

## List of all Operational Improvements in the NAS Architecture 6 database

### Show Operational Improvement Summaries

Service Group **Air Traffic Services**

Service **ATC-Advisory**

Capability **NAS Status Advisory**

Operational Improvement

#### **Current NAS Status Advisory** (103301)

Pilots require NAS status updates, which are essential to safety and efficiency. These updates and information that was not readily available during flight planning are either broadcast or provided directly to in-flight aircraft by specialists at the flight service station/automated flight service station, controllers at air traffic control facilities, and personnel at airline operations centers and other facilities. NAS status includes changes to the operational status of airspace, airports, navigational aids, in-flight or ground hazards, traffic management directives, and other information. Pilots receive some NAS status information, including runway status and weather information, via digital broadcast of automatic terminal information.

#### **Benefits**

Current operations are provided in the NAS.

#### **Key Related Systems**

Automated Radar Terminal System - Model IIIA  
Automated Surface Observing System Controller  
Equipment Information Display System  
Common Automated Radar Terminal System - Model IIE  
Common Automated Radar Terminal System - Model IIIE  
Display System Replacement  
Enhanced Terminal Voice Switch/Interim Voice Switch Replacement  
Enhanced Traffic Management System  
GSA 400/466  
High Frequency Communications  
Integrated Communications Switching System Type I  
Integrated Communications Switching System Type II  
Integrated Communications Switching System Type III  
Rapid Deployment Voice Switch Type I  
Rapid Deployment Voice Switch Type II  
Rapid Deployment Voice Switch Type IIA  
Standard Terminal Automation Replacement System  
Systems Atlanta Information Display System  
Tower Data Link System  
Ultra High Frequency Airborne Radios  
Ultra High Frequency Ground Radios  
Very High Frequency Airborne Radios  
Very High Frequency Ground Radios  
Very High Frequency Omnidirectional Range

#### **Issues**

none identified

Operational Improvement

**On-Demand NAS Information** (103305)

National Airspace System (NAS) and aeronautical information will be available to users on demand. NAS and aeronautical information is consistent across applications and locations, and available to authorized subscribers and equipped aircraft. Proprietary and security sensitive information is not shared with unauthorized agencies/individuals.

**Benefits**

- Enhanced safety
- Improved efficiency
- Improved information distribution and access

**Key Related Systems**

Aeronautical Information Management Modernization Segment 2  
En Route Automation Modernization Release 3  
System Wide Information Management Segment 2

**Issues**

The FIS-B service will be via the UAT data link only. The assumption is that the airlines will get NAS status, and weather data, via their FOCs as they do today. Only properly equipped aircraft will receive the FIS-B service.

Capability **Traffic Advisory**

Operational Improvement

**Current Traffic Advisory** (103201)

Traffic advisories alert aircraft to potential conflicts with other objects on the surface or in flight. For example, controllers transmit traffic advisories to aircraft or other flight objects that are in the proximity of hot air or gas balloons, missile launches, or other potential hazards. Traffic advisories for aircraft on the surface include the number, type, position, and intent of the ground traffic. Controllers provide the advisories to pilots via radio.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Air Route Surveillance Radar Model 1E  
Air Route Surveillance Radar Model 2  
Air Route Surveillance Radar Model 3  
Air Route Surveillance Radar Model 4 (ARSR-4)  
Air Traffic Control Beacon Interrogator Model 6  
Air Traffic Control Beacon Interrogator Models 4/5  
Airport Movement Area Safety System  
Airport Surface Detection Equipment-Model 3 (ASDE-3)  
Airport Surveillance Radar Model 11  
Airport Surveillance Radar Model 7  
Airport Surveillance Radar Model 8  
Airport Surveillance Radar Model 9  
Automated Radar Terminal System - Model IIIA  
Beacon Interrogator, Military OX-60  
Common Automated Radar Terminal System - Model IIE  
Common Automated Radar Terminal System - Model IIIE  
Digital Airport Surveillance Radar  
Digital Bright Radar Indicator Tower Equipment  
Display System Replacement  
Enhanced Terminal Voice Switch/Interim Voice Switch Replacement

Final Monitor Aid  
 Fixed Position Surveillance Model 117  
 Fixed Position Surveillance Model 20 Series  
 Flight Data Input/Output  
 Full Digital Automated Radar Terminal System Display  
 GSA 400/466  
 High Frequency Communications  
 Integrated Communications Switching System Type I  
 Integrated Communications Switching System Type III  
 Microprocessor-En Route Automated Radar Tracking  
 System  
 Mode Select  
 Mode Select Transponder  
 Next-Generation Air/Ground Communications System  
 Cockpit Display Unit  
 Next-Generation Air/Ground Communications System  
 Communication Management Unit  
 Precision Runway Monitor  
 Radar Automated Display System  
 Rapid Deployment Voice Switch Type I  
 Rapid Deployment Voice Switch Type II  
 Rapid Deployment Voice Switch Type IIA  
 Remote Maintenance Monitoring System  
 Standard Terminal Automation Replacement System  
 Traffic Alert and Collision Avoidance System  
 Traffic Information System Avionics  
 Ultra High Frequency Airborne Radios  
 Ultra High Frequency Ground Radios  
 Very High Frequency Airborne Radios  
 Very High Frequency Ground Radios

**Issues**

none identified

Operational Improvement

**Expanded Traffic Advisory Services Using Digital Traffic Data**  
(103206)

Surrounding traffic information is available to the flight deck, including automatic dependent surveillance (ADS) information and the rebroadcast of non-transmitting targets to equipped aircraft. Surveillance and traffic broadcast services improve situational awareness in the cockpit with more accurate and timely digital traffic data provided directly to aircraft avionics for display to the pilot.

**Benefits**

- Enhanced efficiency
- Improved safety
- Enhanced situational awareness

**Key Related Systems**

Automatic Dependent Surveillance Broadcast  
 Cockpit Display of Traffic Information Avionics  
 Multifunction Display System Avionics

**Issues**

Trades must be performed to determine how surveillance data will flow between GBT, SDN, SWIM (to get the flight data object), and the ADS-B/TIS-B Avionics.

Capability **Weather Advisories Capability**

Operational Improvement

**Automatic Hazardous Weather Alert Notification** (103117)

Hazardous weather alerts are automatically sent to NAS users and air navigation service providers (ANSPs) via data communications. Hazardous weather impacting NAS operations is detected, forecast, reported, and disseminated in real-time. Equipped aircraft and ground and space-based systems provide timely and accurate hazardous weather information.

**Benefits**

- Enhanced safety
- Enhanced capacity
- Increased collaboration of weather hazards

**Key Related Systems**

Airport Surveillance Radar-Weather System Processor  
Low-Level Windshear Alert System -  
Relocation/Sustainment Tech Refresh  
Multifunction Display System Avionics  
Weather System Processor Technological Refresh 1

**Issues**

Data link availability with ADS-B and appropriately equipped aircraft.

Operational Improvement

**Current En Route Advisory - Weather** (103107)

Weather advisories alert traffic managers and controllers of hazardous weather (e.g., hail, icing, turbulence, and high winds) associated with thunderstorm activity. National Weather Service (NWS) meteorologists at each Air Route Traffic Control Center's Center Weather Service Unit and the Aviation Weather Center in Kansas City, MO, generate these advisories based on weather data from NWS and FAA sensors. Data also comes from airborne jetliners that downlink wind and temperature data via a meteorological data collection and reporting system (MDCRS) run by a communications service provider. Pilot reports (PIREP) of encountered weather are another valuable source of weather data. En Route controllers provide weather advisories to pilots via radio. Pilots also receive warnings that are recorded and broadcast via radio at selected very high frequency omnidirectional range (VOR) sites.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Air Route Surveillance Radar Model 3  
Air Route Surveillance Radar Model 4 (ARSR-4)  
Aircraft Weather Sensors  
Display System Replacement  
En Route Information Display System  
Enhanced Traffic Management System  
Flight Information Service - Data Link  
National Weather Service Workstation  
Next Generation Weather Radar  
Operational and Supportability Implementation System  
U.S. Notice to Airmen System  
Weather Message Switching Center Replacement  
Weather Message Switching Center Replacement (WMSCR) Tech Refresh  
Weather and Radar Processor Stage 3

**Issues**

none identified

Operational Improvement

**Current Oceanic Advisory - Weather** (103114)

Common situational awareness improves by providing location and intensity of thunderstorm activity over oceanic airspace to controllers, dispatchers, and pilots via alphanumeric messages.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Dynamic Ocean Tracking System  
Future Air Navigation System 1/A  
Operational and Supportability Implementation System  
Weather and Radar Processor Stage 3

**Issues**

>> FAA funding of aviation weather R&D is absolutely essential to developing more accurate, higher-resolution oceanic weather products (detection and forecasts) for convection, turbulence, and in-flight icing. >> WARP interface to above systems provides cost-effective source (vice vendors) of weather products

Operational Improvement

**Current Terminal Advisory - Weather** (103101)

Terminal controllers receive textual and graphical weather information. They use this information to provide pilots weather advisories of potentially hazardous weather conditions, including wind shear and microburst alerts, precipitation intensity levels, icing, and areas of low visibility, hail, lightning, and tornadoes. Controllers also transmit these advisories to pilots via radio. Pilots also receive recorded warnings that are broadcast via radio at selected very high frequency omnidirectional range (VOR) sites and on Automated Terminal Information System (ATIS). In addition to the broadcast weather advisories, pilots receive automated wind shear alerts via the Terminal Weather Information for Pilot (TWIP) system at NAS pacing airports.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Airport Surveillance Radar-Weather System Processor  
Automated Surface Observing System Controller  
Equipment Information Display System  
Integrated Terminal Weather System  
National Weather Service Workstation  
Terminal Doppler Weather Radar  
Terminal Weather Information for Pilots

**Issues**

\* TWIP success is dependent on two factors: 1) AOCs forwarding the wind shear/microburst data to their aircraft, and 2) Ability to display (avionics) that wind shear/microburst information to flight deck personnel \* Convective Weather Forecast capability must be implemented in IOC ITWS - the impact of thunderstorm activity at NAS pacing airports ripples throughout much

security, during pacing airports \* ITWS wind shear/MB prediction is dependent on MDCRS data, however, participating airlines threatening to turn off the MDCRS datastream unless FAA & NWS pay some of their Comms costs \* RUC model forecast data only available hourly if MDCRS received

Operational Improvement

**Deploy FIS-B Nationally** (103104)

Flight Information Service-Broadcast (FIS-B) is deployed to provide weather services on the airport surface, in terminal and en route airspace to equipped aircraft. FIS-B improves flight deck situational awareness relative to weather and reduces frequency congestion. The air navigation service provider (ANSP) provides weather advisories to unequipped aircraft via other means.

**Benefits**

- Enhanced efficiency
- Enhanced safety
- Reduced frequency congestion

**Key Related Systems**

Automatic Dependent Surveillance Broadcast

**Issues**

1) Datalink via GBT, SWIM and the SMU are needed for this step. We will likely need interim interfaces between ITWS, WARP/GWIS, weather sensors, etc., and SWIM. 2) It is assumed that WARP/GWIS (and later GWP) will package the weather data that is sent to AIM via SWIM. Then AIM will package all FIS data (NAS Status and Weather Data) and transmit it via SWIM and GBT. 3) Agency policy vis-a-vis re provision of FIS services--FAA versus vendor--is not clear at this time and being revisited as earlier FAA policy established it to be vendor-provided service.

Operational Improvement

**Full Operational Weather Capability** (103121)

Reducing the impact of weather on NAS operations enhances NAS performance. NextGen network enabled weather (NNEW) facilitates widespread distribution and integration of weather products into ground and airborne decision support systems, enabling collaborative and dynamic NAS decision-making.

**Benefits**

- Enhanced efficiency
- Enhanced safety
- Reduced flight times and emissions

**Key Related Systems**

NextGen Weather Processor WP 1  
System Wide Information Management Segment 3

**Issues**

Under development

Operational Improvement

**Near-real Time Dissemination of Weather Information to all Ground and Air Users** (103120)

NextGen Network Enabled Weather (NNEW) provides near real-time notification of changing weather situations to strategic and tactical decision-makers. The update frequency of weather information is commensurate with the need to react to unanticipated, rapidly changing circumstances. Near real-time weather information integrated into decision-support automation systems enables airspace or configuration changes (e.g., realigning sectors, flows, or runway configurations) based on changing or forecast weather conditions.

### **Benefits**

- Enhanced efficiency
- Enhanced safety
- Enhanced shared situational awareness

### **Key Related Systems**

Automatic Dependent Surveillance Broadcast  
System Wide Information Management Segment 2  
Weather Avionics

### **Issues**

Under development

Operational Improvement

## **Support CDM with Simultaneous Hazardous Weather Notification**

(103112)

Common situational awareness improves through similar depiction of NAS-impacting weather to pilots, controllers, and traffic managers as SWIM facilitates near simultaneous dissemination of aviation-impacting weather to both service providers and users.

### **Benefits**

Since controllers and pilots have a common weather picture, safety is enhanced. Distributing a common weather picture to ATC personnel and pilots supports the Collaborative Decision Making process and delegating separation responsibility to the pilot.

### **Key Related Systems**

Aeronautical Information Management Modernization Segment 1  
Air Route Surveillance Radar Model 4 (ARSR-4)  
Airport Surveillance Radar Model 9 and Mode Select SLEP  
Automated Surface Observing System Pre-Planned Product Improvement  
Cockpit Display of Traffic Information Avionics  
Common Automated Radar Terminal System - Model IIIIE  
Corridor Integrated Weather System Prototype  
Flight Information Service - Data Link  
Integrated Terminal Weather System  
National Weather Service Workstation  
Next Generation Weather Radar Open System  
Operational and Supportability Implementation System  
Stand Alone Weather Sensor  
System Wide Information Management Segment 1  
System Wide Information Management Segment 2  
Terminal Doppler Weather Radar Service Life Extension Program  
Tropospheric Airborne Meteorological Data Reporting System  
Weather Message Switching Center Replacement (WMSCR) Tech Refresh  
Weather System Processor Technological Refresh 1

Weather and Radar Processor Stage 3  
Weather and Radar Processor Tech Refresh

**Issues**

Currently, WMSCR is undergoing a Tech Refresh to enable it to function through 2010/11. SWIM must subsume its functionality by then. From a SWIM perspective, what physically will be in place to subsume WMSCR functionality?

Operational Improvement

**Trajectory-Based Weather Impact Evaluation** (103119)

Weather information and its expected impact on individual 4D trajectories will be integrated into decision-support tools, where it will be translated into operational impacts to support tactical and strategic decisions on individual and group flights. This stands to improve overall flight efficiency and increase the effective use of capacity. Decision-support strategies include automation-to-automation integration of Air Navigation Service Provider (ANSP), and decision-support capabilities with those of users, where appropriate.

**Benefits**

- Improved efficiency
- Enhanced safety
- Improved throughput
- Reduced fuel-burn and engine emissions

**Key Related Systems**

4-D Weather Cube  
En Route Automation Modernization Release 3  
NextGen Weather Processor WP 2  
System Wide Information Management Segment 1

**Issues**

Under development

Operational Improvement

**Turbulence and Icing Available on Meteorological Data Collection and Reporting System (MDCRS)** (103116)

The accuracy and scope of the weather forecast model outputs (e.g., in-flight icing and turbulence forecasts) is expanded/improved as additional atmospheric conditions (humidity, turbulence, winds aloft, etc.) are provided by expanded data sources. Satellite and airborne nodes actively participate in collecting and transmitting network-enabled weather observations to ground-based systems for integration with other weather information.

**Benefits**

- Enhanced efficiency
- Improved weather observations
- Increased safety

**Key Related Systems**

Aircraft Weather Sensors  
Tropospheric Airborne Meteorological Data Reporting System

**Issues**

Airline equipage of their fleet during economic slump.



## **Current Aircraft To Airspace Separation** (102301)

Separation services ensure that aircraft maintain a safe distance from special use airspace (SUA), such as prohibited, restricted, and warning areas. SUA ensures safety for unique aircraft operations or prohibits flight within a specified area. Separation standards ensure that aircraft remain an appropriate minimum distance from the airspace. The standards are applied using such vehicles as regulatory publications and specific control instructions.

### **Benefits**

Current operations are provided in the NAS.

### **Key Related Systems**

Air Route Surveillance Radar Model 1E  
Air Route Surveillance Radar Model 2  
Air Route Surveillance Radar Model 3  
Air Route Surveillance Radar Model 4 (ARSR-4)  
Air Traffic Control Beacon Interrogator Model 6  
Air Traffic Control Beacon Interrogator Models 4/5  
Airport Surveillance Radar Model 11  
Airport Surveillance Radar Model 7  
Airport Surveillance Radar Model 8  
Airport Surveillance Radar Model 9  
Airport Surveillance Radar, Military  
Automated Radar Terminal System - Model IIIA  
Automated Radar Terminal System Color Display  
Common Automated Radar Terminal System - Model IIE  
Common Automated Radar Terminal System - Model IIIE  
Digital Voice Recorder System  
Display System Replacement  
Enhanced Terminal Voice Switch/Interim Voice Switch Replacement  
Full Digital Automated Radar Terminal System Display  
Host Computer System/Oceanic Computer System Replacement  
Integrated Communications Switching System Type I  
Integrated Communications Switching System Type II  
Low-Density Radio Communications Link  
Microprocessor-En Route Automated Radar Tracking System  
Multi-Mode Digital Radios  
Power System - Long-Range Radar  
Radar Automated Display System  
Radio Control Equipment  
Rapid Deployment Voice Switch Type I  
Rapid Deployment Voice Switch Type II  
Rapid Deployment Voice Switch Type IIA  
Remote Automated Radar Terminal System Color Display  
Small Tower Voice Switch  
Standard Terminal Automation Replacement System  
Ultra High Frequency Airborne Radios  
Ultra High Frequency Ground Radios  
Ultra High Frequency Ground Radios - Replacement  
VSCS Control Subsystem Upgrade  
Very High Frequency Airborne Radios  
Very High Frequency Ground Radios

### **Issues**

none identified

Capability **Aircraft to Aircraft Separation Capability**

Operational Improvement

**ADS-B Separation** (102123)

The air navigation service provider (ANSP) automation uses aircraft dependent surveillance broadcast in non-radar airspace to provide reduced separation and flight following. Improved surveillance enables ANSP to use radar-like separation standards and services.

**Benefits**

- Increased safety
- Increased capacity and access
- Improved search and rescue capabilities

**Key Related Systems**

Automated Radar Terminal System - Model IIIA  
Automatic Dependent Surveillance Broadcast  
Common Automated Radar Terminal System - Model IIE  
Common Automated Radar Terminal System - Model IIIE  
Display System Replacement  
Display System Replacement - R-position Technology Refresh  
Microprocessor-En Route Automated Radar Tracking System  
Next-Generation Air/Ground Communications System  
Communication Management Unit  
Standard Terminal Automation Replacement System

**Issues**

Equipage and the mix of procedural versus radar-like targets at the same altitudes and routings. Equity and policy on servicing equipped versus non-equipped to improve/ maximize flow and access.

Operational Improvement

**ADS-B Services to Secondary Airports** (102138)

Expanded Automatic Dependent Surveillance-Broadcast (ADS-B) coverage, combined with other radar sources, provides equipped aircraft with radar-like services to secondary airports. Equipped aircraft automatically receive airborne broadcast traffic information. Surface traffic information is available at select non-towered satellite airports.

**Benefits**

- Improved safety
- Expanded ANSP services
- Enhanced surveillance coverage
- Enhanced search and rescue coordination

**Key Related Systems**

Automatic Dependent Surveillance Broadcast  
Common Automated Radar Terminal System - Model IIIE  
En Route Automation Modernization Release 3  
Microprocessor-En Route Automated Radar Tracking System  
Standard Terminal Automation Replacement System

**Issues**

Under Development

Operational Improvement

**Automation Support for Mixed Environments** (102137)

The ANSP automation provides the controller with tools to manage aircraft in a mixed navigation and wake performance environment.

**Benefits**

Improved efficiency  
Enhanced safety  
Enhanced situational awareness

**Key Related Systems**

En Route Automation Modernization Release 4  
En Route Automation Modernization Release 5  
En Route Automation Modernization Release 6

**Issues**

Under Development

Operational Improvement

**Current En Route Separation** (102112)

Aircraft to aircraft separation services in en route airspace ensure a safe distance is maintained between aircraft. Air traffic controllers apply separation standards defined for the different aircraft operating environments to guide pilots flying under instrument or visual flight rules. They separate aircraft under their control using standard rules for vertical, lateral, longitudinal, or visual separation. When potential conflicts exist, an air traffic controller evaluates the situation, develops conflict resolution alternatives, and alerts or issues separation instructions to the aircraft.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Air Route Surveillance Radar Model 1E  
Air Route Surveillance Radar Model 2  
Air Route Surveillance Radar Model 3  
Air Route Surveillance Radar Model 4 (ARSR-4)  
Air Traffic Control Beacon Interrogator Model 6  
Air Traffic Control Beacon Interrogator Models 4/5  
Alaskan NAS Interfacility Communications System  
Digital Voice Recorder System  
Display System Replacement  
High Frequency Airborne Radios  
High Frequency Communications  
Low-Density Radio Communications Link  
Microprocessor-En Route Automated Radar Tracking System  
Multi-Mode Digital Radios  
Power System - Long-Range Radar  
Power Systems  
Radio Communication Link  
Radio Control Equipment  
Ultra High Frequency Airborne Radios  
Ultra High Frequency Ground Radios - Replacement  
VSCS Control Subsystem Upgrade  
Very High Frequency Airborne Radios  
Very High Frequency Ground Radios

**Issues**

none identified

Operational Improvement

**Current Oceanic Separation** (102105)

Aircraft to aircraft separation services in oceanic airspace ensure a safe distance is maintained between aircraft. Separation minima are based on the oceanic separation and procedures of the International Civil Aviation Organization. These services are supported by a system providing flight data processing, conflict probe, and situation display for oceanic air traffic control. Separation is supported through daily development and publishing of ocean track systems. Assignment to tracks, entry times, etc., through clearance planning, provides separation along and between tracks.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Advanced Technologies and Oceanic Procedures  
Advanced Technologies and Oceanic Procedures  
Controller Work Station  
Air Route Surveillance Radar Model 1E  
Air Route Surveillance Radar Model 2  
Air Route Surveillance Radar Model 3  
Air Route Surveillance Radar Model 4 (ARSR-4)  
Air Traffic Control Beacon Interrogator Model 6  
Digital Voice Recorder System  
Dynamic Ocean Tracking System  
Future Air Navigation System 1/A  
High Frequency Airborne Radios  
High Frequency Communications  
Host Computer System/Oceanic Computer System Replacement  
Low-Density Radio Communications Link  
Microprocessor-En Route Automated Radar Tracking System  
Multi-Mode Digital Radios  
Power System - Long-Range Radar  
Radio Communication Link  
Radio Control Equipment  
Ultra High Frequency Airborne Radios  
Ultra High Frequency Ground Radios  
Ultra High Frequency Ground Radios - Replacement  
VSCS Control Subsystem Upgrade  
Very High Frequency Airborne Radios  
Very High Frequency Ground Radios

**Issues**

none identified

Operational Improvement

**Current Terminal Separation** (102129)

Aircraft to aircraft separation services in terminal airspace ensure a safe distance is maintained between aircraft. Within terminal airspace, requirements for separation vary by airspace Class. Controllers separate aircraft under their control using standard rules for vertical, lateral, longitudinal, or visual separation methods. When potential conflicts exist, an air traffic controller evaluates the situation, develops conflict resolution alternatives, and alerts or issues separation instructions to the aircraft

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Air Traffic Control Beacon Interrogator Model 6  
 Air Traffic Control Beacon Interrogator Models 4/5  
 Airport Surveillance Radar Model 11  
 Airport Surveillance Radar Model 7  
 Airport Surveillance Radar Model 8  
 Airport Surveillance Radar Model 9  
 Airport Surveillance Radar, Military  
 Alaskan NAS Interfacility Communications System  
 Automated Radar Terminal System - Model IIIA  
 Automated Radar Terminal System Color Display  
 Common Automated Radar Terminal System - Model IIIE  
 Digital Airport Surveillance Radar  
 Digital Voice Recorder System  
 Enhanced Terminal Voice Switch/Interim Voice Switch Replacement  
 Flight Data Input/Output  
 Full Digital Automated Radar Terminal System Display  
 High Frequency Airborne Radios  
 Integrated Communications Switching System Type I  
 Low-Density Radio Communications Link  
 Microprocessor-En Route Automated Radar Tracking System  
 Mode Select  
 Multi-Mode Digital Radios  
 Radar Automated Display System  
 Radio Communication Link  
 Radio Control Equipment  
 Rapid Deployment Voice Switch Type I  
 Rapid Deployment Voice Switch Type II  
 Remote Automated Radar Terminal System Color Display  
 Small Tower Voice Switch  
 Standard Terminal Automation Replacement System  
 Ultra High Frequency Airborne Radios  
 Ultra High Frequency Ground Radios  
 Ultra High Frequency Ground Radios - Replacement  
 Very High Frequency Airborne Radios  
 Very High Frequency Ground Radios

**Issues**

none identified

Operational Improvement

**Delegated Responsibility for Horizontal Separation** (102118)

Enhanced surveillance and new procedures enable the ANSP to delegate aircraft-to-aircraft separation. Improved display avionics and broadcast positional data provide detailed traffic situational awareness to the flight deck. When authorized by the controller, pilots will implement delegated separation between equipped aircraft using established procedures.

**Benefits**

- Improved efficiency
- Increased capacity

**Key Related Systems**

En Route Automation Modernization Release 4  
 En Route Automation Modernization Release 5  
 En Route Automation Modernization Release 6

**Issues**

Need concept of use for pilot maintenance of distance with a CDTI thus extending the oceanic procedures into an environment with smaller separation and less structured traffic. Need to evaluate the procedures to determine if the workload associated with monitoring is less than the current resolution merging procedures – does workload reduce or shift from one task to another

Operational Improvement

**Improved Operations to Closely Spaced Parallel Runways (CSPR)** (102141)

Enhanced procedures (including cockpit and ground improvements) enable parallel runway improvements, reducing impact to airport/runway throughput in lower visibility conditions.

**Benefits**

- Improved efficiency
- Increased capacity
- Decreased user operational costs
- Reduced fuel-burn and engine emissions

**Key Related Systems**

Automatic Dependent Surveillance Broadcast

**Issues**

Under development

Operational Improvement

**Initial Conflict Resolution Advisories** (102114)

The ANSP conflict probe is enhanced not only to recognize conflicts but to provide rank-ordered resolution advisories to the provider. The provider may select one of the resolutions to issue to the aircraft. Automation enables ANSP to better accommodate pilot requests for trajectory changes by providing conflict detection, trial flight planning, and development of resolutions, as well as an optimal ranking of resolutions.

**Benefits**

- Enhanced safety
- Improved efficiency

**Key Related Systems**

En Route Automation Modernization Release 4  
En Route Automation Modernization Release 5  
En Route Automation Modernization Release 6

**Issues**

Need to consider the roles and responsibilities in separation assurance versus strategic flow when voice is not required to change trajectories. Not applicable Need to consider the role of TMU for strategic adjustments and the role separation assurance and clearances. Need to develop a concept of use for data messaging that includes its role in separation assurance as well as/differentiating from delivery of other ATM services.

Operational Improvement

**NextGen Oceanic Procedures** (102136)

Enhanced communication, surveillance, and flight deck avionics capabilities enable reduced oceanic separation minima when operationally advantageous and aircraft meet required total system performance requirements. Data communications between aircraft and between the aircraft and the air navigation service provider (ANSP) enable real-time control instructions by the ANSP and aircraft-to-aircraft delegation of separation authority. Accurate and immediate feedback of routing or altitude changes provides immediate acknowledgement for separation assurance, trajectory changes, and deviations around air traffic or weather.

### **Benefits**

- Increased safety
- Increased capacity
- Enhanced efficiency

### **Key Related Systems**

Automatic Dependent Surveillance Broadcast  
Common Display Subsystem Phase 1  
Data Communications Segment 2  
Enhanced-Advanced Technologies and Oceanic Procedures  
Flight Object Management System - En Route  
NAS Voice Switch  
NextGen Automation Platform Release 2  
System Wide Information Management Segment 3

### **Issues**

Identifying the demand point at which the service in a track structure costs more in the terms of efficiency than the institution of increased surveillance, communication to manage the flow with radar-like procedures. Need to develop a concept of control that does not depend on the same domestic volumetric assignments or the cost of radar-like services will outweigh the flight efficacy benefits of flexibility.

Operational Improvement

### **Oceanic In-trail Climb and Descent** (102108)

ANSP automation enhancements will take advantage of improved communication, navigation, and surveillance coverage in the oceanic domain. When authorized by the controller, pilots of equipped aircraft use established procedures for climbs and descents.

### **Benefits**

- Improved efficiency
- Increased capacity
- Reduced fuel burn and engine emissions

### **Key Related Systems**

Advanced Technologies and Oceanic Procedures

### **Issues**

Need to link the flight planning functions of domestic automation and ATOP to accurately project the trajectory to the entry point. Need to link the Traffic Synchronization with ocean control so that the aircraft can be managed to ocean transition and entry with minimal impact on flow while meeting the flight objectives of the oceanic flight.

Operational Improvement

### **Reduce Horizontal Separation Standards -3 Miles** (102117)

The Air Navigation Service Provider (ANSP) provides reduced and more efficient separation between aircraft where the required performance criteria are met, regardless of location. Advances in Air Navigation Service Provider (ANSP) surveillance and automation allow procedures with lower separation minimums to be used in larger areas of the airspace. This reduces the incidence of conflicts and increases the efficiency of the conflict resolution maneuvers.

### **Benefits**

- Increased efficiency
- Increased capacity

### **Key Related Systems**

Automatic Dependent Surveillance Broadcast  
Common Automated Radar Terminal System - Model IIIE  
Common Display Subsystem Phase 1  
Display System Replacement  
Display System Replacement - Console Reconfiguration  
Monitor Replacement  
Display System Replacement - D-position Technology Refresh  
En Route Automation Modernization Release 7  
Standard Terminal Automation Replacement System

### **Issues**

Need to develop and validate a concept of use for surveillance data fusion and its use in separation assurance. Need to consider HMI to support effective use of three-mile procedures including a more rapid update rate for enroute displays. Strategy to exploit the use of ADS-B provided positions with increased accuracy in a transition to or in airspace without the full three mile RSP coverage.

Operational Improvement

## **Use Aircraft Provided Intent Data to Improve Conflict Resolution**

(102122)

Air navigation service provider (ANSP) automation uses aircraft position broadcast reports, velocity, and both short- and long-term intent data to provide tactical and strategic separation services and more efficient flows. Aircraft exchange of short-term intent data enables aircraft-to-aircraft delegated separation authority when operationally advantageous.

### **Benefits**

- Enhanced safety through common situational awareness
- Increased flexibility and flight efficiency by providing more user-preferred trajectories
- Increased predictability of airspace utilization

### **Key Related Systems**

Automated Radar Terminal System - Model IIIA  
Automatic Dependent Surveillance Broadcast  
Common Automated Radar Terminal System - Model IIE  
Common Automated Radar Terminal System - Model IIIE  
En Route Automation Modernization Release 5  
Next-Generation Air/Ground Communications System  
Communication Management Unit  
Standard Terminal Automation Replacement System

### **Issues**



Need to develop a concept of use for and evaluate/validate the role of automation in conformance monitoring. Need to evaluate/validate the improvements in trajectory prediction that intent provides at the normal conflict detection prediction window. How much more accurate are the trajectories at 20, 15, 10 , 5 minutes?

Operational Improvement

**Use Aircraft Provided Intent Data to Improve Flow and Conflict Resolution** (102139)

Air navigation service provider (ANSP) automation uses aircraft provided short-term intent data (4D trajectory contracts) to improve modeling of conflict-free flows at high-density airports. Conformance monitoring tools ensure 4D trajectories reflect the aircraft's actual and intended state.

**Benefits**

- Enhanced efficiency
- Increased flexibility

**Key Related Systems**

Automatic Dependent Surveillance Broadcast  
Collaborative Air Traffic Management Technologies Work Package 3  
En Route Automation Modernization Release 6  
Flight Object Management System - En Route  
Flight Object Management System - Terminal

**Issues**

Under development

Operational Improvement

**Wake Turbulence Mitigation for Departures (WTMD): Wind-Based Wake Procedures** (102140)

Changes to wake rules are implemented based on wind measurements. Procedures allow more closely spaced departure operations to maintain airport/runway capacity.

**Benefits**

- Improved efficiency
- Increased capacity
- Reduced fuel-burn and engine emissions

**Key Related Systems**

Tower Flight Data Manager Phase 1

**Issues**

Under development

Operational Improvement

**Wake Vortex Incorporated into Flow** (102142)

Air navigation service provider (ANSP) automation and decision support tools incorporate aircraft wake characteristics and current wake transport conditions into arrival/departure flows and runway staging enhance efficiency at high-density airports. Arrival and departure flows are planned and executed based on a comprehensive view of real time airport operations. Automation provides optimal departure staging and arrival sequencing based on aircraft wake, wake conditions and airborne performance characteristics.

**Benefits**

- Enhanced efficiency
- Decreased fuel burn, emissions, and noise

**Key Related Systems**

Collaborative Air Traffic Management Technologies Work Package 3  
En Route Automation Modernization Release 8  
Flight Object Management System - Terminal  
Integrated Departure/Arrival Capability  
Surface Traffic Management System  
Wake Vortex System

### Issues

Under development

## Capability **Aircraft-Terrain-Obstacles**

Operational Improvement

### **Current Aircraft To Terrain / Obstacle Separation** (102201)

Separation services ensure that aircraft maintain a safe distance from terrain and obstacles. Aircraft positions are derived from navigational systems, surveillance information, visual orientation, and position reports to ensure that an aircraft's trajectory remains a minimum safe distance from terrain and obstacles.

### Benefits

Current operations are provided in the NAS.

### Key Related Systems

Air Route Surveillance Radar Model 1E  
Air Route Surveillance Radar Model 2  
Air Route Surveillance Radar Model 3  
Air Route Surveillance Radar Model 4 (ARSR-4)  
Air Traffic Control Beacon Interrogator Model 6  
Air Traffic Control Beacon Interrogator Models 4/5  
Airport Surface Detection Equipment-Model 3 (ASDE-3)  
Airport Surveillance Radar Model 11  
Airport Surveillance Radar Model 7  
Airport Surveillance Radar Model 8  
Airport Surveillance Radar Model 9  
Airport Surveillance Radar, Military  
Automated Radar Terminal System - Model IIIA  
Automated Radar Terminal System Color Display  
Common Automated Radar Terminal System - Model IIE  
Common Automated Radar Terminal System - Model IIIE  
Digital Voice Recorder System  
Display System Replacement  
Enhanced Terminal Voice Switch/Interim Voice Switch Replacement  
Full Digital Automated Radar Terminal System Display  
High Frequency Airborne Radios  
Integrated Communications Switching System Type I  
Integrated Communications Switching System Type II  
Low-Density Radio Communications Link  
Microprocessor-En Route Automated Radar Tracking System  
Mode 3/AC Transponder  
Mode Select  
Mode Select Transponder  
Multi-Mode Digital Radios  
Power System - Long-Range Radar  
Radar Automated Display System  
Radio Communication Link  
Radio Control Equipment  
Rapid Deployment Voice Switch Type I  
Rapid Deployment Voice Switch Type II

Rapid Deployment Voice Switch Type IIA  
Remote Automated Radar Terminal System Color Display  
Small Tower Voice Switch  
Ultra High Frequency Airborne Radios  
Ultra High Frequency Ground Radios  
Ultra High Frequency Ground Radios - Replacement  
VSCS Control Subsystem Upgrade  
Very High Frequency Airborne Radios  
Very High Frequency Ground Radios

**Issues**

none identified

Operational Improvement

**Use Improved Terrain Information To Delegate Responsibility For Aircraft To Terrain Separation** (102203)

Flight Crews and single-pilot operations monitor cockpit information that provides increased situational awareness of position, altitude, weather, and other essential data that contribute to safety. Automated systems consolidate essential and timely information that is valuable to the pilot. Pilots receive comprehensive databases that reflect terrain and obstacles, fixed and temporary, to provide continuous updates, rather than the 28-day updates in the current architecture. Satellite position reports show the aircrafts actual position on moving maps in the cockpit to provide pilots a more complete picture of the aircraft-to-ground environment to reduce controlled flight into terrain.

**Benefits**

Since the flight deck can accurately monitor the relationship of the aircraft to the terrain, the service provider can issue clearances for more direct routings in which the flight deck is responsible for maintaining clearance from terrain along the path. This allows greater flight efficiency in the route of flight for the pilot (time and fuel), while the controller can issue direct clearances versus multiple navigational aid fix/intersection clearances. The pilot benefits through increased situational awareness (location and altitude) and operating efficiency while the service provider reduces workload, since the aircraft routing is more direct and the aircraft requires less monitoring.

**Key Related Systems**

Aeronautical Information Management Modernization Segment 1  
Cockpit Display of Traffic Information Avionics Common Display Subsystem Phase 1  
NAS Voice Switch  
System Wide Information Management Segment 3  
VSCS Technology Refresh Phase 1

**Issues**

Need to develop a concept of use for clearances that require an aircraft maintain a true altitude above the terrain versus standard baro-altitude clearances? Need to consider what is required for the controller to issue the clearance- pilot request, designation of capability on the flight plan, etc. Need to evaluate the procedures to see

determine if the workload associated with monitoring is less than the current resolution merging procedures - does workload reduce or shift from one task to another. Need to determine if direct routing based on aircraft equipment will impact minimum safe altitudes to reflect more of a airway safe altitude used today on published airway structures.

Capability **Surface Separation Capability**

Operational Improvement

**Current Surface Separation** (102401)

Separation services on the airport surface prevent taxi conflicts and runway incursions. Separation is based on radio communication, visual acquisition, notes, and monitoring to ensure that taxi clearances do not result in conflicts and to conduct conformance monitoring. At some airports, the airport surface detection equipment radar and the associated display provide increased situational awareness.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Digital Voice Recorder System  
Enhanced Terminal Voice Switch/Interim Voice Switch Replacement  
Flight Data Input/Output  
Integrated Communications Switching System Type I  
Multi-Mode Digital Radios  
Radar Automated Display System  
Radio Control Equipment  
Rapid Deployment Voice Switch Type I  
Rapid Deployment Voice Switch Type II  
Rapid Deployment Voice Switch Type IIA  
Small Tower Voice Switch  
Ultra High Frequency Airborne Radios  
Ultra High Frequency Ground Radios  
Ultra High Frequency Ground Radios - Replacement  
Very High Frequency Airborne Radios  
Very High Frequency Ground Radios

**Issues**

none identified

Operational Improvement

**Provide Full Surface Situation Information** (102406)

Automated broadcast of aircraft and vehicle position to ground and aircraft sensors/receivers provides a digital display of the airport environment. Aircraft and vehicles are identified and tracked to provide a full comprehensive picture of the surface environment to ANSP, equipped aircraft, and flight operations centers (FOCs).

**Benefits**

- Improved safety
- Improved efficiency
- Increased situational awareness

**Key Related Systems**

Automatic Dependent Surveillance Broadcast

**Issues**

Need a concept of use for positions with tags as support for situational awareness (traffic advisory) versus separation. There is the potential for the service provider to developing dependencies on the displayed information in support separation functions. When does situational awareness become separation support?

Operational Improvement

**Provide Surface Situation to Pilots, Service Providers and Vehicle Operators for All-weather Operations** (102409)

Aircraft and surface vehicle positions are displayed to air navigation service providers (ANSP) and equipped aircraft and vehicles. This capability increases situational awareness in restricted visibility conditions and provides more efficient surface movement.

**Benefits**

- Improved situational awareness
- Enhanced safety
- Enhanced efficiency

**Key Related Systems**

Airport Movement Area Safety System  
Airport Surface Detection Equipment Model 3/Airport Movement Area Safety System Upgrade  
Airport Surface Detection Equipment-Model X  
Automatic Dependent Surveillance Broadcast  
Multifunction Display System Avionics  
Traffic Information System Avionics

**Issues**

Requires substantial equipage to exercise the capability. Requires certification of CDTI, with moving map and target positions for taxiing and maintaining separation along the taxiways. Requires certification of surveillance and controller displays for maintaining runway separation.

Service **Airspace Management**

Capability **Airspace Design**

Operational Improvement

**Current Airspace Design** (108101)

Airspace designs consider, among other elements, the existing design, current and projected traffic usage, radio frequency congestion, effects of airport construction, proposed and existing surface structures, and environmental factors, such as noise abatement. Airspace designs provide the aviation community the description, operational composition, and status of airspace/airport components of the NAS required to support separation and synchronization services.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Airspace Simulation and Analysis for Terminal Procedures Sector Design Analysis Tool

**Issues**

none identified

Capability **Airspace Management**

Operational Improvement

**Current Airspace Management** (108201)

Current airspace management assigns airspace classification to volumes of airspace. Within those airspaces the service provides and develops sectorizations and routings based on the characteristics of the aircraft operating within those airspace volumes. Airspace Management also reviews construction projects for their impact on airspace, and designates and schedules airspace for special use for activities. Designs are limited by the minimum capabilities of aircraft allowed within a class of airspace and by the limitation of automation and the management/coverage of CNS (communication and navigation systems) assets.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Common Automated Radar Terminal System - Model IIIIE

**Issues**

none identified

Operational Improvement

**Expand use of RNAV/RNP Procedures** (108203)

Provide airspace design changes to increase access, efficiency and capacity utilization by developing and publishing Area Navigation (RNA) and RNAV Required Navigation Performance (RNP) routings in the NAS. RNAV/RNP provides increased routing to allow more efficient routes of flight and merging of traffic, increased opportunities to manage flow with more defined and closely separated paths. Allows flows that are currently co-mingled due to lateral spacing requirements to be segregated in individual paths.

**Benefits**

By refining navigation system performance and airspace containment to a 99.999% certainty, maximum benefit can be derived from RNP. The accurate, repeatable paths, and integrity and continuity ensure procedures will be flown in the same manner by all aircraft. Controllers can then expect aircraft to be at a specific position with a high degree of confidence, and thus maximize safety and the efficient flow of aircraft through airspace. This improved containment will be used to refine obstacle evaluation when developing routes and procedures. Other benefits are:

- Reduced route separation resulting in increased airspace capacity and efficiency
- Improved obstacle clearance limits
- Lower landing weather minimums
- Reduced pilot and controller

**Key Related Systems**

Aeronautical Information Management Modernization Segment 1  
En Route Automation Modernization Release 1  
Global Positioning System  
Global Positioning System Avionics  
Standard Terminal Automation Replacement System

Wide Area Augmentation System (Satellite-Based Augmentation System)  
Wide Area Augmentation System Avionics

**Issues**

none identified

Operational Improvement

**Flexible Airspace Management** (108206)

ANSP automation supports reallocation of trajectory information, surveillance, communications, and display information to different positions or different facilities.

**Benefits**

- Improved efficiency
- Maintained throughput
- Increased flexibility
- Facilitating reallocation of resources

**Key Related Systems**

Collaborative Air Traffic Management Technologies Work Package 2  
En Route Automation Modernization Release 3  
En Route Automation Modernization Release 4  
En Route Automation Modernization Release 5  
En Route Automation Modernization Release 6  
NAS Voice Switch

**Issues**

none identified

Operational Improvement

**Improved Management of Airspace for Special Use** (108212)

Airspace for special use assignments, schedules, coordination, and status changes are conducted automation-to-automation. Changes to status of airspace for special use are readily available for operators and Air Navigation Service Providers (ANSP). Status changes are transmitted to the flight deck via voice or data communications. Flight trajectory planning is managed dynamically based on real-time use of airspace.

**Benefits**

- Improved efficiency
- Increased access
- Reduced fuel-burn and engine emissions

**Key Related Systems**

Aeronautical Information Management Modernization Segment 1

**Issues**

Under development

Operational Improvement

**Increase Capacity and Efficiency Using Area Navigation (RNAV) and Required Navigation Performance (RNP)** (108209)

Both RNAV and RNP will enable more efficient aircraft trajectories. RNAV and RNP combined with airspace changes, increase airspace efficiency and capacity.

**Benefits**

- Improved efficiency
- Increased access and capacity
- Reduced fuel burn and engine emissions

**Key Related Systems**

En Route Automation Modernization Release 2  
En Route Automation Modernization Release 3

**Issues**

none identified

Operational Improvement

**Initial Trajectory Based Airspace** (108211)

Initial Trajectory based airspace (TBA) and automation enable air navigation service providers (ANSPs) to manage traffic flows without specific local knowledge. ANSPs are certified for airspace, not for specific local regions. ANSP automation includes decision support tools, conflict resolution, and aids for local knowledge.

**Benefits**

- Increased efficiency
- Increased flexibility
- Increased capacity
- Increased user-preferred routes
- Decreased fuel burn and emissions

**Key Related Systems**

Collaborative Air Traffic Management Technologies Work Package 1  
 En Route Automation Modernization Release 2  
 En Route Information Display System  
 System Wide Information Management Segment 2

**Issues**

none identified

Operational Improvement

**Manage Airspace to Flow** (108207)

Airspace and air navigation service provider (ANSP) resources are allocated to accommodate demand, flows, and system constraints. Automation provides the capability to define and manage airspace and asset assignment (re-mapping of flight information, radar information, etc.) to appropriate ANSP positions. Automation, flexible airspace, and procedures enable sharing airspace across facility boundaries.

**Benefits**

- Enhanced efficiency
- Enhanced resource allocation
- Increased flexibility

**Key Related Systems**

Collaborative Air Traffic Management Technologies Work Package 3  
 Common Display Subsystem Phase 1  
 En Route Automation Modernization Release 8  
 Flight Object Management System - En Route  
 Flight Object Management System - Terminal  
 NAS Voice Switch

**Issues**

none identified

Service **Emergency and Alerting**

Capability **Alerting Support**

Operational Improvement

**Current Emergency Alerting Support** (106201)



Indirect assistance is for events and circumstances in which the response is external to the system. For example, when information is received that an aircraft is overdue or missing, emergency locator transmitter signals are received, or search and rescue services may be required. Alerting support provides the relevant information and coordinates with appropriate international, military, federal, state, and local agencies. The appropriate organization(s) then provide the direct response(s).

### **Benefits**

Current operations are provided in the NAS.

### **Key Related Systems**

Air Route Surveillance Radar Model 1E  
Air Route Surveillance Radar Model 2  
Air Route Surveillance Radar Model 3  
Air Route Surveillance Radar Model 4 (ARSR-4)  
Air Traffic Control Beacon Interrogator Model 6  
Air Traffic Control Beacon Interrogator Models 4/5  
Airport Surface Detection Equipment-Model 3 (ASDE-3)  
Airport Surveillance Radar Model 11  
Airport Surveillance Radar Model 7  
Airport Surveillance Radar Model 8  
Airport Surveillance Radar Model 9  
Airport Surveillance Radar, Military  
Automated Radar Terminal System - Model IIIA  
Automated Radar Terminal System Color Display  
Common Automated Radar Terminal System - Model IIE  
Common Automated Radar Terminal System - Model IIIE  
Digital Airport Surveillance Radar  
Digital Voice Recorder System  
Display System Replacement  
Display System Replacement - Console Reconfiguration  
Monitor Replacement  
Emergency Locator Transmitter  
Emergency Locator Transmitter-Satellite  
En Route Communications Gateway  
Enhanced Terminal Voice Switch/Interim Voice Switch Replacement  
Full Digital Automated Radar Terminal System Display  
High Frequency Airborne Radios  
High Frequency Communications  
Host Computer System/Oceanic Computer System Replacement  
Integrated Communications Switching System Type I  
Integrated Communications Switching System Type II  
Integrated Communications Switching System Type III  
Low-Density Radio Communications Link  
Microprocessor-En Route Automated Radar Tracking System  
Operational and Supportability Implementation System  
Operational and Supportability Implementation System Work Station  
Power System - Long-Range Radar  
Radar Automated Display System  
Radio Communication Link  
Radio Control Equipment  
Rapid Deployment Voice Switch Type I  
Rapid Deployment Voice Switch Type II  
Rapid Deployment Voice Switch Type IIA

Remote Automated Radar Terminal System Color Display  
Small Tower Voice Switch  
Standard Terminal Automation Replacement System  
Ultra High Frequency Airborne Radios  
Ultra High Frequency Ground Radios  
Ultra High Frequency Ground Radios - Replacement  
Very High Frequency Airborne Radios  
Very High Frequency Ground Radios

**Issues**

None

Operational Improvement

**Enhance Emergency Alerting** (106202)

Controllers and search and rescue support, using Global Positioning System location information and discrete aircraft identification, locate distressed or downed aircraft, through automatic dependent surveillance system-broadcast. Controllers improve their ability to assist in locating a downed aircraft and to identify and track visual flight rules flights.

**Benefits**

With the use of GPS, a Controller's ability to assist in locating a downed airplane is improved.

**Key Related Systems**

Global Positioning System  
NAS Voice Switch

**Issues**

None

Capability **Emergency Assistance**

Operational Improvement

**Current Emergency Assistance** (106101)

Direct support protects individuals and property both in the air and on the ground. Among other things, direct support includes location and navigation assistance for orientation, guidance to emergency airports, and generation of alternative courses of action.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Air Route Surveillance Radar Model 1E  
Air Route Surveillance Radar Model 2  
Air Route Surveillance Radar Model 3  
Air Route Surveillance Radar Model 4 (ARSR-4)  
Air Traffic Control Beacon Interrogator Model 6  
Air Traffic Control Beacon Interrogator Models 4/5  
Airport Surveillance Radar Model 11  
Airport Surveillance Radar Model 7  
Airport Surveillance Radar Model 8  
Airport Surveillance Radar Model 9  
Airport Surveillance Radar, Military  
Automated Radar Terminal System - Model IIIA  
Automated Radar Terminal System Color Display  
Common Automated Radar Terminal System - Model IIE  
Common Automated Radar Terminal System - Model IIIE  
Digital Airport Surveillance Radar  
Digital Voice Recorder System  
Display System Replacement

Enhanced Terminal Voice Switch/Interim Voice Switch Replacement  
 Flight Data Input/Output  
 Full Digital Automated Radar Terminal System Display  
 High Frequency Airborne Radios  
 High Frequency Communications  
 Integrated Communications Switching System Type I  
 Integrated Communications Switching System Type II  
 Integrated Communications Switching System Type III  
 Microprocessor-En Route Automated Radar Tracking System  
 Mode 3/AC Transponder  
 Mode Select Transponder  
 Multi-Mode Digital Radios  
 Power System - Long-Range Radar  
 Radar Automated Display System  
 Radio Communication Link  
 Radio Control Equipment  
 Rapid Deployment Voice Switch Type I  
 Rapid Deployment Voice Switch Type II  
 Rapid Deployment Voice Switch Type IIA  
 Remote Automated Radar Terminal System Color Display  
 Small Tower Voice Switch  
 Standard Terminal Automation Replacement System  
 Traffic Alert and Collision Avoidance System  
 Ultra High Frequency Airborne Radios  
 Ultra High Frequency Ground Radios  
 Ultra High Frequency Ground Radios - Replacement  
 Very High Frequency Airborne Radios  
 Very High Frequency Ground Radios

**Issues**

None

Service **Flight Planning**  
 Capability **Flight Data Management**

Operational Improvement

**Current Flight Data Management** (101201)

All users (e.g., general aviation, commercial, military, Customs, law enforcement) submit flight plan data for processing. This includes validating flight plans; notifying users of any problems; and flight plan activation, processing amendments, cancellations, and flight plan closures. The NAS disseminates flight plan information as necessary.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Aeronautical Information System Replacement  
 Automated Flight Service Station Facility  
 Direct User Access Terminal Service  
 National Airspace Data Interchange Network  
 Message-Switched Network  
 National Airspace Data Interchange Network  
 Packet-Switched Network

**Issues**

none identified

Operational Improvement

**Trajectory Flight Data Management** (101202)

Trajectory Flight Data Management will improve the operational efficiency and increase the use of available capacity by providing for improved flight data coordination between facilities. This will enable access to airports by readily facilitating reroutes. Additionally, it will support more flexible use of controller/capacity assets by managing data based on volumes of interest that can be redefined to meet change to airspace/routings. Trajectory Flight Data Management will also provide continuous monitoring of the status of all flights – quickly alerting the system to unexpected termination of a flight and rapid identification of last known position.

### **Benefits**

- Enhanced Safety
- Improved efficiency
- Improved flexibility
- Reduced fuel-burn and engine emissions

### **Key Related Systems**

Aeronautical Information Management Modernization Segment 1  
Collaborative Air Traffic Management Technologies Work Package 2  
En Route Automation Modernization Release 3

### **Issues**

·Need Concept of Use for Flight Management for early filing and maintenance of flight profiles (changes from the anticipation of flights based on OAG and historical use) to strategies for user early filing and its role in asset assignment. ·Need Concepts of Flight Management (Strategic Flow to Clearance delivery) ·Need Airspace Management's development of Flexible Airspace and Dynamic Re-sectorization to exploit advance flight management capabilities for benefits ·Need to identify event triggers within Flight Data Management to trigger trajectory updates - clearance deliver, hand-off coordination, etc to improve both traffic synchronization and strategic flow. ·Need a Concept of Use for incorporation of flight deck information to improve trajectory prediction ·Need a concept of use for the delivery of flight information to other government agencies

Capability

## **Flight Plan Support**

Operational Improvement

### **Current Flight Plan Support (101101)**

NAS users receive essential weather and aeronautical information to support flight planning. Flight planning requires such information as expected route, altitude, time of flight, available navigation systems, available routes, special use airspace restrictions, daily demand conditions, and anticipated flight conditions, including weather and sky conditions (e.g., the presence of

volcanic ash, smoke, and/or birds). NAS flight plan processing provides evaluation and feedback for both domestic and international flight plans. Aeronautical information includes notices to airmen concerning establishment or condition of, or change in, any NAS component (i.e., facility, service, or procedure) or NAS hazard. Users need to receive this information in a timely manner because it is essential to flight.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Direct User Access Terminal Service  
Host Computer System/Oceanic Computer System Replacement  
NOTAM Distribution System  
VSCS Control Subsystem Upgrade

**Issues**

none identified

Operational Improvement

**Provide Full Flight Plan Constraint Evaluation with Feedback**  
(101102)

Timely and accurate NAS information allows users to plan and fly routings that meet their objectives. Constraint information that impacts proposed flight routes is incorporated into Air Navigation Service Provider (ANSP) automation, and is available to users for their pre-departure flight planning. Examples of constraint information include infrastructure outages, and significant congestion events. special use airspace status, significant meteorological information (SIGMET),

**Benefits**

- Improved efficiency
- Increased user-preferred routing
- Improved predictability
- Reduced fuel-burn and engine emissions

**Key Related Systems**

Aeronautical Information Management Modernization Segment 1  
Collaborative Air Traffic Management Technologies Work Package 2  
En Route Automation Modernization Release 4  
En Route Automation Modernization Release 5  
En Route Automation Modernization Release 6  
System Wide Information Management Segment 2

**Issues**

·Need to have improved airspace management of SUA to achieve benefits ·Need to have link between Strategic Flow and Flight Planning congestion constraints and/or flow initiatives to achieve benefits ·Need to have NOTAMS/infrastructure initiatives linked from infrastructure management to AIM to achieve benefits

Operational Improvement

**Provide Interactive Flight Planning from Anywhere** (101103)

Flight planning activities are accomplished from the flight deck as readily as any location. Airborne and ground automation provide the capability to exchange flight planning information and negotiate flight trajectory contract amendments in near real-time.

## Benefits

- Increased efficiency
- Increased accessibility
- Enhanced user-preferred trajectories

## Key Related Systems

Aeronautical Information Management Modernization Segment 1  
Collaborative Air Traffic Management Technologies Work Package 2  
En Route Automation Modernization Release 4  
Flight Object Management System - En Route  
Flight Object Management System - Terminal  
System Wide Information Management Segment 2

## Issues

- Need to develop a concept of use for data messaging that includes its role in separation assurance as well as/differentiating from delivery of other ATM services.
- Separation Assurance need to develop changes in clearance delivery beyond tactical realm to achieve benefit
- Incorporation of flight object provided information into Traffic Synchronization to achieve benefits
- Changes to Airspace Management to incorporate Scheduling and Management of Special Use into Flight Planning

Service **Infrastructure-Information Management Service**

Capability **Air Traffic Operations Facilities**

Operational Improvement

## NextGen Facilities (109403)

Air navigation service provider (ANSP) facilities meet mandated security and safety guidelines and allocated airspace accommodates trajectory-based and flexible airspace. General service delivery points (GSDP) use a new geo-independent model, where service delivery is best aligned to manage costs and increase efficiencies to accommodate up to three times the amount of air traffic with no increase in the number of ANSP personnel. ANSP tasks evolve consistent with changes in airspace management, including the inclusion of business continuity planning in the GSDP design. The transition to GSDP incorporates upgrades in automation, communication, weather (NNEW), and surveillance infrastructures required to enable beneficial operational changes, including improvements in situational awareness needed to minimize adverse impacts of severe weather. GSDP site locations are determined according to a number of factors that consider safety, security, and human resource impacts.

## Benefits

- Increased productivity in delivery of air navigation services.
- Reduced operational costs
- Improved ANSP flexibility and responsiveness.

## Key Related Systems

En Route Automation Modernization Release 5  
Enhanced-Advanced Technologies and Oceanic Procedures  
NAS Voice Switch

## Issues

Under development

Capability **Government-Agency Support**

Operational Improvement

**Current Government/Agency Support** (109301)

The FAA provides information and coordination services and support to other federal and state government agencies. ATC supports DoD operations, law enforcement missions, forest fire-fighting operations, and state aviation managers. ATC implements temporary flight restrictions over geographic areas for specified events and supports natural disaster relief flights, medical emergency flights, and drug interdiction flights. The FAA disseminates all available information to the appropriate agencies during search and rescue operations and to the NTSB and other entities during incident and accident investigations.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Command and Control Communications

**Issues**

None

Capability **Monitoring and Maintenance**

Operational Improvement

**Current Monitoring And Maintenance** (109101)

Maintaining, operating, and managing the infrastructure requires a variety of planning, engineering, analysis, repair, and maintenance functions. It also encompasses monitoring status, real-time assessments, and implementation of systems in the NAS. Included are activities to monitor the NAS status, detect and isolate failures and outages, and perform corrective and preventive maintenance to ensure NAS operational readiness. While there are some systems that can be remotely monitored, the status of many assets is detected by periodic testing or through pilot/controller reports of loss of capability.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Remote Maintenance Monitoring System

**Issues**

None

Capability **Spectrum Management**

Operational Improvement

**Current Spectrum Management** (109201)

Spectrum management secures, protects, and manages the radio spectrum for the FAA and the U.S. Aviation community. It is the focal point for management policy and plans, engineering, frequency assignment, radio interference resolution, radiation hazard, obstruction evaluation, electronic counter measures, and other National/International spectrum activities.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Power Systems

**Issues**

none identified

Service **Navigation**  
Capability **Airborne Guidance**

Operational Improvement

**Cat I Precision Approach (GLS)** (107105)

The Global Positioning System (GPS) and Wide Area Augmentation System (WAAS) broadcast signals that are received and processed by aircraft avionics to provide accurate aircraft position information. The position information is sufficiently accurate throughout the NAS to support runway Category I precision approaches and departure guidance.

**Benefits**

Space-based WAAS navigation and landing is a cost effective alternative to ILSs for implementation of Cat I approaches since it does not require the installation and maintenance of individual ILS. At airports with multiple ILS the total number of ILS required may be reduced. At airports requiring new Category I service only the necessary landing and runway lights, visibility monitors, etc. need to be installed to provide the needed service.

WAAS also enables Cat I landing capabilities to runways where ILS cannot be installed due to terrain or obstacles. This same capability can be exercised at airports where Cat I ILS approaches to neighboring runways and/or airports cause operational dependencies between approaching/departing aircraft.

**Key Related Systems**

- Global Positioning System
- Wide Area Augmentation System (Satellite-Based Augmentation System)
- Wide Area Augmentation System (WAAS) Corrections Broadcast Service
- Wide Area Augmentation System Avionics
- Wide Area Augmentation System Technology Refresh

**Issues**

Availability of backup ground-based Cat I landing systems for GPS/WAAS.

Operational Improvement

**Current Enroute Navigation** (107101)

Independent ground and space-based navigation systems support both area navigation (point-to-point) and flights on published Jetroutes and Victor Airways.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

- Distance Measuring Equipment
- Distance Measuring Equipment Avionics
- Global Positioning System
- Global Positioning System Avionics
- Inertial Navigation System Avionics
- Tactical Air Navigation Avionics
- Tactical Air Navigation System
- Very High Frequency Omnidirectional Range
- Very High Frequency Omnidirectional Range Avionics



Wide Area Augmentation System (Satellite-Based Augmentation System)  
Wide Area Augmentation System (WAAS) Corrections Broadcast Service  
Wide Area Augmentation System Avionics

**Issues**

None

Operational Improvement

**Current Non-precision Approach and Departure** (107111)

Ground-based navigation aids provide guidance to and/or along runway centerline extended for non-precision landings and also departure guidance, per published approach and departure procedures.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Distance Measuring Equipment  
Distance Measuring Equipment Avionics  
Global Positioning System  
Global Positioning System Avionics  
Instrument Landing System Avionics  
Localizer  
Tactical Air Navigation Avionics  
Tactical Air Navigation System  
Very High Frequency Omnidirectional Range  
Very High Frequency Omnidirectional Range Avionics  
Visual Approach Slope Indicator  
Wide Area Augmentation System (Satellite-Based Augmentation System)  
Wide Area Augmentation System (WAAS) Corrections Broadcast Service  
Wide Area Augmentation System Avionics

**Issues**

None

Operational Improvement

**Current Precision Approach, Landing and Departure** (107104)

Ground-based instrument landing systems support precision approach and landings for Category I, II and III visibility and decision height minimums. These landing systems radiate precision lateral and vertical descent guidance signals that are received and processed by aircraft navigation avionics to guide the aircraft to the runway. Precision approach systems can be supplanted with marker beacons, which indicate the distance from the aircraft current position to the runway threshold, and Distance Measuring Equipment (DME).

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Distance Measuring Equipment  
Distance Measuring Equipment Avionics  
Instrument Landing System Avionics  
Instrument Landing System Category I  
Instrument Landing System Category II/III  
Microwave Landing System  
Radar Altimeter Avionics  
Runway Visual Range

**Issues**

None

Operational Improvement

**Domestic RNP Navigation** (107114)

Aircraft navigate in the NAS using Required Navigation Performance (RNP) rated avionics. RNP-based navigation ensures an aircraft's position is known within a defined airspace volume, thereby allowing decreased separation between same-RNP capable aircraft.

**Benefits**

RNP is an enabler to airspace design and to separation. The ability to design and deliver routes with less lateral spacing increases capacity of airspace constrained by terrain or special use airspace since more parallel routes can be designed and made available. RNP improves the access to congested airspace since multiple routes can be designed to separate aircraft that are currently commingled on arrival or departure to a terminal and thus in many cases receive a single airport/runway's restriction.

**Key Related Systems**

Global Positioning System  
Global Positioning System Avionics  
Inertial Navigation System Avionics  
Loran-C Avionics  
Wide Area Augmentation System (Satellite-Based Augmentation System)  
Wide Area Augmentation System (WAAS) Corrections Broadcast Service  
Wide Area Augmentation System Avionics

**Issues**

Equippage.

Operational Improvement

**Ground Based Augmentation System (GBAS) Precision Approaches** (107107)

Global Positioning System (GPS)/GBAS support precision approaches to Category I and eventually Category II/III minimums, for properly equipped runways and aircraft. GBAS can support approach minimums at airports with fewer restrictions to surface movement, and offers the potential for curved precision approaches. GBAS also can support high-integrity surface movement requirements.

**Benefits**

- Improved efficiency
- Increased availability of precision approaches
- Increased safety
- Reduced fuel-burn and engine emissions

**Key Related Systems**

Local Area Augmentation System Category I  
Local Area Augmentation System Category II/III

**Issues**

Backup precision landing capability for loss of GPS/LAAS

Operational Improvement

**RNAV SIDS, STARS and Approaches** (107103)

Area navigation is supported throughout the NAS using affordable Global Positioning System (GPS) based avionics with Wide Area Augmentation System (WAAS) capabilities to provide the required position accuracy along a specified direct route.

### **Benefits**

Area navigation supported by low-cost WAAS avionics allows aircraft to fly direct routes, thereby reducing flight time and fuel consumption. WAAS also supports increased situational awareness as an enabler for improved advisory services, and expands the clearance options for controllers in separation assurance. WAAS provides increased access to airport runways in less than optimal Visual Meteorological Conditions (VMC), reducing the possibility of CFITs on approach as well as reducing the amount of holds/diversions, saving lives, fuel and time. WAAS-enabled area navigation provides benefits to pilots and communities by expanding the annual available runway hours.

### **Key Related Systems**

Global Positioning System  
Global Positioning System Avionics  
Wide Area Augmentation System (Satellite-Based Augmentation System)  
Wide Area Augmentation System (WAAS) Corrections Broadcast Service  
Wide Area Augmentation System Avionics

### **Issues**

Defining backbone locations for ground-based nav aids to serve as a backup to WAAS.

## Capability **Surface Guidance**

Operational Improvement

### **Current Airport Surface Guidance** (107201)

Aircraft use runway and taxiway lighting, markage, and signage for movement on an airport.

### **Benefits**

Current operations are provided in the NAS.

### **Key Related Systems**

Runway Centerline Lighting  
Runway Lights

### **Issues**

Funding of ground and space based systems to ensure this capability is implemented to improve airport safety and to assist in preventing runway incursions.

Operational Improvement

### **Low Visibility Operations** (107202)

Aircraft and ground vehicle movement on airports in low visibility conditions is guided by accurate location information and moving map displays.

### **Benefits**

Improved airport surface safety and capacity.

### **Key Related Systems**

Cockpit Display of Traffic Information Avionics  
Cockpit Display of Traffic Information for Safe Flight 21 Avionics  
Enhanced Vision System/Enhanced Flight Vision System/Sythetic Vision System

Global Positioning System  
Global Positioning System Avionics  
Local Area Augmentation System Category I  
Local Area Augmentation System Category II/III

### Issues

Aircraft and vehicle equipage.

Service **TM-Strategic Flow**

Capability **Flight Day Management**

Operational Improvement

### **Current Flight Day Management** (105201)

Participating aircraft operation centers and the FAA have real-time access to current NAS status information, including infrastructure and operational factors. There is an electronic exchange of NAS status information and flight plan information, and interactive decision support tools increase NAS user and traffic manager flexibility to manage flight operations under current constraints, such as special use airspace, equipment and facility status, and weather conditions. The airlines and Traffic Management improve in exchanging information and negotiating flight plan changes in a near real-time ability (Free Flight Phase 1 activity).

### **Benefits**

Current operations are provided in the NAS.

### **Key Related Systems**

CAASD Analysis Platform for En Route  
Collaborative Decision Making Network  
Post Operations Evaluation Tool  
Weather and Radar Processor Stage 3

### **Issues**

none identified

Operational Improvement

### **Enhance Collaborative Decision Making** (105205)

A more robust interactive decision support toolset increases NAS user and traffic manager flexibility to manage flight operations by interfacing with the multiple systems that provide current constraints. These include special use airspace, equipment and facility status, and weather conditions. Traffic management and airlines improve in negotiating planned equipment outages.

### **Benefits**

Collaboration optimizes individual business cases. Improved decision support systems provide users and service providers common situation awareness and a visual displays of resources and demand to manage more complex traffic flows.

### **Key Related Systems**

Aeronautical Information Management Modernization Segment 1  
CAASD Analysis Platform for En Route  
Collaborative Air Traffic Management Technologies Work Package 1

### **Issues**

none identified

Operational Improvement

### **Full Collaborative Decision Making** (105207)

Timely, effective, and informed decision-making based on shared situational awareness is achieved through advanced communication and information sharing systems. Decision-makers request information when needed, publish information as appropriate, and use subscription services to automatically receive desired information through the net-centric infrastructure service. Decisions are made with an awareness of system-wide implications, including an increased level of decision-making by the flight crew and flight operations centers.

**Benefits**

- Improved resource allocation
- Increased productivity
- Improved predictability
- Increased access
- Increased flexibility

**Key Related Systems**

Aeronautical Information Management Modernization Segment 2  
Collaborative Air Traffic Management Technologies Work Package 3  
Data Communications Segment 2  
Evaluator  
Flight Object Management System - En Route  
Flight Object Management System - Terminal  
System Wide Information Management Segment 3

**Issues**

none identified

Operational Improvement

**Traffic Management Initiatives with Flight Specific Trajectories**

(105208)

Individual flight-specific trajectory changes resulting from Traffic Management Initiatives (TMIs) will be disseminated to the appropriate Air Navigation Service Provider (ANSP) automation for tactical approval and execution. This capability will increase the agility of the NAS to adjust and respond to dynamically changing conditions such as bad weather, congestion, and system outages.

**Benefits**

- Improved efficiency
- Increased capacity
- Improved predictability
- Reduced fuel-burn and aircraft emissions

**Key Related Systems**

Collaborative Air Traffic Management Technologies Work Package 2  
En Route Automation Modernization Release 2  
En Route Automation Modernization Release 3

**Issues**

Under Development

Capability

**Long Term Planning**

Operational Improvement

**Current Long Term Planning** (105101)

Establishing standard responses, such as playbooks to enable more efficient day of operations. Inputs include capacity and demand models based on airport use data, airspace for special use schedules, airline flight schedules, infrastructure status, and historical flight traffic demand information.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Enhanced Traffic Management System

**Issues**

none identified

Operational Improvement

**NAS Wide Sector Demand Prediction and Resource Planning**  
(105104)

NAS resource and collaborative decision making (CDM) data are combined in one integrated decision support tool. Strategic management of resources (e.g., airspace, sectors, personnel, facilities, NAS systems) meet changes in systemic demand due to increases in air traffic, seasonality, or city pair business case decisions. Resources are proactively adjusted and assigned based on projections of shifting demand.

**Benefits**

- Enhanced efficiency
- Improved predictability
- Increased flexibility

**Key Related Systems**

Aeronautical Information Management Modernization Segment 1  
Evaluator  
NAS Voice Switch  
System Wide Information Management Segment 3

**Issues**

none identified

Operational Improvement

**Resource Planning** (105102)

The air navigation service provider (ANSP) adjusts sectors and resources to meet anticipated demand, promoting efficiency and ensuring safety by strategically mitigating the risk of chronic sector level demand and capacity imbalances. This includes proactively adjusting airspace and resource scheduling based on projections of shift in demand due to seasonal changes, as well as city pair business adjustments by NAS users.

**Benefits**

- Enhanced efficiency
- Improved predictability
- Increased flexibility

**Key Related Systems**

En Route Automation Modernization Release 1  
Post Operations Evaluation Tool  
Sector Design Analysis Tool  
Unified Decision Management System

**Issues**

none identified

Capability **Performance Assessment**

Operational Improvement

**Continuous Flight Day Evaluation** (105302)

Performance analysis, where throughput is constrained, is the basis for strategic operations planning. Continuous (real-time) constraints are provided to Air Navigation Service Provider (ANSP) traffic management decision-support tools and National Airspace System (NAS) users. Evaluation of NAS performance is both a real-time activity feedback tool and a post-event analysis process. Flight day evaluation metrics are complementary and consistent with collateral sets of metrics for airspace, airport, and flight operations.

**Benefits**

- Improved efficiency
- Improved operational capability analysis
- Increased capacity
- Reduced fuel-burn and engine emissions

**Key Related Systems**

Aeronautical Information Management Modernization Segment 1  
Collaborative Air Traffic Management Technologies Work Package 2  
En Route Automation Modernization Release 3  
System Wide Information Management Segment 2

**Issues**

none identified

Operational Improvement

**Current NAS Performance Assessment** (105301)

A manual process of analysis supported by the Post Operations Evaluation Tool (POET) to review actions taken and their effect provides input to playbooks and standard operating procedures. Performance assessment covers system status and arrival/departure delay times.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Collaborative Decision Making Network  
Enhanced Traffic Management System  
Post Operations Evaluation Tool

**Issues**

none identified

Service **TM-Synchronization**

Capability **Airborne**

Operational Improvement

**Current Arrival/Departure Sequencing** (104109)

Airborne spacing and sequencing of air traffic safely maximizes NAS efficiency and capacity in the terminal portion of the arrival and departure phases of flight. Air traffic controllers provide traffic synchronization to aircraft by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. Controllers optimize the arrival and departure portion of flight by sequencing and spacing

aircraft on final approach and departure. They apply separation standards to achieve efficient use of airports by applying manual controller optimization procedures. Traffic specialists and controllers use traffic displays and flight strips to establish flow initiatives, such as reassignment of flows (arrival and departure) to runways. This includes sequencing and spacing aircraft on closely spaced, parallel runways in visual meteorological conditions and instrument meteorological conditions.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

- Airport Surveillance Radar Model 9
- Automated Radar Terminal System - Model IIIA
- Automated Radar Terminal System Color Display
- Common Automated Radar Terminal System - Model IIE
- Common Automated Radar Terminal System - Model IIIE
- Data Entry and Display Subsystem
- Enhanced Terminal Voice Switch/Interim Voice Switch Replacement
- Enhanced Traffic Management System
- Full Digital Automated Radar Terminal System Display
- Precision Runway Monitor
- Radar Automated Display System
- Standard Terminal Automation Replacement System

**Issues**

None

Operational Improvement

**Current Tactical Management Of Flow in the En Route for Arrivals/Departures** (104115)

Proper spacing and sequencing of air traffic maximizes NAS efficiency and capacity in the arrival and departure phases of flight. Controllers provide traffic synchronization to aircraft by monitoring the situation, making control decisions, and modifying flight trajectories to meet operational objectives and accommodate user preferences. They achieve this by applying manual controller optimization procedures. Traffic specialists and controllers use traffic displays (radar and enhanced traffic management system) and flight strips to establish flow initiatives, such as assignment to alternative arrival flows or miles-in-trial requirements.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

- Display System Replacement
- Enhanced Traffic Management System
- Flight Data Input/Output
- Traffic Management Advisor Display (Free Flight Phase 1)
- VSCS Control Subsystem Upgrade

**Issues**

none identified

Operational Improvement

**Expanded Conflict Resolution via Data Communication** (104105)



In trajectory-based airspace, decision support tools support the air navigation service provider (ANSP) by identifying conflicts/complexity/density conditions and providing alternatives to resolve the conditions. These alternatives include proposed trajectories that are exchanged with the operator via data communications. This allows multi-step solutions that are not subject to constraints imposed by voice.

**Benefits**

- Expanded alternatives for conflict resolution
- Increased efficiency
- Enhanced safety
- Reduced frequency congestion

**Key Related Systems**

Automatic Dependent Surveillance Broadcast  
Common Display Subsystem Phase 1  
Data Communications Segment 1  
En Route Automation Modernization Release 5  
Flight Object Management System - En Route

**Issues**

none identified

Operational Improvement

**Flexible Entry Times for Oceanic Tracks** (104102)

Flexible entry times into oceanic tracks or flows allow greater use of user-preferred trajectories.

**Benefits**

- Greater use of user-preferred trajectories
- Decreased flight time
- Reduced fuel burn and engine emissions
- Increased user access and efficient use of oceanic airspace

**Key Related Systems**

Enhanced-Advanced Technologies and Oceanic Procedures

**Issues**

none identified

Operational Improvement

**Integrated Arrival/Departure Airspace Management** (104122)

New airspace design takes advantage of expanded use of terminal procedures and separation standards. This is particularly applicable in major metropolitan areas supporting multiple high-volume airports. This increases aircraft flow and introduces additional routes and flexibility to reduce delays. ANSP decision support tools are instrumental in scheduling and staging arrivals and departures based on airport demand, aircraft capabilities, and gate assignments.

**Benefits**

- Maximizes throughput
- Improved efficiency
- Reduced flight time
- Reduced noise
- Reduced fuel burn and engine emissions

**Key Related Systems**

En Route Automation Modernization Release 3  
Traffic Management Advisor Upgrades

**Issues**

Under development

Operational Improvement

**Optimize Runway Assignments** (104117)

Arrivals and departures are sequenced and staged to maintain throughput. Air navigation service provider (ANSP) automation uses arrival and departure-scheduling tools and 4DT agreements to flow traffic at high-density airports. Automation incorporates user provided gate assignments, requested runway, aircraft wake characteristics, and flight performance profiles. ANSP and airport operators monitor airport operational efficiency and make real-time adjustments to schedules and sequencing to optimize throughput.

**Benefits**

- Improved efficiency
- Reduced fuel burn, airport noise, and emissions

**Key Related Systems**

Integrated Departure/Arrival Capability  
Surface Traffic Management System  
System Wide Information Management Segment 2  
Traffic Management Advisor

**Issues**

none identified

Operational Improvement

**Point-in-Space Metering** (104120)

ANSP uses scheduling tools and trajectory-based operations to assure smooth flow of traffic and increase the efficient use of airspace.

**Benefits**

- Increased capacity
- Improved efficiency
- Reduced fuel burn and engine emissions

**Key Related Systems**

Collaborative Air Traffic Management Technologies Work Package 1  
En Route Automation Modernization Release 4  
Traffic Management Advisor Upgrades

**Issues**

none identified

Operational Improvement

**Tactical Trajectory Management** (104121)

Tactical trajectory management adjusts individual aircraft within a flow to provide efficient trajectories, manage complexity, and ensure separation assurance. Flight deck and/or air navigation service provider (ANSP) automation resolves pair-wise conflicts. The ANSP role evolves into managing trajectory-based airspace by maintaining largely conflict-free, user-preferred flows. This evolution allows the flexibility required to maximize capacity and en route throughput.

**Benefits**

- Increased efficiency
- Enhanced capacity
- Increased access
- Increased user-preferred trajectories

**Key Related Systems**

Automatic Dependent Surveillance Broadcast

Cockpit Display of Traffic Information Avionics  
Collaborative Air Traffic Management Technologies Work  
Package 3  
Common Display Subsystem Phase 2  
Data Communications Segment 2  
Flight Management System Offset  
NAS Voice Switch  
NextGen Automation Platform Release 1

**Issues**

Under development

Operational Improvement

**Time Based Metering Using RNAV and RNP Route Assignments**

(104123)

RNAV, RNP, and time-based metering provide efficient use of runways and airspace in high-density airport environments. RNAV and RNP provide users with more efficient and consistent arrival and departure routings and fuel-efficient operations. Metering automation will manage the flow of aircraft to meter fixes, thus permitting efficient use of runways and airspace.

**Benefits**

- Improved efficiency
- Increased capacity
- Reduced fuel burn and engine emissions

**Key Related Systems**

Collaborative Air Traffic Management Technologies Work  
Package 2  
En Route Automation Modernization Release 4  
En Route Automation Modernization Release 5  
En Route Automation Modernization Release 6

**Issues**

Under development

Operational Improvement

**Use Optimized Profile Descent** (104124)

Optimized Profile Descents (OPDs) permit aircraft to remain at higher altitudes on arrival to the airport and use lower power settings during descent. OPD arrival procedures will decrease noise and be more fuel-efficient. The air navigation service provider procedures and automation accommodate OPDs when operationally advantageous.

**Benefits**

- Reduced noise
- Reduced fuel-burn and engine emissions

**Key Related Systems**

En Route Automation Modernization Release 3

**Issues**

Under development

Capability **Surface**

Operational Improvement

**Current Surface Traffic Management** (104201)

Controllers, airline ramp tower personnel, and pilots provide surface synchronization using procedural and visual means. Controllers issue taxi clearances and instructions to provide optimum and predictable flows of traffic by communicating with pilots and vehicle operators on the airport surface. At peak times, controllers manage flow by using dedicated taxiways for arrivals or departures. They establish sequences to support the most expeditious use of departure runways or flow into ramp areas.

**Benefits**

Current operations are provided in the NAS.

**Key Related Systems**

Airport Movement Area Safety System  
Airport Surface Detection Equipment-Model 3 (ASDE-3)  
Enhanced Terminal Voice Switch/Interim Voice Switch Replacement  
Flight Data Input/Output  
Integrated Communications Switching System Type I  
Integrated Communications Switching System Type II  
Rapid Deployment Voice Switch Type I  
Small Tower Voice Switch  
Surface Movement Advisor (Free Flight Phase 1)  
Systems Atlanta Information Display System  
Ultra High Frequency Airborne Radios  
Ultra High Frequency Ground Radios  
Very High Frequency Airborne Radios  
Very High Frequency Ground Radios

**Issues**

none identified

Operational Improvement

**Enhanced Surface Traffic Operations** (104207)

Data communication between aircraft and ANSP is used to exchange clearances, amendments, and requests. At specified airports, data communications is the principle means of communication between ANSP and equipped aircraft.

**Benefits**

- Improved efficiency
- Reduced frequency congestion
- Enhanced safety due to avoided readback / hearback operational errors

**Key Related Systems**

Data Communications Segment 1

**Issues**

Under development

Operational Improvement

**Full Surface Traffic Management with Conformance Monitoring**  
(104206)

Improved surveillance tools for airport surface traffic management provide the air navigation service provider (ANSP), equipped aircraft, and airport operators the capability to predict, plan, and manage surface movements. Equipped vehicles provide surface traffic information in real-time to all parties of interest. A comprehensive view of aggregate traffic flows enables ANSP traffic management to project demand, balance runway assignments, and facilitate more efficient arrival and departure flows. Automation monitors surface operations conformance and updates the estimated departure clearance times to renegotiate the 4DT.

**Benefits**

- Increased airport efficiency
- Enhanced surface safety
- Improved shared situational awareness
- Decreased emissions and airport noise levels

**Key Related Systems**

Airport Surface Detection Equipment-Model X  
Common Display Subsystem Remote Phase 1  
Data Communications Segment 2  
Flight Object Management System - Terminal  
Multifunction Display System Avionics  
Surface Traffic Management System  
System Wide Information Management Segment 3

**Issues**

None

Operational Improvement

**Initial Surface Traffic Management** (104209)

Departures are sequenced and staged to maintain throughput. ANSP automation uses departure-scheduling tools to flow surface traffic at high-density airports. Automation provides surface sequencing and staging lists for departures and average departure delay (current and predicted).

**Benefits**

- Improved efficiency
- Reduced fuel burn, airport noise, and engine emissions

**Key Related Systems**

Tower Flight Data Manager Phase 1

**Issues**

under development

Operational Improvement

**Use Data Messaging to Provide Flow and Taxi Assignments**  
(104208)

Surface traffic management incorporates flow and taxi instructions into data messages and delivers them to the flight deck. At high-density airports clearances and amendments, requests, NAS status, airport flows, weather information, and surface movement instructions are issued via data communications.

**Benefits**

- Increased efficiency
- Reduced runway incursions
- Reduced emissions

**Key Related Systems**

Collaborative Air Traffic Management Technologies Work Package 2

Data Communications Segment 1  
Flight Object Management System - Terminal  
Integrated Departure/Arrival Capability  
Multifunction Display System Avionics  
Surface Traffic Management System  
System Wide Information Management Segment 2

**Issues**

Under development

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**NAS 6 Toolset - Validation**