and therefore no one else. [From Weik '89]

e-zine: *Abbreviation for* **electronic magazine.** A periodical publication that is stored on a file server and that may be distributed or accessed via a computer network. [After 2382-pt.35] *Note:* An e-zine that is distributed primarily over the Web is also referred to as a webzine.

facet erosion: In laser diodes, a phenomenon in which a high field intensity of stimulated optical radiation causes degradation of the facets, *i.e.,* those forming the cavity mirrors, decreasing reflectivity and resulting in a decrease of the internal quantum efficiency and an increase in the threshold current.

facility: 1. A fixed, mobile, or transportable structure, including (a) all installed electrical and electronic wiring, cabling, and equipment and (b) all supporting structures, such as utility, ground network, and electrical supporting structures. **2.** A network-provided service to users or the network operating administration. **3.** A transmission pathway and associated equipment. **4.** In a protocol applicable to a data unit, such as a block or frame, an additional item of information or a constraint encoded within the protocol to provide the required control. **5.** A real property entity consisting of one or more of the following: a building, a structure, a utility system, pavement, and underlying land. [JP1]

facility assembly: A group of interconnected equipment and transmission media uniquely identified and dedicated to a specific type of service. [T1.238-1994/97]

facility code: A two-digit code (FC) used in the exchange-carrier-to-interexchange carrier (EC-to-IC) facility/service selective signaling protocol and the IC-to-EC facility/service selective signaling protocol that identifies the type of facility requested. [T1.104-1991]

facility grounding system: The electrically interconnected system of conductors and conductive elements that (a) provides multiple current paths to the earth electrode subsystem, and (b) consists of the earth electrode subsystem, the lightning protection subsystem, and the fault protection subsystem.

facility group: The particular group of facilities to route the call. [T1.667-1999]

facility group member: The specific member of a trunk group or a multi-line hunt group. [T1.667]

facsimile (FAX): 1. A form of telegraphy for the transmission of fixed images, with or without half-tones, with a view to their reproduction in a permanent form. [47CFR] In this definition the term telegraphy has the same general meaning as defined in the Convention. [NTIA] [RR] **2.** The process by which fixed graphic images, such as printed text and pictures, are scanned, and the information converted into electrical signals that may be transmitted over a telecommunications system and used to create a copy of the original, or an image so produced. *Note 1:* Wirephoto and telephoto are facsimile via wire circuits. Radiophoto is facsimile via radio. *Note 2:* Technology now exists that permits the transmission and reception of facsimile data to or from a computer without requiring hard copy at either end. *Note 3:* Current facsimile systems are designated and defined as follows:

- **Group 1 Facsimile:** The mode of black and white facsimile operation, defined in ITU-T Recommendation T.2, that uses double sideband modulation without any special measures to compress the bandwidth. *Note 1:* A 216 × 279-mm document, *i.e.* , an 8½ × 11-inch document, may be transmitted in approximately 6 minutes via a telephone-type circuit. Additional modes in this group may be designed to operate at a lower resolution suitable for the transmission of 216 × 279-mm documents in 3 to 6 minutes. *Note 2:* The CCITT frequencies used are 1300 Hz for white and 2300 Hz for black. The North American standard is 1500 Hz for white and either 2300 or 2400 Hz for black.

- **Group 2 Facsimile:** The mode of black and white facsimile operation, defined in ITU-T Recommendation T.3, that accomplishes bandwidth compression by using encoding and vestigial sideband, but excludes processing of the document signal to reduce redundancy. *Note:* A 216 × 279-mm document, *i.e.* , an 8½ × 11-inch document, may be transmitted in approximately 3 minutes using a 2100-Hz AM/PM/VSB, over a telephone-type circuit.

- **Group 3 Facsimile:** The mode of black and white facsimile operation, defined in ITU-T Recommendation T.4, that incorporates means for reducing the redundant information in the signal by using a one-dimensional run-length coding scheme prior to the modulation process. *Note 1:* A 216 × 279-mm document, *i.e.* , an 8½ × 11-inch document, may be transmitted in approximately 1 minute or less over a telephone-type circuit with twice the Group 2 horizontal resolution. The vertical resolution may also be doubled. *Note 2:* Group 3 Facsimile machines have integral digital modems. *Note 3:* An optional two-dimensional bandwidth compression scheme is also defined within the Group 3 Facsimile Recommendation. *Note 4:* When any CCITT or CCIR Recommendation is modified by the ITU-T, the modified document is designated as an ITU-T Recommendation.

- **Group 3C Facsimile:** The Group 3 digital mode of facsimile operation defined in ITU-T Recommendation T.30. *Note:* Group 3C is also referred to as Group 3 Option C or as Group 3-64 kb/s.

- **Group 4 Facsimile:** The mode of black and white facsimile operation defined in ITU-T Recommendation T.563 and CCITT Recommendation T.6. *Note 1:* Group 4 Facsimile uses bandwidth compression techniques to transmit, essentially without errors, a 216 × 279-mm document, *i.e.* , an 8½ × 11-inch document, at a nominal resolution of 8 lines/mm in less than 1 minute over a public data network voice-grade circuit. *Note 2:* When any CCITT or CCIR Recommendation is modified by the ITU-T, the modified document is designated as an ITU-T Recommendation.

- **Type I Facsimile:** The mode of digital black and white facsimile operation defined in MIL-STD-188-161 used for transmission of bi-level information (*e.g.* , text and simple graphics). *Note:* Type I facsimile is interoperable with the black-and-white facsimile mode of STANAG 5000 and is designed for operation over noisy communications links such as tactical channels.

- **Type II Facsimile:** The mode of gray-scale facsimile operation defined in MIL-STD-188-161 used for transmission of multi-level information (*e.g.* , photographs). *Note:* Type II facsimile is interoperable with the black-and-white facsimile mode of Type I or STANAG 5000 equipment and is designed for operation over noisy communications

links such as tactical channels.

facsimile converter: 1. In a facsimile receiver, a device that changes the signal modulation from frequency-shift keying (FSK) to amplitude modulation (AM). **2.** In a facsimile transmitter, a device that changes the signal modulation from amplitude modulation (AM) to frequency-shift keying (FSK).

facsimile frequency shift: At any point in a frequency-shift facsimile system, the numerical difference between the frequency that corresponds to a white signal and the frequency that corresponds to a black signal. *Note:* Facsimile frequency shift is usually expressed in hertz. [From Weik '89]

facsimile picture signal: In facsimile systems, the baseband signal that results from the scanning process.

facsimile receiver: In a facsimile system, the equipment that converts the facsimile picture signal into a recorded copy.

facsimile recorder: In a facsimile receiver, the device that performs the final conversion of the facsimile picture signal to an image of the object, *i.e.* , makes the recorded copy.

facsimile signal level: In a facsimile system, the signal level at any point in the system. *Note 1:* The facsimile signal level is used to establish the operating levels. *Note 2:* The facsimile signal level is usually expressed in dB with respect to some standard value, such as 1 mW (milliwatt), *i.e.* , 0 dBm.

facsimile transceiver: In a facsimile system, the equipment that sends and receives facsimile signals. *Note:* Full-duplex facsimile transceivers can send and receive at the same time; half-duplex facsimile transceivers cannot.

facsimile transmitter: In a facsimile system, the equipment that converts the baseband picture signals, *i.e.,* the baseband signals resulting from scanning the object, into signals suitable for transmission by a communications system.

fade: 1. In signal propagation, *see* **fading. 2.** In video, the act of dissolving a video picture to either a color, pattern, or titles. *Note:* Fading a video image is often used as an artistic tool in video productions, usually seen as a fade to black. **3.** In audio, a decrease in the sound level until it is no longer audible.

fade margin: 1. A design allowance that provides for sufficient system gain or sensitivity to accommodate expected fading, for the purpose of ensuring that the required quality of service is maintained. **2.** The amount by which a received signal level may be reduced without causing system performance to fall below a specified threshold value. *Synonym* **fading margin.**

fading: In a received signal, the variation (with time) of the amplitude or relative phase, or both, of one or more of the frequency components of the signal. *Note:* Fading is caused by changes in the characteristics of the propagation path with time.

fading distribution: The probability distribution that signal fading will exceed a given value relative to a specified reference level. *Note 1:* In the case of phase interference fading, the time distribution of the instantaneous field strength usually approximates a Rayleigh distribution when several signal components of equal amplitude are present. *Note 2:* The field strength is usually measured in volts per meter. *Note 3:* The fading distribution may also be measured in terms of power level, where the unit of measure is usually watts per square meter and the expression is in dB.

fading margin: *Synonym* **fade margin.**

fail: *See* **failure, graceful degradation.**

fail safe: 1. Of a device, the capability to fail without detriment to other devices or danger to personnel. **2.** Pertaining to the automatic protection of programs and/or processing systems to maintain safety when a hardware or software failure is detected in a system. [NIS] **3.** [The] automatic protection of programs and/or processing systems when hardware or software failure is detected. [INFOSEC-99] **4.** Pertaining to the structuring of a system such that either it cannot fail to accomplish its assigned mission regardless of environmental factors or that the probability of such failure is extremely low.

fail-safe operation: 1. Operation that ensures that a failure of equipment, process, or system does not propagate beyond the immediate environs of the failing entity. **2.** A control operation or function that prevents improper system functioning or catastrophic degradation in the event of circuit malfunction or operator error.

fail soft: [The] selective termination of affected nonessential processing, when hardware or software failure is determined to be imminent. [INFOSEC-99]

failure: The temporary or permanent termination of the ability of an entity to perform its required function.

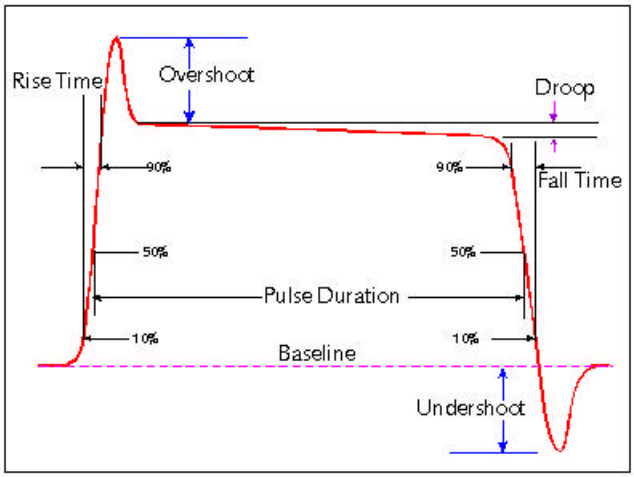
failure access: [An] Unauthorized access to data resulting from a hardware or software failure. [INFOSEC-99]

failure control: [The methods] used to detect imminent hardware or software failure and provide fail safe or fail soft recovery. [INFOSEC-99]

fair queuing: The controlling of congestion in gateways by restricting every host to an equal share of gateway bandwidth. *Note:* Fair queuing does not distinguish between small and large hosts or between hosts with few active connections and those with many.

fake sector: In information assurance, a sector consisting of a header but no data, used in large numbers on a diskette to cause an unauthorized copying program to fail to copy the diskette. [2382-pt.8]

fall time: The time required for the amplitude of a pulse to decrease (fall) from a specified value (usually 90 percent of the peak value exclusive of overshoot or undershoot) to another specified value (usually 10 percent of the peak value exclusive of overshoot or undershoot). *Note:* Limits on undershoot and oscillation, *i.e.,* hunting, may need to be specified when specifying fall time limits. *Synonym* **pulse decay time.**



representative pulse waveform

false character: *See* **illegal character.**

false clock: A condition where a phase-locked loop controlling a clock locks on a frequency other than the correct frequency. *Note 1:* False clock can occur when there is excessive phase shift, as a function of frequency, in the loop. *Note 2:* False clock often occurs where the false frequency is a harmonic of the correct frequency.

false lock: A condition where a phase-locked loop locks to a frequency other than the correct one, or to an improper phase.

fan-beam antenna: A directional antenna producing a main beam having a large ratio of major to minor dimension at any transverse cross section.

fan out: *Synonym* **break out.**

fanout cable: *Synonym* **breakout cable.**

FAQ file: *Abbreviation for* **Frequently Asked Questions file.** An online file that contains frequently asked questions with answers provided to assist new users and avoid repetitive offline inquiries. *Note:* An *FAQ file* is usually created for Internet news groups, but is also used in other applications.

Faraday effect: A magneto-optic effect in which the polarization plane of an electromagnetic wave is rotated under the influence of a magnetic field parallel to the direction of propagation. *Note:* The Faraday effect may be used to modulate a lightwave.

far-end block error (FEBE): An indication returned to a transmitting node (source) that an errored block has been detected at the receiving node (sink). [T1.105-1988]

far-end crosstalk: Crosstalk that is propagated in a disturbed channel in the same direction as the propagation of a signal in the disturbing channel. *Note:* The terminals of the disturbed channel, at which the far-end crosstalk is present, and the energized terminals of the disturbing channel, are usually remote from each other.

far-end customer interface: An associated, loop signaling, customer installation located at the far end of the network transmission path from the network interface (NI) described in the designated document. [T1.407-1990]

far-end receive failure (FERF): An indication returned to a transmitting link terminating equipment (LTE) upon receipt of a line AIS (alarm indication signal) code or detection of an incoming line failure at the receiving LTE. [T1.105-1988]

far field: *Synonym* **far-field region.**

far-field diffraction pattern: The diffraction pattern of a source (such as an LED, ILD, or the output end of an optical fiber) observed at an infinite distance from the source. *Note 1:* A far-field pattern exists at distances that are large compared with s^2/λ, where s is a characteristic dimension of the source and λ is the wavelength. For example, if the source is a uniformly illuminated circle, then s is the radius of the circle. *Note 2:* The far-field diffraction pattern of a source may be observed at infinity or (except for scale) in the focal plane of a well-corrected lens. The far-field pattern of a diffracting screen illuminated by a point source may be observed in the image plane of the source. *Synonym* **Fraunhofer diffraction pattern.**

far-field radiation pattern: A radiation pattern measured at the far field of an antenna or other emitter.

far-field region: The region where the angular field distribution is essentially independent of distance from the source. *Note 1:* If the source has a maximum overall dimension D that is large compared to the wavelength, the far-field region is commonly taken to exist at distances greater than $2D^2/\lambda$ from the source, λ being the wavelength. *Note 2:* For a beam focused at infinity, the far-field region is sometimes referred to as the Fraunhofer region. *Synonyms* **far field, far zone, Fraunhofer region, radiation field.**

far zone: *Synonym* **far-field region.**

fast packet switching: A packet switching technique that increases the throughput by eliminating overhead. *Note 1:* Overhead reduction is accomplished by allocating flow control and error correction functions to either the user applications or the network nodes that interface with the user. *Note 2:* Cell relay and frame relay are two implementations of fast packet switching.

fast select: An optional user facility in the virtual call service of CCITT X.25 protocol (now, ITU-T X.25 protocol) that allows the inclusion of user data in the call request/connected and clear indication packets. *Note:* Fast select is an essential feature of the CCITT X.25 (1984) protocol.

fat client: A client-centric computing model where software must be installed on each client in a network. This often requires that each client computer be upgraded to the same level.

fault: 1. An accidental condition that causes a functional unit to fail to perform its required function. **2.** A defect that causes a reproducible or catastrophic malfunction. *Note:* A malfunction is considered reproducible if it occurs consistently under the same circumstances. **3.** In power systems, an unintentional short-circuit, or partial short-circuit, between energized conductors or between an energized conductor and ground.

fault management: In network management, the set of functions that (a) detect, isolate, and correct malfunctions in a telecommunications network, (b) compensate for environmental changes, and (c) include maintaining and examining error logs, accepting and acting on error detection notifications, tracing and identifying faults, carrying out sequences of diagnostics tests, correcting faults, reporting error conditions, and localizing and tracing faults by examining and manipulating database information.

fault protection subsystem: In a facility power distribution system, the subsystem that provides a direct path from each power sink to the earth electrode subsystem. *Note:* The fault protection subsystem is usually referred to as a *"green wire."*

fault tolerance: The extent to which a functional unit will continue to operate at a defined performance level even though one or more of its components are malfunctioning.

FAX: *Acronym for* **facsimile.**

FC: *Abbreviation for* **functional component.**

FCC: The U.S. Government board of five presidential appointees that has the authority to regulate all non-Federal Government interstate telecommunications (including radio and television broadcasting) as well as all international communications that originate or terminate in the United States. *Note:* Similar authority for regulation of Federal Government telecommunications is vested in the National Telecommunications and Information Administration (NTIA).

FCC registration program: The Federal Communications Commission program and associated directives intended to assure that all connected terminal equipment and protective circuitry will not harm the public switched telephone network or certain private line services. *Note 1:* The FCC registration program requires the registering of terminal equipment and protective circuitry in accordance with Subpart C of part 68, Title 47 of the *Code of Federal Regulations.* This includes the assignment of identification numbers to the equipment and the testing of the equipment. *Note 2:* The FCC registration program contains no requirement that accepted terminal equipment be compatible with, or function with, the network.

FCS: *Abbreviation for* **frame check sequence.** *See* **cyclic redundancy check.**

FDDI: *Abbreviation for* **fiber distributed data interface.**

FDDI-2: *See* **fiber distributed data interface.**

FDHM: *See* **full width at half maximum.**

FDM: *Abbreviation for* **frequency-division multiplexing.**

FDMA: *Abbreviation for* **frequency-division multiple access.**

FDX: *Abbreviation for* **full duplex.** *See* **full-duplex (FDX) circuit, full-duplex (FDX) operation.**

feature code: A code (or codes) used to select/activate a service feature (*e.g.,* forwarding, using two- or three-digit codes preceded by * or 1 1 or #, and which may precede subsequent digit selection). [T1.667-1999]

FEC: *Abbreviation for* **forward error correction.**

Federal Communications Commission: *See* **FCC.**

Federal Networking Council (FNC): The body responsible for coordinating networking needs among U.S. Federal agencies.

Federal Telecommunications System (FTS): A switched long-distance telecommunications service formerly provided for official Federal Government use. *Note:* FTS has been replaced by **Federal Telecommunications Service 2000 (FTS2000).**

Federal Telecommunications System 2000 service: *See* **FTS2000.**

feed: 1. To supply a signal to the input of a system, subsystem, equipment, or component, such as a transmission line or antenna. **2.** A coupling device between an antenna and its transmission line. *Note:* A feed may consist of a distribution network or a primary radiator. **3.** A transmission facility between (a) the point of origin of a signal, such as is generated in a radio or television studio, and (b) the head-end of a distribution facility, such as a broadcasting station in a network. **4.** Pertaining to the function of inserting one thing into another, such as in a feed horn, paper feed, card feed, and line feed.

feedback: 1. The return of a portion of the output, or processed portion of the output, of a (usually active) device to the input. *Note 1:* The feedback signal will have a certain magnitude and phase relationship relative to the output signal or the input signal. This relationship can be used to influence the behavior, such as the gain and stability, of the overall circuit. *Note 2:* If the feedback is regenerative (additive), it is called "positive feedback," which increases gain and distortion, and decreases linearity and stability. *Note 3:* If the feedback is degenerative (subtractive), it is called "negative feedback," which reduces the gain and distortion, and increases linearity and stability. *Note 4:* Feedback may occur inadvertently, and be detrimental. **2.** Information returned as a response to an originating source.

feedback path: The signal path from the input of the bit-masking block to the output of the adaptive predictor. [T1.310-1991]

feeder echo noise: Signal distortion resulting from reflected waves in a transmission line that is many wavelengths long and mismatched at both the generator and the load ends.

feeder link: A radio link from an Earth station at a given location to a space station, or vice versa, conveying information for a space radiocommunication service other than for the fixed-satellite service. The given location may be at a specified fixed point, or at any fixed point within specified areas. [NTIA] [RR]

feed-forward path: In the encoder, the signal path from the input of the PCM-to-uniform-PCM converter to the output of the adaptive quantizer. In the decoder, the feed-forward path is the signal path from the input of the feed-forward inverse adaptive quantizer to the output of the synchronous coding adjustment block. [T1.310-1991]

FEP: *Abbreviation for* **front-end processor.**

Fermat's principle: A principle stating that a ray of light follows the path that requires the least time to travel from one point to another, including reflections and refractions that may occur. *Synonym* **least-time principle.** [From Weik '89]

fetch protection: 1. [An] AIS-provided restriction to prevent a program from accessing data in another user's segment of storage. [NIS] **2.** [An] information-system (IS) hardware-provided restriction to prevent a program from accessing data in another user's segment of storage. [INFOSEC-99]

FET photodetector: A photodetector using photogeneration of carriers in the channel region of a field-effect transistor structure to provide photodetection with current gain.

fiber: *See* **optical fiber.**

fiber amplifier: A device that amplifies an optical signal directly, without the need to convert it to an electrical signal, amplify it electrically, and reconvert it to an optical signal. *Note 1:* One type of fiber amplifier uses a doped fiber (*e.g.* , a fiber doped with erbium), which bears the communication signal, and which is optically pumped with a laser having a high-powered continuous output at an optical frequency slightly higher than that of the communication signal. The signal is intensified by Raman amplification. *Note 2:* Because neither optical-electrical conversion nor electrical amplification takes place, this type of amplifier is well suited for a wide variety of applications, both digital and analog. *Note 3:* Because this type of amplifier does not require extraordinary frequency (wavelength) control of the pumping laser, it is relatively simple. *Synonym* **Raman amplifier.**

fiber axis: The longitudinal center of symmetry of an optical fiber, *i.e.,* the locus of points that are determined by the centers of mechanical symmetry of the outside diameters of fiber cross sections sampled continuously along the length of the fiber.

fiber bandwidth: *See* **bandwidth (of an optical fiber).**

fiber buffer: *See* **buffer.**

fiber cable: *See* **fiber optic cable.**

fiber cutoff wavelength (λ_{cf}): *See* **cutoff wavelength.**

fiber dispersion: *See* **dispersion.**

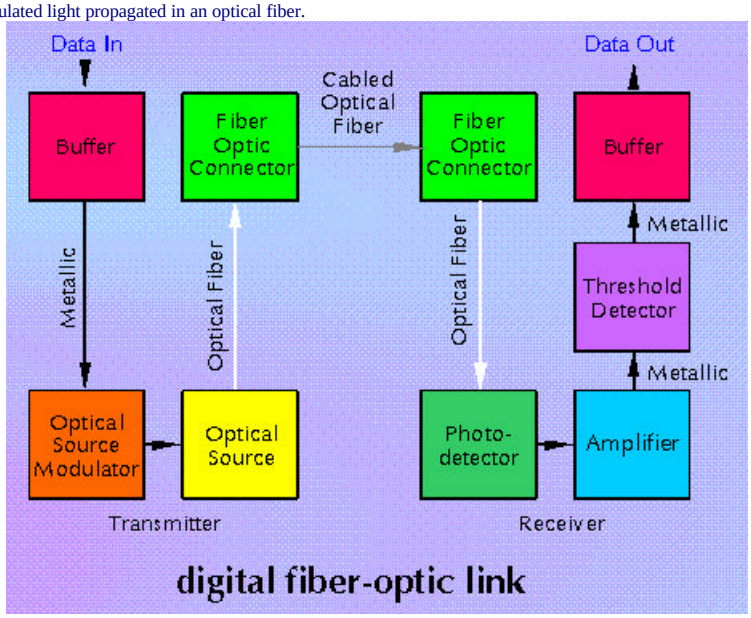
fiber distributed data interface (FDDI): A concept, defined in ANSI standards, for an optical-fiber-based token-ring network, featuring (a) dual counter-rotating logical rings, each with a data transmission capacity of 100 Mb/s, (b) reliable data transfer, (c) active link monitoring, (d) station management, and (e) survivability features. *Note 1:* The four standards are (a) ANSI X3T9.5, containing Physical Media Dependent (PMD) specifications, (b) ANSI X3T9.5, containing the Physical (PHY) specifications, (c) ANSI X3.139, containing Media Access Control (MAC) specifications, and (d) ANSI X39.5, containing the Station Management (SMT) specifications. *Note 2:* The data rate of an FDDI ring may be doubled to 200 Mb/s, with loss of redundancy. *Note 3:* FDDI-2, a second-generation FDDI network standard, is under development.

fiber optic bus: *See* **bus.**

fiber optic cable: A telecommunications cable in which one or more optical fibers are used as the propagation medium. [After 2196] *Note 1:* The optical fibers are surrounded by buffers, strength members, and jackets for protection, stiffness, and strength. *Note 2:* A fiber-optic cable may be an all-fiber cable, or contain both optical fibers and metallic conductors. One possible use for the metallic conductors is the transmission of electric power for repeaters. [After FAA] *Synonyms* **optical cable, optical fiber cable.**

fiber optic isolator: *See* **optical isolator.**

fiber optic link: A communications link that transmits signals by means of modulated light propagated in an optical fiber.



fiber optics (FO): The branch of optical technology concerned with the transmission of light through fibers made of transparent materials such as glasses and plastics. [2196] *Note 1:* Telecommunications applications of fiber optics use flexible low-loss fibers, using a single fiber per optical path. Present-day plastic fibers have losses that are too high for telecommunications applications. *Note 2:* Various industrial and medical applications of fiber optics, such as endoscopes, use flexible fiber bundles in which individual fibers are spatially aligned, permitting optical relay of an image. *Note 3:* Some specialized industrial applications use rigid (fused) aligned fiber bundles for image transfer; such as in the fiber optics faceplates used on some cathode ray rubes (CRTs) to "flatten" the image.

fiber pigtail: *See* **pigtail.**

fidelity: The degree to which a system, or a portion of a system, accurately reproduces, at its output, the essential characteristics of the signal impressed upon its input or the result of a prescribed operation on the signal impressed upon its input.

FidoNet: A network designed for e-mail distribution through individual bulletin board systems rather than through Internet servers.

field: 1. The volume of influence of a physical phenomenon, expressed vectorially. **2.** On a data medium or in storage, a specified area used for a particular class of data, *e.g.* , a group of character positions used to enter or display wage rates on a screen. **3.** Defined logical data that are part of a record. **4.** The elementary unit of a record that may contain a data item, a data aggregate, a pointer, or a link. **5.** In an interlaced, raster-scanned video display, a partial frame, consisting of every nth scanning line of a complete frame, where n is an integer equal to the number of fields (usually two) in a complete frame. *Note 1:* For example, in the National Television Standards Committee (NTSC) television specification used in the United States, a single frame is composed of two fields, each of which has half the number of scanning lines in a complete frame. The scanning lines of a field are separated by twice the space between the scanning lines in the full frame. The two fields are interlaced, *i.e.* , a complete frame consists of the following traces, which are listed in the order of their appearance in the complete frame, but not the order in which scanning occurs: the first line of the first field, the first line of the second field, the second line of the first field, the second line of the second field, the third line of the first field, the third line of the second field, *etc.* , until completion of the full frame. The fields are scanned alternately, one complete field at a time. Thus, the flicker rate of the display is perceived by the eye to be twice as fast as that which would result if the complete frame were to be scanned in

line-by-line order. *Note 2:* Not all scanning lines are necessarily applied to user information, *i.e.* , the graphic display. Certain scanning lines, not seen under ordinary viewing conditions, are often used for transmitting test signals that indicate the quality of the displayed video.

field-disturbance sensor: A restricted radiation device which establishes a radio frequency field in its vicinity and detects changes in that field resulting from the movement of persons or objects within the radio frequency field. Examples: microwave intrusion sensors; devices that use rf energy for production line counting and sensing. [NTIA]

field intensity: The irradiance of an electromagnetic wave under specified conditions. *Note:* Field intensity is usually expressed in watts per square meter.

field strength: 1. The magnitude of an electric, magnetic, or electromagnetic field at a given point. *Note:* The field strength of an electromagnetic wave is usually expressed as the rms value of the electric field, in volts per meter. The field strength of a magnetic field is usually expressed in amperes per meter *Synonym* **radio field intensity. 2.** The electric field strength in the horizontal plane. [47 CFR 73.310]

field tag: *Synonym* **flag.**

field wire: A flexible insulated wire used in field telephone and telegraph systems. *Note 1:* WD-1 and WF-16 are types of field wire. *Note 2:* Field wire usually contains conductors and high-tensile-strength strands serving as strength members.

FIFO: *Abbreviation for* **first-in first-out.**

file: 1. The largest unit of storage structure that consists of a named collection of all occurrences in a database of records of a particular record type. **2.** A set of related records treated as a unit, for example, in stock control, a file could consist of a set of invoices.

file archive: *Synonym* **FTP archive.**

file name extension: 1. A suffix that is preceded by a decimal (".") and that is appended to a computer file name. *Note:* Common filename extensions with their meanings are:

.wpd = a type of word-processing document

.doc = a type of word-processing document

.exe = executable code or a self-extracting archive file.

.gif = a graphical interchange format (graphics file)

.txt = a text file.

2. Proprietary HTML tags that are recognized by a single Web browser or by those Web browsers developed by a single company.

file-oriented applications: Applications concerned with the storage, manipulation, and exchange of information between application processes in the form of files. [T1.210-1993]

file protection: 1. The execution of appropriate administrative, technical, or physical means to guard against the unauthorized access to, modification of, or deletion of a file. [After 2382-8] **2.** [The] aggregate of processes and procedures designed to inhibit unauthorized access, contamination, elimination, modification, or destruction of a file or any of its contents. [INFOSEC-99]

file security: [A] means by which access to computer files is limited to authorized users only. [INFOSEC-99]

file server: 1. A high-capacity disk storage device or a computer that each computer on a network can use or access and retrieve files that can be shared among attached computers. **2.** A program, running on a computer, that allows different programs, running on other computers, to access the files of that computer.

file site: *Synonym* **FTP archive.**

file transfer: In networking, a service to move a part or the whole of a file's content over a computer network. [2382-pt.35]

file transfer, access, and management (FTAM): An application's service and protocol based on the concept of virtual file store. *Note:* FTAM allows remote access to various levels in a file structure and provides a comprehensive set of file management capabilities.

File Transfer Protocol (FTP): *See* **FTP.**

fill: *See* **bit stuffing.**

fill bit: *See* **bit stuffing.**

fill device: [A] COMSEC item used to transfer or store key in electronic form or to insert key into a crypto-equipment. [INFOSEC-99]

filled cable: A cable that has a nonhygroscopic material, usually a gel, inside the jacket or sheath. *Note 1:* The nonhygroscopic material fills the spaces between the interior parts of the cable, preventing moisture from entering minor leaks in the sheath and migrating inside the cable. *Note 2:* A metallic cable, such as a coaxial cable or a metal waveguide, filled with a dielectric material, is not considered as a filled cable.

fill-in area: The area where the coverage contour of an FM translator or booster station is within the protected contour of the associated primary station (*i.e.,* predicted 0.5 mV/m contour for commercial Class B stations, predicted 0.7 mV/m contour for commercial Class B1 stations, and predicted 1 mV/m contour for all other classes of stations). [47 CFR 74.1201]

fill-in signal unit (FISU): A signal unit that is transmitted when there are no message signal units or link status signal units to be transmitted. It contains only error control and delimitation information. [T1.226-1992]

FILO: *Abbreviation for* **first-in last-out.**

filter: In electronics, a device which transmits only part of the incident energy and may thereby change the spectral distribution of energy:

- (a) high pass filters transmit energy above a certain frequency;
- (b) low pass filters transmit energy below a certain frequency;
- (c) band pass filters transmit energy of a certain bandwidth;
- (d) band stop filters transmit energy outside a specific frequency band. [JP 1-02]

filtered symmetric differential phase-shift keying (FSDPSK): A method of encoding information for digital transmission in which (a) a binary 0 is encoded as a +90° change in the carrier phase and a binary 1 is encoded as a -90° change in the carrier phase, and (b) abrupt phase transitions are smoothed by filtering or other functionally equivalent pulse shaping techniques.

final trunk group: A last-choice trunk group that receives overflow traffic, may receive first-route traffic and for which there is no alternate route. There are various types of final trunk groups, differentiated by the type of traffic that they carry. [T1.Rpt 11-1991]

finger: A computer-operating-system command for accessing limited network-user-account information. *Note:* Finger is limited to providing information such as the full name of the account holder and address information, intentionally made public by the account holder. Finger is also used to establish the existence of an address and to discover whether or not the account is currently logged on.

finished call: 1. In an information transaction, a call in which the call originator or call receiver terminates the communication and goes on hook, *i.e.,* hangs up. **2.** In an information transfer transaction, the termination of the information transfer phase.

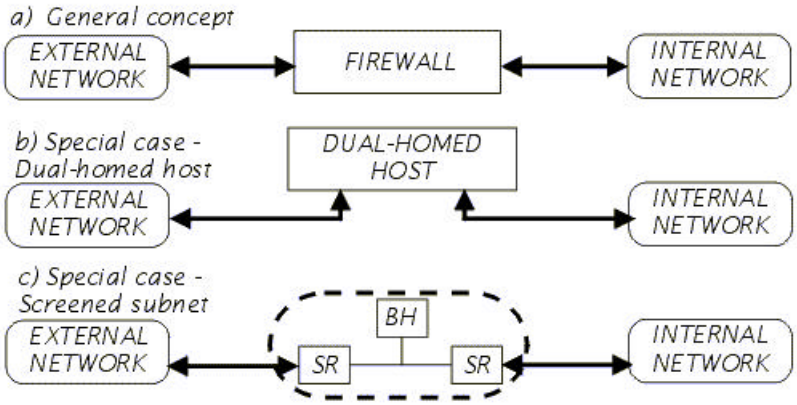
FIP: *Acronym for* **Federal Information Processing.**

FIP equipment: In the Federal government, any equipment or interconnected system or subsystems of equipment (as defined in 41CFR) used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information.

FIP system: In the Federal government, any organized combination of FIP equipment, software, services, support services, or related supplies.

FIREFLY: [A] key management protocol based on public key cryptography. [INFOSEC-99]

firewall: 1. A computer that (a) acts as an interface between two networks (*e.g.,* the Internet and an private network, respectively), and (b) regulates traffic between those networks for the purpose of protecting the internal network from electronic attacks originating from the external network. The firewall is capable of handling the following tasks: (a) isolating internal and external traffic (a bridge service); (b) making internal addresses invisible and directly unaccessible from outside and passing through authorized traffic after proper checking (a proxy service); (c) facilitating protected (encrypted) connections to cooperative parties over public networks (a tunneling service); (d) filtering outgoing traffic for security and network usage rules (filtering or monitoring service); (e) filtering incoming traffic for rogue data (viruses, spam, inappropriate data (filtering), or improper actions (port scanning, overload prevention, *etc.* ; (f) blocking forbidden external services or addresses (blocking, "network nanny"-functions); (g) providing log-in services for authorized outside users and simulating the approved outside user as an inside user (proxy, log-in server); (h) caching network traffic (cache service); (i) converting between different network protocols on different protocol levels (bridge when handling lower level protocols, gateway when handling higher level protocols); (j) traffic diverting (*e.g.,* for cost optimizing, accounting, network planning, monitoring); (k)providing consistent, open entry to the internal network (portal service) and facilitating public network address and connection sharing (proxy service). **2.** [A] system designed to defend against unauthorized access to or from a private network. Firewalls can be implemented in both hardware and software, or a combination of both. [INFOSEC-99] *Synonyms* **front-end security filter, proxy.**



firmware: 1. Software that is embedded in a hardware device that allows reading and executing the software, but does not allow modification, *e.g.,* writing or deleting data by an end user. *Note 1:* An example of firmware is a computer program in a read-only memory (ROM) integrated circuit chip. A hardware configuration is usually used to represent the software. *Note 2:* Another example of firmware is a program embedded in an erasable programmable read-only memory (EPROM) chip, which program may be modified by special external hardware, but not by an application program. **2.** [A] program recorded in permanent or semipermanent computer memory. [INFOSEC-99]

first-in first-out (FIFO): A queuing discipline in which entities in a queue leave the queue in the same order in which they arrive. *Note 1:* Service, when available, is offered to the entity that has been in the FIFO queue the longest. *Note 2:* FIFO techniques are used in message switching.

first-in last-out (FILO): A queuing discipline in which entities in a queue leave the queue in the reverse order from that in which they arrived. *Note:* An understanding of FILO techniques is important in the understanding of store-and-forward capabilities in packing switching.

first-route traffic: Traffic that has not been route-advanced at any switching system. [T1.Rpt 11-1991]

first window: Of silica-based optical fibers, the transmission window at approximately 830 to 850 nm. [FAA]

FISINT: *Acronym for* **foreign instrumentation signals intelligence.**

five-hundred (500) service: A telephone service that allows individuals to receive, via a single number, telephone calls in various locations (*e.g.* , home, office, or car phone) from call originators not necessarily using the same common carrier.

fixed access: In personal communications service (PCS), terminal access to a network in which there is a set relationship between a terminal and the access interface. *Note:* A single "identifier" serves for both the access interface and the terminal. If the terminal moves to another access interface, that terminal assumes the identity of the new interface.

fixed attenuator: *See* **pad.**

fixed loop: A service feature that permits an attendant on an assisted call to retain connection through the attendant position for the duration of the call. *Note:* The attendant will usually receive a disconnect signal when the call is terminated.

fixed microwave auxiliary station: A fixed station used in connection with (a) the alignment of microwave transmitting and receiving antenna systems and equipment, (b) coordination of microwave radio survey operations, and (c) cue and contact control of television pickup station operations. [47CFR]

fixed-reference modulation: Modulation in which the significant condition for any signal element is based on a fixed reference.

fixed-satellite service: 1. A radiocommunication service between Earth stations at given positions when one or more satellites are used; the given position may be a specified fixed point or any fixed point within specified areas; in some cases this service includes satellite-to-satellite links, which may also be effected in the inter-satellite service, the fixed-satellite service may also include feeder links for other space radiocommunication services. [RR] **2.** A radiocommunication service between Earth stations at given positions when one or more satellites are used; the given position may be a specified fixed point or any fixed point within specified areas; in some cases this service includes satellite-to-satellite links, which may also be operated in the inter-satellite service; the fixed-satellite service may also include feeder links of other space radiocommunication services. [47CFR]

fixed service (FX): A radiocommunication service between specified fixed points. [NTIA] [RR] [47CFR]

fixed station: 1. A station in the fixed service. [NTIA] [RR] [47CFR] **2.** The term "fixed station" in the fixed public or fixed public press service includes all apparatus used in rendering the authorized service at a particular location under a single instrument of authorization. [47CFR]

fixed storage: *Synonym* **read-only storage.**

fixed-tolerance-band compaction: Data compaction accomplished by storing or transmitting data only when the data fall outside prescribed limits. *Note:* An example of fixed-tolerance-band compaction in a telemetering system is the transmission of the temperature only when the temperature is above or below preestablished threshold limits. Thus, the recipient of the transmission is to assume that the value is in the prescribed range unless a signal to the contrary occurs. [From Weik '89]

flag: In data transmission or processing, an indicator, such as a signal, symbol, character, or digit, used for identification. *Note:* A flag may be a byte, word, mark, group mark, or letter that signals the occurrence of some condition or event, such as the end of a word, block, or message. *Synonym* **field tag.**

flag sequence: In data transmission or processing, a sequence of bits used to delimit, *i.e.* mark, the beginning and end of a frame. *Note 1:* An 8-bit sequence is usually used as the flag sequence; for example, the 8-bit flag sequence 01111110. *Note 2:* Flag sequences are used in bit-oriented protocols, such as Advanced Data Communication Control Procedures (ADCCP), Synchronous Data Link Control (SDLC), and High-Level Data Link Control (HDLC).

flame: To send nasty or insulting messages, usually in response to someone's having broken the rules of Internet etiquette (called *netiquette*).

flash: 1. A signal generated by the momentary depression of the telephone switchhook or other device. *Note:* A flash may be used to request additional services. **2.** An on-hook signal of a defined duration, used to activate network features. [T1.401-1988]

flash card: In computer-based equipment (such as MP3 players, digital cameras, and palm-held computers), a type of memory storage device approximately the size of a matchbook, capable of recording several megabytes of (usually compressed) digitized audio files or data files. *Synonym* **flash memory card.**

flash feature: A supplementary calling feature provided by the near-end customer interface (CI) that is activated or controlled through the use of one or more flash signals. [T1.407-1997]

flash memory card: *Synonym* **flash card.**

FLASH message: A category of precedence reserved for initial enemy contact messages or operational combat messages of extreme urgency. Brevity is mandatory. [JP 1-02]

flash signal: A loop-open signal of 300 to 1000 ms at the network interface (NI) that is generated by the network, typically under the control of the far-end customer interface (CI), to control supplementary calling features when such features are provided by the near-end CI. [T1.407-1997]

flat fading: Fading in which all frequency components of a received radio signal vary in the same proportion simultaneously.

flat rate service: Telephone service in which a single payment permits an unlimited number of local calls to be made without further charge for a specified period of time.

flat weighting: In a noise-measuring set, a noise weighting based on an amplitude-frequency characteristic that is flat over a frequency range that must be stated. *Note 1:* Flat noise power is expressed in dBrn (f_1 - f_2) or in dBm (f_1 - f_2). *Note 2: "3-kHz flat weighting"* and *"15-kHz flat weighting"* are based on amplitude-frequency characteristics that are flat between 30 Hz and the frequency indicated.

flaw: 1. In computer security, an error of commission, an omission, or an oversight that allows protection mechanisms to be bypassed or disabled. **2.** [An] error of commission, omission, or oversight in an information system (IS) that may allow protection mechanisms to be bypassed. [INFOSEC-99] *Synonym* **loophole.** [2382-pt.8]

flaw hypothesis methodology: System analysis and penetration technique in which the specification and documentation for an information system (IS) are analyzed to produce a list of hypothetical flaws. This list is prioritized on the basis of the estimated probability that a flaw exists, on the ease of exploiting it, and on the extent of control or compromise it would provide. The prioritized list is used to perform penetration testing of a system. [INFOSEC-99]

F layer: *See* **F region.**

Fleming's rule: A rule stating that if the thumb of the right hand points in the direction of an electric current, then the curled fingers point in the direction of the magnetic field that encircles the current; and further, if the curled fingers of the right hand describe the electric current in a solenoid, then the thumb points in the direction of the magnetic field inside the solenoid. *Synonym* **right-hand rule.** [From Weik '89]

flexible disk: *Synonym* **diskette.**

flicker: In video, any of several visual artifacts similar to (*i.e.,* manifested as) a stroboscopic effect (jerkiness), sometimes caused by or related to vertical synchronization characteristics or video field display rates. [JSB]

flip-flop: A device that may assume either one of two reversible, stable states. *Note 1:* The flip-flop is used as a basic control element in computer and communications systems. *Note 2:* In a flip-flop, the transition from one stable state to the other is unstable, *i.e.,* for the very short period during which the transition takes place, both outputs may assume the same state, which state may be unpredictable. *Synonyms* **bistable circuit, bistable multivibrator, bistable trigger circuit.**

floating: *See* **conference floating.**

floating head: A magnetic head floating on a layer of air away from the recording surface. *Synonyms* **air-floating head, flying head.** [ANSDIT]

floating-point coding compaction: Data compaction accomplished by using coefficients, a base, and exponents to specify the scale, range, or magnitude of numbers. *Note:* An example of floating-point coding compaction is using 119.8×10^6, 119.8(6), or 119.86 to represent 119,800,000. If the number is rounded to 120,000,000, it might be written as

1206 or 127 in which the last digit is the number of zeros to be appended to the preceding digits. Thus, only three positions are required instead of nine to represent the number in storage or in a message, which is only 33% of the original space and time requirement. [From Weik '89]

float operation: Operation of a dc system with the battery, rectifier, and load all connected in parallel. The battery charger supplies the normal dc load plus any battery self-discharge current or recharge current required after a discharge. [T1.330-1997]

flooding: Insertion of a large volume of data resulting in denial of service. [INFOSEC-99] *Synonyms [in e-mail and forum postings]* **mail bombing, spamming;** *[in radio and wireline communications]* **flood-search routing, pilot-make-busy.**

flooding compound: A substance surrounding the buffer tubes of a fiber-optic cable, to prevent water intrusion into the interstices in the event of a breach of the jacket. [FAA]

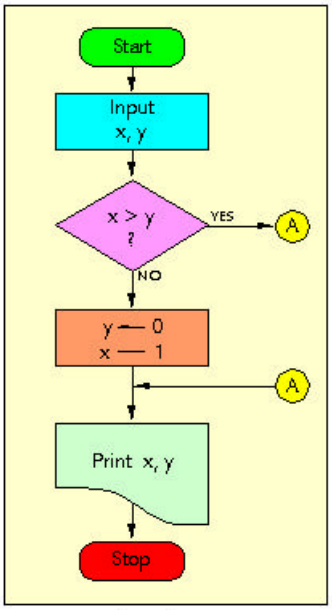
flood projection: In facsimile, the optical method of scanning in which the object is floodlighted and the scanning spot is defined by a masked portion of the illuminated area.

flood search routing: In a telephone network, nondeterministic routing in which a dialed number received at a switch is transmitted to all switches, *i.e.,* flooded, in the area code directly connected to that switch; if the dialed number is not an affiliated subscriber at that switch, the number is then retransmitted to all directly connected switches, and then routed through the switch that has the dialed number corresponding to the particular user end instrument affiliated with it. *Note 1:* All digits of the numbering plan are used to identify a particular subscriber. *Note 2:* Flood search routing allows subscribers to have telephone numbers independent of switch codes. *Note 3:* Flood search routing provides the highest probability that a call will go through even though a number of switches and links fail.

floppy disk: *Synonym* **diskette.**

flops: *Acronym for* **floating-point operations per second.** *Note:* For example, 15 Mflops equals 15 million floating-point arithmetic operations per second. [From Weik '89]

flowchart: A graphical representation in which symbols are used to represent such things as operations, data, flow direction, and equipment, for the definition, analysis, or solution of a problem. *Synonym* **flow diagram.**



flowchart

flow control: *See* **transmit flow control.**

flow control procedure: A procedure for controlling the rate of transfer of data among elements of a network, *e.g.* , between a DTE (data terminal equipment) and a data switching exchange network, to prevent overload.

flow diagram: *Synonym* **flowchart.**

flowline: On a flowchart, a line that (a) has an indicated direction, (b) represents a connection between other symbols, and (c) indicates the sequence of operations or the transfer of control.

flutter: Rapid variation of signal parameters, such as amplitude, phase, and frequency. *Note:* Examples of flutter are (a) rapid variations in received signal levels, such as variations that may be caused by atmospheric disturbances, antenna movements in a high wind, or interaction with other signals, (b) in radio propagation, a phenomenon in which nearly all radio signals that are usually reflected by ionospheric layers in or above the E-region experience partial or complete absorption, (c) in radio transmission, rapidly changing signal levels, together with variable multipath time delays, caused by reflection and possible partial absorption of the signal by aircraft flying through the radio beam or common scatter volume, (d) the variation in the transmission characteristics of a loaded telephone circuit caused by the action of telegraph direct currents on the loading coils, (e) in recording and reproducing equipment, the deviation of frequency caused by irregular mechanical motion, *e.g.,* that of capstan angular velocity in a tape transport mechanism, during operation. *Synonym [loosely]* **frequency flutter.**

flux: 1. The lines of force of a magnetic field. **2.** *Obsolete synonym for* **radiant power.**

flying head: *Synonym* **floating head.**

flywheel effect: In an oscillator, the continuation of oscillations after removal of the control stimulus. *Note 1:* The flywheel effect is usually caused by interacting inductive and capacitive circuits in the oscillator. *Note 2:* The flywheel effect may be desirable, such as in phase-locked loops used in synchronous systems, or undesirable, such as in voltage-controlled oscillators. *Synonym* **flywheeling.**

flywheeling: *Synonym* **flywheel effect.**

FM: *Abbreviation for* **frequency modulation.**

FM blanketing: That form of interference to the reception of other broadcast stations, which is caused by the presence of an FM broadcast signal of 115 dBμ (562 mV/m) or greater signal strength in the area adjacent to the antenna of the transmitting station. The 115-dBμ contour is referred to as the *"blanketing area."* [47CFR]

FM broadcast translator: *See* **translator.**

FM capture effect: *Synonym* **capture effect.**

FM capture ratio: *See* **capture effect.**

FM improvement factor: The quotient obtained by dividing the signal-to-noise ratio (SNR) at the output of an FM receiver by the carrier-to-noise ratio (CNR) at the input of the receiver. *Note:* When the FM improvement factor is greater than unity, the improvement in the SNR is always obtained at the expense of an increased bandwidth in the receiver and the transmission path.

FM improvement threshold: The point in an FM receiver at which the peaks in the rf signal equal the peaks of the thermal noise generated in the receiver. *Note:* A baseband signal-to-noise ratio of about 30 dB is typical at the improvement threshold, and this ratio improves 1 dB for each decibel of increase in the signal above the threshold.

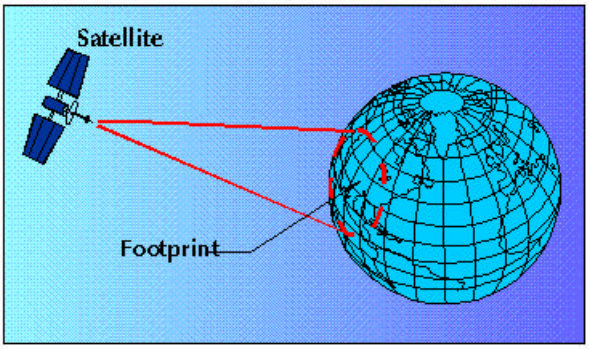
FM threshold effect: In an FM receiver, the effect produced when the desired-signal gain begins to limit the desired signal, and thus noise limiting (suppression). *Note:* FM threshold effect occurs at (and above) the point at which the FM signal-to-noise improvement is measured.

FM threshold extension: A change in the value of the FM threshold of a receiver. *Note:* FM threshold extension may be obtained by decreasing the operational bandwidth, thus decreasing the received noise power and allowing the threshold of the desired signal to occur at a lower signal input level.

FO: *Abbreviation for* **fiber optics.**

followup: *Synonym* **thread.**

footprint: In satellite communications, that portion of the Earth's surface over which a satellite antenna delivers a specified amount of signal power under specified conditions. *Note:* The limiting case of footprint area is somewhat less than one-half the Earth's surface, and depends on the altitude of the satellite.



footprint

forbidden character: *Synonym* **illegal character.**

forced rerouting: A procedure of transferring signaling traffic from one signaling route to another, when the signaling route in use fails or is required to be cleared of traffic. [T1.110-1987]

foreign exchange (FX) service: A network-provided service in which a telephone in a given local exchange area is connected, via a private line, to a central office in another, *i.e., "foreign",* exchange, rather than the local exchange area's central office. *Note:* To call originators, it appears that the subscriber having the FX service is located in the foreign exchange area.

foreign instrumentation signals intelligence (FISINT): 1. Intelligence information derived from electromagnetic emissions associated with the testing and operational deployment of foreign aerospace, surface, and subsurface systems. **2.** Technical information and intelligence information derived from the intercept of foreign instrumentation signals by other than the intended recipients. Foreign instrumentation signals intelligence is a category of signals intelligence. *Note:* Foreign instrumentation signals include but are not limited to signals from telemetry, beaconry, electronic interrogators, tracking/fusing/ arming/firing command systems, and video data links. [JP 1-02]

form: An HTML-based, interactive, ease-of-use Web site feature, containing checkboxes, option lists, text boxes, and buttons that allow users to submit pre-formatted requests or queries or to respond to pre-formatted questions.

format: 1. The arrangement of bits or characters within a group, such as a word, message, or language. **2.** The shape, size, and general makeup of a document.

format converter: 1. In video and television technology, a device that allows the reformatting of a digital data stream originating from one sampling structure (lines per frame, pixels per line) into a digital data stream of another sampling structure for the purposes of recording or passing the original data stream through distribution devices designed to accommodate the latter structure. *Note:* Since, in format conversion, the data still represent the original sampling structure, this process is not the same as standards conversion (from PAL to NTSC, for instance). A format converter can, for instance, accept a signal introduced in a proposed format, and convert it for recording on, and subsequent reproduction from, a high-definition television digital recorder designed for the 1125/60/2:1 format. **2.** In television technology, a system that converts display information from the familiar 3 x 4 aspect ratio to the newer 9 x 16 aspect ratio.

format structure: A combination of two or more data elements grouped in a prescribed sequence. [T1.201-1987] [T1.205-1988]

Fortran: *See* **language processor.**

fortuitous conductor: Any conductor that may provide an unintended path for signals. *Note:* Examples of fortuitous conductors are water pipes, wires, cables, and metal building and equipment structural members.

fortuitous distortion: Distortion resulting from causes generally subject to laws concerning random occurrences.

forum: A computer conference devoted to a specific subject, having an initiator, members, readers, and possibly moderators. [2382-pt.35] *Synonyms* **chat group, discussion group, discussion list, discussion thread, followup, interest group, library, newsgroup, thread.**

forward busying: In a telecommunications system, a feature in which supervisory signals are forwarded in advance of address signals in order to seize assets of the system before attempting to establish a connection.

forward channel: The channel of a data circuit that transmits data from the originating user to the destination user. *Note:* The forward channel carries message traffic and some control information.

forward echo: In a transmission line, an echo propagating in the same direction as the original wave and consisting of energy reflected back by one discontinuity and then forward again by another discontinuity. *Note:* Forward echoes can be supported by reflections caused by splices or other discontinuities in the transmission medium (*e.g.* , optical fiber, twisted pair, or coaxial tube). In metallic lines, they may be supported by impedance mismatches between the source or load and the characteristic impedance of the transmission medium.

forward error correction (FEC): A system of error control for data transmission wherein the receiving device has the capability to detect and correct any character or code block that contains fewer than a predetermined number of symbols in error. *Note:* FEC is accomplished by adding bits to each transmitted character or code block, using a predetermined algorithm.

forward indicator bit (FIB): A bit in a signal unit which indicates the start of a retransmission cycle. [T1.226-1992]

forward propagation ionospheric scatter (FPIS): *Synonym* **ionospheric scatter.**

forward recovery: The data reconstitution of a later version of data by using an earlier version and data recorded in a journal. [2382-pt.8]

forward scatter: The deflection--by diffraction, nonhomogeneous refraction, or nonspecular reflection by particulate matter of dimensions that are large with respect to the wavelength in question but small with respect to the beam diameter--of a portion of an incident electromagnetic wave, in such a manner that the energy so deflected propagates in a direction that is within 90° of the direction of propagation of the incident wave. *Note:* The scattering process may be polarization-sensitive, *i.e.* , incident waves that are identical in every respect but their polarization may be scattered differently.

forward secrecy: The confidence that the compromise of a long-term private key does not compromise any earlier session keys. [After X9.42]

forward sequence number (FSN): A field in a signal unit used to identify the transmitted message signal units. [T1.226-1992]

forward signal: A signal sent in the direction from the calling to the called station, *i.e.* , from the original data source to the original data sink. *Note:* The forward signal is transmitted in the forward channel.

FOT: *Abbreviation for* **frequency of optimum transmission.** In the transmission of radio waves via ionospheric reflection, the highest effective, *i.e.,* working, frequency that is predicted to be usable for a specified path and time for 90% of the days of the month. *Note 1:* The FOT is normally just below the value of the maximum usable frequency (MUF). In the prediction of usable frequencies, the FOT is commonly taken as 15% below the monthly median value of the MUF for the specified time and path. *Note 2:* The FOT is usually the most effective frequency for ionospheric reflection of radio waves between two specified points on Earth. *Synonyms* **frequency of optimum traffic, optimum traffic frequency, optimum transmission frequency, optimum working frequency.**

Fourier analysis: The definition of a periodic waveform of arbitrary shape as a summation of sine waves having specific amplitudes and phases, and having frequencies corresponding to the harmonics of the waveform being defined. *Note:* A Fourier analysis is particularly well suited for communications equipment design and for predicting the performance of a given design. [From Weik '89]

four-wire circuit: A two-way circuit using two paths so arranged that the respective signals are transmitted in one direction only by one path and in the other direction by the other path. *Note:* The four-wire circuit gets its name from the fact that, historically, two conductors were used in each of two directions for full-duplex operation. The name may still be applied, *e.g.* , to a communications link supported by optical fibers, even though only one fiber is required for transmission in each direction.

four-wire repeater: A repeater, consisting of two amplifiers, one associated with each direction, used in a four-wire circuit.

four-wire terminating set: A balanced transformer used to perform a conversion between 4-wire and 2-wire operation. *Note 1:* For example, a 4-wire circuit may, by means of a 4-wire terminating set, be connected to a 2-wire telephone set. Also, a pair of 4-wire terminating sets may be used to introduce an intermediate 4-wire loop into a 2-wire circuit, in which loop repeaters may be situated to amplify signals in each direction without positive feedback and oscillation. *Note 2* : Four-wire terminating sets have been largely supplanted by resistance hybrids.

fox message: A standard test message that includes all the alphanumerics on a teletypewriter and also function characteristics (space, figures shift, letters shift). *Note:* An example of a fox message is "THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890."

FPIS: *Abbreviation for* **forward propagation ionospheric scatter.** *See* **ionospheric scatter.**

fps: *Abbreviation for* **frames per second.** In video and television, the number of images contained in a single second of a moving picture. *Note:* Thirty fps is considered full-motion video in NTSC systems, while 25 fps is considered full-motion in PAL and SECAM systems. Many proprietary video technologies produce 15 fps video; 24 fps is considered full-motion in motion-picture technology.

fractal: A mathematical formula or algorithm that constitutes or defines an efficient way of formulating computer graphics. Fractal graphics translate the natural curves of an object into mathematical formulas, from which the entire image can later be constructed. Fractals are self-similar in that any piece of the fractal design contains a miniature of the entire design. A fractal is completely described by (a) one piece (layer) of the design, and (b) a sublayer of the design, which sublayer shows how contiguous pieces (layers) fit together. For this reason, fractal patterns (designs) require very little computer storage space. An example of a fractal is a fern leaf design.

fractional frequency deviation: *Synonym* **fractional frequency offset.**

fractional frequency fluctuation: The deviation of the frequency of an oscillator from its nominal constant frequency, normalized to the nominal frequency.

fractional frequency offset: A measure of the deviation of the frequency of a signal from a reference, expressed as a ratio. The ratio is dimensionless but typically expressed as parts per million, ppm. For example, 4.6 ppm = 4.6/106. Fractional frequency offset = [(f-fr) / fr] where: f = the actual frequency output of the signal in question, and fr = the reference frequency. *Synonym [in ITU-T Recommendation G.810]* **fractional frequency deviation.** [T1.105.09-1996]

fractional T1: In telecommunications, a portion of the 1.544 Mb/s (T1-aggregate) bit stream; the available fractions being determined by the type of multiplexer used to achieve the T1 aggregate bit stream.

fragmentation: 1. The process in which an IP (Internet protocol) datagram is broken into smaller pieces to fit the requirements of a given physical network; the reverse process of reassembly. **2.** The physical separation of portions of a file on a computer disk.

frame: 1. In data transmission, the sequence of contiguous bits delimited by, and including, beginning and ending flag sequences. *Note 1:* A frame usually consists of a specified number of bits between flag sequences and usually includes an address field, a control field, and a frame check sequence. *Note 2:* Frames usually consist of a representation of the original data to be transmitted, together with other bits which may be used for error detection or control. Additional bits may be used for routing, synchronization, or overhead information not directly associated with the original data. **2.** In the multiplex structure of pulse-code modulation (PCM) systems, a set of consecutive time slots in which the position of each digit can be identified by reference to a frame-alignment signal. *Note:* The frame-alignment signal does not necessarily occur, in whole or in part, in each frame. **3.** In a time-division multiplexing (TDM) system, a repetitive group of signals resulting from a single sampling of all channels, including any required system information, such as additional synchronizing signals. *Note: "In-frame"* is the condition that exists when there is a channel-to-channel and bit-to-bit correspondence, exclusive of transmission errors, between all inputs of a time-division multiplexer and the output of its associated demultiplexer. **4.** In ISDN, a block of variable length, labeled at the Data Link Layer of the Open Systems Interconnection--Reference Model. **5.** In video display, the set of all picture elements that represent one complete image. *Note:* In NTSC and other television standards used throughout the world, a frame consists of two interlaced fields, each of which has half the number of scanning lines, and consequently, half the number of pixels, of one frame. **6.** In video display, one complete scanned image from a series of video images. *Note:* A video frame is usually composed of two interlaced fields. **7.** In computer screen displays of HTML documents, a portion (usually rectangular) of the screen where one usually finds the same types of fields/information displayed, in the same manner as one usually finds the same or similar information displayed in the same segment of different copies of a printed form. **8.** An HTML feature that allows multiple Web pages to be viewed simultaneously (by means of scrolling or re-sizing) through a browser window.

frame alignment: 1. In the reception of framed digital data, the extent to which a received frame is correctly aligned with respect to the clock at the receiver. **2.** The state in which the frame of the receiving equipment is synchronized with that of the received signal. [T1.107-1988]

frame-alignment recovery time: *Synonym* **reframing time.**

frame-alignment signal: In the transmission of data frames, a distinctive sequence of bits used to accomplish frame alignment. *Note:* A frame-alignment signal may also contain additional bits for status, control, and error detection.

frame-alignment time slot : A time slot occupying the same relative position in every frame and used to transmit the frame alignment signal. [T1.107-1988]

frame check sequence (FCS): *See* **cyclic redundancy check.**

framed interface: An interface through which information flow is partitioned into physical, periodic frames consisting of overhead information and an information payload.

frame duration: The time between the beginning of a frame and the end of that frame. *Note:* For fixed-length frames, at a fixed data rate, frame duration is constant.

frame frequency: *Synonym* **frame rate.**

frame grabber: A device that can seize and record a single frame of video information out of a sequence of many frames.

frame matching: The process of comparing one sequence of frames with another sequence of frames in order to determine the correspondence between frames in each sequence and the correspondence of individual frames. *Note:* One means to test the correspondence between two video frames is to compare their digital representations on a pixel by pixel basis, and summarizing over all pixels as the mean-square of the differences (usually called "mean square error"). [T1.801.04-1997]

frame overhead: Bits (binary digits) that are added at regular intervals to a digital signal at the sending end of a digital link and used to provide network functions such as framing, operations, administration, and maintenance. [T1.107-1988]

frame pitch: The distance, time, or number of bits between corresponding points, *i.e.,* significant instants, in two consecutive frames. [From Weik '89]

frame rate: The number of frames transmitted or received per unit time. *Note 1:* The frame rate is usually expressed in frames per second. *Note 2:* In television transmission, the frame rate must be distinguished from the field rate, which in the NTSC and other systems, is twice the frame rate. *Synonym* **frame frequency.**

frame-rate conversion: With respect to television or other video display technologies, the process of transforming from one standard frame rate to another, using an algorithm. *Note:* Standard display rates of 24, 25, 29.97, 30, and 60 fps (frames per second) presently exist.

frame relay: An interface protocol for statistically multiplexed packet-switched data communications in which (a) variable-sized packets (frames) are used that completely enclose the user packets they transport, and (b) transmission rates are usually between 56 kb/s and 1.544 Mb/s (the T-1 rate). *Note 1:* In frame relay, (a) there is neither flow-control nor an error-correction capability, (b) there is information-content independence, (c) there is a correspondence only to the ISO Open systems Interconnection--Reference Model Layers 1 and 2, (d) variable-sized user packets are enclosed in larger packets (frames) that add addressing and verification information, (e) frames may vary in length up to a design limit, usually 1 kilobyte or more, (f) one frame relay packet transports one user packet, (g) implementation of fast-packet technology is used for connection-oriented frame relay services, and (h) there is a capability to handle time-delay insensitive traffic, such as LAN interworking and image transfer. *Note 2:* Frame relay is referred to as the *local management interface (LMI) standard* and is specified in *ANSI T1.617* .

frame relaying protocol data unit (FPDU): A data unit exchanged at the user-network interface and having a format based on that defined in CCITT Recommendation Q.921 (1988) (ANSI T1.602). [T1.606-1990]

frame relaying service data unit (FSDU): The data unit exchanged at the functional boundary between the core function of Q.921 and the end-to-end protocol implemented above the core functions of Q.921. [T1.606-1990]

frame size: The number of octets after the address field and before the frame check sequence (FCS) field in a frame. The octet count is done either before zero-bit insertion or after zero-bit extraction. [T1.615-1992]

frame slip: In the reception of framed data, the loss of synchronization between a received frame and the receiver clock, causing a frame misalignment event, and resulting in the loss of the data contained in the received frame. *Note:* A frame slip should not be confused with a dropped frame where synchronization is not lost, *e.g.* , in the case of buffer overflow.

frame synchronization: Of a received stream of framed data, the process by which incoming frame alignment signals, *i.e.* , distinctive bit sequences, are identified, *i.e.* , distinguished from data bits, permitting the data bits within the frame to be extracted for decoding or retransmission. *Note:* The usual practice is to insert, in a dedicated time slot within the frame, a noninformation bit that is used for the actual synchronization of the incoming data with the receiver. *Synonym* **framing.**

frame synchronization pattern: In digital communications, a prescribed recurring pattern of bits transmitted to enable the receiver to achieve frame synchronization.

framing: 1. In time-division multiplexing reception, *synonym* **frame synchronization. 2.** In video reception, the process of adjusting the timing of the receiver to coincide with the received video synchronization pulse. **3.** In facsimile, the adjustment of the facsimile picture to a desired position in the direction of line progression.

framing bit: 1. A bit used for frame synchronization. **2.** In a bit stream, a bit used in determining the beginning or end of a frame. *Note 1:* The framing bit occurs at a specific position in the frame. *Note 2:* In a bit stream, framing bits are noninformation bits. *Note 3:* Framing in a digital signal is usually repetitive.

framing signal: *See* **frame-alignment signal, framing bit.**

Fraunhofer diffraction pattern: *Synonym* **far-field diffraction pattern.**

Fraunhofer region: *Synonym* **far-field region.**

free net: A radio net in which any station may communicate with any other station in the net without first obtaining the permission of the net-control station. *Note:* Permission to operate as a free net is granted by the net-control station until such time as a directed net is established by the net-control station. [From Weik '89] *See [for Internet systems]* **freenet.**

freenet: A system of computer networks (usually funded by individuals or organizations) consisting of community-based bulletin board systems with, *e.g.,* e-mail, information services, interactive communications, and conferencing, and that are available to the user free of charge, or for a small membership fee. *See [for radio communications]* **free net.**

free routing: The routing of messages in such a manner that they are forwarded toward their destination or addressee over any available channel without dependence upon predetermined routing. [From Weik '89]

free-running capability: In a synchronized oscillator, the capability to operate in the absence of a synchronizing signal.

free space: A theoretical concept of space devoid of all matter. *Note:* Free space also implies remoteness from material objects that could influence the propagation of electromagnetic waves.

free-space coupling: Coupling of magnetic, electric, or electromagnetic fields that are not confined to a conductor. *Note:* Coupling by the deliberate introduction of capacitors and inductors is not considered free-space coupling.

free-space loss: The signal attenuation that would result if all absorbing, diffracting, obstructing, refracting, scattering, and reflecting influences were sufficiently removed so as to have no effect on propagation. *Note:* Free-space loss is primarily caused by beam divergence, *i.e.* , signal energy spreading over larger areas at increased distances from the source.

freeware: Software that is developed usually by individuals or small companies and distributed, usually via FTP, at essentially no cost to the recipient. *Note:* Often the developer or another party retains the copyright to the software product; therefore, freeware is not necessarily in the public domain, and its distribution may be controlled by the copyright owner.

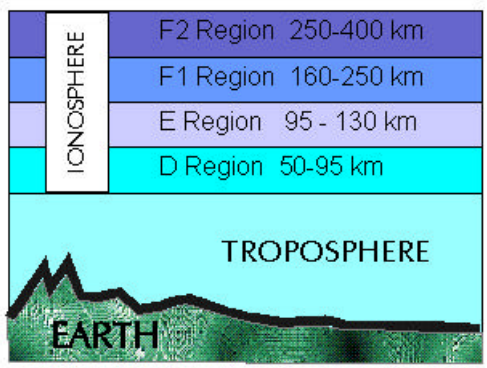
freeze frame: A frame of visual information that is selected from a set of motion video frames, and is held in a buffer.

freeze frame television: Television in which fixed ("still") images are transmitted sequentially at a rate far too slow to be perceived as continuous motion by human vision. *Note:* Transmission of an image is usually performed periodically by a processing unit that contains memory in which data representing the image are stored. For an image of specified quality, *e.g.,* resolution and color fidelity, freeze-frame television has a lower bandwidth requirement than that of full-motion operation.

freeze-out: The condition that occurs when an earlier nonactive speaker on an input transmission trunk channel becomes active and cannot immediately be assigned to a bearer channel, due to lack of free instantaneous transmission capacity. [T1.309-1990]

freeze-out fraction: The ratio of the total time that the individual channels experience the freeze-out condition to the total time of the active intervals, and their corresponding hangover times and front end delays, for all transmission trunks over a fixed interval of time, *e.g.,* 1 minute. [T1.309-1990]

F region: That portion of the ionosphere existing between approximately 160 and 400 km above the surface of the Earth, consisting of layers of increased free-electron density caused by the ionizing effect of solar radiation. *Note 1:* The F region reflects normal-incident frequencies at or below the critical frequency (approximately 10 MHz) and partially absorbs waves of higher frequency. *Note 2:* The F_1 layer exists from about 160 to 250 km above the surface of the Earth and only during daylight hours. Though fairly regular in its characteristics, it is not observable everywhere or on all days. The principal reflecting layer during the summer for paths of 2,000 to 3,500 km is the F_1 layer. The F_1 layer has approximately 5×10^5 e/cm^3 (free electrons per cubic centimeter) at noontime and minimum sunspot activity, and increases to roughly 2×10^6 e/cm^3 during maximum sunspot activity. The density falls off to below 10^4 e/cm^3 at night. *Note 3:* The F_1 layer merges into the F_2 layer at night. *Note 4:* The F_2 layer exists from about 250 to 400 km above the surface of the Earth. The F_2 layer is the principal reflecting layer for HF communications during both day and night. The horizon-limited distance for one-hop F_2 propagation is usually around 4,000 km. The F_2 layer has about 10^6 e/cm^3. However, variations are usually large, irregular, and particularly pronounced during magnetic storms.



ionosphere

frequency: 1. For a periodic function, the number of cycles or events per unit time. **2.** The number of cycles occurring per second of an electrical or electromagnetic wave; a number representing a specific point in the electromagnetic spectrum. [47CFR]

frequency accuracy: The degree of conformity to a specified value of a frequency.

frequency aging: Of an oscillator, the change in frequency, over time, caused by internal changes in oscillator parameters even when external factors, such as environment and power supply characteristics, are constant.

frequency allocation: *See* **allocation (of a frequency band).**

frequency allotment: *See* **allotment (of a radio frequency or radio frequency channel).**

frequency-analysis compaction: Data compaction accomplished by using an expression composed of a number of different frequencies of different magnitudes to represent a particular curve. *Note:* An example of frequency-analysis compaction is the use of a Fourier analysis to represent an arbitrary curve, a periodic function, an aperiodic function, or a wave shape. Thus, the fundamental frequency, the amplitude of the fundamental frequency, and the amplitudes and frequencies of the harmonics are all that are needed to reconstitute the function or wave shape. The shape can thus be readily stored and transmitted in this compacted form. [From Weik '89]

frequency assignment: 1. Authorization, given by an Administration, for a radio station to use a radio frequency or radio frequency channel under specified conditions **2.** The process of authorizing a specific frequency, group of frequencies, or frequency band to be used at a certain location under specified conditions, such as bandwidth, power, azimuth, duty cycle, or modulation. *Synonym* **radio frequency channel assignment.**

frequency assignment authority: The power granted an Administration, or its designated or delegated leader or agency via treaty or law, to specify frequencies, or frequency bands, in the electromagnetic spectrum for use in systems or equipment. *Note:* Primary frequency assignment authority for the United States is exercised by the National Telecommunications and Information Administration (NTIA) for the Federal Government and by the Federal Communications Commission (FCC) for non-Federal Government organizations. International frequency assignment authority is vested in the International Frequency Registration Board of the International Telecommunication Union. [Extracted from NTIA]

frequency averaging: 1. The process by which the relative phases of precision clocks are compared for the purpose of defining a single time standard. **2.** A process in which network synchronization is achieved by use, at all nodes, of oscillators that adjust their frequencies to the average frequency of the digital bit streams received from connected nodes. *Note:* In frequency averaging, all oscillators are assigned equal weight in determining the ultimate network frequency.

frequency band: *See* **electromagnetic spectrum.**

frequency band allocation: *See* **allocation (of a frequency band).**

frequency-change signaling: A signaling method in which one or more discrete frequencies correspond to each desired significant condition of a code. *Note 1:* The transition from one set of frequencies to the other may be a continuous or a discontinuous change in frequency or in phase. *Note 2:* Frequency-change signaling may be used in both supervisory signaling and data transmission.

frequency coherence: *See* **phase coherence.**

frequency compatibility: 1. Of an electronic device, the extent to which it will operate at its designed performance level in its intended operational environment (including the presence of interference) without causing interference to other devices. **2.** The degree to which an electrical or electronic device or devices operating on or responding to a specified frequency or frequencies is capable of functioning with other such devices.

frequency departure: 1. The difference between the instantaneous frequency of a digital signal and the long-term average frequency of that signal. [T1.Rpt17-1993] **2.** An unintentional deviation from the nominal frequency value.

frequency-derived channel: A channel derived by dividing an allocated or available bandwidth over a medium into two or more portions, each usable separately. *Note:* A frequency-derived channel is continuously available and may be further divided on either a frequency or time basis.

frequency deviation: 1. The amount by which a frequency differs from a prescribed value, such as the amount an oscillator frequency drifts from its nominal frequency. **2.** In frequency modulation, the absolute difference between (a) the maximum permissible instantaneous frequency of the modulated wave or the minimum permissible instantaneous frequency of the modulated wave and (b) the carrier frequency. **3.** In frequency modulation, the maximum absolute difference, during a specified period, between the instantaneous frequency of the modulated wave and the carrier frequency.

frequency dispersal: An electronic counter-countermeasure (ECCM) in which communications nets' operating frequencies are widely separated from each other, causing a requirement to spread jamming power over wider frequency bands and thus compelling a reduction of available jamming power on any single channel or frequency, or causing a requirement for more jamming power or more jamming equipment. [From Weik '89]

frequency displacement: The end-to-end shift in frequency that may result from independent frequency translation errors in a circuit.

frequency distortion: *Synonym* **amplitude-vs.-frequency distortion.**

frequency diversity: Transmission and reception in which the same information signal is transmitted and received simultaneously on two or more independently fading carrier frequencies.

frequency-division multiple access (FDMA): The use of frequency division to provide multiple and simultaneous transmissions to a single transponder.

frequency-division multiplexing (FDM): The deriving of two or more simultaneous, continuous channels from a transmission medium by assigning a separate portion of the available frequency spectrum to each of the individual channels.

frequency drift: An undesired progressive change in frequency with time. *Note 1:* Causes of frequency drift include component aging and environmental changes. *Note 2:* Frequency drift may be in either direction and is not necessarily linear.

frequency-exchange signaling: Frequency-change signaling in which the change from one significant condition to another is accompanied by decay in amplitude of one or more frequencies and by buildup in amplitude of one or more other frequencies. *Note:* Frequency-exchange signaling applies to supervisory signaling and user-information transmission. *Synonym* **two-source frequency keying.**

frequency fluctuation: A short-term variation, with respect to time, of the frequency of an oscillator. *Note:* Frequency fluctuation, $f(t)$, is given by

$$f(t) = \frac{1}{2\pi}\frac{d^2\theta(t)}{dt^2},$$

where $\theta(t)$ is the phase angle of the sinusoidal wave with respect to time, t.

frequency flutter: A deviation of frequency that generally results from irregular motion of the recording medium during the recording, duplication, or reproduction. [T1.401-1988] *Synonym [loosely]* **flutter.**

frequency frogging: 1. The interchanging of the frequencies of carrier channels to accomplish specific purposes, such as to prevent feedback and oscillation, to reduce crosstalk, and to correct for a high frequency-response slope in the transmission line. *Note:* Frequency frogging is accomplished by having modulators, which are integrated into specially designed repeaters, translate a low-frequency group to a high-frequency group, and vice versa. A channel will appear in the low group for one repeater section and will then be translated to the high group for the next section because of frequency frogging. This results in nearly constant attenuation with frequency over two successive repeater sections, and eliminates the

need for large slope equalization and adjustments. Singing and crosstalk are minimized because the high-level output of a repeater is at a different frequency than the low-level input to other repeaters. **2.** In microwave systems, the alternate use of two frequencies at repeater sites to prevent feedback and oscillation.

frequency guard band: A frequency band deliberately left vacant between two channels to provide a margin of safety against mutual interference.

frequency hopping: [The] repeated switching of frequencies during radio transmission according to a specified algorithm, to minimize unauthorized interception or jamming of telecommunications. [NIS] [INFOSEC-99] *Note:* The overall bandwidth required for frequency hopping is much wider than that required to transmit the same information using only one carrier frequency.

frequency-hopping spread spectrum: A signal structuring technique employing automatic switching of the transmitted frequency. Selection of the frequency to be transmitted is typically made in a pseudo-random manner from a set of frequencies covering a band wider than the information bandwidth. The intended receiver would frequency-hop in synchronization with the code of the transmitter in order to retrieve the desired information. [NTIA] [RR] *Note:* In many cases, used as an electronic counter-countermeasure (ECCM) technique.

frequency hour: One frequency used for one hour regardless of the number of transmitters over which it is simultaneously broadcast by a station during that hour. [47CFR]

frequency instability: *See* **frequency stability.**

frequency lock: The condition in which a frequency-correcting feedback loop maintains control of an oscillator within the limits of one cycle. *Note:* Frequency lock does not imply phase lock, but phase lock does imply frequency lock.

frequency modulation (FM): Modulation in which the instantaneous frequency of a sine wave carrier is caused to depart from the center frequency by an amount proportional to the instantaneous value of the modulating signal. *Note 1:* In FM, the carrier frequency is called the center frequency. *Note 2:* FM is a form of angle modulation. *Note 3:* In optical communications, even if the electrical baseband signal is used to frequency-modulate an electrical carrier (an "FM" optical communications system), it is still the intensity of the lightwave that is varied (modulated) by the electrical FM carrier. In this case, the "information," as far as the lightwave is concerned, is the electrical FM carrier. The lightwave is varied in intensity at an instantaneous rate corresponding to the instantaneous frequency of the electrical FM carrier. [After FAA]

frequency offset: The difference between the frequency of a source and a reference frequency.

frequency of optimum traffic (FOT): *Synonym* **FOT.**

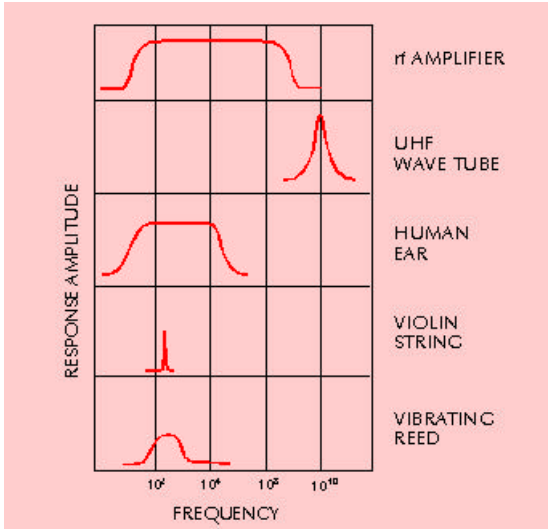
frequency of optimum transmission (FOT): *See* **FOT.**

frequency prediction: A prediction of the maximum usable frequency (MUF), the optimum traffic frequency, and the lowest usable frequency (LUF) for transmission between two specific locations or geographical areas during various times throughout a 24-hour period. *Note:* The prediction is usually indicated by means of a graph for each frequency plotted as a function of time. [From Weik '89]

frequency range: A continuous range or spectrum of frequencies that extends from one limiting frequency to another. *Note 1:* The frequency range for given equipment specifies the frequencies at which the equipment is operable. For example, filters pass or stop certain bands of frequencies. The frequency range for propagation indicates the frequencies at which electromagnetic wave propagation in certain modes or paths is possible over given distances. Frequency allocation, however, is made in terms of bands of frequencies. There is little, if any, conceptual difference between a range of frequencies and a band of frequencies. *Note 2: "Frequency band"* usually identifies a specific band of frequencies in the Tables of Frequency Allocations. [From Weik '89]

frequency response: *See* **insertion-loss-vs.-frequency characteristic.**

frequency response curve: A plot of the gain or attenuation of a device, such as an amplifier or a filter, as a function of frequency. *Note:* A flat curve indicates a uniform gain or attenuation over the range of frequencies for which the curve is flat. Most amplifiers have a flat frequency response over a certain band, above and below which the gain is reduced. The frequency response curve of a filter has one or more peaks or troughs. [From Weik '89]



representative frequency response of various devices

frequency scanning: Conducting a search for signals over a band or range of frequencies by means of a manually or automatically tuned receiver. *Note:* The tuning rate, *i.e.,* the frequency change rate, may be fixed or variable, or it may be performed mechanically at low speed or electronically at high speed. Frequency scanning may be used to enable a radar to transmit on a clear frequency, *i.e.,* a no-interference frequency, by searching a frequency band and then tuning the system to a clear portion of that band. [From Weik '89]

frequency sharing: The assignment to or use of the same radio frequency by two or more stations that are separated geographically or that use the frequency at different times. *Note 1:* Frequency sharing reduces the potential for mutual interference where the assignment of different frequencies to each user is not practical or possible. *Note 2:* In a communications net, frequency sharing does not pertain to stations that use the same frequency.

frequency shift: 1. Any change in frequency. **2.** Any change in the frequency of a radio transmitter or oscillator. *Note:* In the radio regime, frequency shift is also called rf shift. **3.**

See **frequency-shift telegraphy. 4.** In facsimile, a frequency modulation system where one frequency represents picture black and another frequency represents picture white. Frequencies between these two limits may represent shades of gray. **5.** An intentional frequency change used for modulation purposes.

frequency-shift keying (FSK): Frequency modulation in which the modulating signal shifts the output frequency between predetermined values. *Note 1:* Usually, the instantaneous frequency is shifted between two discrete values termed the *"mark"* and *"space"* frequencies. This is a noncoherent form of FSK. *Note 2:* Coherent forms of FSK exist in which there is no phase discontinuity in the output signal. *Synonyms* **frequency-shift modulation, frequency-shift signaling.**

frequency-shift modulation: *Synonym* **frequency-shift keying.**

frequency-shift signaling: *Synonym* **frequency-shift keying.**

frequency-shift telegraphy: Telegraphy by frequency modulation in which the telegraph signal shifts the frequency of the carrier between predetermined values. [NTIA] [RR]

frequency source: *See* **frequency standard.**

frequency spectrum: *See* **electromagnetic spectrum.**

frequency spectrum congestion: The situation that occurs when many stations transmit simultaneously using frequencies that are close together, *i.e.,* with insufficient width of frequency guard bands or channel spacing. *Note:* Frequency spectrum congestion causes (a) difficulty in discrimination by tuning, (b) overlap of (i) a sideband and an adjacent carrier, or (ii) upper and lower sidebands, respectively, of adjacent carriers, and (c) interference that occurs when frequencies shift slightly or are phase shifted by ionospheric reflection. [From Weik '89]

frequency stability: The degree to which variations of the frequency of an oscillator deviate from the mean frequency over a specified period of time.

frequency standard: A stable oscillator used for frequency calibration or reference. *Note 1:* A frequency standard generates a fundamental frequency with a high degree of accuracy and precision. Harmonics of this fundamental frequency are used to provide reference points. *Note 2:* Frequency standards in a network or facility are sometimes administratively designated as "primary" or "secondary." The terms *"primary"* and *"secondary,"* as used in this context, should not be confused with the respective technical meanings of these words in the discipline of precise time and frequency.

frequency synthesizer: A device that produces frequencies that are phase coherent with a reference frequency. *Note:* The reference frequency may be derived from an internal or external source.

frequency tolerance: 1. The maximum permissible departure by the center frequency of the frequency band occupied by an emission from the assigned frequency, or by the characteristic frequency of an emission from the reference frequency. Frequency tolerance is expressed in parts per 10^6 or in hertz. [NTIA] [RR] *Note:* In the United States, frequency tolerance is expressed in parts per 10^n, in hertz, or in percentages. Frequency tolerance includes both the initial setting tolerance and excursions related to short- and long-term instability and aging. **2.** The maximum permissible departure by the center frequency of the frequency band occupied by an emission from the assigned frequency or, by the characteristic feequency of an emission from the reference frequency. The frequency tolerance is expressed as a percentage or in Hertz. [47CFR]

frequency translation: The transfer of signals occupying a specified frequency band, such as a channel or group of channels, from one portion of the frequency spectrum to another, in such a way that the arithmetic frequency difference of signals within the band is unaltered.

frequently asked questions: *See* **FAQ file.**

Fresnel diffraction pattern: *Synonym* **near-field diffraction pattern.**

Fresnel reflection: In optics, the reflection of a portion of incident light at a discrete interface between two media having different refractive indices. *Note 1:* Fresnel reflection occurs at the air-glass interfaces at the entrance and exit ends of an optical fiber. Resultant transmission losses, on the order of 4% per interface, can be reduced considerably by the use of index-matching materials. *Note 2:* The coefficient of reflection depends upon the refractive index difference, the angle of incidence, and the polarization of the incident radiation. For a normal ray, the fraction of reflected incident power is given by

$$R = \frac{(n_1 - n_2)^2}{(n_1 + n_2)^2} ,$$

where R is the reflection coefficient and n_1 and n_2 are the respective refractive indices of the two media. In general, the greater the angle of incidence with respect to the normal, the greater the Fresnel reflection coefficient, but for radiation that is linearly polarized in the plane of incidence, there is zero reflection at Brewster's angle. *Note 3:* Macroscopic optical elements may be given antireflection coatings consisting of one or more dielectric thin-film layers having specific refractive indices and thicknesses. Antireflection coatings reduce overall Fresnel reflection by mutual interference of individual Fresnel reflections at the boundaries of the individual layers.

Fresnel zone: In radio communications, one of a (theoretically infinite) number of a concentric ellipsoids of revolution which define volumes in the radiation pattern of a (usually) circular aperture. *Note 1:* The cross section of the first Fresnel zone is circular. Subsequent Fresnel zones are annular in cross section, and concentric with the first. *Note 2:* Odd-numbered Fresnel zones have relatively intense field strengths, whereas even numbered Fresnel zones are nulls. *Note 3:* Fresnel zones result from diffraction by the circular aperture.

front-end noise temperature: A measure of the thermal noise generated in the first stage of a receiver.

front-end processor (FEP): A programmed-logic or stored-program device that interfaces data communication equipment with an input/output bus or memory of a data processing computer.

front-end security filter: [A] security filter logically separated from the remainder of an information system (IS) to protect system integrity. *Synonyms [loosely]* **firewall, proxy.** [INFOSEC-99]

front-to-back ratio: 1. Of an antenna, the gain in a specified direction, *i.e.* , azimuth, usually that of maximum gain, compared to the gain in a direction 180° from the specified azimuth. *Note:* Front-to-back ratio is usually expressed in dB. **2.** A ratio of parameters used to characterize rectifiers or other devices, in which electrical current, signal strength, resistance, or other parameters, in one direction is compared with that in the opposite direction.

FSDPSK: *Abbreviation for* **filtered symmetric differential phase-shift keying.**

FSK: *Abbreviation for* **frequency-shift keying.**

FTAM: *Abbreviation for* **file transfer, access, and management.**

FTP: *Abbreviation for* **File Transfer Protocol.** The Transmission Control Protocol/Internet Protocol (TCP/IP) protocol that is (a) a standard high-level protocol for transferring files from one computer to another, (b) usually implemented as an application level program, and (c) uses the Telnet and TCP protocols. *Note:* In conjunction with the proper local software, FTP allows computers connected to the Internet to exchange files, regardless of the computer platform.

FTP archive: A collection of files that are available by using file transfer protocol (FTP). *Synonyms* **file archive, file site.**

FTP mail: A method of accessing and retrieving FTP-based files via e-mail.

FTS: Historically, the telecommunications service initiated in 1964 by the Federal government to provide a consolidated communications capability to support the agencies with voice and data services that could endure when the public switched network was congested or otherwise incapacitated. GSA has awarded and maintained the FTS network since its inception. The FTS2000 designator was used in the 1988 contract award, and the FTS2001 was used in the 1999 contract award. In 1988 GSA began using the term *FTS* to include all services provided in the Federal community to support communications, including local, long-distance and international services, regardless of media or transport. *See* **FTS2000, FTS2001.**

FTS2000: *Abbreviation for* **Federal Telecommunications System 2000.** The designation for a defunct Federal telecommunications contract replaced by the contract designated by the title "FTS2001."

FTS2001: *Abbreviation for* **Federal Telecommunications System.** A contract to provide a consolidated telecommunications capability to support Federal agencies with voice and data services (including local, long-distance, and international services) that can endure if the public switched network is congested or otherwise incapacitated. The FTS2000 contract was renegotiated for the FTS2001 contract to take advantage of pricing structures and unbundling rulings.

full carrier: A carrier that is transmitted without reduction in power, *i.e .*, a carrier that is of sufficient level to demodulate the sideband(s).

full carrier single-sideband emission: A single-sideband emission without reduction of the carrier. [NTIA] [RR]

full-duplex (FDX) circuit: A circuit that permits simultaneous transmission in both directions.

full-duplex (FDX) operation: *Synonym* **duplex operation.**

full duration at half maximum (FDHM): Full width at half maximum in which the independent variable is time. *See* **full width at half maximum.**

full load level (FLL): The peak voltage level of a nominal 400-Hz sine wave required to excite the analog-to-digital converter of the transmit channel unit to the extremes of its encoding range. [T1.305-1990]

full modulation: In an analog-to-digital converter, the condition in which the input signal amplitude has just reached the threshold at which clipping begins to occur. [From Weik '89]

full-motion operation: In television, a video frame update rate that provides the appearance of full motion without flicker or smear problems. *Note:* Picture motion appears to be full at greater than 16 fps (frames per second). European television operates at 25 fps and North American television at 30 fps.

full processing: All processing functions required to recover the information bits from a received signal.

full width at half maximum (FWHM): An expression of the extent of a function, given by the difference between the two extreme values of the independent variable at which the dependent variable is equal to half of its maximum value. *Note 1:* FWHM is applied to such phenomena as the duration of pulse waveforms and the spectral width of sources used for optical communications. *Note 2:* The term *full* ***duration*** *at half maximum (FDHM)* is preferred when the independent variable is time.

fully connected mesh network: *See* **network topology.**

fully connected topology: *See* **network topology.**

fully intermateable connectors: Connectors from one source that mate with complementary components from other sources without mechanical damage and with transmission properties maintained within specified limits.

fully qualified domain name (FQDN): A domain name including all higher level domain names up to the top-level domain name; for example: Paris.nisc.sri.com is a fully qualified domain name for the host at 192.33.33.109; nisc.sri.com is the fully qualified domain name for the NISC domain. *Note:* The fully qualified domain name must be unique within the Internet. [2382-pt.35]

functional component (FC): In intelligent networks, an elemental call-processing component that directs internal network resources to perform specific actions, such as collecting dialed digits. *Note:* An FC is unique to the intelligent-network-IN/2 architecture.

functionality: The ability of equipment to operate as expected during actual service conditions in a central office. [T1.304-1989]

functional profile: A standardization document that characterizes the requirements of a standard or group of standards, and specifies how the options and ambiguities in the standard(s) should be interpreted or implemented to (a) provide a particular information technology function, (b) provide for the development of uniform, recognized tests, and (c) promote interoperability among different network elements and terminal equipment that implement a specific profile.

functional signaling: In an integrated services digital network (ISDN), signaling in which the signaling messages are unambiguous and have clearly defined meanings that are known to both the sender and receiver of the messages. *Note:* Functional signaling is usually generated by the data terminal equipment (DTE).

functional signaling link: A combination of a communications link and the associated transfer control functions.

functional unit: An entity of hardware, software, or both, capable of accomplishing a specified purpose.

function signal: A set of signal elements that is used to transmit or represent a function-control character that actuates a control function, such as carriage return, line-feed, letters shift, or figures shift, that is to be performed by communications devices, such as teletypewriters and teleprinters. [From Weik '89]

fundamental: Of a periodic wave, the sinusoidal component, *i.e.,* Fourier component, having the lowest frequency. *Note:* Every periodic waveform may be expressed as the summation of the fundamental and its harmonics. For example, a square wave may be expressed as the summation of sine waves equal in frequency to the fundamental and all odd harmonics, each frequency having an appropriate amplitude and phase. A pure sinusoidal wave has only one component, *i.e.,* the fundamental.

fundamental mode: The lowest order mode of a waveguide. *Note:* In optical fibers, the fundamental mode is designated LP_{01} or HE_{11}.

furcate: *Synonym* **break out.**

fuse: 1. A device that has as its critical component a metal wire or strip that will melt when heated by a prescribed (design) amperage, creating an open in the circuit of which it is a part, thereby protecting the circuit from an overcurrent condition. *Note:* Fuses are often characterized as "fast-blow" or "slow-blow," according to the time required for them to respond to an overcurrent condition. Fast-blow fuses open nearly instantaneously when exposed to an overcurrent condition. Slow-blow fuses can tolerate a transient overcurrent condition, but will open if the overcurrent condition is sustained. **2.** In optical fiber technology, to join the endfaces of a pair of optical fibers by melting, *i.e.* , welding, the endfaces together.

fused silica: *Synonym* **vitreous silica.**

fusion: *Synonym (in cryptosystems)* **linkage.**

fusion splice: In fiber optics, a splice created by localized heating of the ends of the two fibers to be joined. *Note:* A properly made fusion splice results in a continuous length of material with minimal discontinuities at the splice.

FWHM: *Abbreviation for* **full width at half maximum.**

FX: *Abbreviation for* **fixed service, foreign exchange service.**

gain: The ratio of output current, voltage, or power to input current, voltage, or power, respectively. *Note 1:* Gain is usually expressed in dB. *Note 2:* If the ratio is less than unity, the gain, expressed in dB, will be negative, in which case there is a loss between input and output.

gain hit: *See* **hit.**

gain medium: An active medium, device, or system in which amplification of input occurs with or without feedback. *Note:* Gain media include amplifiers, lasers, and avalanche photodiodes (APDs).

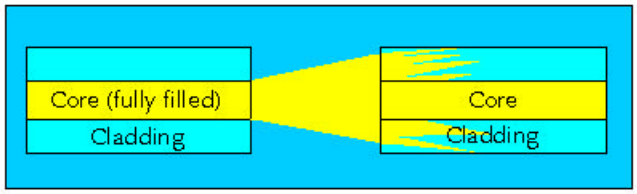
gain of an antenna: *Synonym* **antenna gain.**

galactic radio noise: *Synonym* **cosmic noise.**

gamma correction: In video, the insertion of a nonlinear output-input characteristic for the purpose of changing the system transfer characteristic. [IEEE 100] *Note:* Historically, gamma correction was a precompensation applied to the video signal at the camera to correct for the nonlinearities of the CRT (*i.e.,* the power function of the electron gun) and, as such, it was the inverse of the electron gun function. It is now widely used, however, to describe "the total of all transfer function manipulations" (*i.e.,* including departures from a true power-law function), whether inherent or intentionally introduced to act upon the video signal for the purpose of reducing the bandwidth for signal processing, making the image on the final display conform to preconceived artistic objectives, or providing noise suppression, or even bit-rate reduction.

gap: A period of low energy content signals present of a digital speech interpolation device. [T1.509-1995]

gap loss: 1. The power loss that occurs when an optical signal is transferred from one fiber to another that is axially aligned with it, but longitudinally separated from it. *Note:* The gap allows light from the "transmitting" fiber to spread out as it leaves the fiber endface. When it strikes the "receiving" fiber, some of the light will enter the cladding, where it is quickly lost. [After FAA] **2.** An analogous form of coupling loss that occurs between an optical source, *e.g.* , an LED, and an optical fiber. *Note:* Gap loss is not usually significant at the optical detector, because the sensitive area of the detector is normally somewhat larger than the cross section of the fiber core. Unless the separation is substantial, all light emerging from the fiber, even though it diverges, will still strike the detector. *Synonym* **longitudinal offset loss.** [FAA]



gap loss

gap-loss attenuator: An optical attenuator that exploits the principle of gap loss to reduce the optical power level when inserted in-line in the fiber path; *e.g.* , to prevent saturation of the receiver. *Note:* Gap-loss attenuators should be used in-line near the optical transmitter. [After FAA]

gaps: Periods of no speech activity or low-energy content signals present in the access channel of a wideband packet network. [T1.312-1991]

garble: 1. An error in transmission, reception, encryption, or decryption that changes the text of a message or any portion thereof in such a manner that it is incorrect or undecryptable. [JP 1-02] **2.** In a telephone circuit or channel, readily audible but unintelligible interference from another circuit or channel. *Note:* Garble may, for example, take place in an FDM telephone carrier system in which an interfering signal from another channel or system is demodulated in such a fashion that it has an objectionable audio power level but is nonetheless unintelligible.

gate: 1. A device having one output channel and one or more input channels, such that the output channel state is completely determined by the input channel states, except during switching transients. **2.** One of many types of combinational logic elements having at least two inputs; *e.g.* , AND, OR, NAND, and NOR.

gateway: 1. In a communications network , a network node equipped for interfacing with another network that uses different protocols. *Note 1:* A gateway may contain devices such as protocol translators, impedance matching devices, rate converters, fault isolators, or signal translators as necessary to provide system interoperability. It also requires that mutually acceptable administrative procedures be established between the two networks. *Note 2:* A protocol translation/mapping gateway interconnects networks with different network protocol technologies by performing the required protocol conversions. **2.** [An] interface providing a compatibility between networks by converting transmission speeds, protocols, codes, or security measures. [INFOSEC-99] **3.** *Loosely,* a computer configured to perform the tasks of a gateway.

gating: 1. The process of selecting only those portions of a wave between specified time intervals or between specified amplitude limits. **2.** The controlling of signals by means of combinational logic elements. **3.** A process in which a predetermined set of conditions, when established, permits a second process to occur.

gaussian beam: A beam of light whose electric field intensity distribution is gaussian. *Note:* When such a beam is circular in cross section the intensity at distance r from the center, $E(r)$, is given by

$$E(r) = E(0)\, e^{(-r/w)^2} ,$$

where E (0) is the electrical field strength at the beam center, *i.e.* , at $r = 0$; and w is the value of r at which the intensity is 1/e of its value on the axis.

gaussian filter: A filter having a response curve (magnitude versus frequency) that approximates an ideal gaussian curve.

gaussian pulse: A pulse that has a waveform described by the gaussian distribution. *Note:* In the time domain, the amplitude of the waveform is given by

$$f(t) = A\, e^{(-t/\sigma)^2} ,$$

where A is the maximum amplitude, and σ is the pulse half-duration at the 1/e points.

GBH: *Abbreviation for* **group busy hour.**

Gb/s: *Abbreviation for* **gigabytes per second.** *See* **International System of Units.**

GCT: *Abbreviation for* **Greenwich Civil Time.** *See* **Coordinated Universal Time.**

GDF: *Abbreviation for* **group distribution frame.**

gel: 1. A substance, resembling petroleum jelly in viscosity, that surrounds a fiber, or multiple fibers, enclosed in a loose buffer tube. *Note:* This gel serves to lubricate and support the fibers in the buffer tube. It also prevents water intrusion in the event the buffer tube is breached. [FAA] **2.** Index-matching material in the form of a gel. [FAA] *Synonyms* **index-matching gel, matching gel.**

general purpose computer: A computer designed to perform, or that is capable of performing, in a reasonably efficient manner, the functions required by both scientific and business applications. *Note:* A general purpose computer is often understood to be a large system, capable of supporting remote terminal operations, but it may also be a smaller computer, *e.g.,* a desktop workstation.

general purpose network: *See* **common user network.**

generation: In audio and video analog recording, pertaining to the number of duplication steps between an original recording and a given copy. *Note 1:* A second generation duplicate is a copy of the original master and a third generation duplicate is a copy of a copy of the original master, *etc. Note 2:* Relative to digital duplication, the copy is almost always identical to the original, so the term *generation* is irrelevant.

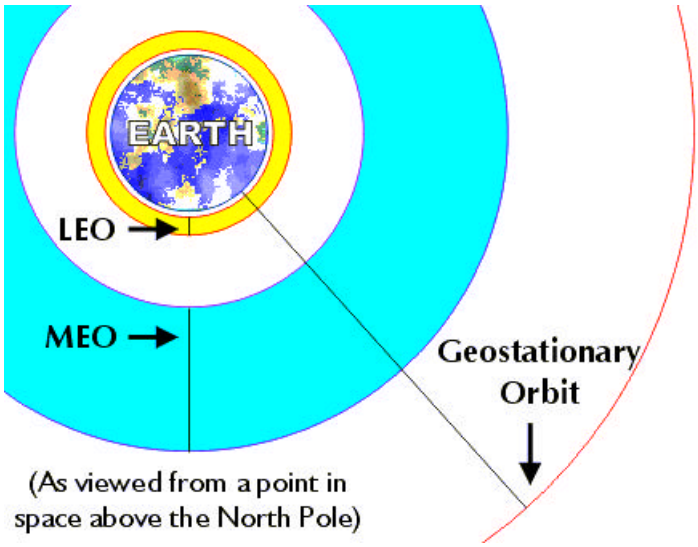
generation loss: In analog recording, cumulative deterioration of signal quality introduced as a consequence of limitations of the recording electronics and storage medium, when successive copies of an original recording are made, each from the preceding copy. *Note 1:* Examples of signal deterioration attributable to generation loss are increased distortion, increased noise, change in frequency response, and change in the relative phase of one frequency component with respect to another. *Note 2:* As a specific example, in the recording of television baseband signals, generation loss may manifest itself in the loss of fine detail, color distortion, erratic synchronization, etc. In audio recording, generation loss may manifest itself as audible distortion or loss of frequency response. *Note 3:* Generation loss is limited to analog recording because digital recording and reproduction may be performed in a manner that is essentially free from generation loss. Digital signals may be reshaped before being rerecorded, so successive generations are extremely faithful to one another, with possible exceptions attributable primarily to occasional uncompensated flaws that may be present in the recording medium. The degree to which this affects the outcome (signal quality) depends on the specific recording technique involved, but it is usually negligible. In digital recording, essentially all of the distortion introduced in the recording and playback process takes place in (a) the analog-to-digital conversion that occurs during the initial recording, and (b) the digital-to-analog process that occurs during playback. *Note 4:* Generation loss in digital recordings can quickly become non-negligible unless all transfers of the recording take place solely in the digital domain and lossless compression/decompression is used.

genlock: The synchronization of two television signals at the vertical, horizontal, and chroma phase levels such that the signals may be cut, mixed, or cross-faded without noticeable roll, jump, or chroma shift. *Note:* Modern usage accomplishes this with a frame synchronizer/time base corrector, but it may also be accomplished by a closed loop method or an open loop method, the latter using a pair of rubidium clocks and a video delay line to maintain chroma lock.

geometric optics: The branch of optics that describes light propagation in terms of rays. *Note 1:* Rays are bent at the interface between two dissimilar media, and may be curved in a medium in which the refractive index is a function of position. *Note 2:* The ray in geometric optics is perpendicular to the wavefront in physical optics. *Synonym* **ray optics.**

geometric spreading: *See* **inverse-square law.**

geostationary orbit: A circular orbit in the equatorial plane, any point on which revolves about the Earth in the same direction and with the same period as the Earth's rotation. *Note:* An object in a geostationary orbit will remain directly above a fixed point on the equator at a distance of approximately 42,164 km from the center of the Earth, *i.e.* , approximately 35,786 km above mean sea level.



Classification	Orbital Altitude (km above the earth)
LEO	500-2,000
MEO	8,000-20,000
Geostationary Orbit	35,786

geostationary satellite: A geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth's equator and which thus remains fixed relative to the Earth; by extension, a satellite that remains approximately fixed relative to the Earth. [NTIA] [RR] [47CFR]

geostationary satellite orbit: The orbit in which a satellite must be placed to be a geostationary satellite. [NTIA] [RR]

geosynchronous orbit: Any orbit about the Earth, which orbit has a period equal to the period of rotation of the Earth about its axis, and in the same sense, *i.e.,* direction, as the rotation of the Earth.

germanium photodiode: A germanium-based PN- or PIN-junction photodiode. *Note 1:* Germanium photodiodes are useful for direct detection of optical wavelengths from approximately 1 μm to several tens of μm. *Note 2:* Germanium-based detectors are noisier than silicon-based detectors. Silicon-based detectors are therefore usually preferred for wavelengths shorter than 1 μm. [After FAA]

GETS: *Abbreviation for* **Government Emergency Telecommunications Service (GETS).**

ghost: In the transmission or recording of raster-scanned analog television signals, an artifact manifested as a weak, ghost-like secondary image, offset (in the direction of the scan) with respect to the position of the primary image. *Note:* Ghosting is probably most familiar as a consequence of multipath rf reception of a broadcast television signal. The slight delay in the arrival time of the reflected signal results in the display of a secondary image that follows the primary. In the playback of a tape-recorded program, ghosting may also be introduced by print-through in the magnetic tape medium.

ghosting: *See* **ghost.**

gif: (or **.gif**) *Abbreviation for* **graphical interchange format.** A file-name extension indicating a certain digital image file format suitable for efficiently importing image data into computer files or for transmitting or displaying the formatted image on a computer monitor or printing it out.

gigaflop: A billion, *i.e.* , 10^9, floating point operations per second.

gigahertz (GHz): A unit of frequency denoting 10^9 Hz.

GII: *Abbreviation for* **global information infrastructure.** The totality of worldwide infrastructure elements that combine the three industry sectors of (a) telecommunications, (b) computer (information) technology, and (c) consumer electronics to extend the capabilities of the NII (national information infrastructure) worldwide. [After ISO/IEC N1957]

glare: *Deprecated synonym for* **call collision.** *See also* **dual seizure.**

glare master: The Signaling System No. 7 (SS7) switch designated as control switch for circuits in the both-way circuit group. For the same circuits, the other switch is referred to as the slave. On detecting glare, the control switch proceeds to complete the call for which it has already sent an initial address message (IAM). The IAM received from the slave is discarded. The call being processed by the slave is backed off and the switch path released. A release message is not sent. [T1.226-1992]

glass: 1. In the strict sense, a state of matter. [FAA] **2.** In fiber-optic communication, any of a number of noncrystalline, amorphous inorganic substances, formed, by heating, from metallic or semiconductor oxides or halides, and used as the material for fibers. *Note:* The most common glasses are based on silicon dioxide (SiO_2). [After FAA]

glide slope facility: In aeronautical navigation, an instrument approach landing facility that furnishes vertical guidance information to an aircraft from its approach altitude down to the surface of the runway.

global: 1. Pertaining to, or involving, the entire world. **2.** Pertaining to that which is defined in one subsection of an entity and used in at least one other subsection of the same entity. **3.** In computer, data processing, and communications systems, pertaining to what is applicable to an area beyond the immediate area of consideration. *Note:* Examples of global entities are (a) in computer programming, an entity that is defined in one subdivision of a computer program and used in at least one other subdivision of that program and (b) in personal computer systems and their software packages, a setting, definition, or condition that applies to the entire software system. [From Weik '89]

global address: In a communications network, the predefined address that is used as an address for all users of that network, and that may not be the address of an individual user, or subgroup of users, of the network.

global area network (GAN): A network that (a) is composed of different interconnected computer networks and (b) covers an unlimited geographical area. *Note: Loosely synonymous with* **an internet** (as opposed to **the Internet** (with an uppercase "I"), which designates one specific network). [After 2382-pt.35]

global functional plane (GFP): The plane in the intelligent network conceptual model that defines service independent building blocks (SIBs) used in providing service features. [T1.667-1999]

global information infrastructure: *See* **GII.**

global positioning system (GPS): *See* **GPS.**

global status: 1. The set of attributes of an entity, described at a particular time, when that set is extended to every occurrence of that entity within a prescribed boundary. **2.** The complete set of attributes necessary to describe an entity at a particular time.

global system for mobile communications (GSM): A public, all-digital cellular network that is standardized worldwide and that uses (a) TDMA techniques for multiplexing at approximately 900 MHz, (b) compressed voice at about 13 kb/s, (c) 16 kb/s circuit-switching technology, and (d) error-correcting algorithms.

global title (GT): A "logical" or "virtual" address used for routing Signaling System No. 7 (SS7) messages using signaling connection control part (SCCP) capabilities. To complete message routing, a GT must be translated to a SS7 point code and subsystem number. [T1.711-1999]

glyph: Any graphic symbol not in the ASCII character set. [After IS 14651]

GMT: *Abbreviation for* **Greenwich Mean Time.** *Obsolete term. See* **Coordinated Universal Time.**

go-ahead message: *Synonym* **go-ahead notice.**

go-ahead notice: In a tape-relay communications system, a service message, usually sent to a relay station or to a tributary station, that contains a request to the operator to resume transmitting over a specified channel or channels. [From Weik '89] *Synonyms* **go-ahead message, start message, start notice.**

go-ahead tone: In communications systems, an audible signal transmitted by a system indicating that the system is ready to receive a message or signal. [From Weik '89]

gold code: In spread-spectrum systems, a code that is generated by summing, using modulo-two addition, the outputs of two spread-spectrum code-sequence generators. [From Weik '89]

go list: *Synonyms* **bookmark list, history list, hotlist.**

Gopher: A menu-based information searching tool that allows users to access various types of databases, such as FTP archives and white pages databases. *Note 1:* Gopher is most often used as an Internet browser. *Note 2:* Gopher software uses the client-server model.

gopherspace: That part of the cyberspace to which the user has access by means of gopher software. [2382-pt.35] *Note:* The use of gopher software has declined rapidly in recent years as the use of Web software has increased.

GOS: *Abbreviation for* **grade of service.**

GOSIP: *Acronym for* **Government Open Systems Interconnection Profile.** A definition of Federal Government functional requirements for open systems computer network products, including a common set of Open System Interconnection (OSI) data communication protocols that enables systems developed by different vendors to interoperate and enable the users of different applications on these systems to exchange information. *Note 1:* The OSI protocols were developed primarily by ISO and CCITT (now, ITU-T). *Note 2:* The GOSIP is a subset of the OSI protocols and is based on agreements reached by vendors and users of computer networks participating in the National Institute of Standards and Technology (NIST) Implementors Workshop. *Note 3:* The GOSIP is described in the latest version of FIPS PUB 146.

Government Emergency Telecommunications Service (GETS): A special federal government telecommunications service that provides National Security and Emergency Preparedness (NS/EP) users with priority switched voice and voiceband data communications during periods of emergency or crisis. GETS uses existing features and services of the Public Switched Network (PSN) with selected NS/EP augmentations and enhancements. Access to GETS requires a telephone calling card with personal identification number. GETS is maintained in a constant state of readiness to make maximum use of all available PSN telephone resources should network congestion or damage occur during an emergency or crisis. GETS calls receive priority over other traffic through special features such as trunk queuing, exemption from restrictive network management controls and Alternate Carrier Routing (ACR) on approximately 85% of all local carrier access lines. Comparable features provide priority treatment and enhanced routing in the interexchange networks. While GETS calls receive priority for next available path, they do not preempt other traffic. The Signaling System No. 7 (SS7) - High Probability of Completion (HPC) Network Capability standard (ANSI T1.631-1993) is applied to provide NS/EP call identification and priority signaling.

Government Open Systems Interconnection Profile: *See* **GOSIP.**

GPI: *Abbreviation for* **general purpose interface.** An equipment-interface device (usually computer equipment) with some number of digital lines, usually a multiple of eight, which may be used for input, output, or both, depending on the function. *Note:* The digital lines may be individually controlled, although nothing precludes using them in combination.

GPS: *Abbreviation for* **global positioning system.** A satellite-based global navigation system that consists of (a) a constellation of 24 satellites in orbit 11,000 nmi above the Earth, (b) several on-station (*i.e.,* in-orbit) spares, and (c) a ground-based control segment. The satellites transmit signals that are used for extremely accurate three-dimensional (latitude, longitude, and elevation) global navigation (position determination), and for the dissemination of precise time. GPS-derived position determination is based on the arrival times, at an appropriate receiver, of precisely timed signals from the satellites that are above the user's radio horizon.

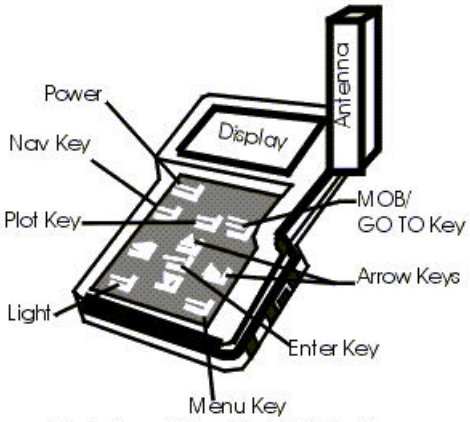
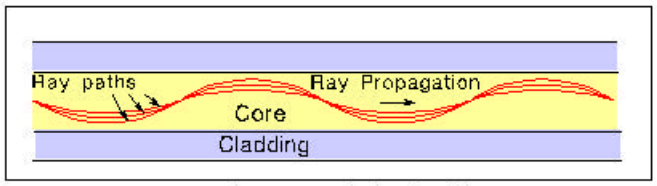


Illustration of a hand-held GPS unit

graceful degradation: Degradation of a system in such a manner that it continues to operate, but provides a reduced level of service rather than failing completely.

graded-index fiber: An optical fiber with a core having a refractive index that decreases with increasing radial distance from the fiber axis. *Note:* The most common refractive index profile for a graded-index fiber is very nearly parabolic. The parabolic profile results in continual refocusing of the rays in the core, and compensates for multimode distortion.



ray paths in a graded-index fiber

graded-index profile: In the core of an optical fiber, a plot of the variation of refractive index such that the refractive index decreases with increasing radial distance from the fiber axis.

grade of service (GOS): 1. The probability of a call's being blocked or delayed more than a specified interval, expressed as a decimal fraction. *Note:* Grade of service may be applied to the busy hour or to some other specified period or set of traffic conditions. Grade of service may be viewed independently from the perspective of incoming versus outgoing calls, and is not necessarily equal in each direction. **2.** In telephony, the quality of service for which a circuit is designed or conditioned to provide, *e.g.,* voice grade or program grade. *Note:* Criteria for different grades of service may include equalization for amplitude over a specified band of frequencies, or in the case of digital data transported via analog circuits, equalization for phase also.

gradient: In graphics, especially computer graphics, that which characterizes an area in which a smooth transition between one color and another, or between black and white (*i.e.* , contrast), takes place.

grandfathered systems: Systems, including but not limited to: (a) PBX and key telephone systems, directly connected to the public switched telephone network on June 1, 1978, that may remain permanently connected thereto without registration unless subsequently modified, and (b) systems that are of the same type as those connected to the public switched telephone network on July 1, 1978, that were added before January 1, 1980, and that may remain permanently connected thereto without registration unless subsequently modified.

grandfathered terminal equipment: Terminal equipment (other than PBX and key telephone systems) and protective circuitry connected to the public switched telephone network before July 1, 1978, that may remain connected thereto for life without registration unless subsequently modified.

graphical user interface: *See* **gui.**

graphic character: 1. A visual representation of a character, other than a control character. **2.** In the ASCII code, a character other than an alphanumeric character, intended to be written, printed, or otherwise displayed in a form that can be read by humans. *Note 1:* Graphic characters are contained in rows 2 through 7 of the ASCII code table. *Note 2:* The space and delete characters are considered to be graphic characters.

graphics: The art or science of conveying information through the use of display media, such as graphs, letters, lines, drawings, and pictures. *Note:* Graphics includes the transmission of coded images such as facsimile.

graphics pipe: In computer science and technology, the special hardware within the computer optimized for the display of real-time 3D graphics.

Gray code: A binary code in which consecutive decimal numbers are represented by binary expressions that differ in the state of one, and only one, one bit. *Synonym* **reflected code.**

gray scale: An optical pattern consisting of discrete steps or shades of gray between black and white.

great circle: A circle defined by the intersection of the surface of the Earth and any plane that passes through the center of the Earth. *Note:* On the idealized surface of the Earth, the shortest distance between two points lies along a great circle.

Greenwich Civil Time (GCT): *Synonym* **Greenwich Mean Time (GMT).** *Obsolete term. See* **Coordinated Universal Time.**

Greenwich Mean Time (GMT): Mean solar time at the meridian of Greenwich, England, formerly used as a basis for standard time throughout the world. *Obsolete term. Synonym* **Greenwich Civil Time.** *See* **Coordinated Universal Time.**

ground: 1. An electrical connection to earth through an earth-electrode subsystem. **2.** In an electrical circuit, a common return path that usually (a) is connected to an earth-electrode subsystem and (b) is extended throughout a facility via a facility ground system consisting of the signal reference subsystem, the fault protection subsystem, and the lightning protection subsystem. **3.** In an electrical circuit, a common return path that (a) may not necessarily be connected to earth and (b) is the zero voltage reference level for the equipment or system.

ground absorption: The dissipation of rf energy by the earth.

ground constants: The electrical parameters of earth, such as conductivity, permittivity, and magnetic permeability. *Note 1:* The values of these parameters vary with the local chemical composition and density of the earth. *Note 2:* For a propagating electromagnetic wave, such as a surface wave propagating along the surface of the Earth, these parameters vary with frequency and direction.

ground current: In the presence of an electrical fault, the current that flows in the protective ground wire of a power distribution system.

ground loop: In an electrical system, an unwanted current that flows in a conductor connecting two points that are nominally at the same potential, *i.e.,* ground, but are actually at different potentials. *Note 1:* For example, the electrical potential at different points on the surface of the Earth can vary by hundreds of volts, primarily from the influence of the solar wind. Such an occurrence can be hazardous, *e.g.,* to personnel working on long grounded conductors such as metallic telecommunications cable pairs. *Note 2:* A ground loop can also exist in a floating ground system, *i.e.,* one not connected to an Earth ground, if the conductors that constitute the ground system have a relatively high resistance, or have, flowing through them, high currents that produce a significant voltage ("I•R") drop. *Note 3:* Ground loops can be detrimental to the operation of the electrical system.

ground plane: An electrically conductive surface that serves as the near-field reflection point for an antenna. *Note:* A ground plane may consist of a natural (*e.g.,* Earth or sea) surface, an artificial surface of opportunity (*e.g.,* the roof of a motor vehicle), or a specially designed artificial surface (*e.g.,* the disc of a discone antenna).

ground potential: The zero reference level used to apply and measure voltages in a system. *Note:* A potential difference may exist between this reference level and the ground potential of the Earth, which varies with locality, soil conditions, and meteorological phenomena.

ground-return circuit: 1. A circuit using a common return path that is at ground potential. *Note:* Earth may serve as a portion of the ground-return circuit. **2.** A circuit in which there is a common return path, whether or not connected to earth.

ground start: A method of signaling from a terminal or subscriber loop to a switch, in which method one side of a cable pair is temporarily grounded.

ground-start signaling: A type of analog voicegrade access line signaling that requires the customer interface (CI) to provide a ground on the ring conductor at the network interface (NI) to initiate service requests. [T1.401-1998]

ground wave: In radio transmission, a surface wave that propagates close to the surface of the Earth. *Note 1:* The Earth has one refractive index and the atmosphere has another, thus constituting an interface that supports surface wave transmission. These refractive indices are subject to spatial and temporal changes. *Note 2:* Ground waves do not include ionospheric and tropospheric waves.

ground window: The interface or transition point between the isolated and integrated ground planes. The ground window can be a dimensional area around a bus bar or the bus bar itself. After passing through the ground window, there shall be no additional paths to ground, intentional or unintentional, inside the isolated ground plane. [T1.313-1997]

group: 1. In frequency-division multiplexing, a specific number of associated voice channels, either within a supergroup or as an independent entity. *Note 1:* In wideband systems, a group usually consists of 12 voice channels and occupies the frequency band from 60 kHz to 108 kHz. *Note 2:* this is ITU-T group B (formerly CCITT group B). *Note 3* : ITU-T Basic Group A, for carrier telephone systems, consists of 12 channels occupying upper sidebands in the 12-kHz to 60-kHz band. Basic Group A is no longer mentioned in ITU-T Recommendations. *Note 4:* A supergroup usually consists of 60 voice channels, *i.e.,* 5 groups of 12 voice channels each, occupying the frequency band from 312 kHz to 552 kHz. *Note 5:* A mastergroup consists of 10 supergroups or 600 voice channels. *Note 6:* The ITU-T standard mastergroup consists of 5 supergroups. The U.S. commercial carrier standard mastergroup consists of 10 supergroups. *Note 7:* The terms "supermaster group" or "jumbo group" are sometimes used to refer to 6 mastergroups. **2.** A set of characters forming a unit for transmission or cryptographic treatment.

group address: In a communications network, a predefined address used to address only a specified set of users. *Synonym* **collective address.**

group alerting and dispatching system: A service feature that (a) enables a controlling telephone to place a call to a specified number of telephones simultaneously, (b) enables the call to be recorded, (c) if any of the called lines is busy, enables the equipment to camp on until the busy line is free, and (d) rings the free line and plays the recorded message.

group busy hour (GBH): The busy hour for a given trunk group.

group delay: 1. The rate of change of the total phase shift with respect to angular frequency, $d\theta/d\omega$, through a device or transmission medium, where θ is the total phase shift, and ω is the angular frequency equal to $2\pi f$, where f is the frequency. **2.** In an optical fiber, the transit time required for optical power, traveling at a given mode's group velocity, to travel a given distance. *Note:* For optical fiber dispersion measurement purposes, the quantity of interest is group delay per unit length, which is the reciprocal of the group velocity of a particular mode. The measured group delay of a signal through an optical fiber exhibits a wavelength dependence due to the various dispersion mechanisms present in the fiber.

group delay time: In a group of waves that have slightly different individual frequencies, the time required for any defined point on the envelope (*i.e.,* the envelope determined by the additive resultant of the group of waves) to travel through a device or transmission facility.

group distribution frame (GDF): In frequency-division multiplexing, a distribution frame that provides terminating and interconnecting facilities at the group level, *i.e.* , group modulator output and group demodulator input circuits of FDM carrier equipment. *Note:* The basic spectrum of the FDM group is 60 kHz to 108 kHz.

group index (*N*): In fiber optics, for a given mode propagating in a medium of refractive index n, the velocity of light in vacuum, c, divided by the group velocity of the mode. *Note:* For a plane wave of wavelength λ, the group index may also be expressed,

$$N = n - \lambda \frac{dn}{d\lambda} ,$$

where n is the phase index of wavelength λ.

grouping factor: *Synonym* **blocking factor.**

group 1. . . 4 facsimile: *See* **facsimile.**

group patch bay: *See* **patch bay.**

group velocity: 1. The velocity of propagation of an envelope produced when an electromagnetic wave is modulated by, or mixed with, other waves of different frequencies. *Note:* The group velocity is the velocity of information propagation and, loosely, of energy propagation. **2.** In optical fiber transmission, for a particular mode, the reciprocal of the rate of change of the phase constant with respect to angular frequency. *Note:* The group velocity equals the phase velocity if the phase constant is a linear function of the angular frequency,

$\omega = 2\pi f$, where f is the frequency. **3.** In optical-fiber transmission, the velocity of the modulated optical power.

groupware: Network-compatible software applications that facilitate shared work on information and documents.

GSM: A public all-digital cellular network using TDMA techniques for multiplexing and using a transmission band around 900 MHz. GSM formerly identified the Groupe Speciale Mobile of the European Telecommunication Standards Institute (ETSI); today it is a worldwide standard. A GSM network can provide, besides telephony services, short messaging services (SMS) and data communication, in circuit- and/or packet mode. GSM signaling uses specific channels and protocols; voice is compressed at about 13 kb/s and error correcting algorithms (FEC) are used. The core network is based on a 64 kb/s circuit-switching technology. A more recent version uses an 1800 MHz band; modern terminals currently used in Europe can access both networks depending on traffic conditions and other parameters. A GSM version using a 1900 MHz access network is available in the United States.

***G*/*T*:** *Abbreviation for* **antenna gain-to-noise-temperature.**

guard: In computer security, a functional unit that provides a security filter between two data processing systems operating at different security levels or between a user terminal and a database to filter out data that the user is not authorized to access. [2382-pt.8]

guard band: *See* **frequency guard band, time guard band.**

guarded frequency: A transmission frequency that is not to be jammed or interfered with because of the value of the information being derived from it. *Note:* For example, a guarded frequency will not be jammed when the tactical, strategic, and technical information that can be obtained from the transmissions outweighs the potential operational gain achieved by jamming. [From Weik '89]

gui: *Acronym for* **graphical user interface.** A computer environment or program that displays, or facilitates the display of, on-screen options, usually in the form of icons (pictorial symbols) or menus (lists of alphanumeric characters) by means of which users may enter commands. *Note 1:* Options are selected by using the appropriate hardware (*e.g.* , mouse, designated keyboard keys, or touchpad) to move a display cursor to, or on top of, the icon or menu item of interest. The application or function so represented may then be selected (*e.g.* , by clicking a mouse button, pressing the "enter" key, or by touching the touchpad). *Note 2:* Pronounced "gooey."

guided mode: *Synonym* **bound mode.**

guided ray: In an optical fiber, a ray that is confined primarily to the core. *Note:* A guided ray satisfies the relation given by

$$0 \leq \sin\theta_r \leq \sqrt{n_r^2 - n_a^2} \ ,$$

where θ_r is the angle the ray makes with the fiber axis, r is the radial position, *i.e.* , radial distance, of the ray from the fiber axis, n_r is the refractive index at the radial distance r from the fiber axis, and n_a is the refractive index at the core radius, a, *i.e.* , at the core-cladding interface. Guided rays correspond to bound modes, *i.e.* , guided modes, in terms of modes rather than rays. *Synonyms* **bound ray, trapped ray.**

guided wave: A wave having (a) energy concentrated near a boundary, or between substantially parallel boundaries, separating materials of different properties and (b) a direction of propagation effectively parallel to these boundaries.

hack: 1. To break into or use a computer network or use a system without authorization, as a hacker might do. **2.** Referring to a track used to bypass a flaw or a bug in an application program or application.

hacker: 1. A person who breaks into, or attempts to break into, or use, a computer network or system without authorization , often at random, for personal amusement or gratification, and not necessarily with malicious intent. **2.** [An] unauthorized user who attempts to or gains access to an information system (IS). [INFOSEC-99] **3.** A technically sophisticated computer expert who intentionally gains unauthorized access to targeted protected resources. [After ANSDIT] **4.** *Loosely,* a computer enthusiast. [ANSDIT] **5.** A person who uses a computer resource in a manner for which it is not intended or which is in conflict with the terms of an acceptable-use policy, but (unlike the work of a cracker) is not necessarily malicious in intent.

Hagelbarger code: A convolutional code that enables error bursts to be corrected provided that there are relatively long error-free intervals between the error bursts. *Note:* In the Hagelbarger code, inserted parity check bits are spread out in time so that an error burst is not likely to affect more than one of the groups in which parity is checked.

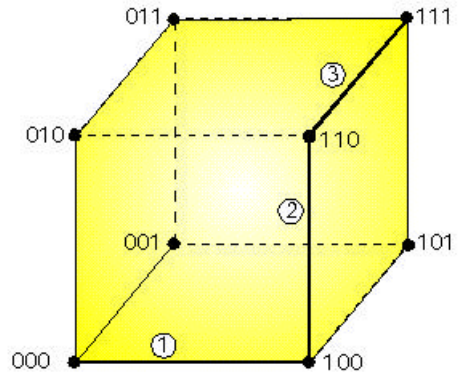
half-duplex (HDX) operation: Operation in which communication between two terminals occurs in either direction, but in only one direction at a time. *Note:* Half-duplex operation may occur on a half-duplex circuit or on a duplex circuit, but it may not occur on a simplex circuit. *Synonyms* **one-way reversible operation, two-way alternate operation.**

halftone: Any photomechanical printing surface or the impression therefrom in which detail and tone values are represented by a series of evenly spaced dots in varying size and shape, varying in direct proportion to the intensity of tones they represent. [JP1]

halftone characteristic: 1. In facsimile systems, the relationship between the density of the recorded copy and the density of the object, *i.e.* , the original. **2.** In facsimile systems, the relationship between the amplitude of the facsimile signal to either the density of the object or the density of the recorded copy when only a portion of the system is under consideration. *Note:* In an FM facsimile system, an appropriate parameter other than the amplitude is used.

Hamming code: An error-detecting and error-correcting binary code, used in data transmission, that can (a) detect all single- and double-bit errors and (b) correct all single-bit errors. *Note:* A Hamming code satisfies the relation $2^m \geq n+1$, where n is the total number of bits in the block, k is the number of information bits in the block, and m is the number of check bits in the block, where $m = n - k$.

Hamming distance: The number of digit positions in which the corresponding digits of two binary words of the same length are different. *Note 1:* The Hamming distance between 1011101 and 1001001 is two. *Note 2:* The concept can be extended to other notation systems. For example, the Hamming distance between 2143896 and 2233796 is three, and between "toned" and "roses" it is also three. *Synonym* **signal distance.**



the number of digit positions in which the corresponding digits of two binary numbers or words of the same length are different

Hamming weight: The number of non-zero symbols in a symbol sequence. *Note:* For binary signaling, Hamming weight is the number of "1" bits in the binary sequence.

handoff: 1. In cellular mobile systems, the process of transferring a phone call in progress from one cell transmitter and receiver and frequency pair to another cell transmitter and receiver using a different frequency pair without interruption of the call. *Synonym* **handover. 2.** In satellite communications, the process of transferring ground-station control responsibility from one ground station to another without loss or interruption of service.

handover: 1. In telephony, *synonym* **handoff.** [After T1.Rpt34-1994] **2.** The transfer (permanent or temporary) of a component or series of components to another application process. [T1.110-1987] **3.** The automatic rerouting of the radio portion of a call for signal quality, traffic management, or other reasons. [T1.Rpt21-1993] [T1.Rpt22-1993]

handshaking: 1. In data communications, a sequence of events governed by hardware or software, requiring mutual agreement of the state of the operational modes prior to information exchange. **2.** The process used to establish communications parameters between two stations. *Note:* Handshaking follows the establishment of a circuit between the stations and precedes information transfer. It is used to agree upon such parameters as information transfer rate, alphabet, parity, interrupt procedure, and other protocol features.

handshaking procedures: [The] dialogue between two information systems for synchronizing, identifying, and authenticating themselves to one another. [INFOSEC-99]

hangover: *Synonym* **tailing.**

hang-up: Calling- or called-user placement of a telephone set or other unit of telecommunications equipment in the quiescent state. [T1.104-1988]

hang-up signal: An on-hook signal sent from an end office toward the disconnect-control office indicating either calling or called user hang-up and requesting the connection be disconnected. The interface remains dedicated to the call until the disconnect-control office responds to the hang-up signal. [T1.104-1988]

HA1-receiver weighting: A noise weighting used in a noise measuring set to measure noise across the HA1-receiver of a 302-type or similar instrument. *Note 1:* The meter scale readings of an HA1 test set are in dBa (HA1). *Note 2:* HA1 noise weighting is obsolete for new DOD applications.

hard copy: In computer graphics and in telecommunications, a permanent reproduction, on any media suitable for direct use by a person, of displayed or transmitted data. *Note 1:* Examples of hard copy include teletypewriter pages, continuous printed tapes, facsimile pages, computer printouts, and radiophoto prints. *Note 2:* Magnetic tapes, diskettes, and nonprinted punched paper tapes are not hard copy.

hard-copy key: [A] physical keying material, such as printed key lists, punched or printed key tapes, or programmable, read-only memories (pROM). [INFOSEC-99]

hard disk: A flat, circular, rigid plate with a magnetizable surface on one or both sides of which data can be stored. *Note:* A hard disk is distinguished from a diskette by virtue of the fact that it is rigid. Early in the development of computer technology, hard disks, often multiple disks mounted on a common spindle, were interchangeable and removable from their drives, which were separate from the processor chassis. This technology is still in use, especially in conjunction with large mainframe computers, but physically smaller computers use hard disks that are in sealed units, along with their control electronics and read/write heads. The sealed units are usually installed permanently in the same chassis that contains the processor.

hard-drawn copper wire: Copper wire that has not been annealed after being drawn.

hardened: Pertaining to the condition of a facility with protective features that enable it to withstand destructive forces, such as explosions, natural disasters, or ionizing radiation.

hard limiting: *See* **limiting.**

hard sectoring: In magnetic or optical disk storage, sectoring that uses a physical mark on the disk, from which mark sector locations are referenced. *Note:* Hard sectoring may be done, for example, by punching an index hole in a floppy diskette. When the presence of the index hole is recognized by an optical reader, a reference signal is generated. All sector locations can be referenced from this signal.

hardware: 1. Physical equipment as opposed to programs, procedures, rules, and associated documentation. **2.** The generic term dealing with physical items as distinguished from its capability or function such as equipment, tools, implements, instruments, devices, sets, fittings, trimmings, assemblies, subassemblies, components, and parts. The term is often used in regard to the stage of development, as in the passage of a device or component from the design stage into the hardware stage as the finished object. [JP 1-02] **3.** In data automation, the physical equipment or devices forming a computer and peripheral components. [JP 1-02]

hardware platform: *Synonym* **platform.**

hardwire: 1. To connect equipment or components permanently in contrast to using switches, plugs, or connectors. **2.** To wire in fixed logic or read-only storage that cannot be altered by program changes.

hardwired key: [A] permanently installed key. [INFOSEC-99]

harmful interference: 1. Any emission, radiation, or induction interference that endangers the functioning or seriously degrades, obstructs, or repeatedly interrupts a communications system, such as a radio navigation service, telecommunications service, radio communications service, search and rescue service, or weather service, operating in accordance with

approved standards, regulations, and procedures. *Note:* To be considered harmful interference, the interference must cause serious detrimental effects, such as circuit outages and message losses, as opposed to interference that is merely a nuisance or annoyance that can be overcome by appropriate measures. **2.** Interference which endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service [47CFR] operating in accordance with these *[Radio] Regulations.* [NTIA] [RR]

harmonic: 1. Of a sinusoidal wave, an integral multiple of the frequency of the wave. *Note:* The frequency of the sine wave is called the fundamental frequency or the first harmonic, the second harmonic is twice the fundamental frequency, the third harmonic is thrice the fundamental frequency, *etc.* **2.** Of a periodic signal or other periodic phenomenon, such as an electromagnetic wave or a sound wave, a component frequency of the signal that is an integral multiple of the fundamental frequency. *Note:* The fundamental frequency is the reciprocal of the period of the periodic phenomenon.

harmonic distortion: In the output signal of a device, distortion caused by the presence of frequencies that are not present in the input signal. *Note:* Harmonic distortion is caused by nonlinearities within the device.

hash function: A mathematical function that maps values from a large (or very large) domain into a smaller range, and that reduces a potentially long message into a "message digest" or "hash value" or that is sufficiently compact to be input into a digital signature algorithm. *Note:* A "good" hash function is one that results from applying the function to a (large) set of values that are evenly (and randomly) distributed over the range.

hashing: Computation of a hash total. [INFOSEC-99]

hash total: 1. The result obtained by subjecting a set of data to an algorithm for purposes of checking the data at the time the algorithm is applied or for use at a later time such as after transmission or retrieval from storage. [After Weik '96] **2.** [A] value computed on data to detect error or manipulation. *See* **checksum.** [INFOSEC]

hash value: In cryptography, the result of applying a cryptologic hash function to a message. [After X9.31]

hashword: [The] memory address containing [a] hash total. [INFOSEC-99]

hazards of electromagnetic radiation to fuel (HERF): The potential for electromagnetic radiation to cause ignition or detonation of volatile combustibles, such as aircraft fuels.

hazards of electromagnetic radiation to ordnance (HERO): The potential for electromagnetic radiation to affect adversely munitions or electroexplosive devices.

hazards of electromagnetic radiation to personnel (HERP): The potential for electromagnetic radiation to produce harmful biological effects in humans.

H-bend: A smooth change in the direction of the axis of a waveguide, throughout which the axis remains in a plane parallel to the direction of magnetic H-field (transverse) polarization. *Synonym* **H-plane bend.**

H-channel: In Integrated Services Digital Networks (ISDN), a 384-kb/s, 1472-kb/s, or 1536-kb/s channel, designated as "H_0", "H_{10}", and "H_{11}", respectively, accompanied by timing signals used to carry a wide variety of user information. *Note:* Examples of types of user information representation forms include fast facsimile, video, high-speed data, high-quality audio, packet-switched data, bit streams at rates less than the respective H-channel bit rate that have been rate-adapted or multiplexed together, and packet-switched information.

HDLC: *Abbreviation for* **high-level data link control.**

HDTV: *Abbreviation for* **high-definition television.**

HDX: *Abbreviation for* **half-duplex (HDX) operation.**

head: A device that reads, writes, and/or erases data on a storage medium.

head end: *See* **cable headend, headend.**

headend: 1. A central control device required by some networks (*e.g.,* LANs or MANs) to provide such centralized functions as remodulation, retiming, message accountability, contention control, diagnostic control, and access to a gateway. **2.** A control center of a CATV system, where incoming signals are amplified, converted, processed, and combined into a common cable for transmission to customers. The headend usually includes antennas, preamplifiers, frequency converters, demodulators, modulators, processors, and other related equipment. *Synonym [in this sense]* **cable headend.**

header: The portion of a message that contains information used to guide the message to the correct destination. *Note:* Examples of items that may be in a header are the addresses of the sender and receiver, precedence level, routing instructions, and synchronizing bits.

header check sequence (HCS): A 16-bit cyclic redundancy check (CRC) check sequence (CS) that is derived from bits from the first 8 octets (excluding flags) of a UIH format packet. [T1.509-1995]

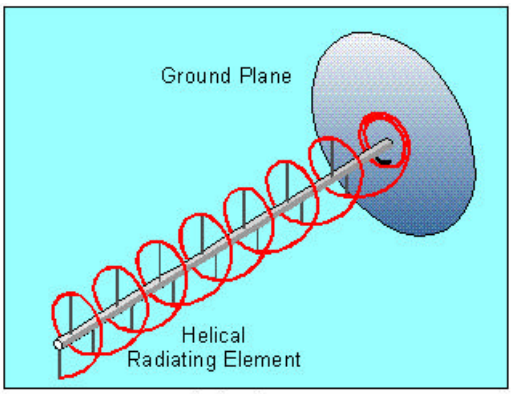
head-of-bus function: The function that generates management information and empty bus slots at the point on each bus where data flow begins.

head-on collision: A collision that occurs on a communications channel when two or more users begin to transmit on the channel at approximately the same instant.

Heaviside layer: *Synonym* **E region.**

height gain: For a given propagation mode of an electromagnetic wave, the ratio of the field strength at a specified height to the field strength at the surface of the Earth.

helical antenna: An antenna that has the form of a helix. *Note:* When the helix circumference is much smaller than one wavelength, the antenna radiates at right angles to the axis of the helix. When the helix circumference is one wavelength, maximum radiation is along the helix axis.



helical antenna

helical scan: A method of recording video information diagonally on a tape, used in home and professional video cassette recorders (VCRs). *Note:* High-speed rotating video heads scan these diagonal video tracks, giving an effective tape speed much higher than the actual tape speed, allowing more information to be recorded on a given length of magnetic tape.

HEMP: *Abbreviation for* **high-altitude electromagnetic pulse.**

HE_{11} mode: Designation for the fundamental hybrid mode of an optical fiber.

HERF: *Abbreviation for* **hazards of electromagnetic radiation to fuel.**

HERO: *Abbreviation for* **hazards of electromagnetic radiation to ordnance.**

HERP: *Abbreviation for* **hazards of electromagnetic radiation to personnel.**

hertz (Hz): 1. The SI unit of frequency, equal to one cycle per second. *Note:* A periodic phenomenon that has a period of one second has a frequency of one hertz. **2.** A unit of frequency which is equivalent to one cycle per second. [NTIA]

Hertzian wave: *Synonym* **radio wave.**

heterochronous: A relationship between two signals such that their corresponding significant instants do not necessarily occur at the same time. *Note:* Two signals having different nominal signaling rates and not stemming from the same clock or from homochronous clocks are usually heterochronous.

heterodyne: 1. To generate new frequencies by mixing two or more signals in a nonlinear device such as a vacuum tube, transistor, or diode mixer. *Note:* A superheterodyne receiver converts any selected incoming frequency by heterodyne action to a common intermediate frequency where amplification and selectivity (filtering) are provided. **2.** A frequency produced by mixing two or more signals in a nonlinear device.

heterodyne repeater: In radio reception and retransmission, a repeater that converts the original band of frequencies of the received signal to a different frequency band for retransmission after amplification. *Note:* Heterodyne repeaters are used, for example, in microwave systems, to avoid undesired feedback between the receiving and transmitting antennas. *Synonym* **IF repeater.**

heterogeneous multiplexing: Multiplexing in which not all the information-bearer channels operate at the same data signaling rate.

heuristic routing: Routing in which data, such as time delay, extracted from incoming messages, during specified periods and over different routes, are used to determine the optimum routing for transmitting data back to the sources. *Note:* Heuristic routing allows a measure of route optimization based on recent empirical knowledge of the state of the network.

hexadecimal: 1. Characterized by a selection, choice or condition that has sixteen possible different values or states. *Synonym* **sexadecimal. 2.** Pertaining to a fixed-radix numeration system in which the radix is sixteen.

HF: *Abbreviation for* **high frequency.**

HFDF: *Abbreviation for* **high-frequency distribution frame.**

hierarchical computer network: A computer network in which processing and control functions are performed at several levels by computers specially suited for the functions performed, such as industrial process control, inventory control, database control, or hospital automation.

hierarchically synchronized network: A mutually synchronized network in which some clocks exert more control than others, the network operating frequency being a weighted mean of the natural frequencies of the population of clocks.

hierarchical routing: Routing that is based on hierarchical addressing. *Note:* Most Transmission Control Protocol/Internet Protocol (TCP/IP) routing is based on a two-level hierarchical routing in which an IP address is divided into a network portion and a host portion. Gateways use only the network portion until an IP datagram reaches a gateway that can deliver it directly. Additional levels of hierarchical routing are introduced by the addition of subnetworks.

high-altitude electromagnetic pulse (HEMP): An electromagnetic pulse produced at an altitude effectively above the sensible atmosphere, *i.e.* , above about 120 km.

high-definition television (HDTV): Television that has approximately twice the horizontal and twice the vertical emitted resolution specified by the NTSC standard. *Note 1:* In HDTV, the total number of pixels is therefore approximately four times that of the NTSC standard. *Note 2:* HDTV may include any or all improved-definition television (IDTV) and extended-television (EDTV) improvements. *Note 3:* HDTV employs a wide aspect ratio.

higher frequency ground: *Deprecated term name. See* **facility grounding system.**

high frequency (HF): Frequencies from 3 MHz to 30 MHz. *See* **electromagnetic spectrum.**

high-frequency distribution frame (HFDF): A distribution frame that provides terminating and interconnecting facilities for those combined supergroup modulator output circuits and combined supergroup demodulator input circuits that contain signals occupying the baseband spectrum.

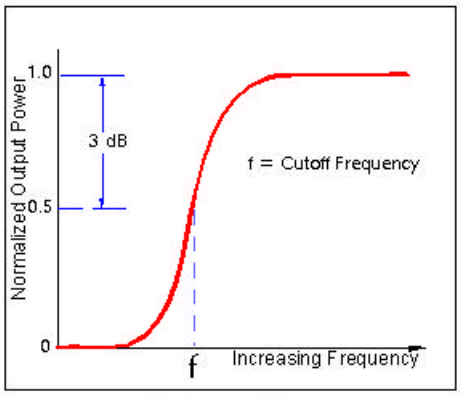
high-level control: In the hierarchical structure of a primary or secondary data transmission station, the conceptual level of control or processing logic that (a) is above the Link Level and (b) controls Link Level functions, such as device control, buffer allocation, and station management.

high-level data link control (HDLC): A Link-Level protocol used to facilitate reliable point-to-point transmission of a data packet. *Note:* A subset of HDLC, known as *"LAP-B,"* is the Layer-two protocol for ITU-T Recommendation X.25.

high-level language (HLL): A computer programming language that is primarily designed for, and syntactically oriented to, particular classes of problems and that is essentially independent of the structure of a specific computer or class of computers; for example, Ada®, COBOL, Fortran, Pascal. *Synonym* **high-order language.**

high-order language: *Synonym* **high-level language.**

high-pass filter: A filter that passes frequencies above a given frequency and attenuates all others.



high-pass filter

high-performance equipment: Equipment that (a) has the performance characteristics required for use in trunks or links, (b) is designed primarily for use in global and tactical systems, and (c) sufficiently withstands electromagnetic interference when operating in a variety of network or point-to-point circuits. *Note:* Requirements for global and tactical high-performance equipment may differ.

high-priority emergency service call: A call identified as receiving emergency service treatment, which has been marked as requiring special treatment by the emergency service administration. The call has an associated CESID and transfer numbers. [T1.628-1993]

high probability of completion (HPC): With reference to American National Standard ANSI T1.631-1993, an aspect of National Security and Emergency Preparedness (NS/EP) telephone calls, as implemented in the public switched network (PSN) for the Government Emergency Telecommunications Service (GETS).

High Sierra format: A standard format for placing fields and directories on CD ROM, revised and adopted by the International Organization for Standardization as ISO 9660. [After Silicon]

high-usage trunk group: A group of trunks for which an alternate route has been provided to absorb the relatively high rate of overflow traffic.

highway: 1. A digital serial-coded bit stream with time slots allotted to each call on a sequential basis. **2.** A common path or a set of parallel paths over which signals from more than one channel pass with separation achieved by time division.

hiss: Noise in the audio frequency range, having subjective characteristics analogous to prolonged sibilant sounds. *Note:* Noise in which there are no pronounced low-frequency components may be considered as hiss.

history list: A record of the documents visited during a Web session, which list allows users to access previously visited pages more quickly or to generate a record of a user's progress. *Synonym* **bookmark list, go list, hotlist.**

hit: 1. A transient disturbance to, or momentary interruption of, a communication channel, power supply (especially that provided via a commercial electric power distribution network or grid, but not limited to same), *etc.* **2.** A match of a data item to a prescribed criterion or criteria. *Note:* For example, each of the matches from a search engine is called a "hit." **3.** The access of any item, such as a page or a graphic image, from a Web server. *Note 1:* Hits are recorded for the purpose of assessing traffic/interest in a web site; many web sites have a commercial sponsor who pays a small amount per hit for displaying the commercial advertisement on that site. *Note 2:* The number of hits on a web site is not synonymous with the number of distinct visitors. **4.** The number of document requests being answered by a server.

hit counter: An indicator on a Web page that graphically displays the number of previous users that have accessed the page. *Note:* For example, the (earlier) 1996 edition of this glossary has been accessed more than 250,000 times, as of March 2000.

HLL: *Abbreviation for* **high-level language.**

hockey puck: A polishing fixture used to facilitate the manual finishing of the endfaces of certain types of optical fiber connectors. *Note 1:* The hockey puck consists of the appropriate mating sleeve for the connector in question, mounted at right angles to, and in the center of, a disk of stainless steel or other hard material. When the unfinished connector, secured to the fiber-optic cable, is mounted in the hockey puck, excess material (*e.g.* , fiber end, bead of adhesive material, and excess connector length, if present) protrudes from the opposite side of the disk. The excess is then ground away as the fixture is manually swept to and fro, usually in a figure-8 pattern, in contact with a piece of microfinishing film which is in turn supported by a rigid flat substrate. Two to four grades of microfinishing film, with abrasive particles ranging in size from 15 μm to 0.3 μm, are commonly used. [After FAA] *Note 2:* Various manufacturers use proprietary names to identify this device; however "hockey puck" has become ubiquitous.

hold-in frequency range: The range of frequencies over which a phase-locked loop can vary and still maintain frequency lock.

holding time: 1. The total length of time that a call makes use of a trunk or channel. *Note:* Holding time is usually measured in seconds. **2.** The time in which an item of telephone plant is in actual use either by a customer or an operator. For example, on a completed telephone call, holding time includes conversation time as well as other time in use. At local dial offices any measured minutes which result from other than customer attempts to place calls (as evidenced by the dialing of at least one digit) are not treated as holding time. [47 CFR Pt.36-A]

hold-in range: *See* **hold-in frequency range.**

home network: The carrier's own Signaling System No. 7 (SS7) network. [T1.226-1992]

home page: 1. The document that is configured to be displayed first when a Web browser is opened. **2.** The document designed to be the user's point of entry into a Web site, or the page that the user first sees when he or she first visits a company's Web site.

homing: 1. A process in which a mobile station is directed, or directs itself, toward an electromagnetic, thermal, sonic, or other source of energy, whether primary or reflected, or follows a vector force field or a gradient of a scalar force field. **2.** In radio direction-finding, the locating of a moving signal source by a moving direction-finding station that has a mobile advantage. **3.** The act of approaching a source of electromagnetic radiation in which the approaching vehicle is guided by a receiver with a directional antenna. **4.** Seeking, finding, intercepting, and engaging an object, *i.e.,* a target (fixed or mobile) that may contain a signal source. [From Weik '89]

homochronous: The relationship between two signals such that their corresponding significant instants are displaced by a constant interval of time.

homogeneous cladding: In an optical fiber, a cladding in which the nominal refractive index is constant throughout. *Note:* An optical fiber may have several homogeneous claddings, each having a different refractive index.

homogeneous multiplexing: Multiplexing in which all of the information-bearer channels operate at the same data signaling rate.

hop: 1. The excursion of a radio wave from the Earth to the ionosphere and back to the Earth. *Note:* The number of hops is synonymous with the number of reflections from the ionosphere. **2.** A waveform transmitted for the duration of each relocation of the carrier frequency of a frequency-hopped system. **3.** To modify a modulated waveform with constant center frequency so that it frequency hops. **4.** An intermediate network connection consisting of a leg from one router to another router and over which a packet travels to reach its destination. *Note:* Hops can be traced using ping or other trace utilities.

hop count: 1. In a data communications network, the number of legs traversed by a packet between its source and destination. *Note:* Hop count may be used to determine the time-to-live for some packets. **2.** The number of signal regenerating devices (such as repeaters, bridges, routers, and gateways) through which data must pass to reach their destination.

horizon angle: Of a directional antenna, the angle, in a vertical plane, subtended by the lines extending (a) from the antenna to the radio horizon and (b) from the antenna in its direction of maximum radiation.

horizontal redundancy check: *Synonym* **longitudinal redundancy check.**

horizontal resolution: 1. In facsimile, the number of pixels per unit distance in the direction of scanning or recording. **2.** In digital telegraphy, the number of pixels in the horizontal direction. **3.** In raster-scanned television, the number of picture elements in a scan line. **4.** In a computer monitor, the number of pixels per unit distance in the horizontal direction. *Note:* This value is inversely proportional to the dot pitch of the monitor.

horn: 1. In radio transmission, an open-ended waveguide, of increasing cross-sectional area, which radiates directly in a desired direction or feeds a reflector that forms a desired beam. *Note 1:* Horns may have one or more expansion curves, *i.e.* , longitudinal cross sections, such as elliptical, conical, hyperbolic, or parabolic curves, and not necessarily the same expansion curve in each (E-plane and H-plane) cross section. *Note 2:* A very wide range of beam patterns may be formed by controlling horn dimensions and shapes, placement of the reflector, and reflector shape and dimensions. **2.** A portion of a waveguide in which the cross section is smoothly increased along the axial direction. **3.** In audio systems, a tube, usually having a rectangular transverse cross section and a linearly or exponentially increasing cross-sectional area, used for radiating or receiving acoustic waves.

horn gap switch: A switch provided with arcing horns, ordinarily used for disconnecting or breaking the charging current of overhead transmission and distribution lines.

host: 1. In packet- and message-switching communications networks, the collection of hardware and software that makes use of packet or message switching to support user-to-user, *i.e.,* end-to-end, communications, interprocess communications, and distributed data processing. [From Weik '89] **2.** *Synonym* **host computer.**

host address: A fully qualified domain name (usually alphabetic) identifying the address of one specific host computer on the Internet. *Note:* The host address is a subset of the IP address. [After 2382-pt.35]

host central office: An electronic analog or digital base switching unit containing the central call processing functions which service the host office and its remote locations. [47 CFR Pt.36-A]

host computer: 1. In a computer network, a computer that provides end users with services such as computation and database access and that usually performs network control functions. *Synonym* **host. 2.** A computer on which is developed software intended to be used on another computer.

host-host protocol: End-to-end (transport) protocol.

hosting: *Synonym (in Internet usage)* **content hosting.**

host name: A fully qualified domain name identifying one specific host computer within the Internet.

hot boot: *Synonym* **warm restart.**

hotbot: *Synonym* **droid.**

hotline: A point-to-point communications link in which a call is automatically originated to the preselected destination without any additional action by the user when the end instrument goes off-hook. *Note 1:* Hotlines cannot be used to originate calls other than to preselected destinations. *Note 2:* Various priority services that require dialing are **not** properly termed "hotlines." *Synonyms* **automatic signaling service, off-hook service.**

hotlink: *See* **hyperlink.**

hotlist: A list of frequently used web locations and URLs (Uniform Resource Locators). *Note:* Hotlists may consist of a) lists of bookmarks accessed by a browser or b) lists of URLs at a web site for linking to other relevant web sites. *Synonyms* **bookmark list, go list, history list.**

hot site: In computer security, *synonym for* **hot standby.** *See* **standby.**

hot standby: *See* **standby.**

hot swap: In an electronic device, of a subassembly or component therein (*e.g.* circuit card), the act or process of removing and replacing the subassembly or component without first powering down the device. *Note:* Hot swapping of components in devices or environments not designed to support such practice may result in damage to the component or device, or may pose a spark hazard even if the primary power has been removed. And, in some computing devices, hot swapping may not be appropriate because new components may be recognized only during boot-up.

house cable: *Deprecated term.* Communication cable within a building or a complex of buildings. *Note:* House cable owned before divestiture by the Bell System and after divestiture by the Regional Bell Operating Companies will eventually be fully depreciated and will then belong to the customer. *See* **on-premises wiring.**

housekeeping signals: *Synonym* **service signals.**

HPC: *Abbreviation for* **high probability of completion.**

H-plane bend: *Synonym* **H-bend.**

HTML: *Abbreviation for* **Hypertext Markup Language.** An application of SGML (Standard Generalized Markup Language [ISO 8879]) implemented in conjunction with the World Wide Web to facilitate the electronic exchange and display of simple documents using the Internet.

HTTP: *Abbreviation for* **Hypertext Transfer Protocol.** In the World Wide Web, a protocol that facilitates the transfer of hypertext-based files between local and remote systems.

hub: 1. A distribution point in a network. **2.** A device that accepts a signal from one point and redistributes it to one or more points.

Huffman coding: A coding technique used to compact data by representing the more common events with short codes and the less common events with longer codes. *Note:* Huffman coding is used in Group 3 facsimile.

human-machine interface (HMI): Human-machine interface between user and terminal/system that consists of a physical section (electro-acoustic, electro-optic transducer, keys, *etc.*) and a logical section dealing with functional operation states. [T1.800.01-1995]

hundred call-seconds (CCS): *See* **call-second.**

hunting: 1. In telephony, pertaining to the operation of a selector or other similar device to find and establish a connection with an idle circuit of a chosen group. **2.** Pertaining to the failure of a device to achieve a state of equilibrium, usually by alternately overshooting and undershooting the point of equilibrium.

hybrid: 1. A functional unit in which two or more different technologies are combined to satisfy a given requirement. *Note:* Examples of hybrids include (a) an electronic circuit having both vacuum tubes and transistors, (b) a mixture of thin-film and discrete integrated circuits, and (c) a computer that has both analog and digital capability. **2.** A resistance hybrid. **3.** A hybrid coil.

hybrid balance: An expression of the degree of electrical symmetry between two impedances connected to two conjugate sides of a hybrid set or resistance hybrid. *Note 1:* Hybrid balance is usually expressed in dB. *Note 2:* If the respective impedances of the branches of the hybrid that are connected to the conjugate sides of the hybrid are known, hybrid balance may be computed by the formula for return loss.

hybrid cable: An optical communications cable having two or more different types of optical fibers, *e.g.,* single-mode and multimode fibers.

hybrid coil: A single transformer that effectively has three windings, and which is designed to be configured as a circuit having four branches, *i.e.,* ports, that are conjugate in pairs. *Note:* The primary use of a hybrid coil is to convert between 2-wire and 4-wire operation in concatenated sections of a communications circuit. Such conversion is necessary when repeaters are introduced in a 2-wire circuit. *Synonym* **bridge transformer.**

hybrid communications network: A communications network that uses a combination of line facilities, *i.e.,* trunks, loops, or links, some of which use only analog or quasi-analog signals and some of which use only digital signals. *Synonyms* **hybrid network, hybrid system.**

hybrid computer: A computer that processes both analog and digital data.

hybrid connector: A connector that contains contacts for more than one type of service. *Note:* Examples of hybrid connectors are those that have contacts for both optical fibers and twisted pairs, electric power and twisted pairs, or shielded and unshielded twisted pairs.

hybrid coupler: In an antenna system, a hybrid junction used as a directional coupler. *Note:* The loss through a hybrid coupler is usually $\approx$3 dB.

hybrid fiber coaxial cable (HFC): A telecommunications cable in which optical fiber cable and coaxial cable constitute different portions of a network carrying broadband content (such as video, data, and voice). Typically, a local CATV company might use fiber optic cable from the cable headend (distribution center) to the serving node located near business and residential users, and then use coaxial cable from these nodes to individual businesses and homes. An advantage of HFC is that some of the characteristics of fiber optic cable (high bandwidth and low noise/low interference susceptibility) can be brought close to the user without having to replace the entire existing coaxial cable that is installed.

hybrid interface structure: In integrated services digital networks (ISDN), an interface structure that uses both labeled and positioned channels.

hybrid junction: A waveguide or transmission line arranged such that (a) there are four ports, (b) each port is terminated in its characteristic impedance, and (c) energy entering any one port is transferred, usually equally, to two of the three remaining ports. *Note:* Hybrid junctions are used as mixing or dividing devices.

hybrid mode: A mode consisting of components of both electrical and magnetic field vectors in the direction of propagation. *Note:* In fiber optics, such modes correspond to skew (nonmeridional) rays.

hybrid network: *See* **hybrid communications network.**

hybrid routing: Routing in which numbering plans and routing tables are used to permit the collocation, in the same area code, of switches using a deterministic routing scheme with switches using a nondeterministic routing scheme, such as flood search routing. *Note:* Routing tables are constructed with no duplicate numbers, so that direct dial service can be provided to all network subscribers. This may require the use of 10-digit numbers.

hybrid set: Two or more transformers interconnected to form a network having four ports that are conjugate in pairs. *Note:* The primary use of a hybrid set is to convert between 2-wire and 4-wire operation in concatenated sections of a communications circuit. Such conversion is necessary when repeaters are introduced in a 2-wire circuit.

hybrid spread spectrum: A combination of frequency hopping spread spectrum and direct-sequence spread spectrum. [NTIA]

hybrid system: *Synonym* **hybrid communications network.**

hybrid topology: *See* **network topology.**

hydroxyl ion absorption: In optical fibers, the absorption of electromagnetic waves, including the near-infrared, due to the presence of trapped hydroxyl ions remaining from water as a contaminant. *Note:* The hydroxyl (OH^-) ion can penetrate glass during or after product fabrication, resulting in significant attenuation of discrete optical wavelengths, *e.g.* , approximately 1.3 μm, used for communications via optical fibers.

hyperlink: 1. A software function that (a) is manifest to the user as displayed, selectable words or icons, and (b) allows viewers of an HTML document to navigate thereby to another HTML document or file. **2.** The link created, as in 1.

hypermedia: Computer-addressable files that contain pointers for linking to multimedia information, such as text, graphics, video, or audio in the same or other documents. *Note:* The use of hypertext links is known as navigating.

hypertext: The system of coding that is used to create or navigate hypermedia in a nonsequential manner.

Hypertext Transfer Protocol: *See* **HTTP.**

Hz: *Abbreviation for* **hertz.**

IANA: *Abbreviation for* **Internet Assigned Numbers Authority.** An organization directed by the Internet Architecture Board (IAB) and which assigns IP numbers and protocol parameters such as port, protocol, and enterprise numbers, and options, codes, and types.

I_a: The 4-wire (2-pair) bidirectional primary rate interface point on the network side of the termination equipment (*i.e.,* NT1, NT2), including the equipment connecting cord, or equivalent, on the user side of the interface cable. [After T1.217-1991] [After T1.408-1990]

I_b: The 4-wire (2-pair) bidirectional primary rate (PR) interface point on the user side of the termination equipment (*i.e.,* NT1 and NT2), including the equipment connecting cord or equivalent on the network side of the interface cable. [T1.408-1990]

IC: *Abbreviation for* **integrated circuit.**

ICA: *Abbreviation for* **International Communications Association.**

ICI: *Abbreviation for* **incoming call identification.**

ICMP: *Abbreviation for* **Internet Control Message Protocol.** An Internet protocol that reports datagram delivery errors. *Note 1:* ICMP is a key part of the TCP/IP protocol suite. *Note 2:* The packet internet gopher (ping) application is based on ICMP.

icon: In computer systems, a small, pictorial representation of an application software package, idea, or concept used in a window or a menu to represent commands, files, or options.

ICW: *Abbreviation for* **interrupted continuous wave.**

identification: [The] process an information system (IS) uses to recognize an entity. [INFOSEC-99]

identification, friend or foe (IFF): A system using electromagnetic transmissions to which equipment carried by friendly forces automatically responds, for example, by emitting pulses, thereby distinguishing themselves from enemy forces. [JP 1-02] *Note:* The secondary surveillance radar (SSR) system used in modern air traffic control systems is an outgrowth of the military IFF system used during World War II. The IFF equipment carried by modern military aircraft is compatible with the transponder system used for civilian air traffic control.

identification friend or foe personal identifier: The discrete identification, friend or foe code assigned to a particular aircraft, ship, or other vehicle for identification by electronic means. [JP1]

identification information: A form of notification information that consists of the documentation of the actual sequence of intermediate networks traversed by a signaling message. The documentation of the sequence of networks traversed may also include the origination and destination networks. The documentation that the message traversed a given network is performed by that network itself. Intermediate networks that are not ISNI-capable are not identified. ISNI identification information can be used to force a return error message, destined for the originating SEP, to transit the same intermediate network(s) as the original message. [T1.118-1992]

identifier (ID): 1. In telecommunications and data processing systems, one or more characters used to identify, name, or characterize the nature, properties, or contents of a set of data elements. **2.** A string of bits or characters that names an entity, such as a program, device, or system, in order that other entities can call that entity. **3.** In programming languages, a lexical unit that names a language object, such as a variable, array, record, label, or procedure. *Note:* An identifier is placed in a label. The label is attached to, is a part of, or remains associated with, the information it identifies. If the label becomes disassociated from the information it identifies, the information may not be accessible.

identity authentication: The performance of tests to enable a data processing system to recognize entities. *Note:* An example of identity authentication is the checking of a password or identity token. [2382-pt.8]

identity token: 1. A device, such as a metal key or smart card, used for identity authentication. [After 2382-pt.8] **2.** [A] Smart card, metal key, or other physical object used to authenticate identity. [INFOSEC-99]

identity validation: Tests enabling an information system to authenticate users or resources. [INFOSEC-99]

IDF: *Abbreviation for* **intermediate distribution frame.**

idle-channel noise: Noise that is present in a communications channel when no signals are applied. *Note:* The channel conditions and terminations must be stated for idle-channel noise measurements to be meaningful.

idle character: A control character that is transmitted when no useful information is being transmitted. [From Weik '89]

idle code: A special sequence that indicates that no data are being sent on the channelized side. [T1.509-1995]

idle-line termination: A switch-controlled electrical network that maintains a desired impedance at a trunk or line terminal that is in the idle state.

idle state: The telecommunications service condition that exists whenever user messages are not being transmitted but the service is immediately available for use.

idle time: A period during which a system, circuit, or component is not in use, but is available.

IDN: *Abbreviation for* **integrated digital network.**

IDTV: *Abbreviation for* **improved-definition television.**

IETF: *Abbreviation for* **Internet Engineering Task force.** One of the task forces (with more than 40 working groups) of the Internet Architecture Board, responsible for solving short-term engineering needs of the Internet.

IF: *Abbreviation for* **intermediate frequency.**

I/F: *Abbreviation for* **interface.**

IFF: *Abbreviation for* **identification, friend or foe.**

IF4 (interface 4): An interface suitable for multipoint concentration by polling. [T1.201-1987] [T1.204-1988]

IF1 (interface 1): An interface suitable for star concentration. [T1.201-1987] [T1.204-1988]

IFRB: *Abbreviation for* **International Frequency Registration Board.**

IF repeater: *See* **heterodyne repeater.**

IFS: *Abbreviation for* **ionospheric forward scatter.** *See* **ionospheric scatter.**

IF6 (interface 6): An interface between a network element (NE) to one or more network elements (NEs) in other locations using star configuration embedded operations channel (EOCs) or conventional communications services. [T1.204-1992]

IF2 (interface 2): An interface suitable for communication between a network element (NE) location and operations systems (OSs) over packet switched networks, dedicated lines, or circuit switched connections. [T1. 201-1987] [T1.204-1988]

ILD: *Abbreviation for* **injection laser diode.**

ILEC: *Abbreviation for* **incumbent local exchange carrier.** The incumbent or existing franchised local exchange carrier in any given area. [After FCC]

illegal character: A character, or a combination of bits, that is not valid in a given system according to specified criteria, such as with respect to a specified alphabet, a particular pattern of bits, a rule of formation, or a check code. [From Weik '89] *Synonyms* **false character, forbidden character, improper character, unallowable character, unused character.**

ILS: *Abbreviation for* **instrument landing system.**

IM: *Abbreviation for* **intensity modulation, intermodulation.**

image: In the field of image processing, a two-dimensional representation of a scene. *Synonym* **picture.**

image antenna: A hypothetical mirror-image, *i.e.,* virtual-image, of an antenna, *i.e.,* antenna element, considered to extend as far below ground, *i.e.,* the ground plane, as the actual antenna is above the ground plane. *Note 1:* The image antenna is helpful in calculating electric field vectors, magnetic field vectors, and electromagnetic fields emanating from the real antenna, particularly in the vicinity of the antenna and along the ground. Each charge and current in the real antenna has its image that may also be considered as a source of radiation equal to, but differently directed from, its real counterpart. *Note 2:* An image antenna may also be considered to be on the opposite side of any equipotential plane surface, such as a metal plate acting as a ground plane, analogous to the position of a virtual optical image in a plane mirror. *Note 3:* The ground plane need not be grounded to the Earth.

image capture: The transducing of the information in a real image into the photographic or electronic medium. *Note:* Normally in motion-reproducing systems, synchronous audio information is simultaneously transduced. [After SMPTE]

image compression: 1. Application of an appropriate transfer function to an image signal so as to limit dynamic range. **2.** Application of bandwidth limiting or bit-rate reduction to an image signal in order to bring it within the limitations of a lower capacity channel. [After SMPTE]

image enhancement: In video technology, a technique used to improve contrast and picture clarity by flattening the camera response to 400 lines (by aperture correction) and applying an additional correction to increase the depth of modulation in the range of 250 to 300 lines (in an NTSC system), both vertically and horizontally. *Note:* Image enhancement produces a correction signal with symmetrical overshoots around transitions in the picture, but it must be used sparingly if natural appearance is to be maintained. [After SMPTE]

image file architecture: The formalization of a multidisciplinary agreement—regarding digital image characteristics, such as the structure of digital image files, the organization of the image data itself, and the definition of fully flexible, interoperable, scalable, and extensible systems—which agreement facilitates the exchange of such files across various technology interfaces.

image file descriptor: A block of data that (a) may contain, in standardized format, data concerning production, ownership, access, previous processing, *etc.,* relevant to the basic interpretation of the data, and (b) enhances the utility of the main data for the user.

image file header: A compact label for image files, created using a universally accepted algorithm, that (a) identifies the encoding standard, (b) specifies the length of the file, (c) indicates whether a readable descriptor is included, (d) permits random interception of data stream, and (d) offers optional error protection.

image file motion-picture format: The defining file format for exchange of digital motion-picture information on a variety of media between computer-based systems. *Note:* This flexible file format describes pixel-based (raster) images with attributes defined in the binary file descriptor—which identifies (a) generic file information, image information, data format, and image orientation information; (b) motion-picture and television industry-specific information; and (c) user defined information. The format assumes non real-time application, with accommodation for real-time to be considered as the developing technology permits.

image file video index: A recommended practice intended to provide a method of coding video index information in which various picture- and program-related source data can be carried in conjunction with the video signal. *Note:* There are three classes of video index data based on type and use of the data. Class 1 contains information that is required to know how to use the signal. Class 2 contains heritage information for better usage of the signal. Class 3 contains other information not required to know how to use the signal.

image frequency: In radio reception using heterodyning in the tuning process, an undesired input frequency that is capable of producing the same intermediate frequency (IF) that the desired input frequency produces. *Note:* The term *image* arises from the mirror-like symmetry of signal and image frequencies about the beating-oscillator frequency.

image frequency rejection ratio: *Synonym* **image rejection ratio.**

image generation: The creation of an image from an image concept. *Note:* The image can be created with computer-graphics software or photography, for example.

image map: A Web page feature in which hyperlinks are assigned ("mapped") to different portions of a graphic image, thereby allowing users to access links by clicking with a mouse on the mapped areas. *Note:* Image map requests are processed by CGI scripts on the server.

image rejection ratio: In reception using heterodyning in the tuning process, the ratio of (a) the intermediate-frequency (IF) signal level produced by the desired input frequency to (b) that produced by the image frequency. *Note 1:* The image rejection ratio is usually expressed in dB. *Note 2:* When the image rejection ratio is measured, the input signal levels of

the desired and image frequencies must be equal for the measurement to be meaningful. *Synonym* **image frequency rejection ratio.**

imagery: Collectively, the representations of objects reproduced electronically or by optical means on film, electronic display devices, or other media. [JP1]

IMD: *Abbreviation for* **intermodulation distortion.**

imitative communications: *See* **communications deception.**

immediate action limit (IAL): The bound on performance allowed for a circuit or connection that is in service. When any parameter value exceeds the IAL, the circuit or connection is considered defective and corrective action is necessary. [T1-506-1989]

immediate activation: In cryptology, a condition of readiness associated with a key having no effective date. *Note:* A key is immediately activated (a) by the receiver when the RSM is sent in response to the KSM that carried that key, and (b) by the sender when the RSM is received in response to the KSM that carried the key. [After X9.17]

immediate message: A category of precedence reserved for messages relating to situations that gravely affect the security of national/allied forces or populace and that require immediate delivery to the addressee(s). [JP 1-02]

immunity: The ability of an assembly, equipment, or a system to perform without degradation in the presence of an electromagnetic disturbance. [T1.308-1996]

IMP: *Abbreviation for* **interface message processor.**

impedance: The total passive opposition offered to the flow of electric current. *Note 1:* Impedance is determined by the particular combination of resistance, inductive reactance, and capacitive reactance in a given circuit. *Note 2:* Impedance is a function of frequency, except in the case of purely resistive networks.

impedance matching: The connection of an additional impedance to an existing one in order to accomplish a specific effect, such as to balance a circuit or to reduce reflection in a transmission line.

impersonating: [A] form of spoofing. [INFOSEC-99]

implant: [In security, an] electronic device or electronic equipment modification designed to gain unauthorized interception of information-bearing emanations. [INFOSEC-99]

implicit congestion control: A scheme under which user terminals first detect a possible congestion condition by means other than explicit congestion messages, and then take appropriate action to reduce their throughput. [T1.615-1992]

improper character: *Synonym* **illegal character.**

improved-definition television (IDTV): Television transmitters and receivers that (a) are built to satisfy performance requirements over and above those required by the NTSC standard and (b) remain within the general parameters of NTSC standard emissions. *Note 1:* IDTV improvements may be made at the TV transmitter or the receiver. *Note 2:* Examples of improvements include enhancements in encoding, digital filtering, scan interpolation, interlaced line scanning, and ghost cancellation. *Note 3:* IDTV improvements must allow the TV signal to be transmitted and received in the standard 4:3 aspect ratio. *Synonym* **enhanced-quality television.**

improvement threshold: *See* **FM improvement threshold.**

impulse: A short surge of electrical, magnetic, or electromagnetic energy. *Synonym* **surge.**

impulse excitation: The production of oscillation in a circuit or device by impressing a stimulus (signal) for a period that is extremely short compared to the duration of the oscillation that it produces. *Synonym* **shock excitation.**

impulse noise: Noise consisting of random occurrences of energy spikes having random amplitude and spectral content. *Note:* Impulse noise in a data channel can be a definitive cause of data transmission errors.

impulse response: 1. Of a device, the mathematical function that describes the output waveform that results when the input is excited by a unit impulse. **2.** The waveform that results at the output of a device when the input is excited by a unit impulse.

IN: *Abbreviation for* **intelligent network.**

inactive signaling link: A signaling link that has been deactivated and cannot therefore carry signaling traffic. [T1.110-1987]

in-band: Using or involving the information digit time slots of a DS1 frame; *i.e.,* bit assignments of a frame exclusive of the framing bit. [T1 Gloss '90] [T1.403-1989]

in-band control: Control effected by sending control information over the same channel as the one used to send data.

in-band noise power ratio: For multichannel equipment, the ratio of (a) the mean noise power measured in any channel, with all channels loaded with white noise, to (b) the mean noise power measured in the same channel, with all channels but the measured channel loaded with white noise.

in-band signaling: Signaling that uses frequencies or time slots within the bandwidth or data stream occupied by the information channel.

in call: A UPT (Universal Personal Telecommunications) call type which permits a UPT user to have calls to his/her UPT number routed to the terminal specified by the user. [After T1.Rpt41-1995]

in call delivery: A feature by which incoming calls are presented at the terminal address registered previously by in-call registration. This feature is invoked when originating parties or others call the UPT (Universal Personal Telecommunications service) user. [T1.701-1994]

in-call registration: A feature that enables the UPT (Universal Personal Telecommunications service) user to register from the current terminal address for incoming calls to be presented to that terminal address. When registered, all incoming calls to the UPT number of the UPT user will be presented to the registered terminal address, for the duration specified by the UPT user (duration may also be specified in terms of number of incoming UPT calls), or until a specified deregistration time. A UPT user's in-call registration will cancel the previous in-call registration of that UPT user's UPT number. Several UPT users may register for incoming calls to the same terminal address simultaneously. The UPT user may also explicitly de-register for incoming calls. [T1.701-1994]

incident: 1. In information systems (IS), [an] assessed occurrence having actual or potentially adverse effects on an IS. [INFOSEC-99] **2.** In COMSEC, the occurrence that potentially jeopardizes the security of COMSEC material or the secure electrical transmission of national security information or information governed by *10 U.S.C. Section 2315.* [INFOSEC-99]

incidental-radiation device: A device that radiates radio frequency energy during the course of its operation although the device is not intentionally designed to generate radio

frequency energy. [NTIA]

inclination of an orbit (of an Earth satellite): The angle determined by the plane containing the orbit and the plane of the Earth's equator. [NTIA] [RR]

inclined orbit: Any nonequatorial orbit of a satellite. *Note:* Inclined orbits may be circular or elliptical, synchronous or asynchronous, and direct or retrograde.

inclusion: A foreign object present within, for example, an optical fiber or a crystal.

incoherent: In optics, characterized by a degree of coherence significantly less than 0.88.

incoming access: The ability of a user to terminate data calls via an ISDN. [T1.615-1992]

incoming call identification (ICI): A switching system feature that allows an attendant to identify visually the type of service or trunk group associated with a call directed to the attendant's position.

incorrect block: A block successfully delivered to the intended destination user, but having one or more incorrect bits, additions, or deletions, in the delivered block.

incremental compaction: Data compaction accomplished by specifying only the initial value and all subsequent changes. *Note:* An example of incremental compaction is the storing or transmitting of a line voltage followed only by the deviations from the initial value. Thus, instead of transmitting the values 102, 104, 105, 103, 100, 104 and 106, only the values 102, +2, +1, -2, -3, +4, and +2, or only the values 100, +2, +4, +5, +3, 0, +4, and +6 need be sent, depending on the system used. At a given data rate, transmitting only the initial and incremental values require much less time and space than transmitting the absolute values. [From Weik '89]

incremental phase modulation (IPM): In spread-spectrum systems, phase modulation in which one binary code sequence is shifted with respect to another, usually to conduct a synchronizing search, *i.e.* , a search to discover if the two sequences are the same, and perhaps thereby enabling two data streams to be synchronized. [From Weik '89]

indefinite call sign: 1. A call sign that represents a group of facilities, commands, authorities, activities, or units rather than one of these. **2.** In radio communications, a call sign that does not identify a station and that is used in the call-up signal or in a message that has the station call sign encrypted in the text. [From Weik '89]

independent clocks: In communication network timing subsystems, free-running precision clocks used, for synchronization purposes, at the nodes. *Note:* Variable storage buffers, installed to accommodate variations in transmission delay between nodes, are made large enough to accommodate small time (phase) departures among the nodal clocks that control transmission. Traffic may occasionally be interrupted to allow the buffers to be emptied of some or all of their stored data.

independent-sideband (ISB) transmission: Double-sideband transmission in which the information carried by each sideband is different. *Note:* The carrier may be suppressed.

index dip: In an optical fiber, an undesired decrease in the refractive index at the center of the core. *Note:* An index dip is an artifact of certain manufacturing processes. *Synonym* **profile dip.**

indexing: *See* **interaction crosstalk.**

index-matching gel: *Synonym* **gel.**

index-matching material: A substance, usually a liquid, cement (adhesive), or gel, which has an index of refraction that closely approximates that of an optical fiber, and is used to reduce Fresnel reflection at the fiber endface. (FAA) *Note 1:* An index-matching material may be used in conjunction with pairs of mated connectors, with mechanical splices, or at the ends of fibers. *Note 2:* Without the use of an index-matching material, Fresnel reflections will occur at the smooth endfaces of a fiber. These reflections may be as high as -14 dB (*i.e.,* 14 dB below the level of the incident signal). When the reflected signal returns to the transmitting end, it is reflected again and returns to the receiving end at a level that is (28 plus twice the fiber loss) dB below the direct signal. The reflected signal will also be delayed by twice the delay time introduced by the fiber. The reflected signal will have no practical effect on digital systems because of its low level relative to the direct signal; *i.e.* , it will have no practical effect on the detected signal seen at the decision point of the digital optical receiver. It may be noticeable in an analog baseband intensity-modulated video signal.

index of cooperation: 1. In facsimile, the product of the total line length and the number of lines per unit length, divided by π. **2.** For rotating devices, the product of the drum diameter and the number of lines per unit length. *Synonyms:* **diametral index of cooperation, international index of cooperation.**

index of refraction: *Synonym* **refractive index.**

index profile: *Synonym* **refractive index profile.**

indirect control: In digital data transmission, the use of a clock rate of 2^n times the modulation rate, where n is an integer greater than one.

indirect wave: A wave, such as a radio wave or sound wave, that arrives at a given point by reflection or scattering from surrounding objects, rather than directly from the source. [From Weik '89]

individual line: A line that connects a single user to a switching center.

individual reception (in the broadcasting-satellite service): The reception of emissions from a space station in the broadcasting-satellite service by simple domestic installations and in particular those possessing small antennae. [NTIA] [RR]

inductive coupling: The transfer of energy from one circuit to another by virtue of the mutual inductance between the circuits. *Note 1:* Inductive coupling may be deliberate and desired (as in an antenna coupler) or may be undesired (as in power line inductive coupling into telephone lines). *Note 2:* Capacitive coupling favors transfer of higher frequency components, whereas inductive coupling favors transfer of lower frequency components.

industrial, scientific, and medical (ISM) applications (of radio frequency energy): Operation of equipment or appliances designed to generate and use locally radio-frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications. [NTIA] [RR]

industry standard: A voluntary, industry-developed document that establishes requirements for products, practices, or operations.

infobahn: A slang term for The Internet or NII. *See* **National Information Infrastructure.**

infobot: *Synonym* **droid.**

information: 1. Facts, data, or instructions in any medium or form. [JP 1-02] **2.** The meaning that a human assigns to data by means of the known conventions used in their representation. [JP 1-02]

information agent: *Synonym* **droid.**

information assurance: Information operations (IO) that protect and defend information and information systems (IS) by ensuring their availability, integrity, authentication, confidentiality, and nonrepudiation. This includes providing for restoration of information systems by incorporating protection, detection, and reaction capabilities. [INFOSEC-99]

information-bearer channel: 1. A channel capable of transmitting all the information required for communication, such as user data, synchronizing sequences, and control signals. *Note:* The information-bearer channel may operate at a higher data rate than that required for user data alone. **2.** A basic communications channel with the necessary bandwidth but without enhanced or value-added services.

information bit: *See* **user information bit.**

information digit(s): A single-digit data element in the 7-digit format that is outpulsed by the network to indicate the numbering plan digit (NPD) and CESID (caller's emergency service ID) display status. In the 10-digit format, two information digits used to indicate the CESID display status. The information digit or digits can also indicate a maintenance test call. [T1.414-1998]

information feedback: The return of received data to the source, usually for the purpose of checking the accuracy of transmission by comparison with the original data.

information field: In data transmission, a field assigned to contain user information. *Note:* The contents of the information field are not interpreted at the link level.

information flow control: [In COMSEC, a] procedure to ensure that information transfers within an information system (IS) are not made from a higher security level object to an object of a lower security level. [INFOSEC-99]

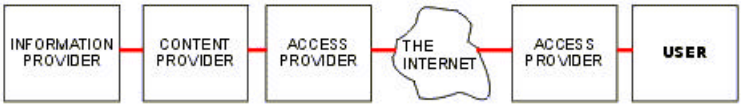
information integrity: In a frame-relaying network, the condition when all frames relayed by the network satisfy the frame check sequence check. [After T1.606-1990]

information origination/termination equipment: Equipment used to input into or receive output from the telecommunications network. [47 CFR Pt.36-A]

information processing: *Synonym* **data processing.**

information processing center (IPC): A facility staffed and equipped for processing and distributing information. *Note:* An IPC may be geographically distributed.

information provider: An entity that collects information and makes it available to Internet users. *Note:* The information can be provided directly to users, or provided via an Internet access provider or a content provider. [After 2382-pt.35]



information rate: For a frame relay logical connection, the average number of end user bits transferred per second, in one direction, across a user-network interface as measured over an interval of duration t. The measurement interval t is network dependent. [T1.615-1992]

information security: The protection of information against unauthorized disclosure, transfer, modification, or destruction, whether accidental or intentional.

information source: *Synonym* **source user.**

information superhighway: *Synonym* **National Information Infrastructure.**

information system: 1. A system, whether automated or manual, that comprises people, machines, and/or methods organized to collect, process, transmit, and disseminate data that represent user information. **2.** Any telecommunications and/or computer related equipment or interconnected system or subsystems of equipment that is used in the acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of voice and/or data, and includes software, firmware, and hardware. [NIS] **3.** The entire infrastructure, organization, personnel, and components for the collection, processing, storage, transmission, display, dissemination, and disposition of information. [INFOSEC-99]

information systems security (INFOSEC and/or ISS): [The] protection of information systems against unauthorized access to or modification of information, whether in storage, processing or transit, and against the denial of service to authorized users, including those measures necessary to detect, document, and counter such threats. [INFOSEC]

information technology (IT): The branch of technology devoted to (a) the study and application of data and the processing thereof; *i.e.,* the automatic acquisition, storage, manipulation (including transformation), management, movement, control, display, switching, interchange, transmission or reception of data, and (b) the development and use of the hardware, software, firmware, and procedures associated with this processing.

information transfer: The process of moving messages containing user information from a source to a sink. *Note:* The information transfer rate may or may not be equal to the transmission modulation rate.

information transfer capability: The capability associated with the transfer of different types of information through the ISDN. It can be used to characterize a telecommunication service or connection. Values associated with this attribute are unrestricted digital, speech, 3.1-kHz audio, 7- kHz audio, 15-kHz audio, and video. [T1.603-1990] [T1.604-1990]

information transfer interface: Establishment of a communication (signaling) path and any required bearer path between the RPT/RT and the radio port. For example, in TDMA and FDMA, time slots and frequencies are identified, and in CDMA, sequence codes are identified. [T1.Rpt34-1994]

information transfer mode: The operational mode for transferring (transportation and switching) user information through the ISDN. It can be used to characterize a telecommunication service or a connection in the network. Values associated with the attribute are circuit mode and packet mode. [T1.603-1990] [T1.604-1990]

information-transfer phase: In an information-transfer transaction, the phase during which user information blocks are transferred from the source user to a destination user.

information transfer rate: The transfer of digital information between two access points or reference points. Values associated with this attribute are appropriate bit rate (in circuit mode) and throughput rate (in packet mode). [T1.603-1990] [T1.604-1990]

information-transfer transaction: A coordinated sequence of user and telecommunications system actions that cause information present at a source user to become present at a destination user. *Note:* An information-transfer transaction usually consists of three consecutive phases called the access phase, the information-transfer phase, and the disengagement phase.

INFOSEC: *Acronym for* **information systems security.**

infrared (IR): The region of the electromagnetic spectrum bounded by the long-wavelength extreme of the visible spectrum (approximately 0.7 μm) and the shortest microwaves (approximately 0.1 mm). *See* **electromagnetic spectrum.**

infrastructure assurance: Preemptive or reactive risk-management techniques designed to increase confidence that disruption of a system will be minimized if its critical infrastructure is attacked.

infrastructure protection: Preemptive or reactive risk-management techniques designed to prevent disruption of a system after its critical infrastructure is attacked.

inhibiting signal: A signal that prevents the occurrence of an event. *Note:* An inhibiting signal may be used, for example, to disable an AND gate, thus preventing any signals from passing through it as long as the inhibiting signal is present. [From Weik '89]

initial alignment: A procedure used to qualify a signaling link for carriage of signaling traffic, either for the first time or after failure has occurred. [T1.226-1992]

initialization vector: In encryption, a nonsecret binary vector used as the initializing input algorithm for the encryption of a plaintext block sequence to increase security by introducing additional cryptographic variance and to synchronize cryptographic equipment. [After X9.52]

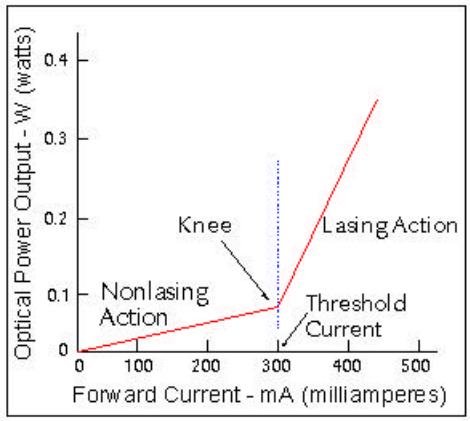
initialize: Setting the state of a cryptographic logic prior to key generation, encryption, or other operating mode. [INFOSEC-99]

initial text sequence: In cryptography, a 64-bit binary sector that may be attached to the beginning of a message. [After X9.23]

initiating MSC: The mobile switching center (MSC) (switch) that obtains routing information (*i.e.,* LRN). [T1.708-1998]

injection fiber: *Synonym* **launching fiber.**

injection laser diode (ILD): A laser that uses a forward-biased semiconductor junction as the active medium. *Note:* Stimulated emission of coherent light occurs at a p-n junction where electrons and holes are driven into the junction. *Synonyms* **diode laser, laser diode, semiconductor laser.** *See figure on following page.*



injection-laser diode: output vs. input current

ink vapor recording: Recording in which vaporized ink particles are deposited directly upon the record medium.

inline: An image on a web page that is displayed directly to the viewer rather than being made available only as a hot link.

input: 1. In a device, process, or channel, a point that accepts data. **2.** A state, or a sequence of states, of a point that accepts data. **3.** A stimulus, such as a signal or interference, that enters a functional unit, such as a telecommunications system, a computer, or a computer program.

input data: 1. Data being received or to be received by a device or a computer program. **2.** Data to be processed.

input focus: The attribute of a user interface component, such as a window, that enables it to receive input from a particular input device, such as the keyboard. [T1.232-1996]

input-output channel: For a computer, a device that handles the transfer of data between internal memory and peripheral equipment.

input-output controller (IOC): A functional unit that controls one or more input-output channels. *Synonym* **I/O controller.**

input/output (I/O) device: A device that introduces data into or extracts data from a system.

input protection: For analog input channels, protection against overvoltages that may be applied between any two input connectors or between any input connector and ground.

insertion gain: The gain resulting from the insertion of a device in a transmission line, expressed as the ratio of the signal power delivered to that part of the line following the device to the signal power delivered to that same part before insertion. *Note 1:* If the resulting number is less than unity, an *"insertion loss"* is indicated. *Note 2:* Insertion gain is usually expressed in dB.

insertion loss: 1. The loss resulting from the insertion of a device in a transmission line, expressed as the reciprocal of the ratio of the signal power delivered to that part of the line following the device to the signal power delivered to that same part before insertion. *Note:* Insertion loss is usually expressed in dB. **2.** In an optical fiber system, the total optical power loss caused by insertion of an optical component, such as a connector, splice, or coupler.

insertion-loss-vs.-frequency characteristic: Of a system or device, a plot of the amplitude as a function of frequency. *Note:* The insertion-loss-vs.-frequency characteristic may be expressed as absolute gain or loss, or it may be normalized with respect to gain or loss at a specified reference frequency.

inside call: *Synonym* **internal call.**

inside plant: 1. All the cabling and equipment installed in a telecommunications facility, including the main distribution frame (MDF) and all the equipment extending inward therefrom, such as PABX or central office equipment, MDF protectors, and grounding systems. **2.** In radio and radar systems, all communications-electronics (C-E) equipment that is installed in buildings.

inside wire: *See* **on-premises wiring.**

in-slot signaling: Signaling performed in the associated channel time slot.

inspection lot: A collection of produced units from which a statistically valid sample is to be drawn and inspected to determine conformance with acceptability criteria. *Note:* The inspection lot may differ from a collection of units designated as a lot for other purposes, such as for production, storage, packaging, and shipment.

instantiation: the process of creating a managed object according to a managed object class definition. [T1.260-1998]

instruction: In a programming language, an expression that specifies one operation and identifies its operands, if any.

instructional television fixed station: A fixed station operated by an educational organization and used primarily for the transmission of visual and aural instructional, cultural, and other types of educational material to one or more fixed receiving locations. [47 CFR 74.901]

instrument landing system (ILS): 1. A radio-navigation system which provides aircraft with horizontal and vertical guidance just before and during landing and, at certain fixed points, indicates the distance to the reference point of landing. [NTIA] [RR] **2.** A system of radio navigation intended to assist aircraft in landing which provides lateral and vertical guidance, which may include indications of distance from the optimum point of landing. [JP1]

instrument landing system glide path: A system of vertical guidance embodied in the instrument landing system which indicates the vertical deviation of the aircraft from its optimum path of descent. [NTIA] [RR]

instrument landing system localizer: A system of horizontal guidance embodied in the instrument landing system which indicates the horizontal deviation of the aircraft from its optimum path of descent along the axis of the runway. [NTIA] [RR]

insulated wire: Telecommunications plant containing from one to six paired conductors, and possibly a shield. Wire may be found in either aerial or buried installations. [T1.316-1997]

integrated circuit (IC): An electronic circuit that consists of many individual circuit elements, such as transistors, diodes, resistors, capacitors, inductors, and other active and passive semiconductor devices, formed on a single chip of semiconducting material and mounted on a single piece of substrate material. *Synonyms* **chip, microcircuit.** [From Weik '89]

integrated digital network (IDN): A network that uses both digital transmission and digital switching.

integrated ground plane: A set of interconnected frames that is intentionally grounded via multiple connections to a ground reference. Multiple connections are intended to keep voltage drops (due to power faults in the ac or dc power systems or from lightning) to acceptable levels. The following are examples of an integrated ground plane: building steel, water pipes, ground rod systems, counterpoises, vertical and horizontal ground reference conductors, grounding (earthing) wires, and metallic raceways form an integrated ground plane when bonded together by a multiplicity of both deliberate and incidental connections. *Synonym* **common bonding network (CBN).** [T1.313-1997]

integrated optical circuit (IOC): A circuit, or group of interconnected circuits, consisting of miniature solid-state optical components on semiconductor or dielectric substrates. *Note:* IOC components include light sources, optical filters, photodetectors, and thin-film optical waveguides.

integrated services digital network: *See* **ISDN.**

integrated station: A terminal device in which a telephone and one or more other devices, such as a video display unit, keyboard, or printer, are integrated and used over a single circuit.

integrated system: A telecommunication system that transfers analog and digital traffic over the same switched network.

integrated voice and data terminal (IVDT): *See* **integrated station.**

integrating network: A network (circuit) that produces an output waveform that is the time integral of the input waveform. *Note:* Integrating networks are used in signal processing, such as for producing sawtooth waves from square waves.

integrity: [In INFOSEC, the] quality of an information system (IS) reflecting the logical correctness and reliability of the operating system; the logical completeness of the hardware and software implementing the protection mechanisms; and the consistency of the data structures and occurrence of the stored data. Note that, in a formal security mode, integrity is interpreted more narrowly to mean protection against unauthorized modification or destruction of information. [INFOSEC-99]

integrity check value: [A] checksum capable of detecting modification of an information system (IS). [INFOSEC-99]

intelligent agent: *Synonym* **droid.**

intelligent network application protocol (INAP): A protocol for intelligent network applications contained in Layer 7 (the Application Layer of the OSI model). [T1.667-1999]

intelligent network (IN): 1. A network that allows functionality to be distributed flexibly at a variety of nodes on and off the network and allows the architecture to be modified to control the services. **2.** In North America, an advanced network concept that is envisioned to offer such things as (a) distributed call-processing capabilities across multiple network modules, (b) real-time authorization code verification, (c) one-number services, and (d) flexible private network services [including (1) reconfiguration by subscriber, (2) traffic analyses, (3) service restrictions, (4) routing control, and (5) data on call histories]. Levels of IN development are identified below:

- **IN/1** A proposed intelligent network targeted toward services that allow increased customer control and that can be provided by centralized switching vehicles serving a large customer base.
- **IN/1+** A proposed intelligent network targeted toward services that can be provided by centralized switching vehicles, *e.g.,* access tandems, serving a large customer base.
- **IN/2** A proposed, advanced intelligent-network concept that extends the distributed IN/1 architecture to accommodate the concept called *"service independence." Note:* Traditionally, service logic has been localized at individual switching systems. The IN/2 architecture provides flexibility in the placement of service logic, requiring the use of advanced techniques to manage the distribution of both network data and service logic across multiple IN/2 modules.

intelligent network (IN) supported service: A service provided using the capabilities of the intelligent network. [T1.667-1999]

intelligent peripheral (IP): 1. A functional component that may be used most efficiently when accessed locally. **2.** An intelligent-network feature that provides specialized telecommunication capabilities required by IN/2 service logic programs.

intelligibility: For voice communications, the capability of being understood. *Note:* Intelligibility does not imply the recognition of a particular voice.

intelligible crosstalk: Crosstalk from which information can be derived.

INTELSAT: *Abbreviation for* **International Telecommunications Satellite Organization.** [47 CFR 0.453]

intensity: The square of the electric field strength of an electromagnetic wave. *Note:* Intensity is proportional to irradiance and may be used in place of the term *"irradiance"* when only relative values are important.

intensity modulation (IM): In optical communications, a form of modulation in which the optical power output of a source is varied in accordance with some characteristic of the modulating signal. *Note:* In intensity modulation, there are no discrete upper and lower sidebands in the usually understood sense of these terms, because present optical sources lack sufficient coherence to produce them. The envelope of the modulated optical signal is an analog of the modulating signal in the sense that the instantaneous power of the envelope is an analog of the characteristic of interest in the modulating signal. Recovery of the modulating signal is by direct detection, not heterodyning.

interaction crosstalk: Crosstalk caused by coupling between carrier and noncarrier circuits. *Note:* If the interaction crosstalk is, in turn, coupled to another carrier circuit, that crosstalk is called "indexing."

interactive: Pertaining to a communications environment in which more than one party is equipped and ready to participate actively in a session or a protocol. [After X9.42] *Note:* Common usage of the term refers to a session where at least one of the parties is human and another of the parties is a software application.

interactive data transaction: A unidirectional message, transmitted via a data channel, that requires a response in order for work to proceed logically.

interactive service: In an integrated services digital network (ISDN), a telecommunications service that facilitates a bidirectional exchange of information among users or among users and hosts. *Note:* Interactive services are grouped into conversational services, messaging services, and retrieval services.

interblock gap: On a data recording medium, an area used to indicate the end of a block or physical record. *Note:* Examples of interblock gaps are the gaps between blocks on magnetic tape and disks.

intercept: 1. To stop a telephone call directed to an improper, disconnected, or restricted telephone number, and to redirect that call to an operator or a recording. **2.** To gain possession of communications intended for others without their consent, and, ordinarily, without delaying or preventing the transmission. *Note:* An intercept may be an authorized or unauthorized action. **3.** The acquisition of a transmitted signal with the intent of delaying or eliminating receipt of that signal by the intended destination user. **4.** A call disposition category for a call attempt to a non-operating number. [T1.209-1998]

intercept call request: An operator services call request initiated by the network because of the service condition of the line of the called party (*e.g.,* line out of service, *etc.*). [T1.661-1997]

interchange: Mutual acceptance and exchange of messages between entities. [After X9.24]

interchangeability: 1. The ability to exchange hardware components having the same form, fit, and function, across platforms, without affecting the functionality of the system. [JP 1-02] **2.** A condition which exists when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability, and are capable of being exchanged one for the other without alteration of the items themselves, or of adjoining items, except for adjustment, and without selection for fit and performance. [JP 1-02]

interchangeable connectors: Connectors that share common installation geometry and have the same transmission performance.

interchange circuit: A circuit that facilitates the exchange of data and signaling information between data terminal equipment (DTE) and data circuit-terminating equipment (DCE). *Note:* An interchange circuit can carry many types of signals and provide many types of service features, such as control signals, timing signals, and common return functions.

intercharacter interval: In asynchronous transmission, the time interval between the end of the stop signal of one character and the beginning of the start signal of the next character. *Note:* The intercharacter interval may be of any duration. The signal sense of the intercharacter interval is always the same as the sense of the stop element, *i.e.* , "1" or "mark."

intercom: 1. A telephone apparatus by means of which personnel can talk to each other within an aircraft, tank, ship, or activity. [JP 1-02] **2.** A dedicated voice service within a specified user environment.

interconnect facility: In a communications network, one or more communications links that (a) are used to provide local area communications service among several locations and (b) collectively form a node in the network. *Note 1:* An interconnect facility may include network control and administrative circuits as well as the primary traffic circuits. *Note 2:* An interconnect facility may use any medium available and may be redundant.

interconnecting networks (ICNs): Two or more networks connected for purposes of call processing. [T1.207-1998]

interconnection: 1. The linking together of interoperable systems. [JP 1-02] **2.** The linkage used to join two or more communications units, such as systems, networks, links, nodes, equipment, circuits, and devices.

interconnectivity: *See* **interconnection.**

interdigit interval: A multifrequency (MF) and dual tone multifrequency (DTMF) signal timing interval that is equal to the sum of the fall time, signal-off time, and rise time. The interdigit interval starts when the MF or DTMF signal duration ends. The interdigit interval ends when the next MF or DTMF signal duration begins. [T1.414-1998]

interest group: A gathering or category of network users who have a similar interest in a particular topic and who share their opinions with each other via email or an internet forum.

interexchange carrier (IXC or **IC**): **1.** A communications common carrier authorized to provide interexchange telecommunications services within world zone 1 using the North American numbering plan. [After T1.104-1988] **2.** A telecommunications common carrier authorized to provide telecommunications services between LATAs. [After T1.502-1988] [T1.508-1998] *Note:* The term "interexchange carrier" is also used to refer to any other entity that connects to the exchange access network at a point of termination (POT). [After T1.506-1989] **3.** A carrier that provides connections between LATAs, where the calling or called customer is located in the United States. *Note:* This definition has no Canadian equivalent. However, the term "interexchange carrier" is used in the context of a carrier that provides connections extending across borders to carriers in the United States. [T1.209-1998] *Synonyms [loosely]* **carrier, common carrier, commercial carrier, communications carrier.**

interexchange channel: A circuit which is included in the interexchange transmission equipment. [47 CFR Pt.36-A]

interexchange transmission equipment: The combination of (a) interexchange cable and wire facilities, (b) interexchange circuit equipment and, (c) associated land and buildings. [47 CFR Pt.36-A]

interface data: The parameter within a primitive that is the unit of information transferred to/from the upper layer or sublayer in a single interaction. [T1.629-1999]

interface (I/F): 1. In a system , a shared boundary, *i.e.,* the boundary between two subsystems or two devices. **2.** A shared boundary between two functional units, defined by specific attributes, such as functional characteristics, common physical interconnection characteristics, and signal characteristics. **3.** A point of communication between two or more

processes, persons, or other physical entities. **4.** A point of interconnection between user terminal equipment and commercial communications facilities. **5.** To interconnect two or more entities at a common point or shared boundary. **6.** [A] common boundary between independent systems or modules where interactions take place. [INFOSEC-99] **7.** The point of interconnection between two distinct but adjacent communications systems having different functions. The interface in the communication-satellite service is that point where communications terminal equipment of the terrestrial common carriers or other authorized entities interconnects with the terminal equipment of the communication-satellite earth station complex. The interface in the communication-satellite service shall be located at the earth station site, or if this is impracticable, as close thereto as possible. [47CFR]

interface functionality: In telephony, the characteristic of interfaces that allows them to support transmission, switching, and signaling functions identical to those used in the enhanced services provided by the carrier. *Note:* As part of its comparably efficient interconnection (CEI) offering, the carrier must make available standardized hardware and software interfaces that are able to support transmission, switching, and signaling functions identical to those used in the enhanced services provided by the carrier.

interface message processor (IMP): A processor-controlled switch used in packet-switched networks to route packets to their proper destination.

interface payload: In integrated services digital networks (ISDN), the part of the bit stream through a framed interface used for telecommunications services and signaling.

interface point: *Synonym* **point of interface.**

interface rate: The gross bit rate of the signal at the boundary between the physical layer and the physical medium. [T1.107-1988]

interface standard: A standard that describes one or more functional characteristics (such as code conversion, line assignments, or protocol compliance) or physical characteristics (such as electrical, mechanical, or optical characteristics) necessary to allow the exchange of information between two or more (usually different) systems or equipment. *Note 1:* An interface standard may include operational characteristics and acceptable levels of performance. *Note 2:* In the military community, interface standards permit command and control functions to be performed using communication and computer systems.

interference: 1. In general, extraneous energy, from natural or man-made sources, that impedes the reception of desired signals. **2.** A coherent emission having a relatively narrow spectral content, *e.g.,* a radio emission from another transmitter at approximately the same frequency, or having a harmonic frequency approximately the same as, another emission of interest to a given recipient, and which impedes reception of the desired signal by the intended recipient. *Note:* In the context of this definition, interference is distinguished from noise in that the latter is an incoherent emission from a natural source *(e.g.,* lightning) or a man-made source, of a character unlike that of the desired signal (*e.g.,* commutator noise from rotating machinery) and which usually has a broad spectral content. **3.** The effect of unwanted energy due to one or a combination of emissions, radiation, or inductions upon reception in a radiocommunication system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy. [NTIA] [RR] **4.** The interaction of two or more coherent or partially coherent waves, which interaction produces a resultant wave that differs from the original waves in phase, amplitude, or both. *Note:* Interference may be constructive or destructive, *i.e.,* it may result in increased amplitude or decreased amplitude, respectively. Two waves equal in frequency and amplitude, and out of phase by 180°, will completely cancel one another. In phase, they create a resultant wave having twice the amplitude of either interfering beam.

interference emission: Emission that results in an electrical signal's being propagated into, and interfering with the proper operation of, electronic or electrical equipment. *Note:* The frequency range of interference emissions may include the entire electromagnetic spectrum.

interference filter: An optical filter that reflects one or more spectral bands or lines and transmits others, while maintaining a nearly zero coefficient of absorption for all wavelengths of interest. *Note 1:* An interference filter may be high-pass, low-pass, bandpass, or band-rejection. *Note 2:* An interference filter consists of multiple thin layers of dielectric material having different refractive indices. There also may be metallic layers. Interference filters are wavelength-selective by virtue of the interference effects that take place between the incident and reflected waves at the thin-film boundaries.

interfering contour: The locus of points surrounding a transmitter where the predicted median field strength of the signal from that transmitter is the maximum field strength that is not considered to cause interference at the service contour of another transmitter. [47CFR]

interferometer: An instrument that uses the principle of interference of electromagnetic waves for purposes of measurement. *Note:* Interferometers may be used to measure a variety of physical variables, such as displacement (distance), temperature, pressure, and strain.

interferometry: The branch of science devoted to the study and measurement of the interaction of waves, such as electromagnetic waves and acoustic waves. *Note 1:* The interaction of the waves can produce various spatial-, time-, and frequency-domain energy distribution patterns. [After 2196] *Note 2:* Interferometric techniques are used to measure refractive index profiles, *e.g.,* those of the preforms from which optical fibers are drawn, and to sense and measure physical variables, such as displacement (distance), temperature, pressure, and magnetic fields.

interframe time fill: In digital data transmission, a sequence of bits transmitted between consecutive frames. *Note:* Interframe time fill does not include bits stuffed within a frame.

interlaced scanning: In raster-scanned video displays, a scanning technique in which all odd-numbered scanning lines are first traced in succession, followed by the tracing of the even-numbered scanning lines in succession, each of which is traced between a pair of odd-numbered scanning lines. *Note 1:* The pattern created by tracing the odd-numbered scanning lines is called the *odd field* , and the pattern created by tracing the even-numbered scanning lines is called the *even field* . Each field contains half the information content, *i.e.,* pixels, of the complete video frame. *Note 2:* Image flicker is less apparent in an interlaced display than in a noninterlaced display, because the rate at which successive fields occur in an interlaced display is twice that at which successive frames would occur in a noninterlaced display containing the same number of scanning lines and having the same frame refresh rate. *Synonym* **interlacing.**

interlacing: *Synonym* **interlaced scanning.**

inter-LATA: 1. Between local access and transport areas (LATAs). **2.** Services, revenues, and functions associated with telecommunications that originate in one LATA and that terminate in another one or that terminate outside of that LATA.

interleaving: The transmission of pulses from two or more digital sources in time-division sequence over a single path.

interlocal trunk: A circuit between two local central office units, either manual or dial. Interlocal trunks may be used for either exchange or toll traffic or both. [47 CFR Pt.36-A]

intermediate certificates: In cryptology, certificates in a certificate chain other than the first or end certificate.

intermediate distribution frame (IDF): In a central office or customer premises, a frame that (a) cross-connects the user cable media to individual user line circuits and (b) may serve as a distribution point for multipair cables from the main distribution frame (MDF) or combined distribution frame (CDF) to individual cables connected to equipment in areas remote from these frames.

intermediate element: In a network, a line-unit-line termination (LULT) or a line-unit-network termination (LUNT).

intermediate field: *Synonym* **intermediate-field region.**

intermediate-field region: For an antenna, the transition region--lying between the near-field region and the far-field region--in which the field strength of an electromagnetic wave is dependent upon the inverse distance, inverse square of the distance, and the inverse cube of the distance from the antenna. *Note:* For an antenna that is small compared to the wavelength in question, the intermediate-field region is considered to exist at all distances between 0.1 wavelength and 1.0 wavelength from the antenna. *Synonyms* **intermediate**

field, intermediate zone, transition zone.

intermediate frequency (IF): A frequency to which a carrier frequency is shifted as an intermediate step in transmission or reception.

intermediate language: In computer programming, a target language into which all or part of a single statement or a source program--in a source language--is translated before it is further translated or interpreted. *Note* : For a subsequent translation, an intermediate language may serve as a source language.

intermediate-level language: In computer, communications, and data processing systems, a programming language that (a) is less machine-oriented than a machine language, (b) is not so machine-independent as a common language, such as Ada®, COBOL, or Fortran, (c) contains macros that are less powerful than common-language macros, and (d) usually is the object language of a root compiler. Examples of intermediate-level languages include assembly languages, such as PL/I. [From Weik '89]

intermediate operating system: In some operating system (OS) architectures, the OS functions that may be implemented through a central element and one or more remote elements that may do such work as area resource control or area reports. [After T1.201-1987] [After T1.204-1988]

intermediate system: A system that provides an Open Systems Interconnection--Reference Model (OSI--RM) Network Layer relay function in which data received from one corresponding network entity are forwarded to another corresponding network entity.

intermediate translation signaling point (ITSP): A translation signaling point (TSP) that translates the global title (as received or after changing to another global title) to identify the next TSP in succession to which the switched control center system (SCCP) message is then routed. The next TSP may be another ITSP or a final TSP (FTSP). [T1.226-1992]

intermediate trunk (IT): A channel mapping designation that ranges between 1 and 216 and relates the digital circuit multiplication equipment (DCME) transmission trunk to an internal numbering designation used within the DCME for conveying trunk-channel-to-bearer-channel connectivity via the DCME assignment channel. [T1.309-1990]

intermediate zone: *Synonym* **intermediate-field region.**

intermittent service area: The area receiving service from the groundwave of a broadcast station but beyond the primary service area and subject to some interference and fading. [47 CFR 73.14]

intermodal delay distortion: *Synonym* **multimode distortion.**

intermodal dispersion: *Incorrect synonym for* **multimode distortion.**

intermodal distortion: *Synonym* **multimode distortion.**

intermodulation (IM): The production, in a nonlinear element of a system, of frequencies corresponding to the sum and difference frequencies of the fundamentals and harmonics thereof that are transmitted through the element.

intermodulation distortion: Nonlinear distortion characterized by the appearance, in the output of a device, of frequencies that are linear combinations of the fundamental frequencies and all harmonics present in the input signals. *Note:* Harmonic components themselves are not usually considered to characterize intermodulation distortion. When the harmonics are included as part of the distortion, a statement to that effect should be made.

intermodulation noise: In a transmission path or device, noise, generated during modulation and demodulation, that results from nonlinear characteristics in the path or device.

intermodulation product: In the output of a nonlinear system, a frequency produced by intermodulation of harmonics of the frequencies present in the input signal.

internal bias: In a start-stop teletypewriter receiving mechanism, bias generated locally by the mechanism, and which has the same effect on the operating margin as bias external to the receiver, *i.e.* , applied bias. *Note:* Internal bias may be a marking bias or a spacing bias.

internal call: A call placed within a private branch exchange (PBX) or local switchboard, *i.e.* , not through a central office in a public switched network. *Synonym* **inside call.** [From Weik '89]

internal memory: In a computer, all of the storage spaces that are accessible by a processor without the use of the computer input-output channels. *Note:* Internal memory usually includes several types of storage, such as main storage, cache memory, and special registers, all of which can be directly accessed by the processor. *Synonym* **internal storage.**

internal photoelectric effect: A photoconductive or photovoltaic effect.

internal storage: *Synonym* **internal memory.**

International Atomic Time (TAI): The time scale established by the Bureau International des Poids et Mesures (BIPM--International Bureau of Weights and Measures in Sevres, France) on the basis of atomic clock data supplied by cooperating institutions.

international carrier (INC): A carrier authorized to provide telecommunications services outside World Zone 1 using the international dialing plan; however, the carrier has the option of providing service to World Zone 1 points outside the forty-eight contiguous states of the United States. [T1.104-1991]

international fixed public control service: A fixed service carried on for the purpose of communicating between transmitting stations, receiving stations, message centers or control points in the international fixed public radiocommunication service. [47CFR]

international fixed public radiocommunication service: A fixed service, the stations of which are open to public correspondence and which, in general, is intended to provide radiocommunication between any one of the contiguous 48 states (including the District of Columbia) and the state of Alaska, or the State of Hawaii, or any U.S. possession or any foreign point; or between any U.S. possession and any other point; or between the state of Alaska and any other point; or between the state of Hawaii and any other point. In addition, radiocommunications within the contiguous 48 states (including the District of Columbia) in connection with the relaying of international traffic between stations which provide the above service, are also deemed to be the international fixed public radiocommunications service; provided, however, that communications solely between Alaska, or any one of the contiguous 48 states (including the District of Columbia), and either Canada or Mexico are not deemed to be in the international fixed public radiocommunication service when such radiocommunications are transmitted on frequencies above 72 MHz. [47CFR]

international index of cooperation: *Synonym* **index of cooperation.**

International Frequency Registration Board (IFRB): *See* **Radio Regulations Board.**

International Organization for Standardization: *See* **ISO.**

international prefix: The combination of digits to be dialed by a calling subscriber making a call to a subscriber in another country to obtain access to the automatic outgoing international equipment. [T1.Rpt30-1994]

International Radio Consultative Committee (CCIR): *See* **ITU-R.**

International Reference Alphabet (IRA) No. 5: *See* **ASCII.**

international routing code: A 3-digit code within the North American numbering plan, beginning with 1, that classifies international calls as requiring either regular or special handling. [T1.104-1988]

International System of Units (SI): The modern form of the metric system, which has been adopted by the United States and most other nations. *Note:* The SI is constructed from seven base units for independent physical quantities. *Tables showing these values are included below and are current as of Fall 1995.*

SI Prefixes. The common metric prefixes are;

Multiplication Factor	Prefix Name	Prefix	Symbol
1 000 000 000 000 000 000 000 000 =	10^{24}	yotta	Y
1 000 000 000 000 000 000 000 =	10^{21}	zetta	Z
1 000 000 000 000 000 000 =	10^{18}	exa	E
1 000 000 000 000 000 =	10^{15}	peta	P
1 000 000 000 000 =	10^{12}	tera	T
1 000 000 000 =	10^{9}	giga	G
1 000 000 =	10^{6}	mega	M
1 000 =	10^{3}	kilo	k
100 =	10^{2}	hecto	h
10 =	10^{1}	deka	da
0.1 =	10^{-1}	deci	d
0.01 =	10^{-2}	centi	c
0.001 =	10^{-3}	milli	m
0.000 001 =	10^{-6}	micro	μ
0.000 000 001 =	10^{-9}	nano	n
0.000 000 000 001 =	10^{-12}	pico	p
0.000 000 000 000 001 =	10^{-15}	femto	f
0.000 000 000 000 000 001 =	10^{-18}	atto	a
0.000 000 000 000 000 000 001 =	10^{-21}	zepto	z
0.000 000 000 000 000 000 000 001 =	10^{-24}	yocto	y

SI Base Units

Quantity	Unit Name	Unit Symbol
length	meter	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K
amount of substance	mole	mol
luminous intensity	candela	cd

SI derived units. Derived units are formed by combining base units and other derived units according to the algebraic relations linking the corresponding quantities. The symbols for derived units are obtained by means of the mathematical signs for multiplication, division, and use of exponents. For example, the SI unit for velocity is the *meter per second* (m/s or $m \cdot s^{-1}$), and that for angular velocity is the *radian per second* (rad/s or $rad \cdot s^{-1}$). Some derived SI units have been given special names and symbols, as listed in this table.

Quantity	Unit Name	Unit Symbol	Expression in Terms of Other SI Units
Absorbed dose, specific energy imparted, kerma, absorbed dose index	gray	Gy	J/kg
Activity (of a radionuclide)	becquerel	Bq	1/s
Celsius temperature	degree Celsius	$^{\circ}C$	K
Dose equivalent	sievert	Sv	J/kg
Electric capacitance	farad	F	C/V
Electric charge, quantity of electricity	coulomb	C	A•s
Electric conductance	siemens	S	A/V
Electric inductance	henry	H	Wb/A
Electric potential, potential difference, electromotive force	volt	V	W/A
Electric resistance	ohm	Ω	V/A
Energy, work, quantity of heat	joule	J	N•m
Force	newton	N	$kg \cdot m/s^2$
Frequency (of a periodic phenomenon)	hertz	Hz	1/s
Illuminance	lux	lx	lm/m^2
Luminous flux	lumen	lm	cd•sr
Magnetic flux	weber	Wb	V•s
Magnetic flux density	tesla	T	Wb/m^2
Plane angle	radian	rad	m/m
Power, radiant flux	watt	W	J/s
Pressure, stress	pascal	Pa	N/m^2
Solid angle	steradian	sr	m^2/m^2

International Telecommunication Union (ITU): A civil international organization established to promote standardized telecommunications on a worldwide basis. *Note:* The ITU-R and ITU-T are committees under the ITU. The ITU headquarters is located in Geneva, Switzerland. While older than the United Nations, it is recognized by the U.N. as the specialized agency for telecommunications.

International Telegraph Alphabet Number 5 (ITA-5): An alphabet in which (a) 128 unique 7-bit strings are used to encode upper- and lower-case letters, 10 decimal numerals, special signs and symbols, diacritical marks, data delimiters, and transmission control characters, (b) 12 of the 7-bit strings are not assigned to any letter, numeral, or control character, and (c) the unassigned bit strings are open for use in a given country that may have unique requirements, such as monetary symbols; diacritical marks, such as the tilde, umlaut, circumflex, and dieresis, and (d) a two-condition 8-bit pattern may be used that consists of seven information bits and a parity check bit. *Note:* ITA-5 is used for effecting information interchange. It is a result of a joint agreement between the International Telegraph and Telephone Consultative Committee (CCITT), now ITU-T, of the International Telecommunication Union (ITU) and the International Organization for Standardization (ISO). It is published as CCITT (ITU-T) Recommendation V.3 and as ISO 646. It has also been adopted by NATO for military use. The United States adaptation of ITA-5 is ASCII (American Standard Code for Information Interchange) published by the American National Standards Institute (ANSI). *Synonym* **International Reference Alphabet (IRA).**

International Telegraph and Telephone Consultative Committee (CCITT): *See* **ITU-T.**

International Time Bureau (BIH): *See* **International Atomic Time.**

Internaut: Slang term for a user of the Internet. *Synonym* **cybernaut.**

internet: Any interconnection among or between private, industrial or governmental computer (digital communication) networks. *Note:* The term internet (spelled with a lower case "i") is distinguished from the Internet (spelled with the "I" capitalized). "The Internet" refers to a specific, historic, ubiquitous worldwide digital communications network. *See* **Internet [the].**

Internet address: In The Internet protocol, the decimal-numeric, fixed-length address that identifies the hosts of data sources, and, specifically, a communication port. *Note:* A single Internet address can have multiple URLs. *Synonyms* **IP address, Internet protocol address.**

Internet appliance: *Synonym* **thin client.**

Internet Architecture Board (IAB): The technical body that oversees the development of the Internet suite of protocols (commonly referred to as "TCP/IP"), and that has two task forces (the Internet Research Task Force and the Internet Engineering Task Force), each charged with investigating a particular field.

Internet Assigned Numbers Authority (IANA): An organization, directed by the Internet Architecture Board, that assigns IP numbers and protocol parameters such as port, protocol, and enterprise numbers, and opinions, codes, and types.

Internet assistant: Commercial software, written in HTML, that combines the functions of a file-conversion tool and a Web browser.

Internet box: *Synonym* **thin client.**

Internet control message protocol: *See* **ICMP.**

Internet information center: *See* **InterNIC.**

Internet mail agent: *Synonym* **message transfer agent.**

Internet mall: *Synonym* **cybermall.**

Internet Network Information Center: *See* **InterNIC.**

Internet phone: A combination of software and hardware that allows a user to approximate a telephone conversation over an Internet connection instead of using a traditional telephone system. *Note 1:* The required hardware generally consists of a microphone and headphones. *Note 2:* The sound quality of current Internet-phone systems is much less than that of traditional telephone systems. *Synonym* **Web phone.**

Internet presence provider: *See* **IPP.**

Internet protocol address: *Synonym* **Internet address.** *See* **IP address.**

Internet protocol (IP): A DOD standard protocol designed for use in interconnected systems of packet-switched computer communication networks. *Note:* The internet protocol provides for transmitting blocks of data called *datagrams* from sources to destinations, where sources and destinations are hosts identified by fixed-length addresses. The internet protocol also provides for fragmentation and reassembly of long datagrams, if necessary, for transmission through small-packet networks.

Internet protocol (IP) spoofing: 1. The creation of IP packets with counterfeit (spoofed) IP source addresses. **2.** A method of attack used by network intruders to defeat network security measures such as authentication based on IP addresses. *Note 1:* An attack using IP spoofing may lead to unauthorized user access, and possibly root access, on the targeted system. *Note 2:* A packet-filtering-router firewall may not provide adequate protection against IP spoofing attacks. It is possible to route packets through this type of firewall if the router is not configured to filter incoming packets having source addresses on the local domain. *Note 3:* IP spoofing is possible even if no reply packets can reach the attacker. *Note 4:* A method for preventing IP spoofing problems is to install a filtering router that does not allow incoming packets to have a source address different from the local domain. In addition, outgoing packets should not be allowed to contain a source address different from the local domain, in order to prevent an IP spoofing attack from originating from the local network.

Internet relay chat: *See* **IRC.**

Internet Research Task Force: *See* **IRTF.**

Internet resource: Within the Internet, an accessible facility or entity that contains information or provides data-processing capabilities. *Note:* An example of an Internet resource is a Web server. [After 2382-pt.35]

Internet search engine: *Synonym* **droid.**

Internet service provider: *See* **ISP.**

Internet Society: *See* **ISOC.**

Internet telephone: *See* **Internet phone.**

Internet telephony: *See* **Internet phone.**

Internet [the]: 1. A worldwide interconnection of individual networks a) with an agreement on how to talk to each other, and b) operated by government, industry, academia, and private parties. *Note:* The Internet originally served to interconnect laboratories engaged in government research, and has now been expanded to serve millions of users and a multitude of purposes, such as interpersonal messaging, computer conferences, file transfer, and consulting of files containing documents. **2.** The international computer network of both federal and nonfederal interoperable packet switched data networks. [47 USC 230]

Internet2: *See* **I2.**

internetwork: *Synonym* **internet.**

internetwork connection: *See* **gateway.**

internetworking: The process of interconnecting two or more individual networks to facilitate communications among their respective nodes. *Note:* The interconnected networks may be different types. Each network is distinct, with its own addresses, internal protocols, access methods, and administration.

internetwork interface (INI): The point of demarcation between networks when service is provided across multiple networks. [T1.503-1989] [T1.507-1996]

Internetwork Packet Exchange: *See* **IPX.**

InterNIC: *Contraction of* **Internet Network Information Center.** The association of providers of domain-name registration, information, and database services to the Internet.

interoffice trunk: A single direct transmission channel, *e.g.,* voice-frequency circuit, between central offices.

interoperability: 1. The ability of systems, units or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together. [JP 1-02] **2.** The condition achieved among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The degree of interoperability should be defined when referring to specific cases. [JP 1-02] **3.** Allows applications executing on separate hardware platforms, or in multi-processing environments on the same platform, to share data and cooperate in processing it through communications mechanisms such as remote procedure calls, transparent file access, *etc.* [JP 1-02] **4.** The ability of a set of modeling and simulation to provide services to and accept services from other modeling and simulation, and to use the services for exchange enabling them to operate effectively together. [JP 1-02] **5.** The capability to provide useful and cost-effective interchange of electronic data among, *e.g.* , different signal formats, transmission media, applications, industries, or performance levels.

interoperability standard: A document that establishes engineering and technical requirements that are necessary to be employed in the design of systems, units, or forces and to use the services so exchanged to enable them to operate effectively together.

interoperation: The use of interoperable systems, units, or forces. [JP 1-02]

interpolation gain: The input trunk channel multiplication ratio that is achieved through DSI. The interpolation gain is the ratio of the number of input transmission trunks to the number of DCME bearer channels where the same signal encoding rate is used for both trunk and bearer channels. [T1.309-1990]

interposition trunk: 1. A single direct transmission channel, *e.g.,* voice-frequency circuit, between two positions of a large switchboard to facilitate the interconnection of other circuits appearing at the respective switchboard positions. **2.** Within a technical control facility, a single direct transmission circuit, between positions in a testboard or patch bay, which circuit facilitates testing or patching between the respective positions.

interpret: To translate and to execute each source language statement of a computer program before translating and executing the next statement.

interrogation: 1. The transmission of a signal or combination of signals intended to trigger a response. **2.** The process whereby a station or device requests another station or device to identify itself or to give its status.

interrupt: A suspension of a process, such as the execution of a computer program, caused by an event external to that process, and performed in such a way that the process can be resumed. *Synonym* **interruption.**

interrupted continuous wave (ICW): Modulation in which there is on-off keying of a continuous wave.

interrupted isochronous transmission: *Synonym* **isochronous burst transmission.**

interruption: *Synonym* **interrupt.**

interruption control: A system that monitors a pilot for interruptions on frequency division multiplexing (FDM) systems and that transmits an indication to the switching equipment. [T1.110-1987]

inter-satellite service: A radiocommunication service providing links between artificial Earth satellites. [NTIA] [RR] [47CFR]

interswitch trunk: A single direct transmission channel, *e.g.,* voice-frequency circuit, between switching nodes.

intersymbol interference: 1. In a digital transmission system, distortion of the received signal, which distortion is manifested in the temporal spreading and consequent overlap of individual pulses to the degree that the receiver cannot reliably distinguish between changes of state, *i.e.* , between individual signal elements. *Note 1:* At a certain threshold, intersymbol interference will compromise the integrity of the received data. *Note 2:* Intersymbol interference attributable to the statistical nature of quantum mechanisms sets the fundamental limit to receiver sensitivity. *Note 3:* Intersymbol interference may be measured by eye patterns. **2.** Extraneous energy from the signal in one or more keying intervals that interferes with the reception of the signal in another keying interval. **3.** The disturbance caused by extraneous energy from the signal in one or more keying intervals that interferes with the reception of the signal in another keying interval.

intertoll circuits: Circuits between toll centers and circuits between a toll center and a tandem system in a different toll center area. [47 CFR Pt.36-A]

intertoll trunk: A single direct transmission channel, *e.g.,* voice-frequency circuit, between two toll offices.

interworking functions: Mechanisms that mask differences in physical, link, and network technologies by converting (or mapping) states and protocols into consistent network and user services. [After T1.Rpt34-1994]

intra-LATA: Within the boundaries of a local access and transport area (LATA).

intramodal distortion: In an optical fiber, distortion caused by dispersion, such as material or profile dispersion, of a given propagating mode. [After 2196]

intranet: Any private network that uses some or all of the protocols of The Internet. *Note:* In an intranet, nodes interact in a client-server relationship, nodes are identified by using Internet protocol (IP) addresses, and files are identified by universal resource locators (URLs). The data being exchanged are typically formatted using the HTML language, and is controlled and displayed using a browser. The intranet may be connected to The Internet via firewalls, or it may be totally separate. [After 2382-pt.35]

intraoffice trunk: A single direct transmission channel, *e.g.,* voice-frequency circuit, within a given switching center.

intrinsic joint loss: Of nonidentical optical fibers joined by a splice or a mated pair of connectors, the power loss attributable to manufacturing variations, in such parameters as physical dimensions, differences in refractive index (including profile parameter), numerical aperture, and mode field diameter.

intrinsic noise: In a transmission path or device, that noise inherent to the path or device and not contingent upon modulation.

intrusive measurements: Measurements that require that the facility be taken out of service and made unavailable to the user. [T1.Rpt25-1993]

invalid frame: A frame for which one or more of the following conditions apply: the frame is not properly bounded by flags; the frame does not consist of an integral number of octets prior to zero-bit insertion or following zero-bit extraction; the frame contains a frame-check sequence error (note that this condition is not recorded in the protocol abnormality log); the frame contains an incorrect address field. [T1.218-1991]

inverse adaptive quantizer: In the encoder and the feedback path of the decoder, the process that maps the core bits into a quantized difference signal. In the feed-forward path of the decoder, the process that maps the core bits and the received enhancement bits into a quantized difference signal. [T1.310-1991]

inverse multiplexer: A functional unit capable of accessing and combining two or more low-speed circuits into a virtual broadband circuit, up to and including an aggregate equal to a T1 rate.

inverse-square law: The physical law stating that irradiance, *i.e.,* the power per unit area in the direction of propagation, of a spherical wavefront varies inversely as the square of the distance from the source, assuming there are no losses caused by absorption or scattering. *Note:* For example, the power radiated from a point source, *e.g.,* an omnidirectional isotropic antenna, or from any source at very large distances from the source compared to the size of the source, must spread itself over larger and larger spherical surfaces as the distance from the source increases. Diffuse and incoherent radiation are similarly affected.

inverted position: In frequency-division multiplexing, a position of a translated channel in which an increasing signal frequency in the untranslated channel causes a decreasing signal frequency in the translated channel.

inverter: 1. In electrical engineering, a device for converting direct current into alternating current. [JP 1-02] **2.** In computers, a device or circuit that inverts the polarity of a signal or pulse. *Deprecated synonym* **negation circuit.**

Inward Wide-Area Telephone Service (INWATS): *See* **eight-hundred (800) service.**

INWATS: *Acronym for* **Inward Wide-Area Telephone Service.** *See* **eight-hundred (800) service.**

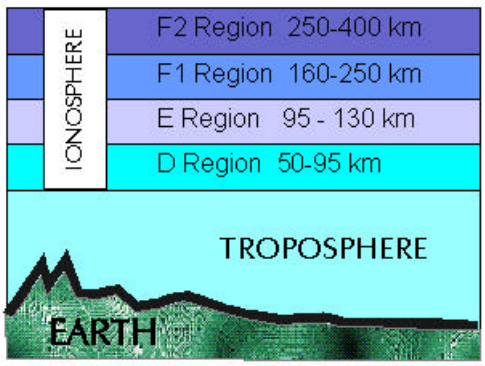
I/O: *Abbreviation for* **input/output.**

IOC: *Abbreviation for* **input-output controller, integrated optical circuit.**

I/O controller: *Synonym* **input-output controller.**

IONL: *Abbreviation for* **Internal Organization of the Network Layer.** The OSI standard for the detailed architecture of the Network Layer. *Note:* Basically, it partitions the Network layer into subnetworks interconnected by convergence protocols (equivalent to internetworking protocols), creating what is called a catenet or internet.

ionosphere: That part of the atmosphere, extending from about 70 to 500 kilometers, in which ions and free electrons exist in sufficient quantities to reflect and/or refract electromagnetic waves. [After JP1]



ionosphere

ionosphere sounder: A device that transmits signals for the purpose of determining ionospheric conditions. [NTIA] [RR]

ionospheric absorption: Absorption occurring as a result of interaction between an electromagnetic wave and free electrons in the ionosphere.

ionospheric disturbance: An increase in the ionization of the ionosphere, caused by solar activity, which results in greatly increased radio wave absorption.

ionospheric forward scatter (IFS): *Synonym* **ionospheric scatter.**

ionospheric reflection: Of electromagnetic waves propagating in the ionosphere, a redirection, *i.e.,* bending--by a complex processing involving reflection and refraction--of the waves back toward the Earth. *Note:* The amount of bending depends on the extent of penetration (which is a function of frequency), the angle of incidence, polarization of the wave, and ionospheric conditions, such as the ionization density.

ionospheric scatter: The propagation of radio waves by scattering as a result of irregularities or discontinuities in the ionization of the ionosphere. [NTIA] [RR] *Synonym* **forward propagation ionospheric scatter.**

ionospheric sounding: A technique that provides real-time data on high-frequency ionospheric-dependent radio propagation, using a basic system consisting of a synchronized transmitter and receiver. *Note:* The time delay between transmission and reception is translated into effective ionospheric layer altitude. Vertical incident sounding uses a collocated transmitter and receiver and involves directing a range of frequencies vertically to the ionosphere and measuring the values of the reflected returned signals to determine the effective ionosphere layer altitude. This technique is also used to determine the critical frequency. Oblique sounders use a transmitter at one end of a given propagation path, and a synchronized receiver, usually with an oscilloscope-type display (ionogram), at the other end. The transmitter emits a stepped- or swept-frequency signal which is displayed or measured at the receiver. The measurement converts time delay to effective altitude of the ionospheric layer. The ionogram display shows the effective altitude of the ionospheric layer as a function of frequency.

ionospheric turbulence: Ongoing disturbances of the ionosphere that scatter incident electromagnetic waves. *Note:* Ionospheric turbulence results in irregularities in the composition of the ionosphere that change with time. This causes changes in reflection properties. These, in turn, cause changes in skip distance, fading, local intensification, and distortion of the incident waves. [From Weik '89]

IP: *Abbreviation for* **intelligent peripheral, Internet protocol.**

IP address: A device's or resource's numerical address as expressed in the format specified in the Internet Protocol. *Note 1:* In the current addressing format, IP version 4 (IPv4), an IP address is a 32-bit sequence divided into four groups of decimal numbers separated by periods ("dots"), commonly referred to as "dotted decimals." The IP address of a device is made up of two parts: the number of the network to which it is connected, and a sequence representing the specific device within that network. An IP address may be used on private intranets, as well as The Internet. *Note 2:* Due to inefficiencies that have arisen in address assignment, available IPv4 addresses are nearly exhausted. A newer version of IP addressing (IP version 6, consisting of a 128-bit numerical sequence) is currently being developed. *Synonyms* **Internet address, IP number.**

IPC: *Abbreviation for* **information processing center.**

IP datagram: The fundamental unit of information passed across any network utilizing Internet protocol. *Note:* An IP datagram contains source and destination addresses along with data and a number of fields that define such things as the length of the datagram, the header checksum, and flags that indicate whether the datagram can be (or has been) fragmented.

IP dialup access: Nonpermanent access, by means of a switched network (*e.g.* , the public switched telephone network), to any network utilizing The Internet Protocol, especially The Internet. *Note:* Two well-known protocols for dialup access are PPP (point-to-point) and SLIP (serial line internet protocol). [After 2382-pt.35]

IP multicast: A technique that allows packets to be simultaneously transmitted over the Mbone (multicast backbone on The Internet) to a selected set of destinations. *Note:* Standard Internet traffic requires a separate set of packets for each destination. IP multicast allows for one set of packets to be sent to multiple destinations.

IPng: *Abbreviation for* **IP next generation, IP version 6.**

IP number: *Synonym* **IP address.**

IPP: *Abbreviation for* **Internet presence provider.** An organization or commercial enterprise that provides storage space for the Web resources of an individual or other entity and enables those resources to be accessed by Internet users. *Note:* An IPP may not offer basic Internet connections as an ISP usually does.

IP spoofing: 1. A technique used by hackers to access computer systems by modifying packet headers to make them appear to have originated from a trusted port. **2.** The practice of

falsifying an e-mail header to make it appear as though it originated from a different address.

IP switching: A method of routing developed to use asynchronous transfer mode (ATM) hardware to route packets through networks more rapidly.

IPTF: *Abbreviation for* **Infrastructure Protection Task Force.**

IPX: *Abbreviation for* **Internetwork Packet Exchange.** A proprietary (LAN) protocol.

IR: *Abbreviation for* **infrared.**

IRC: *Abbreviation for* **Internet relay chat.** A service for conducting a chat on the Internet, *i.e.* , an application that allows a number of individual users to exchange text messages simultaneously in real time over The Internet.

irradiance: Radiant power incident per unit area upon a surface. *Note:* Irradiance is usually expressed in watts per square meter, but may also be expressed in joules per square meter. *Deprecated synonym* **power density.**

irradiation: The product of irradiance and time, *i.e.,* the time integral of irradiance. *Note:* For example, an irradiation of 100 J/m^2 (joules per square meter) is obtained when an irradiance of 25 W/m^2 (watts per square meter) is continuously incident for 4 seconds.

irreversible encryption: Encryption that produces ciphertext from which the original data cannot be reproduced. *Note:* Irreversible encryption is useful in authentication. For example, a password might be irreversibly encrypted and the resulting ciphertext stored. A password presented later would be irreversibly encrypted identically and the two strings of ciphertext compared. If they are identical, the presented password is correct. *Synonyms* **irreversible encipherment, one-way encryption.** [2382-pt.8]

IRTF: *Abbreviation for* **Internet Research Task Force.** A task force of the Internet Architecture Board (IAB), and which is responsible for research and development of the Internet protocol suite.

ISB: *Abbreviation for* **independent sideband.** *See* **independent-sideband transmission.**

ISDN: *Abbreviation for* **integrated services digital network.** An integrated digital network in which the same time-division switches and digital transmission paths are used to establish connections for different services. *Note 1:* ISDN services include telephone, data, electronic mail, and facsimile. *Note 2:* The method used to accomplish a connection is often specified: for example, switched connection, nonswitched connection, exchange connection, ISDN connection.

ISDN user part (ISUP): The functional part of the Signaling System No. 7 (SS7) protocol, *i.e.,* the part that specifies the interexchange signaling procedures for the set up and tear down of trunk calls between networks. The ISDN User Part is one of the specified users of the Message Transfer Part (MTP) transport capability of the SS7 interconnections. The user part identification is encoded in the service indicator (SI) portion of the service information octet (SIO). [T1.236-1993]

ISM: *Abbreviation for* **industrial, scientific, and medical applications (of radio frequency energy).**

ISMAP: A Web page feature in which hyperlinks are assigned or "mapped" to different portions of a graphic image. *Note:* Users access links by using a mouse to click on mapped areas. ISMAP requests are processed by common gateway interface (CGI) scripts on the server.

ISO: *Abbreviation for* **International Organization for Standardization.** An international organization that (a) consists of member bodies that are the national standards bodies of most of the countries of the world, (b) is responsible for the development and publication of international standards in various technical fields, after developing a suitable consensus, (c) is affiliated with the United Nations, and (d) has its headquarters at 1, rue de Varembé, Geneva, Switzerland. *Note:* Member bodies of ISO include, among others, the American National Standards Institute (ANSI), the Association Française de Normalisation (AFNOR), the British Standards Institution (BSI), and the Deutsche Institut für Normung (DIN).

ISOC: *Abbreviation for* **Internet Society.** A nongovernmental, international organization for global cooperation and coordination for The Internet and its internetworking technologies and applications.

isochrone: A line on a map or chart joining points associated with a constant time difference from the transmitter to receiver of electromagnetic waves, such as radio waves, at all points along the line. [From Weik '89]

isochronous: 1. Of a periodic signal, pertaining to transmission in which the time interval separating any two corresponding transitions is equal to the unit interval or to a multiple of the unit interval. **2.** Pertaining to data transmission in which corresponding significant instants of two or more sequential signals have a constant phase relationship. *Note:* "Isochronous" and "anisochronous" are characteristics, while "synchronous" and "asynchronous" are relationships.

isochronous burst transmission: In a data network where the information-bearer channel rate is higher than the input data signaling rate, transmission performed by interrupting, at controlled intervals, the data stream being transmitted. *Note 1:* Isochronous burst transmission enables communication between data terminal equipment (DTE) and data networks that operate at dissimilar data signaling rates, such as when the information-bearer channel rate is higher than the DTE output data signaling rate. *Note 2:* The binary digits are transferred at the information-bearer channel rate. The transfer is interrupted at intervals in order to produce the required average data signaling rate. *Note 3:* The interruption is always for an integral number of unit intervals. *Note 4:* Isochronous burst transmission has particular application where envelopes are being transferred between data circuit-terminating equipment (DCE) and only the bytes contained within the envelopes are being transferred between the DCE and the DTE. *Synonyms* **burst isochronous** *(deprecated)* , **interrupted isochronous transmission.**

isochronous demodulation: Demodulation in which the time interval separating any two significant instants is equal to the unit interval or a multiple of the unit interval.

isochronous distortion: The difference between the measured modulation rate and the theoretical modulation rate in a digital system.

isochronous modulation: Modulation in which the time interval separating any two significant instants is equal to the unit interval or a multiple of the unit interval.

isochronous signal: A signal in which the time interval separating any two significant instants is equal to the unit interval or a multiple of the unit interval. *Note 1:* Variations in the time intervals are constrained within specified limits. *Note 2:* "Isochronous" is a characteristic, while "synchronous" indicates a relationship.

isolate: To restrict communication in both directions with a participant of the conference. [T1.647-1995]

isolated bonding network: *Synonym* **isolated ground plane.**

isolated ground plane: A set of interconnected frames that is intentionally grounded via only one connection to a ground reference; this plane, taken as a conductive unit with all of its metallic surfaces and grounding (earthing) wires bonded together, is insulated from contact with any other grounded metalwork in the building. *Synonym* **isolated bonding network.** [T1.313-1997]

isolated NRZ pulse: A single bit period of logical value "1" with adjacent bit periods of logical value "0". [T1.106-1988]

isolated pulse: A pulse free from the effects of the other pulses in the same signal. (A suitable testing signal is a repetitive pattern of one "one" and seven "zeros".) [T1.408-1990]

isolated RZ pulse: Any bit period of logical value "1." [T1.106-1988]

isolator: *See* **optical isolator.**

isotropic: 1. Pertaining to a material with properties, such as density, electrical conductivity, electric permittivity, magnetic permeability, or refractive index that do not vary with distance or direction. **2.** Pertaining to a material with magnetic, electrical, or electromagnetic properties that do not vary with the direction of static or propagating magnetic, electrical, or electromagnetic fields within the material.

isotropic antenna: A hypothetical antenna that radiates or receives equally in all directions. *Note:* Isotropic antennas do not exist physically but represent convenient reference antennas for expressing directional properties of physical antennas.

isotropic gain: *Synonym* **absolute gain.**

ISP: *Abbreviation for* **Internet service provider.** A company or organization that provides connections to the Internet to companies or individuals via dial-up, ISDN, T1, or other connection.

I2: *Abbreviation for* **Internet second generation.** A proposed high-speed Internet for use exclusively by government researchers and academic institutions.

IT: *Abbreviation for* **information technology.**

iterative impedance: In electrical circuits, for a four-terminal network, the impedance that, if connected across one pair of terminals, will match the impedance across the other pair of terminals. *Note:* The iterative impedance of a uniform line is the same as its characteristic impedance.

ITU: *Abbreviation for* **International Telecommunication Union.**

ITU-R: The Radiocommunications Sector of the ITU; responsible for studying technical issues related to radiocommunications, and having some regulatory powers. *Note:* A predecessor organization was the CCIR.

ITU-T: *Abbreviation for* **International Telecommunication Union--Telecommunication Standardization Sector.** The Telecommunication Standardization Sector of the International Telecommunication Union (ITU). *Note 1:* ITU-T is responsible for studying technical, operating, and tariff Questions and issuing Recommendations on them, with the goal of standardizing telecommunications worldwide. *Note 2:* In principle, the ITU-T combines the standards-setting activities of the predecessor organizations formerly called the International Telegraph and Telephone Consultative Committee (CCITT) and the International Radio Consultative Committee (CCIR).

IVDT: *Abbreviation for* **integrated voice data terminal.** *See* **integrated station.**

IXC: *Abbreviation for* **interexchange carrier.**

jabber: In local area networks, transmission by a data station beyond the time interval allowed by the protocol.

jack: 1. A female fitting or connector that accepts a male mating component *("plug")* to facilitate an electrical connection. *Note:* The term *jack* is frequently applied in applications involving communications signals, while the term *receptacle* is almost universally reserved for applications involving the distribution of electric power. **2.** An analogous fitting or connector used to facilitate an optical fiber connection.

jacket: *Synonym* **sheath.**

jamming: The deliberate radiation, reradiation, or reflection of electromagnetic energy for the purpose of disrupting enemy use of electronic devices, equipment, or systems.

jamming margin: The level of interference (jamming) that a system is able to accept and still maintain a specified level of performance, such as maintain a specified bit-error ratio even though the signal-to-noise ratio is decreasing. [From Weik '89]

jamming to signal ratio (J/S): The ratio, usually expressed in dB, of the power of a jamming signal to that of a desired signal at a given point such as the antenna terminals of a receiver.

jam signal: A signal that carries a bit pattern sent by a data station to inform the other stations that they must not transmit. *Note 1:* In carrier-sense multiple access with collision detection (CSMA/CD) networks, the jam signal indicates that a collision has occurred. *Note 2:* In carrier-sense multiple access with collision avoidance (CSMA/CA) networks, the jam signal indicates that the sending station intends to transmit. *Note 3: "Jam signal"* should not be confused with *"electronic jamming."*

Java™: A trademarked set of programming language technologies for creating and safely running software programs in both stand-alone and networked environments. Most graphics-based Web browsers can recognize and run Java codes.

Java applet: A small application-program component that typically executes in a client's Web browser, but can execute in a variety of other simple applications or devices; Java applets support the applet programming model and may be downloaded through the Internet via a Web site and run directly on a remote computer; Java applets are often used to create Web page effects.

JavaBean: A portable, platform-independent, reusable component model that conforms to specification defining how Java objects interact.

Java Database Connectivity (JDBC™): An industry standard for database-independent connectivity between a computer platform or device operating in the Java™ environment and a wide range of databases; the JDBC™ provides a call-level API (application program interface) for SQL-based (structured-query-language based) database access.

JDBC: *Abbreviation for* **Java database connectivity.**

jerkiness: In a video display, the perception, by human vision faculties, of originally continuous motion as a sequence of distinct "snapshots." *Note 1:* The perception of continuous motion by human vision faculties is a manifestation of complex functions, *i.e.,* characteristics, of the eyes and brain. When presented with a sequence of fixed, *i.e.,* still, images of sufficient continuity and at a sufficiently frequent update rate, the brain interpolates intermediate images, and the observer subjectively appears to see continuous motion that in reality does not exist. *Note 2:* For example, the update rate of NTSC television displays is 30 frames (60 fields) per second.

jfif or **.jfif:** A file-name extension that identifies an image file compressed with the Joint Photographic Experts Group (JPEG) format.

Jini™: A set of Java application program interfaces (APIs) to enable transparent networking of devices and services, thus eliminating the need for system or network administration intervention by a user.

jitter: 1. Abrupt and unwanted variations of one or more signal characteristics, such as the interval between successive pulses, the amplitude of successive cycles, or the frequency or phase of successive cycles. *Note 1:* Jitter must be specified in qualitative terms (*e.g.,* amplitude, phase, pulse width or pulse position) and in quantitative terms (*e.g.,* average, RMS, or peak-to-peak). *Note 2:* The low-frequency cutoff for jitter is usually specified at 1 Hz. **2.** Random variability of data pass-through time. *See* **timing jitter.**

job: In computing, a unit of work that is defined by a user and that is to be accomplished by a computer. *Note:* A job is identified by a label and usually includes a set of computer programs, files, and control statements to the computer operating system.

job-recovery control file: *Synonym* **backup file.**

Johnson noise: *Synonym* **thermal noise.**

joint: For optical fibers, a splice or connector.

joint multichannel trunking and switching system: That composite multichannel trunking and switching system formed from assets of the Services, the Defense Communications System, other available systems, and/or assets controlled by the Joint Chiefs of Staff to provide an operationally responsive, survivable communication system, preferably in a mobile/transportable/recoverable configuration, for the joint force commander in an area of operations. [JP1]

joint random buried plant: Telecommunications outside plant that is directly buried in the same trench with power conductors, with no restriction regarding minimum separation between the two systems. [T1.316-1997]

Joint Telecommunications Resources Board (JTRB): The body required to be established by Section 2(b) (3) of Executive Order No. 12472 to assist the Director of the Office of Science and Technology Policy in the exercise of assigned nonwartime emergency telecommunications functions.

joint use aerial plant: Aerial telecommunications and power plant utilizing the same structure, such as poles. [T1.318-2000]

journal: 1. A chronological record of data processing operations that may be used to reconstruct a previous or an updated version of a file. *Synonym* **log. 2.** In database management systems, the record of all stored data items that have values changed as a result of processing and manipulation of the data.

joy stick: In computer graphics, a lever (with at least two degrees of freedom) that is used as an input unit, normally as a locator.

J-PEG [or **JPEG]:** *Abbreviation for* **Joint Photographic Experts Group. 1.** A standardized, if relatively lossy, file format for transporting, storing, and/or displaying data representing still images and graphical data. *Note:* Along with .gif, it is one of the most common ways that photos are moved over the Web. **2.** Images compressed with the JPEG format and identified with the .jpg or .jpeg file-name extension. **3.** An international standards group functioning under ISO and IEC developing an international consensus on an image compression algorithm for continuous-tone still color pictures.

judder: A temporal artifact associated with moving images, which artifact occurs when the image is sampled at one frame rate and converted to a different frame rate for display; as a result, motion vectors in the display may appear to represent continuously varying velocities. *Note:* The subjective effect of the artifact becomes more obvious when the frame-rate conversion is made by simple deletions or repetitions of selected frames (or fields). It may become less obvious when interpolated frames (or fields) are generated by using predictive algorithms.

Julian date: 1. The sequential day count reckoned consecutively beginning January 1, 4713 B.C. *Note:* The Julian date on January 1, 1990, was 2,446,892. **2.** The sequential day count of the days of a year, reckoned consecutively from the first day of January. *Note:* In modern times, the definition of Julian date has been corrupted to use the first day of the year as the point of reference. To avoid ambiguity with the traditional meaning, *"day of year"* rather than *"Julian date"* should be used for this purpose.

jumper: *Synonym* **cross-connection.**

junction point: *Synonym* **node.**

jurisdiction: 1. In telecommunications, the functional separation of telecommunications networks. A jurisdiction is one of the following four types: (a) local exchange carrier network; (b) interexchange carrier network; (c) end user network; (d) some combination of the above. [T1.256-1999] **2.** *Loosely, and in a more general sense,* the regulatory authority of the Federal Communications Commission as specified in the *Communications Act of 1934,* supplements thereto, and numerous court decisions; and the regulatory authority of state regulatory commissions as specified in the laws established by each state.

justification: The process of changing the digit rate of a digital signal in a controlled manner so that it is in accord with a digit rate different from its own inherent rate, usually without loss of information. [T1.107-1988] *Synonyms [loosely]* **bit stuffing, de-stuffing, justify.**

justify: 1. To shift the contents of a register or a field so that the significant character at the specified end of the data is at a particular position. **2.** To align text horizontally or vertically so that the first and last characters of every line, or the first and last line of the text, are aligned with their corresponding margins. *Note 1:* In English, text may be justified left, right, or both. Left justification is the most common. *Note 2:* The last line of a paragraph is usually only left justified. **3.** To align data on a designated character position.

k: *Abbreviation for* **kilo** (SI prefix for 10^3). *See* **International System of Units.**

K: 1. *Abbreviation for* **kelvin(s).** *See* **thermodynamic temperature. 2.** When referring to data storage capacity, 2^{10}, or 1024 in decimal notation; however this usage of an upper case K is deprecated.

Kalman filter: A computational algorithm that processes measurements to deduce an optimum estimate of the past, present, or future state of a linear system by using a time sequence of measurements of the system behavior, plus a statistical model that characterizes the system and measurement errors, plus initial condition information.

KA9Q: A popular implementation of TCP/IP and associated protocols for amateur packet radio systems.

KDC: *Abbreviation for* **key distribution center.**

kelvin (K): A unit of thermodynamic temperature, taken as one of the base units of the International System of Units (SI). The kelvin is defined by setting the thermodynamic temperature of the triple point of water at 273.16 K. *Note 1:* The kelvin was formerly called *"degree Kelvin."* The term *"degree Kelvin"* is now obsolete. No degree symbol is written with K, the symbol for kelvin(s). *Note 2:* In measuring temperature intervals, the degree Celsius is equal to the kelvin. The Celsius temperature scale is defined by setting 0 °C equal to 273.16 K.

kelvin temperature scale: *See* **thermodynamic temperature.**

Kendall effect: A spurious pattern or other distortion in a facsimile record copy caused by unwanted modulation products arising from the transmission of a carrier signal, and appearing in the form of a rectified baseband that interferes with the lower sideband of the carrier. *Note:* The Kendall effect occurs principally when the single-sideband width is greater than half of the facsimile carrier frequency.

Kennelly-Heaviside layer: *Synonym* **E region.**

Kermit: An early generation protocol [a file-transfer and terminal-emulation program] developed for transfer of asynchronous data files, designed to help minimize the effects of interference and noise on analog telephone circuits.

kernel: A module of a program that forms a logical entity or performs a unit function. *Note:* The most vulnerable portion of code in a secure operating system is a special case of a kernel.

Kerr electro-optic effect: The creation of birefringence in a liquid that is not otherwise birefringent, by subjecting the liquid to an electric field. *Note 1:* The degree of birefringence, which is manifested as a difference in refractive indices for light of orthogonal linear polarizations, one of which is parallel to the induced optical axis, is directly proportional to the square of the applied electric field strength. *Note 2:* In the general case, the birefringence produced by the applied electric field can be used in conjunction with polarizers to modulate light. Devices that use this principle are called *Kerr cells* .

key: 1. Information (usually a sequence of random or pseudorandom binary digits) used initially to set up and periodically change the operations performed in crypto-equipment for the purpose of encrypting or decrypting electronic signals, for determining electronic counter-countermeasures patterns (*e.g.* , frequency hopping or spread spectrum), or for producing other key. *Note: "Key"* has replaced the terms *"variable," "key(ing) variable,"* and *"cryptovariable."* [NIS] **2.** Usually a sequence of random or pseudorandom bits used initially to set up and periodically change the operations performed in crypto-equipment for the purpose of encrypting or decrypting electronic signals, or for determining electronic counter-countermeasures patterns(*e.g.,* frequency hopping or spread spectrum), or for producing other key. [INFOSEC-99]

key agreement: 1. A key establishment protocol whose secret key is a function of information contributed by two or more participants, so that no party can predetermine the value of the key. [After X9.42] **2.** A method for negotiating a key value on-line without transferring the key, even in an encrypted form, *e.g.,* the Diffie-Hellman technique. [After X.509]

key authentication: The assurance of the legitimate participants in a key agreement that no other entity possesses the shared-secret key. [After X9.42]

key-auto-key: Cryptographic logic using previous key to produce key. [INFOSEC-99]

keyboard: An input device used to enter data by manual depression of keys, which causes the generation of the selected code element.

keyboard punch: *Synonym* **keypunch.**

keyboard recorder: A hidden program in a computer that stores user-typed input or other input and sends this data to the originator. Keyboard recorders are used for stealing user identifications, passwords, and other sensitive information.

key bundle: An assemblage of two keys that are considered logically to be one key, in that one key alone cannot be manipulated. [After X9.65]

key component: One of two or more parameters that have the format of a cryptographic key that is added modulo-1 with one or more like parameters to form a cryptographic key. [After X9.8]

key confirmation: The assurance of the rightful participants in a key-establishment protocol that the intended recipient(s) of the shared key actually possess the shared key. [After X9.42]

key distribution center (KDC): [A] COMSEC facility generating and distributing key in electrical form. [INFOSEC-99]

key encrypting key: 1. A key that is used exclusively for encrypting and decrypting keys. [After X9.28] **2.** Key that encrypts or decrypts other key for transmission or storage. [INFOSEC-99]

key encrypting key pair: In public-key cryptography, two key encrypting keys used together to encrypt other keys. [After X9.28]

key establishment: 1. A protocol that reveals a secret key to its legitimate participants for cryptographic use. [After X9.42] **2.** The procedure to share a common secret key among different parties by either key agreement or key transport. [After X9.42]

key generation center: A facility within a group, which facility performs the function of generating keys for any specific key exchange transaction. [After X9.28]

key generator: A device, including associated alarms and self-tests, for generating cryptographic keys (and where needed, initialization vectors). [After X9.17]

key granularity: The number of individuals represented by a key, *e.g.,* the finest granularity is one individual represented by one key; a coarser granularity is a node key. [After X9.26]

keying: 1. The generating of signals by the interruption or modulation of a steady signal or carrier. **2.** *See* **chroma keying.**

keying material: 1. In encryption, the data (*e.g.,* keys, certificates, and initialization vectors) necessary to establish and maintain cryptographic keying relationships. [After X9.24] **2.** [A] key, code, or authentication information in physical or magnetic form. [INFOSEC-99]

keying relationship: The state existing between two parties such that they share at least one cryptographic key. [After X9.17]

keying variable: *Deprecated synonym for* **key.**

key integrity: The assurance that a key (a) is always used in the proper order and key space, and (b) has not been altered. [After X9.65]

key list: Printed sets of key settings for a specific cryptonet. Keylists may be produced in list, pad, or printed tape format. [INFOSEC-99]

key loader: An electronic, self-contained unit which is capable of storing at least one key and transferring that key, upon request, into cryptographic modules. [After X9.17]

key management: Supervision and control of the process whereby key is generated, stored, protected, transferred, loaded, used, and destroyed. [INFOSEC-99]

key management facility: The physically protected enclosure (*e.g.,* room or device) and its contents where cryptographic elements (*i.e.,* cryptographic hardware, software, firmware, keys, or initialization vectors) reside. [After X9.17]

key offset: 1. The process of applying a count value to a cryptographic key using the Boolean exclusive-OR function. [After X9.17] **2.** The count so added.

key pair: 1. In public-key cryptography, a public key and its corresponding private key. **2.** Two key-encrypting keys that are used in concert to encrypt other keys. [After X9.17]

key pair updating: The recertification or replacement of a certificate authority's public/private key pair.

key production key: Key used to initialize a keystream generator for the production of other electronically generated key. [INFOSEC-99]

key-pulse signal: The first signal in an MF (multifrequency) outpulsing format; a control signal used to prepare the customer installation (CI) to receive digits. [T1.414-1998]

key pulsing: A system of sending telephone calling signals in which the digits are transmitted by operation of a pushbutton key set. *Note:* The type of key pulsing commonly used by users and PBX operators is dual-tone multifrequency signaling. Each pushbutton causes generation of a unique pair of tones. In military systems, pushbuttons are also provided for additional signals, such as precedence. *Synonym* **pulsing.**

keypunch: Historically, a keyboard-actuated punch that punches holes in a data medium. *Synonym* **keyboard punch.**

key security: In cryptology, the protection of keys against compromise. [After X9.19]

key service message: A message used for transferring keys between subscribers. [After X9.28]

key set: A multiline or multifunction user terminal device.

key set identifier: A non-secret value that uniquely identifies a key set. [After X9.24]

key storage: In cryptology, storage of cryptographic keys in such a manner as (a) to protect them against unauthorized use, disclosure, or tampering, and (b) to erase them and re-initialize equipment upon tampering. [After X9.19]

key stream: [A] sequence of symbols (or their electrical or mechanical equivalents) produced in a machine or auto-manual cryptosystem to combine with plain text to produce cipher text, control transmission security processes, or produce key. [INFOSEC-99]

keystroke verification: With respect to data entry via a keyboard, determination of the accuracy of data entry by the re-entry of the same data through the same (or another) keyboard. [After 2382-pt.8]

key tag: Identification information associated with certain types of electronic key. [INFOSEC-99]

key tape: Punched or magnetic tape containing key. Printed key in tape form is referred to as a *key list.* [INFOSEC-99]

key telephone system (KTS): In a local environment, terminals and equipment that provide immediate access from all terminals to a variety of telephone services without attendant assistance. *Note:* A KTS may interface with the public switched telephone network.

key transport: The means by which a cryptographic key is passed from its origination point to its point(s) of actual use, whether by bonded courier, registered mail, over-the-air-rekeying (OTAR), or a number of other protected methods. *Note:* As a result of key transport, all rightful participants share a common secret key in such a way that the secret key is determined entirely by one party.

key type: A characteristic of a key that distinguishes it as either a key-encrypting key or a data key. [After X9.17]

key updating: Irreversible cryptographic process for modifying key. [INFOSEC-99]

key usage vector: An identifier that specifies cryptographic services, modes, and key values in which the associated key may be used. [After X9.69]

key validation: In public key infrastructure (PKI) systems, the procedure allowing the receiver of a public key to verify that it conforms with the requirements for such a key; this procedure is used to counter certain types of attacks against the security of the PKI system. *Synonym* **public key validation.** [After X9.42]

key variable: *Deprecated synonym for* **key.**

k-factor: 1. In tropospheric radio propagation, the ratio of the effective Earth radius to the actual Earth radius. *Note:* The k-factor is approximately 4/3. **2.** In ionospheric radio propagation, a correction factor that (a) is applied in calculations related to curved layers, and (b) is a function of distance and the real height of ionospheric reflection.

kHz: *Abbreviation for* **kilohertz.**

killer app: *Slang contraction of* **killer application.** A successful and popular software application (often written by a third party), that is generally perceived to be superior in function or that employs the latest and most impressive techniques.

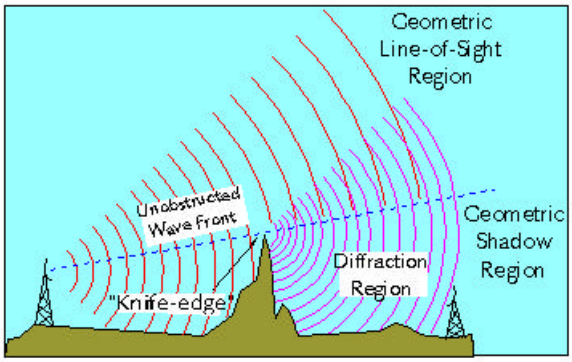
kilohertz (kHz): A unit of frequency denoting one thousand (10^3) Hz.

kilometer: A unit of distance corresponding to 1000m.

km: *Abbreviation for* **kilometer.**

knee: In video, by convention, the circuitry introducing white compression into the opto-electronic transfer function and thereby modifying the curve for a more gradual approach to white clip. [After SMPTE]

knife-edge effect: In electromagnetic wave propagation, a redirection by diffraction of a portion of the incident radiation that strikes a well-defined obstacle such as a mountain range or the edge of a building. *Note:* The knife-edge effect is explained by Huygens' principle, which states that a well-defined obstruction to an electromagnetic wave acts as a secondary source, and creates a new wavefront. This new wavefront propagates into the geometric shadow area of the obstacle.



knife-edge effect

knowbot: *Contraction of* **knowledge robot.** A search tool that automatically seeks relevant online information based on the user's previously identified specifications. *Synonyms* **droid, intelligent agent, personal agent, hotbot.** [After Bahorsky]

knowledge robot: A component of a search engine that collects information from Internet resources. [2832-35] *Synonyms* **droid, infobot, robotic librarian, search robot.**

known-plain-text attack: An analytical attack in which a cryptanalyst possesses a substantial quantity of corresponding plain text and cipher text. [2382-pt.8]

k*T* : *See* **noise power density.**

KTS: *Abbreviation for* **key telephone system.**

K-type patch bay: A patching facility designed for patching and monitoring of balanced digital data circuits that support data rates up to 1 Mb/s.

label: 1. An identifier within or attached to a set of data elements. **2.** One or more characters that (a) are within or attached to a set of data elements and (b) represent information about the set, including its identification. **3.** In communications, information within a message that is used to identify specific system parameters, such as the particular circuit with which the message is associated. *Note:* Messages that do not relate to call control should not contain a label. **4.** In programming languages, an identifier that names a statement. **5.** An identifier that indicates the sensitivity of the attached information. **6.** For classified information, an identifier that indicates (a) the security level of the attached information or (b) the specific category in which the attached information belongs. **7.** A field within a signaling message that contains information used to identify the circuit, call, or management transaction to which the message is related. [T1.226-1992]

label bureau: A computer or server that supplies content labels or Web-site ratings. *Synonym* **rating server.** [Bahorsky]

labeled channel: In integrated services digital networks, (ISDN), a time-ordered set of all block payloads that have labels containing the same information, *i.e.* , containing the same identifiers.

labeled interface structure: In integrated services digital networks (ISDN), an interface structure that provides telecommunications services and signaling by means of labeled channels.

labeled multiplexing: In integrated services digital networks (ISDN), multiplexing by concatenation of the blocks of the channels that have different identifiers in their labels.

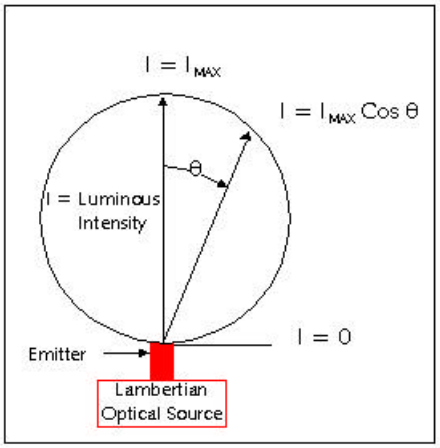
labeled statistical channel: In integrated services digital networks (ISDN), a labeled channel in which the block payloads or the duration of each successive block is random.

laboratory attack: Use of sophisticated signal recovery equipment in a laboratory environment to recover information from data storage media. [INFOSEC-99]

Lambertian radiator: *See* **Lambertian source.**

Lambertian reflector: *See* **Lambertian source.**

Lambertian source: An optical source that obeys Lambert's cosine law, *i.e.,* that has an intensity directly proportional to the cosine of the angle from which it is viewed. *Note:* Conventional (surface-emitting) LEDs are approximately Lambertian. They have a large beam divergence. This results in a radiation pattern that resembles a sphere. Thus, most of their total optical output is not coupled into communication fibers. [After FAA]



Lambertian optical source

Lambert's cosine law: *See* **Lambertian source.**

Lambert's emission law: *Synonym* **Lambertian source.**

LAN: *Acronym for* **local area network.**

LAN application (software): An application software package specifically designed to operate in a local-area-network environment.

land line: An informal name for conventional telephone facilities. *Note:* Land lines include conventional twisted-pair lines, carrier facilities, and microwave radio facilities for supporting a conventional telephone channel, but do not include satellite links or mobile telephone links using radio transmissions.

land mobile-satellite service: A mobile-satellite service in which mobile Earth stations are located on land. [NTIA] [RR]

land mobile service: A mobile service between base stations and land mobile stations, or between land mobile stations. [NTIA] [RR] [47CFR]

land mobile station: A mobile station in the land mobile service capable of surface movement within the geographical limits of a country or continent. [NTIA] [RR] [47CFR]

landscape mode: 1. In facsimile, the mode for scanning lines across the longer dimension of a rectangular object, *i.e.* , rectangular original. **2.** In computer graphics, the orientation of an image in which the longer dimension is horizontal. **3.** An orientation of printed text on a page such that the lines of text are parallel to the long dimension of the page. *Note:* If the page contains an image, such as a picture, and the page is viewed in the normal manner, the long dimension of the page would be parallel to the line that joins the eyes of the viewer.

land station: A station in the mobile service not intended to be used while in motion. [NTIA] [RR] [47CFR]

language: A set of characters, conventions, and rules that is used for conveying information.

language processor: A program that performs tasks, such as translating and interpreting, required for processing a specified programming language. *Note:* Examples of language processors include a Fortran processor and a COBOL processor.

LAN operating system: *See* **network operating system.**

LAP-B: The Data Link Layer protocol as specified by ITU-T Recommendation X.25 (1989).

LAP-D: *Abbreviation for* **link access procedure D.** A link protocol used in ISDN.

large prime factors: Specially constructed large prime numbers, *viz., p1, p2, q1,* and *q2,* each > 2100, where $p1 \mid p-1$, $p2 \mid p+1$, $q1 \mid q-1$, and $q2 \mid q+1$, where p and q are the private prime factors. [After X9.31]

laser: *Acronym for* **light amplification by stimulated emission of radiation.** A device that produces a coherent beam of optical radiation by stimulating electronic, ionic, or molecular transitions to higher energy levels so that when they return to lower energy levels they emit energy. *Note 1:* Laser radiation may be either temporally coherent, spatially coherent, or both. *Note 2:* The degree of coherence of laser radiation exceeds 0.88.

laser chirp: An abrupt change of the center wavelength of a laser, caused by laser instability.

laser diode: *Synonym* **injection laser diode.**

laser disk: *See* **optical disk.**

laser intelligence (LASINT): Technical and geolocation intelligence derived from laser systems; a subcategory of electro-optical intelligence. [JP 1-02]

laser medium: *Synonym* **active laser medium.**

lasing: *See* **laser.**

lasing threshold: The lowest excitation level at which laser output is dominated by stimulated emission rather than by spontaneous emission.

LASINT: *Acronym for* **laser intelligence.**

last-in first-out (LIFO): A queuing discipline in which entities in a queue leave in the reverse order of the sequence in which they arrive. *Note:* Service, when available, is offered to the entity that has been in the LIFO queue the shortest time.

last number redial: *Synonym* **automatic redial.**

LATA: *Acronym for* **local access and transport area.**

lateral offset loss: 1. In fiber optics, a loss of optical power at a splice or connector, caused by a lateral, *i.e.* , transverse, offset of the mating fiber cores, which offset causes an imperfect transfer of the optical signal from the "transmitting" fiber to the "receiving" fiber. *Note:* The effect of a given amount of lateral offset will depend on other parameters such as the relative diameters of the respective cores. For example: if, because of manufacturing tolerances, the "transmitting" core is smaller than the "receiving" core, the effect will be less than if both cores were the same size. [After FAA] **2.** An analogous loss of optical power caused by lateral misalignment of the fiber and optical source. [FAA] *Synonym* **transverse offset loss.**

launch angle: 1. The angle, with respect to the normal, at which a light ray emerges from a surface. **2.** The beam divergence at an emitting surface, such as that of a light-emitting diode (LED), laser, lens, prism, or optical fiber end face. **3.** At an end face of an optical fiber, the angle between an input ray and the fiber axis. *Note:* If the end face of the fiber is perpendicular to the fiber axis, the launch angle is equal to the incidence angle when the ray is external to the fiber and the refraction angle when initially inside the fiber.

launching fiber: An optical fiber used in conjunction with a source to excite the modes of another fiber in a particular fashion. *Note:* Launching fibers are most often used in test systems to improve the precision of measurements. *Synonym* **injection fiber.**

launch numerical aperture (LNA): The numerical aperture of an optical system used to couple (launch) power into an optical fiber. *Note 1:* LNA may differ from the stated NA of a final focusing element if, for example, that element is underfilled or the focus is other than that for which the element is specified. *Note 2:* LNA is one of the parameters that determine the initial distribution of power among the modes of an optical fiber.

layer: 1. In radio wave propagation, *see* **F region. 2.** In telecommunications networks and open systems architecture, a group of related functions that are performed in a given level in a hierarchy of groups of related functions. *Note:* In specifying the functions for a given layer, the assumption is made that the specified functions for the layers below are performed, except for the lowest layer.

layered protocol: The protocol reference model defined by layered structures based on and using the terminology of ITU-T Recommendations X.200 and X.210. The protocols referred to in this American National Standard conform to the OSI Reference Model for ISDN specified in ITU-T Recommendation I.320. [After T1.218-1991] [T1.603-1990] [T1.604-1990]

layered system: A system in which components are grouped, *i.e.* , layered, in a hierarchical arrangement, such that lower layers provide functions and services that support the functions and services of higher layers. *Note:* Systems of ever-increasing complexity and capability can be built by adding or changing the layers to improve overall system capability while using the components that are still in place.

layer entity: An active element within a layer. [T1.630-1999]

layer function: A part of the activity of the layer entities. [T1.627-1993]

layer interface: The boundary between two adjacent layers in the model. [T1.110-1987]

layer service: A capability of the (N) layer and the layers beneath it, which is provided to (N + 1) layer entities, at the boundary between the (N) layer and the (N + 1) layer. [T1.110-1987]

layer service elements: An indivisible component of the layer service made visible to the service user via layer service primitives. [T1.110-1987]

layer service primitives: A means for specifying in detail the adjacent layer interactions. [T1.110-1987]

layer user data: Data transferred between corresponding entities on behalf of the upper layer or layer management entities for which they are providing services. [T1.630-1999]

lay length: In communications cables--including fiber-optic cables--having the transmission media wrapped helically around a central member, the longitudinal distance along the cable required for one complete helical wrap; *i.e.* , the total cable length divided by the total number of wraps. *Note 1:* In many fiber-optic cable designs, the lay length is shorter than in metallic cables of similar diameter, to avoid overstressing the fibers during the pulling associated with the installation operation. *Note 2:* The wraps, *i.e.* , turns, that are referred to should not be confused with the twists given twisted metallic pairs, *i.e.* , wires, to reduce electromagnetic coupling. Pairs of optical fibers are not given such twists. [After FAA] *Synonym* **pitch.**

LBO: *Abbreviation for* **line buildout.** *Synonym* **building out.**

LCD: *Abbreviation for* **liquid crystal display.**

LDAP: *Abbreviation for* **lightweight directory access protocol.** A simplified version of the X.500 standard, which version consists of a set of protocols developed for accessing information directories. [After Bahorsky]

LDM: *Abbreviation for* **limited distance modem.**

leaky bucket counter: A counter that is incremented by one each time an event occurs and is decremented by a fixed value periodically. [T1.218-1991]

leaky mode: In an optical fiber, a mode having a field that decays monotonically for a finite distance in the transverse direction but becomes oscillatory everywhere beyond that finite distance. *Note:* Leaky modes correspond to leaky rays in the terminology of geometric optics. Leaky modes experience attenuation, even if the waveguide is perfect in every respect. *Synonym* **tunneling mode.**

leaky ray: In an optical fiber, a ray for which geometric optics would predict total internal reflection at the boundary between the core and the cladding, but which suffers loss by virtue of the curved core boundary. *Note:* Leaky rays correspond to leaky (*i.e.* , tunneling) modes in the terminology of mode descriptors. *Synonym* **tunneling ray.**

leap second: An occasional adjustment of one second, added to, or subtracted from, Coordinated Universal Time (UTC) to bring it into approximate synchronism with UT1, which is the time scale based on the rotation of the Earth. *Note 1:* Adjustments, when required, are made with respect to the last second of the last minute of the day (Universal Time) on one of two annual days of opportunity (June 30 or December 31). *Note 2:* The last minute of the day on which an adjustment is made will therefore have 61 or 59 seconds. The former is the usual case, and the latter, a theoretical possibility if ever needed. *Note 3:* An adjustment is required on any day of opportunity when it is anticipated that if unadjusted, UTC will deviate from UT1 by more than 0.9 second before the next day of opportunity.

leased circuit: Dedicated common-carrier facilities and channel equipment used by a network to furnish exclusive private line service to a specific user or group of users.

least privilege: [The] principle requiring that each subject be granted the most restrictive set of privileges needed for the performance of authorized tasks. Application of this principle limits the damage that can result from accident, error, or unauthorized use of an information system (IS). [INFOSEC-99]

least significant bit: In a binary code, the bit or bit position that is assigned to, or represents, the smallest quantity or increment that can be represented by the code.

least-time principle: *Synonym* **Fermat's principle.**

LEC: *Abbreviation for* **local exchange carrier.**

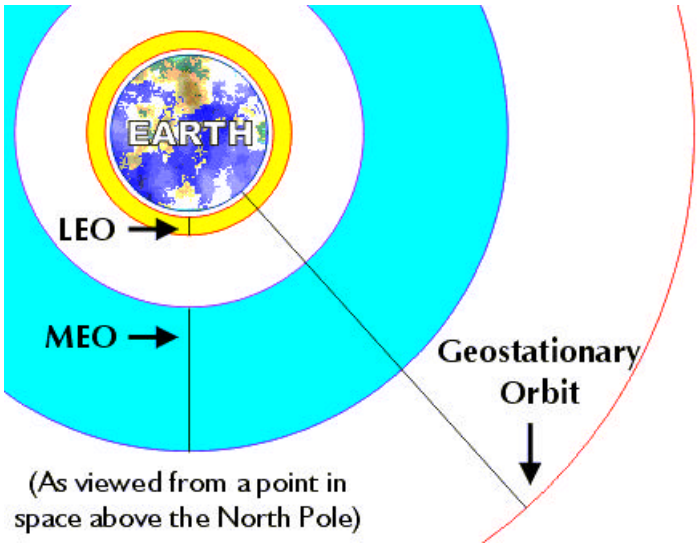
LED: *Abbreviation for* **light-emitting diode.**

left-hand (anti-clockwise) polarized wave: An elliptically or circularly polarized wave, in which the electric field vector, observed in the fixed plane, normal to the direction of propagation, whilst looking in the direction of propagation, rotates with time in a left-hand or anticlockwise direction. [NTIA] [RR]

leg: 1. A segment of an end-to-end route or path, such as a path from user to user via several networks and nodes within networks. *Note:* Examples of legs are several sequential microwave links between two switching centers and a transoceanic cable between two shore communications facilities, each connected to a node in a national network. **2.** A connection from a specific node to an addressable entity, such as communication link from a computer workstation to a hub. **3.** A loop termination of a multipoint circuit that links a bridge to the end user location. [T1.266-2000]

length indicator (LI): A six-bit field that defines message length and that is used to differentiate between message signal units, link status signal units, and fill-in signal units. [T1.226-1992]

LEO: *Abbreviation for* **low Earth orbit.** A term used to describe the orbital altitude range (500 to 2000 km above the surface of the Earth) of certain communications satellites. *Note 1:* Generally, LEO satellites are part of constellations of satellites that achieve wide coverage of the Earth's surface with lower power requirements and shorter propagation delays than can be achieved with, *e.g.* Geostationary orbit satellites, or MEO satellites. *Note 2:* LEO satellites may have equatorial or polar paths. *Note 3:* Two LEO groups have emerged: *Little LEO* for data-communications satellites and *Big LEO* for data-and-voice communications, each using preassigned frequency ranges.



Classification	Orbital Altitude (km above the Earth)
LEO	500-2,000
MEO	8,000-20,000
Geostationary orbit	35,786

level: 1. The absolute or relative voltage, current, or power at a particular point in a circuit or system. **2.** A tier or layer of a hierarchical system, *e.g.* , the Link-Level protocol, high-level computer language.

level alignment: The adjustment of transmission levels of single links and of links in tandem to prevent problems such as overloading of transmission subsystems.

level of protection: [The] extent to which protective measures, techniques, and procedures must be applied to information systems (IS) and networks based on risk, threat, vulnerability, system interconnectivity considerations, and information assurance needs. Levels of protection are: **1.** Basic: [The] IS and networks requiring implementation of standard minimum security countermeasures. **2.** Medium: [The] IS and networks requiring layering of additional safeguards above the standard minimum security countermeasures. **3.** High: [The] IS and networks requiring the most stringent protection and rigorous security countermeasures. [INFOSEC-99]

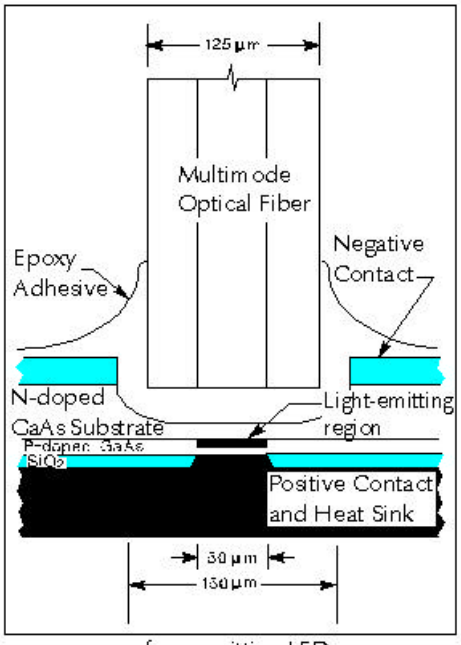
LF: *Abbreviation for* **low frequency.**

library: 1. An assembly of objects, routines, programs, *etc.,* that may be drawn upon for use in the performance of functions. [T1.667-1999] **2.** *Synonym* **forum.**

LIFO: *Acronym for* **last-in first-out.**

light: In a strict sense, the region of the electromagnetic spectrum that can be perceived by human vision, *i.e.* , the visible spectrum, which is approximately the wavelength range of 0.4 μm to 0.7 μm. *Note 1:* In the laser and optical communications fields, custom and practice have extended usage of the term *light* to include the much broader portion of the electromagnetic spectrum that can be handled by the basic optical techniques used for the visible spectrum. *Note 2:* The region embraced by the term *light* has not been clearly defined, but by convention and usage, is considered to extend from the near-ultraviolet region of approximately 0.3 μm, through the visible region, and into the mid-infrared region to approximately 30 μm.

light-emitting diode (LED): A semiconductor device that emits incoherent optical radiation when biased in the forward direction.



surface-emitting LED

lightguide: *See* **optical fiber.**

lightness: The brightness of an area subjectively judged relative to the brightness of a similarly illuminated area that appears to be white or highly transmitting. [After SMPTE]

lightning down-conductor: In a lightning protection subsystem, the conductor connecting the air terminal or overhead ground wire to the earth electrode subsystem.

lightning protection subsystem: All of the components used to protect a facility from the effects of lightning. *Note:* The lightning protection subsystem includes air terminals, lightning down- conductors, the earth electrode subsystem, air gaps, arresters, and their interconnections.

light pen: A stylus, usually hand-held, that contains a photodetector or light source, and that allows interaction with a computer through a specially designed monitor screen.

light valve: *Synonym* **optical switch.**

limited protection: A form of short-term communications security applied to the electromagnetic or acoustic transmission of unclassified information that warrants a degree of protection against simple analysis and easy exploitation but that does not warrant protection to the extent needed for security of classified information.

limited-protection voice equipment: Equipment that provides limited security for unclassified voice communications.

limiter: A device in which the voltage or some other characteristic of the output signal is automatically prevented from exceeding a specified value.

limiter circuit: A circuit of nonlinear elements that restricts the electrical excursion of a variable in accordance with specified criteria.

limiting: Any process by which a specified characteristic (usually amplitude) of the output of a device is prevented from exceeding a predetermined value. *Note 1: Hard limiting ("clipping")* is a limiting action in which there is (a) over the permitted dynamic range, negligible variation in the expected characteristic of the output signal, and (b) a steady-state signal, at the maximum permitted level, for the duration of each period when the output would otherwise be required to exceed the permitted dynamic range in order to correspond to the transfer function of the device. *Note 2: Soft limiting* is limiting in which the transfer function of a device is a function of its instantaneous or integrated output level. The output waveform is therefore distorted, but not clipped.

limits of interference: In radio transmission, the maximum permissible interference as specified in recommendations of the International Special Committee on Radio Interference or other recognized authority.

line: 1. A physical medium for transferring electrical or electromagnetic energy from one point to another for purposes of communications. **2.** A land line. **3.** A metallic medium used for the transmission of electrical power. **4.** A transmission medium, together with the associated equipment, required to provide the means of transporting information between two consecutive network elements, one of which originates the line signal and the other terminates the line signal. **5.** *Synonym* **scanning line.**

line adapter circuit: *See* **four-wire terminating set.**

line alarm indication signal (AIS) code: The code generated by a regenerator upon loss of input signal or loss of frame. The line AIS signal will maintain operation of the downstream regenerators and therefore prevent generation of unnecessary alarms. At the same time, data and orderwire communication is retained between the regenerators and the downstream line terminating equipment (LTE). [T1.105-1988]

linear analog control: *Synonym* **linear analog synchronization.**

linear analog synchronization: Synchronization in which the functional relationships used to obtain synchronization are of simple proportionality. *Synonym* **linear analog control.**

linear combiner: A diversity combiner in which the combining consists of simple addition of two or more signals.

linear device: A device for which the output is, within a given dynamic range, linearly proportional to the input.

linearity: The property of a system in which, if input signals X and Y result in system output $S(X)$ and $S(Y)$ respectively, the input signal $aX + bY$ will result in the output $aS(X) + bS(Y)$, where S is the system transfer function and a and b are scalars.

linear key: In video technology and image processing, a process for the selective overlay of one video image upon another, as through chroma key. *Note:* Control of the ratio of

foreground to background determined by the specifications derived from luminance information, and provided in the linear key data. Ratios to be applied are carried for each picture element in the alpha channel. The process permits realistic rendering of semi-transparent objects. [After SMPTE]

linearly polarized (LP) mode: A mode for which the field components in the direction of propagation are small compared to components perpendicular to that direction. *Note:* The LP description is an approximation that is valid for a weakly guiding optical fiber, including typical telecommunications grade fibers.

linear network: *See* **network topology.**

linear optimization: *Synonym* **linear programming.**

linear polarization: Of an electromagnetic wave, confinement of the E-field vector or H-field vector to a given plane. *Note:* Historically, the orientation of a polarized electromagnetic wave has been defined in the optical regime by the orientation of the electric vector, and in the radio regime, by the orientation of the magnetic vector. *Synonym* **plane polarization.**

linear predictive coding (LPC): A method of digitally encoding analog signals, which method uses a single-level or multilevel sampling system in which the value of the signal at each sample time is predicted to be a linear function of the past values of the quantized signal. *Note:* LPC is related to adaptive predictive coding (APC) in that both use adaptive predictors. However, LPC uses more prediction coefficients to permit use of a lower information bit rate than APC, and thus requires a more complex processor.

linear programming (LP): In operations research, a procedure for locating the maximum or minimum of a linear function of variables that are subject to linear constraints. *Synonym* **linear optimization.**

linear topology: *See* **network topology.**

line balance: The degree of electrical similarity of the two conductors of a transmission line. *Note:* A high degree of line balance reduces pickup of extraneous disturbances of all kinds, including crosstalk.

line buildout (LBO): *Synonym* **building out.**

line code: A code chosen for use within a communications system for transmission purposes. *Note 1:* A line code may differ from the code generated at a user terminal, and thus may require translation. *Note 2:* A line code may, for example, reflect a requirement of the transmission medium, *e.g.* , optical fiber versus shielded twisted pair.

line conditioning: [The] elimination of unintentional signals or noise induced or conducted on a telecommunications or information system signal, power, control, indicator, or other external interface line. [INFOSEC-99]

line conduction: Unintentional signals or noise induced or conducted on a telecommunications or information system signal, power, control, indicator, or other external interface line. [INFOSEC-99]

line driver: An amplifier used to enhance the transmission reliability of a usually digital intrafacility metallic transmission line, over extended distances, by driving the input to the transmission line with a higher than normal signal level. *Note:* An example of a line driver is an amplifier used to extend the range of an RS-232C digital signal beyond 50 feet (~15 m) while maintaining a specified bit-error ratio.

line filter balance: A network designed to maintain phantom group balance when one side of the group is equipped with a carrier system. *Note:* Since it must balance the phantom group for only voice frequencies, the line filter balance configuration is usually simple compared with the filter that it balances.

line hit: *See* **hit.**

line load control: A network-provided service feature that allows selective denial of call origination to certain lines when excessive demands for service are required of a switching center.

line loop: *See* **loop.**

line loopback: A signal used to command the far-end receiver to loopback the received line signal. [T1.107-1988] *Synonym [loosely]* **line loopback signal.**

line loopback signal: *See* **line loopback.**

line noise: In a telecommunications link or line facility, interference, from any source, that degrades performance. *Note 1:* Line noise is usually measured as a signal-to-noise ratio and as a set parameter used by engineers to determine the operating range of the system. *Note 2:* In analog lines, noise is usually measured in dbrnc (dB relative to -90 dBm, with C-message weighting). *Note 3:* In digital lines, noise is usually measured as a function of the number of errored bits per second or errors in the digital data stream. In digital systems with signal buffers, these errors may be linked to alarms, and to circuitry that enables the signal to be recovered to acceptable degree.

line-of-sight (LOS) propagation: Of an electromagnetic wave, propagation in which the direct ray from the transmitter to the receiver is unobstructed, *i.e.,* the transmission path is not established by or dependent upon reflection or diffraction. *Note:* The need for LOS propagation is most critical at VHF and higher frequencies.

line-rate conversion: A translation of standardized, existing video systems (using 525, 625, and 1125 total lines per frame) to proposed systems. *Note:* Current systems operate in a 2:1 interlace mode, *i.e.,* with 262.5, 312.5, 562.5 lines per field and with concurrent temporal differences at field rates of 50.00, 59.94, or 60.00 fields per second. While simple transcoding by deletion or repetition can be applied, it is more commonly done by applying an algorithm to stored information in order to generate predictive line structures in the target system. [After SMPTE]

line-route map: A map or overlay for signal communications operations that shows the actual routes and types of construction of wire circuits in the field. It also gives the locations of switchboards and telegraph stations. [JP1]

line side: The portion of a device that is connected to external, *i.e.,* outside plant, facilities such as trunks, local loops, and channels.

line source: 1. In spectroscopy, an optical source that emits one or more spectrally narrow lines as opposed to a continuous spectrum. **2.** In the geometric sense, an optical source having an emitting area in the form of a spatially narrow line, *e.g.* , a slit. *Synonym* **slit source.**

line spectrum: In optics, an emission or absorption spectrum consisting of one or more narrow spectral lines, as opposed to a continuous spectrum.

line speed: *See* **modulation rate.**

line terminating equipment (LTE): Network elements that originate and/or terminate line signals. LTEs can originate, access, modify, or terminate the transport overhead, or can perform any combination of these actions. [T1.105-1988]

line-to-line correlation: In facsimile, the correlation of object information from scanning line to scanning line. *Note:* Line-to-line correlation is used in two-dimensional encoding.

line traffic coordinator (LTC): In a DDN switching center, the processor that controls traffic on a line.

line unit network termination (LUNT): The customer side of any digital subscriber line (DSL) that does not terminate on the customer installation (CI). [T1.216-1998]

line verification: *See* **busy verification.**

linewidth: *See* **spectral width.**

link: 1. The communications facilities between adjacent nodes of a network. *Synonym [loosely]* **telecommunications link. 2.** A portion of a circuit connected in tandem with, *i.e.* , in series with, other portions. **3.** A radio path between two points, called a radio link. **4.** In communications, a general term used to indicate the existence of communications facilities between two points. [JP 1-02] **5.** A conceptual circuit, *i.e.* , logical circuit, between two users of a network, that enables the users to communicate, even when different physical paths are used. *Note 1:* In all cases, the type of link, such as data link, downlink, duplex link, fiber optic link, line-of-sight link, point-to-point link, radio link and satellite link, should be identified. *Note 2:* A link may be simplex, half-duplex, or duplex. **6.** In a computer program, a part, such as a single instruction or address, that passes control and parameters between separate portions of the program. **7.** In hypertext, a logical connection between discrete units of data, or a hypertext connection between Web pages. *Synonyms (in this sense)* **hotlink, hyperlink.**

linkage: In computer security, the purposeful combining of data or information from one data processing system with data or information from another system to derive protected information. [After 2382-pt.8] *Synonym* **fusion.**

link diversity: The process of provisioning signaling links with physically separate transmission routes between signaling points to mitigate impact of facility failures. [T1.226-1992]

linked registration: A type of AllCall registration feature, the use of which combines the registrations for incoming and outgoing calls for the current terminal address in a single procedure. However, unlike AllCall registration, a linked registration cannot be overridden in all or in part by: (a) InCall, remote InCall, AllCall, or remote AllCall registrations by the same UPT (Universal Personal Telecommunications service) user; (b) OutCall, remote OutCall, AllCall, remote AllCall, linked, or remote linked registrations by other UPT users. The UPT user must explicitly deregister a linked registration or override it by another linked or remote linked registration. [After T1.701-1994]

link encryption: 1. The application of on-line crypto-operation to a link of a communications system so that all information passing over the link is encrypted in its entirety. [JP1-02] **2.** Encryption of information between nodes of a communications system. [INFOSEC-99]

linking protection (LP): In adaptive high-frequency (HF) radio, protection intended to prevent the establishment of unauthorized links or the unauthorized manipulation of legitimate links, and which are administered through an authorization process. [After FED-STD-1049/1]

Link Layer: *Deprecated term for* **Data Link Layer.** *See* **Open Systems Interconnection--Reference Model.**

link level: In the hierarchical structure of a primary or secondary station, the conceptual level of control or data processing logic that controls the data link. *Note:* Link-level functions provide an interface between the station high-level logic and the data link. Link-level functions include (a) transmit bit injection and receive bit extraction, (b) address and control field interpretation, (c) command response generation, transmission and interpretation, and (d) frame check sequence computation and interpretation.

link orderwire: A voice or data communications circuit that (a) serves as a transmission link between adjacent communications facilities that are interconnected by a transmission link and (b) is used only for coordination and control of link activities, such as traffic monitoring and traffic control.

link protocol: A set of rules relating to data communications over a data link. *Note:* Link protocols define data link parameters, such as transmission code, transmission mode, control procedures, and recovery procedures.

link quality analysis (LQA): In adaptive high-frequency (HF) radio, the overall process by which measurements of signal quality are made, assessed, and analyzed. *Note 1:* In LQA, signal quality is determined by measuring, assessing, and analyzing link parameters, such as bit error ratio (BER), and the levels of the ratio of signal-plus-noise-plus-distortion to noise-plus-distortion (SINAD). Measurements are stored at--and exchanged between--stations, for use in making decisions about link establishment. *Note 2:* For adaptive HF radio, LQA is automatically performed and is usually based on analyses of pseudo-BERs and SINAD readings.

link set: A set of signaling links directly connecting two signaling points.[T1.226-1992]

link state control: The control that coordinates functions of the signaling link, including signal unit delimitation, signal unit alignment, error detection, error correction, initial alignment, signaling link error monitoring, and flow control. [T1.110-1987]

link status signal unit: A signal unit that contains status information about the signaling link in which it is transmitted. [T1.110-1987]

linux: A freeware version of the Unix^{TM} operating system.

lip synchronization: The synchronization of audio and corresponding video signals so that there is no noticeable lack of simultaneity between them. *Note:* An example of a lip synchronization problem is the case in which television video and audio signals are transported via different facilities *(e.g.,* a geosynchronous satellite link and a landline) that have significantly differently delay times, respectively. In such cases it is necessary to delay the audio electronically to allow for the difference in propagation times.

liquid crystal display (LCD): A display device that creates characters by means of the action of electrical signals on a matrix of liquid cells that become opaque when energized. *Note:* A liquid crystal display may be designed to be viewed by reflected or transmitted light.

list address: In e-mail, an address used by mailing list subscribers to send e-mail to be distributed to each member of a discussion list, forum, interest group, mailing list, or newsgroup. [After Bahorsky]

list processor: Software used to manage and administer a discussion-group list, an interest group list, or a mailing list. [After Bahorsky]

list server: A functional unit (hardware and software) for operating a computer conferencing system by acting as a repository for electronic messages and redistributing those messages automatically or on-demand. *Synonyms* **distribution list server, mailing list server.**

live link: A link, on a World Wide Web file, that connects to another layer of information. [After Bahorsky]

livescript: *See* **scripting language.**

LLC: *Abbreviation for* **logical link control.** *See* **logical link control sublayer.**

LNA: *Abbreviation for* **launch numerical aperture.**

load: 1. The power consumed by a device or circuit in performing its function. **2.** A power-consuming device connected to a circuit. **3.** To enter data or programs into storage or

working registers. **4.** To insert data values into a database that previously contained no occurrences of data. **5.** To place a magnetic tape reel on a tape drive, or to place cards into the card hopper of a card punch or reader.

load capacity: In pulse-code modulation (PCM), the level of a sinusoidal signal that has positive and negative peaks that coincide with the positive and negative virtual decision values of the encoder. *Note:* Load capacity is usually expressed in dBm0. *Synonym* **overload point.**

loader: A routine that reads data into main storage.

load factor: The ratio of the average load over a designated period of time to the peak load occurring during that period.

loading: 1. The insertion of impedance into a circuit to change the characteristics of the circuit. **2.** In multichannel communications systems, the insertion of white noise or equivalent dummy traffic at a specified level to simulate system traffic and thus enable analysis of system performance. **3.** In telephone systems, the load, *i.e.* , power level, imposed by the busy hour traffic. *Note 1:* The loading may be expressed as (a) the equivalent mean power and the peak power as a function of the number of voice channels or (b) the equivalent power of a multichannel complex or signal composite referred to zero transmission level point (0TLP). *Note 2:* Loading is a function of the number of channels and the specified voice channel mean power.

loading characteristic: In multichannel telephone systems, a plot, for the busy hour, of the equivalent mean power and the peak power as a function of the number of voice channels. *Note:* The equivalent power of a multichannel signal referred to the zero transmission level point is a function of the number of channels and has for its basis a specified voice channel mean power.

loading coil: A coil that does not provide coupling to any other circuit, but is inserted in a circuit to increase its inductance. *Note 1:* Loading coils inserted periodically in a pair of wires reduce the attenuation at the higher voice frequencies up to the cutoff frequency of the low-pass filter formed by (a) the inductance of the coils and distributed inductance of the wires, and (b) the distributed capacitance between the wires. Above the cutoff frequency, attenuation increases rapidly. *Note 2:* A common application of loading coils is to improve the voice-frequency amplitude response characteristics of twisted cable pairs. When connected across a twisted pair at regular intervals, loading coils, in concert with the distributed resistance and capacitance of the pair, form an audio-frequency filter that improves the high-frequency audio response of the pair. *Note 3:* When loading coils are in place, signal attenuation increases rapidly for frequencies above the audio cutoff frequency. Thus, when a pair is used to support applications that require higher frequencies, such as carrier systems, loading coils must be absent.

load sharing: A process used to route signaling traffic over two or more signaling routes for purposes of traffic equalization or security. [T1.226-1992]

lobe: 1. An identifiable segment of an antenna radiation pattern. *Note:* A lobe is characterized by a localized maximum bounded by identifiable nulls. **2.** A pair of channels between a data station and a lobe attaching unit, one channel for sending and one for receiving, as seen from the point of view of the attached data station.

lobe attaching unit: In a ring network, a functional unit used to connect and disconnect data stations to and from the ring without disrupting network operations.

local access and transport area (LATA): Under the terms of the Modification of Final Judgment (MFJ), a geographical area within which a divested Bell Operating Company (BOC) is permitted to offer exchange telecommunications and exchange access services. *Note:* Under the terms of the MFJ, the BOCs are generally prohibited from providing services that originate in one LATA and terminate in another.

local area network (LAN): A data communications system that (a) lies within a limited spatial area, (b) has a specific user group, (c) has a specific topology, and (d) is not a public switched telecommunications network, but may be connected to one. *Note 1:* LANs are usually restricted to relatively small areas, such as rooms, buildings, ships, and aircraft. *Note 2:* An interconnection of LANs within a limited geographical area, such as a military base, is commonly referred to as a campus area network. An interconnection of LANs over a city-wide geographical area is commonly called a metropolitan area network (MAN). An interconnection of LANs over large geographical areas, such as nationwide, is commonly called a wide area network (WAN). *Note 3:* LANs are not subject to public telecommunications regulations.

local battery: 1. In telegraphy, the source of power that actuates the telegraphic station recording instruments, as distinguished from the source of power that furnishes current to the line. **2.** In telephony, a system in which each telephone instrument has its own source of power, as opposed to being powered from the central office. **3.** A source of local power for a telephone instrument.

local call: 1. Any call using a single switching facility. **2.** Any call for which an additional charge, *i.e.* , toll charge, is not made to the calling or called party. *Note:* Calls such as those via "800" numbers do not qualify as local calls, because the called party is charged.

local central office: *Synonym* **central office.**

local channel: The portion of a private line circuit which is included in the exchange transmission plant. However, common usage of this term usually excludes information origination/termination equipment. [47 CFR Pt.36-A]

local clock: A source of timing located in close proximity to an associated facility, such as a communications station, central office, or node. *Note:* The same clock might be a remote clock relative to some other facility.

local communication network (LCN): A communication network within a TMN (telecommunications management network) that supports data communication functions (DCFs) normally at [specified] reference points q1 and q2. LCNs range from the simple to the complex. LCN examples include point-to-point connections and networks based on star and bus topologies. [After T1.210-1993]

local exchange: *Synonym* **central office.**

local exchange carrier (LEC): A local telephone company, *i.e.* , a communications common carrier that provides ordinary local voice-grade telecommunications service under regulation within a specified service area.

local exchange loop: An interconnection between customer premises equipment and telephone central office.

local line: *See* **loop.**

local loop: *Synonym* **loop.**

local measured service: *See* **measured-rate service.**

local node: A node which interfaces directly with customer equipment. [T1.101-1999]

local office: 1. *Synonym* **central office. 2.** A central office serving primarily as a place of termination for subscriber lines and for providing telephone service to the subscribers on these lines. [47 CFR Pt.36-A]

local orderwire: A communications circuit between a technical control facility and selected terminal or repeater locations within the communications complex. *Note:* In multichannel radio systems, the local orderwire is usually a handset connection at the radio location.

local reference: A local number, unambiguously identifying an SCCP (signaling connection control part) connection within one SCCP entity. [T1.110-1987]

local side: The portion of a device that is connected to internal facilities, such as switches, patch panels, test bays and supervisory equipment.

lock and key protection system: [A] protection system that involves matching a key or password with a specific access requirement. [INFOSEC-99]

locked mode: *Synonym* **clock normal mode.**

lock-in frequency: A frequency at which a closed-loop system can acquire and track a signal. *See* **lock-in range.**

lock-in range: 1. The range of frequencies within which a closed-loop system can acquire and track a signal. **2.** The dynamic range within which a closed-loop system can acquire and track a signal.

lockout: 1. In telephone systems, treatment of a user's line or trunk that is in trouble, or in a permanent off-hook condition, by automatically disconnecting the line from the switching equipment. **2.** In public telephone systems, a process that denies an attendant or other users the ability to reenter an established connection. **3.** In a telephone circuit controlled by two voice-operated devices, the inability of one or both users to get through, either because of excessive local circuit noise or because of continuous speech from either or both users. **4.** In mobile communications, an arrangement of control circuits whereby only one receiver can feed the system at a time. *Synonym* **receiver lockout system. 5.** An arrangement for restricting access to use of all, or part of, a computer system. *Synonym* **protection.**

log: *Synonym* **journal.**

logical circuit: *Synonym* **virtual circuit.**

logical link control (LLC) sublayer: In a local-area-network/metropolitan-area-network (LAN/MAN) system, the part of the link level that (a) supports medium-independent data link functions and (b) uses the services of the medium access control sublayer to provide services to the network layer.

logical route: *Synonym* **virtual circuit.**

logical signaling channel: A logical channel that provides a signaling path within an information channel or within a physical signaling channel.

logical topology: Of a network, the schematic configuration that reflects the network's function, use, or implementation without regard to the physical interconnection of network elements.

logic bomb: 1. Malicious logic that causes damage to a data processing system when triggered by some specific system condition. [2382-pt.8] **2.** [A] resident computer program triggering an unauthorized act when particular states of an information system (IS) are realized. [INFOSEC-99]

log in: To perform a login procedure. *Synonym* **log on.**

login: The procedure that is followed by a user in beginning a session, *e.g.* , a period of terminal operation. *Synonym* **logon.**

log off: To perform a log-off procedure. *Synonym* **log out.**

log-off: The procedure that is followed by a user in closing a session, *e.g.* , a period of terminal operation. *Synonym* **log out.**

logon: *Synonym* **login.**

log on: *Synonym* **log in.**

log out: *Synonym* **log off.**

log-periodic (LP) antenna: A broadband, multi-element, unidirectional, narrow-beam antenna that has impedance and radiation characteristics that are regularly repetitive as a logarithmic function of the excitation frequency. *Note:* The length and spacing of the elements of a log-periodic antenna increase logarithmically from one end to the other. *Synonym* **log-periodic array.**

log-periodic (LP) array: *Synonym* **log-periodic antenna.**

long-distance call: Any telephone call to a destination outside the local service area of the calling station, whether inter-LATA or intra-LATA, and for which there is a charge beyond that for basic service. *Synonym* **toll call.**

long-haul communications: 1. In public switched networks, pertaining to circuits that span large distances, such as the circuits in inter-LATA, interstate, and international communications. **2.** In the military community, communications among users on a national or worldwide basis. *Note 1:* Compared to tactical communications, long-haul communications are characterized by (a) higher levels of users, such as the National Command Authority, (b) more stringent performance requirements, such as higher quality circuits, (c) longer distances between users, including world wide distances, (d) higher traffic volumes and densities, (e) larger switches and trunk cross sections, and (f) fixed and recoverable assets. *Note 2: "Long-haul communications"* usually pertains to the U.S. Defense Communications System.

longitudinal balance: 1. The electrical symmetry, with respect to ground, of the two wires of a pair **2.** An expression of the difference in impedance of the two sides of a circuit.

longitudinal balance—audio: The ratio of the disturbing longitudinal source voltage, Vs, and the resultant metallic voltage, Vm, at the same frequency of the network under test, expressed in dB. The degree of balance between each conductor of a wire pair or equipment unit and ground is a measure of immunity to noise induced from external sources. [After T1.Rpt16-1992]

longitudinal offset loss: *Synonym* **gap loss.**

longitudinal redundancy check (LRC): A system of error control based on the formation of a block check following preset rules. *Note 1:* The block check formation rules are applied in the same manner to each character. *Note 2:* A combination of longitudinal and vertical redundancy check allows the detection and correction of single bit errors. *Synonym* **horizontal redundancy check.**

longitudinal voltage: A voltage induced or appearing along the length of a transmission medium. *Note 1:* Longitudinal voltage may be effectively eliminated by using differential amplifiers or receivers that respond only to voltage differences, *e.g.,* those between the wires that constitute a pair. *Note 2:* Induced longitudinal voltages at low (power-line) frequencies can be greatly reduced by twisting parallel wires to create what are referred to as *"twisted wire pairs." Synonym [loosely]* **common-mode voltage.**

long line: A transmission line in a long-distance communications network. *Note:* Examples of long lines are TDM and FDM carrier systems, microwave radio links, geosynchronous satellite links, underground cables, aerial cables and open wire, and submarine cables.

long-range aid to navigation (loran) system: *See* **loran.**

long-range radio aid to navigation system: *See* **loran.**

long silent interval: A silent interval during a ringing cycle or pattern that lasts at least 1200 ms. [T1.401-1998]

long-term bit error rate: Bit error rate measured over a sufficiently long period, for example, one month. [T1.226-1992]

long-term stability: Of an oscillator, the degree of uniformity of frequency over time, when the frequency is measured under identical environmental conditions, such as supply voltage, load, and temperature. *Note:* Long-term frequency changes are caused by changes in the oscillator elements that determine frequency, such as crystal drift, inductance changes, and capacitance changes.

long wavelength: In fiber optic communications, pertaining to optical wavelengths greater than ≈ 1 μm.

look-ahead-for-busy (LFB) information: Information concerning network resources available to support higher precedence calls. *Note 1:* Available resources include idle circuits and circuits used for lower precedence calls. *Note 2:* LFB information may be used to make call-path reservations.

loop: 1. A communications channel from a switching center or an individual message distribution point to the user terminal. *Synonym* **subscriber line. 2.** A pair of wires, or its equivalent, between a customer's station and the central office from which the station is served. [47 CFR Pt.36-A] *Synonyms* **local loop, user line. 3.** Go-and-return conductors of an electric circuit; a closed circuit. **4.** A closed path under measurement in a resistance test. **5.** A type of antenna, in the form of a circle or rectangle, usually used in direction-finding equipment and in UHF reception. **6.** A sequence of instructions that may be executed iteratively while a certain condition prevails until the loop has been executed once.

loop-back: 1. A method of performing transmission tests of access lines from the serving switching center, which method usually does not require the assistance of personnel at the served terminal. **2.** A method of testing between stations (not necessarily adjacent) wherein two lines are used, with the testing being done at one station and the two lines interconnected at the distant station. **3.** A patch, applied manually or automatically, remotely or locally, that facilitates a loop-back test.

loop check: *Synonym* **echo check.**

loop closure: A condition in which the network presents a low-resistance tip-to-ring dc path at the network interface (NI). [T1.407-1990]

loop compensation loss: The loss that could be provided by a digital loop carrier system or a fiber-in-the-loop system when a short customer analog access cable results in below-average attenuation. [T1.508-1998]

looped dual bus: A distributed-queue dual-bus (DQDB) scheme in which the head-of-bus functions for both buses are at the same location.

loop filter: In a phase-locked loop, a filter located between the phase detector (or time discriminator) and the voltage controlled oscillator (or phase shifter).

loop gain: 1. The total usable power gain of a carrier terminal or two-wire repeater. *Note:* The maximum usable gain is determined by, and may not exceed, the losses in the closed path. **2.** The sum of the gains, expressed in dB, acting on a signal passing around a closed path, *i.e.* , a loop.

loophole: In computer security, *synonym* **flaw.**

loop noise: The noise contributed by one or both loops of a telephone circuit to the total circuit noise. *Note:* In a given case, it should be stated whether the loop noise is for one or both loops.

loop open: A signal in which the network applies a high resistance between the tip and ring conductors at the network interface (NI). [T1.407-1997]

loop start: A supervisory signal given by a telephone or PBX in response to completing the loop path.

loop test: A test that uses a closed circuit, *i.e.* , loop, to detect and locate faults.

loop transmission: Multipoint transmission in which (a) all the stations in a network are serially connected in one closed loop, (b) there are no cross-connections, (c) the stations serve as regenerative repeaters, forwarding messages around the loop until they arrive at their destination stations, and (d) any station can introduce a message into the loop by interleaving it with other messages. [From Weik '89]

loose buffer: *See* **buffer.**

loran: *Acronym for* **long-range radio navigation.** A long-range radio navigation position-fixing system consisting of an array of fixed stations that transmit precisely synchronized signals to mobile receivers. *Note:* A loran receiver measures differences in the times of arrival of the signals from the various stations. A fixed difference in the time of arrival of the signals from any two stations will define a hyperbolic arc on which the receiver must lie. Three or more stations are needed to remove ambiguities in the position of the receiver. *Synonyms* **long-range aid to navigation system, long-range radio aid to navigation system.**

loran station: A long distance radionavigation land station transmitting synchronized pulses. Hyperbolic lines of position are determined by the measurement of the difference in the time of arrival of these pulses. [NTIA]

LOS: *Abbreviation for* **line of sight.** *See* **line-of-sight propagation.**

loss: 1. The diminution, usually expressed in dB, of signal level in a communications medium. **2.** The power, usually expressed in watts, consumed or dissipated by a circuit or component without accomplishing useful work or purpose; *e.g.* , heating (hysteresis loss) that occurs in the core of a transformer. **3.** In computer security, a quantitative measure of harm or deprivation resulting from a compromise. [2382-pt.8]

lossless compression: 1. In the storage of digital data, reduction, by the use of one or more appropriate algorithms, of the amount of data to be stored, in such a manner that the original data may be recovered precisely; *i.e.* , in the exact original form. *Note:* The actual algorithm(s) applied to a given set of data may depend on the application (and hence, the statistical properties) of the data, *e.g.* , for image storage. **2.** An analogous real-time process applied to the transmission of digital data, with the objective of reducing the amount of data that need be transmitted per unit time; *i.e.* , data rate, without compromising the ability to completely restore the data. **3.** A digital image compression technique that allows for the removal of redundant bits without a resulting loss of image quality. [Bahorsky]

lossy compression: 1. In video and multimedia, bit-rate reduction of an image signal by powerful algorithms that compress beyond what is achievable in lossless compression or in quasi-lossless compression. *Note:* Lossy compression accepts loss of information and introduction of artifacts that can be ignored as unimportant when viewed in direct comparison with the original. Lossy compression takes advantage of the subtended viewing angle for the intended display, the perceptual characteristics of human vision, the statistics of image populations, and the objectives of the display. [After SMPTE] **2.** In video technology, a digital image compression technique that removes redundant bits from an image in return for a minor loss of image quality. [Bahorsky]

lossy medium: A medium in which a significant amount of the energy of a propagating electromagnetic wave is absorbed per unit distance traveled by the wave. [After 2196]

lost block: A block not delivered to the user within a specified maximum end-to-end block transfer time.

lost call: A call that has not been completed for any reason other than cases where the call receiver (termination) is busy.

lost frame: A frame that is not delivered to the destination user within an agreed-upon measurement period, and the network is responsible. The procedure used to reach agreement on the measurement period should allow for the possibility that more than one network may be involved in the connection. [After T1.615-1992]

low Earth orbit: *See* **LEO.**

lower frequency ground: *Deprecated term. See* **facility grounding system.**

lowest usable high frequency (LUF): The lowest frequency in the HF band at which the received field intensity is sufficient to provide the required signal-to-noise ratio for a specified time period, *e.g.* , 0100 to 0200 UTC, on 90% of the undisturbed days of the month.

low frequency (LF): Any frequency in the band from 30 kHz to 300 kHz. *See* **electromagnetic spectrum.**

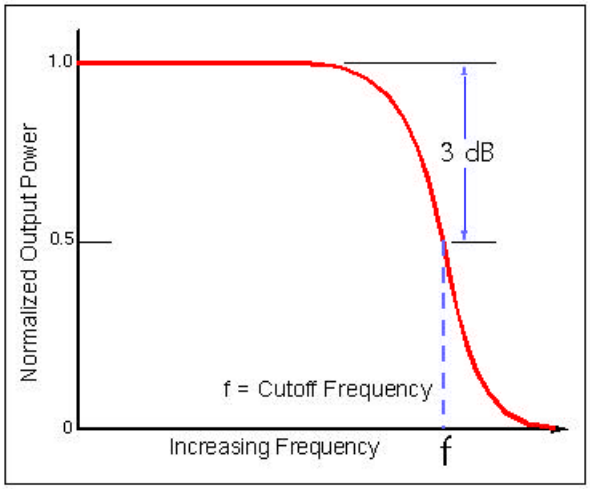
low-level keying: *Synonym* **low-level signaling.**

low-level language: *Synonym* **computer-oriented language.**

low-level modulation: Modulation of a signal, *e.g.,* a carrier, at a point in a system or device, such as a radio transmitter, where the power level is low compared to the final output power.

low-level signaling: The use on signal lines of voltage levels that are between the limits of positive and negative 6 volts. *Synonym* **low-level keying.**

low-pass filter: A filter network that passes all frequencies below a specified frequency with little or no loss, but strongly attenuates higher frequencies.



low pass filter

low-performance equipment: 1. Equipment that has imprecise characteristics that do not meet system reliability requirements. **2.** In military communications, equipment that has insufficiently exacting characteristics to permit its use in trunks or links. *Note:* Low-performance equipment may be used in loops if it meets loop performance requirements. **3.** Tactical ground and airborne equipment that (a) has size, weight, and complexity characteristics that must be kept to a minimum and (b) is used in systems that have components with similar minimum performance characteristics.

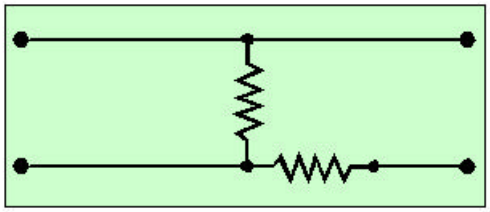
low-power communication device: A restricted radiation device, exclusive of those employing conducted or guided radio frequency techniques, used for the transmission of signs, signals (including control signals), writing, images and sounds or intelligence of any nature by radiation of electromagnetic energy. Examples: Wireless microphone, phonograph oscillator, radio-controlled garage door opener, and radio-controlled models. [NTIA]

low-power FM radio (LPFM): A broadcast service that permits the licensing of 50- to 100-watt FM radio stations within a service radius of up to 3.5 miles and 1- to 10-watt FM radio stations within a service radius of 1 to 2 miles. [After FCC]

low-power television (LPTV): A broadcast service that permits program broadcasting via television translators operating with low power. LPTV service includes the existing translator service and operates on a secondary basis to regular television stations. Transmitter output is limited to 1,000 watts for normal VHF stations and 100 watts when a VHF operation is on an allocated channel. [After FCC]

LP: *Abbreviation for* **linear programming, linking protection.**

L-pad: A pad composed of two discrete components, one series component and one shunt component. *Note:* In schematic representation, the components resemble the upper-case letter "L," hence the name.



L-pad

LPC: *Abbreviation for* **linear predictive coding.**

LP mode: *Abbreviation for* **linearly polarized mode.**

LP_{01} mode: Designation of the fundamental LP mode. *See* **fundamental mode.**

LQA: *Abbreviation for* **link quality analysis.**

LRC: *Abbreviation for* **longitudinal redundancy check.**

LSB: *Abbreviation for* **least significant bit, lower sideband.**

LTC: *Abbreviation for* **line traffic coordinator.**

.l3: A file-name extension that identifies a Motion Picture Experts Group (MPEG) audio file. [Bahorsky]

LUF: *Acronym for* **lowest usable high frequency.**

luminance range: 1. In CRT displays, the difference in brightness between the lightest and the darkest element of a scene or its display. [After SMPTE] **2.** Of a CRT or other display device, the ratio of (a) the maximum brightness that is (or can be) displayed to (b) the minimum brightness that is (or can be) displayed.

luminance signal: 1. In television technology, the signal that describes (a) the distribution of brightness levels within the image and (b) the equation for deriving that information from the camera output. [After SMPTE] **2.** In composite color television, a signal that has major control of the brightness. *Note:* Luminance signal is a linear combination of gamma-corrected primary color signals. [After IEEE 100] [After SMPTE]

luminescent diode: *See* **superluminescent LED.**

luminous flux: The rate of flow of radiant energy. *Note:* Luminous flux is expressed in lumens (cd sr).

luminous intensity: *See* **candela.**

lurker: In the Internet, a participant in a chat room or a subscriber to a mailing list or newsgroup who passively observes but does not actively participate in the exchange. [Bahorsky]

lurking: Passive participation in (*i.e.* , monitoring) the activities of a mailing list, a newsgroup, an IRC channel, a video connection, or any other Internet communication device. *Note:* Lurking is generally carried out for the purpose of nondirected information gathering or to allow a new user to first understand the focus and the manners of a discussion group. [Bahorsky]

lynx: A World Wide Web browser that provides a character-based user interface to hypertext-based information. *Note:* Lynx can display only character-based portions of the hypertext-based information.