Scorecard for Authentication Technologies

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RSA BSAFE®

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Authentication Scorecard

- *Why Focus on Authentication?*
- What are the Requirements for Authentication?
- What is the State of Authentication Technology?
- What is the Authentication Scorecard?

Understanding The Problem

No Single Technology Solves ALL The Problems

United States Nuclear TRIAD

Intercontinental Ballistic Missile (Peacekeeper)

Bomber (B2)

Ballistic Missile Submarine (USS Maine)

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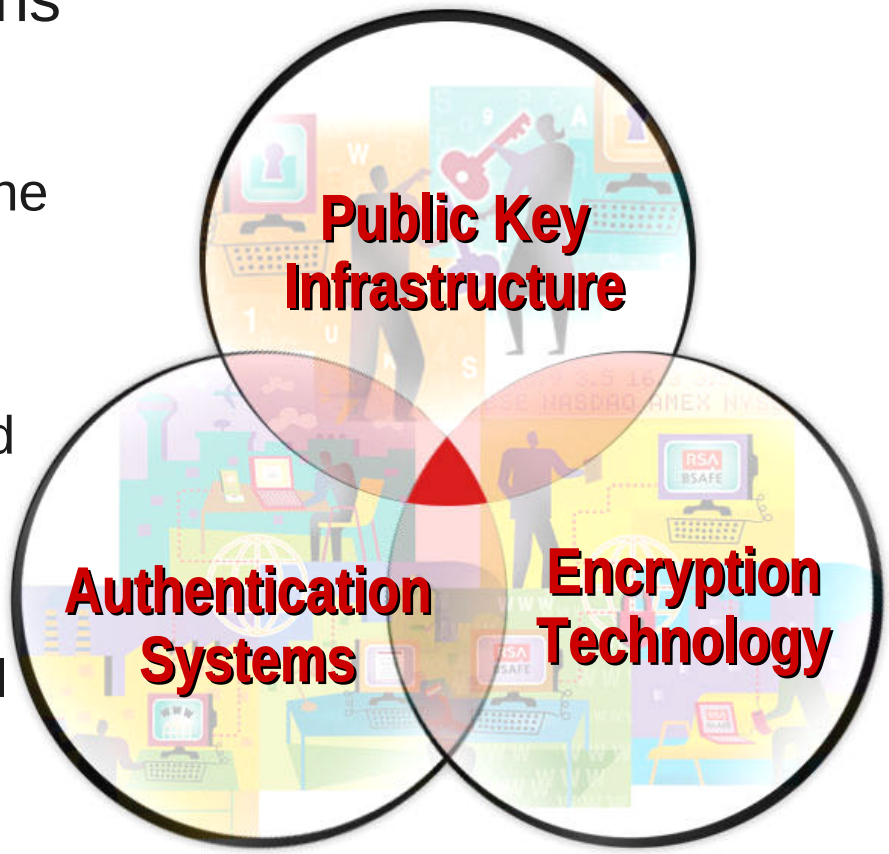
Understanding The Problem
Leads to an Effective Solution

- E-Security requires solutions in *three key areas*
  - **Authentication** for binding the user to the digital identity
  - **Encryption** for binding the digital identity to the data and transactions
  - **PKI** to provide a managed service to reduce operational costs



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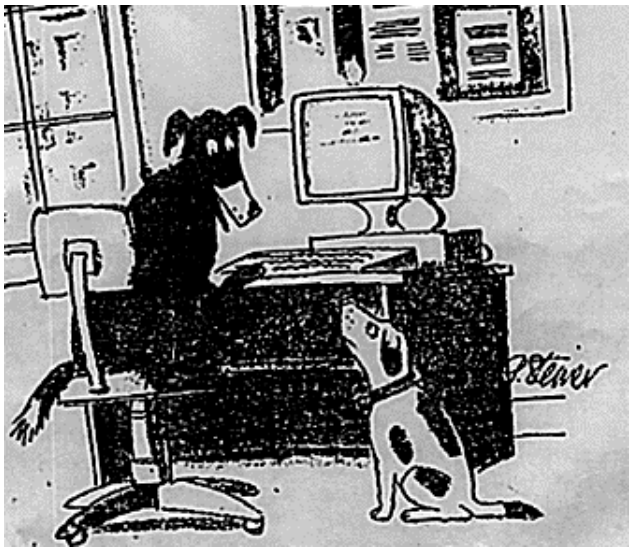
Why Focus on Authentication?

- Authentication is the essential foundation for e-government
  - Establishes trust by proving identities of the participants in a transaction
- Authentication is the foundation for other important security services
  - Authorization
  - Audit



"On the Internet, no one knows you're a dog!"

e-Security for e-Government …

Authentication: A Piece of the Puzzle

e-Government Requirements	e-Security Services	**e-Security Technologies**
• **Prove identities (establish trust)**	• **Authentication, Strong Authentication**	• UserID/Password, Kerberos/DCE, Hardware Tokens, Software Tokens, Digital Certificates (PKI), Biometrics
• **Protect communications**	• **Data Privacy, Data Integrity**	• Encryption
• **Sign transactions**	• **Non-Repudiation**	• Digital Signatures (e.g.,PKI, Encryption)

Authentication Market
Drivers

- Expanding access
  - Increasing numbers of mobile workers
  - Increasing numbers of telecommuters
  - Extension of the enterprise network to third parties
  - Increasing network size and complexity
  - Need for portable credentials
- "Willy Sutton effect"
  - Increase in sensitive information on intranets
  - High levels of internal compromise/theft
  - Growing security awareness in enterprise accounts
- The problem w/ passwords
  - Passwords provide weak security
  - Unmanageability of multiple passwords

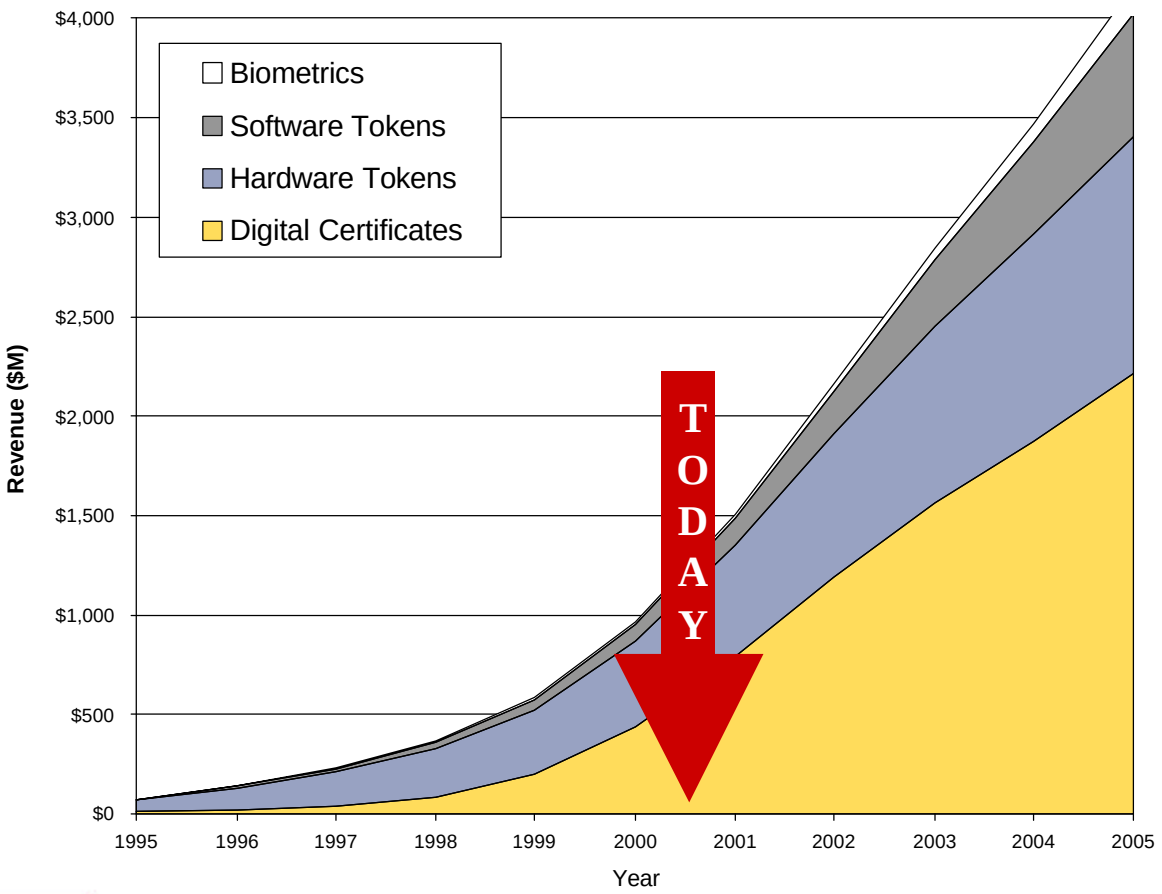
Source: RSAS, adapted from Frost & Sullivan "US Network Authentication Markets"

Authentication Market
Inhibitors

- Costs
  - Perception of high deployment costs
  - Perception of additional administrative burden
  - Lack of installed base of smart card readers
  - Concern over lost / forgotten / broken tokens or smart cards
- Deployability
  - Concern over scalability
  - Interoperability with current systems
  - Short-term focus on Y2K initiatives
- Business Justification
  - Lack of security awareness
  - Difficulty in quantifying ROI

Source: RSAS, adapted from Frost & Sullivan “US Network Authentication Markets”

Market Forecast:
Authentication Technologies



Source: Frost and Sullivan, US Authentication Market

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Authentication Scorecard

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IATF Authentication Requirements

- IATF Chapter 6 - *"Defend the Enclave Boundary/External Connections"*
  - Focus on "effective control"
    - Firewalls
    - Guards
    - Virtual Private Networks (VPNs)
    - Identification & Authentication
  - Focus on "effective monitoring"
    - Intrusion Detection Systems (IDS)
    - Vulnerability Scanners
    - Virus Detection

Information Assurance Technical Framework

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Authentication Maps to the "Defense in Depth Overview"

DEFENSE-in-DEPTH

PROTECT ELEMENTS

- PROTECTION OF WANs
- PROTECTION OF ENCLAVE BOUNDRIES
- SECURABLE HOST COMPUTER OPER SYSTEMS
- KMI SERVICES
- SECURITY-ENABLED APPLICATIONS

DETECT AND REACT ELEMENTS

- NETWORK-BASED MONITORING
- HOST-BASED MONITORING
- SITUATION AWARENESS & RESPONSE

Defense in Depth Overview, Figure 2, "Technical Elements of the Defense-in-Depth Strategy"

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What Our Government and Commercial Customers Require

"Protection for Network Access (PNA) addresses the requirement for authorized Local Area Network (LAN) users and administrators, and individual workstation/personal-computer users, to be able to safely-access and to be-safely-accessed-by untrusted (potentially hostile) network connections."

Source: IATF, Section 6.1

- The ability to ***strongly authenticate***…
  - e-Government/e-Business
    - Protect mission-critical applications, databases, files or web sites, while enabling the sharing of highly valuable information
  - Local Networks
    - Provide local network login protection and authenticate users to critical network operating systems (e.g., Mainframe, workstation, and PC)
  - Remote Access
    - Ensure only authorized remote users can access information resources via direct dial-in systems or Internet-based connections via VPN/Firewalls

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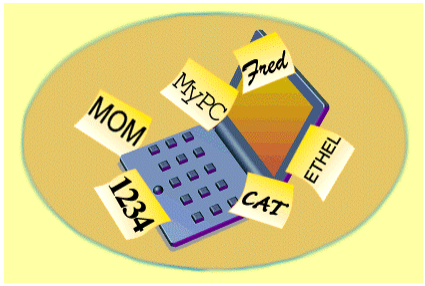
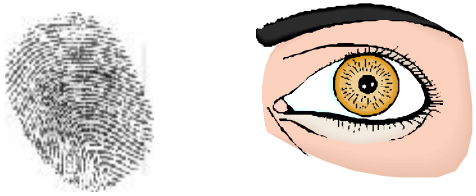
Strong Authentication:
"Two or More Factors"

- Something you know
  - Password
  - PIN
  - "Mother's maiden name"
- Something you have
  - Physical key
  - Token
  - Magnetic card
  - Smart card
- Something you are
  - Fingerprint
  - Voice
  - Retina
  - Iris





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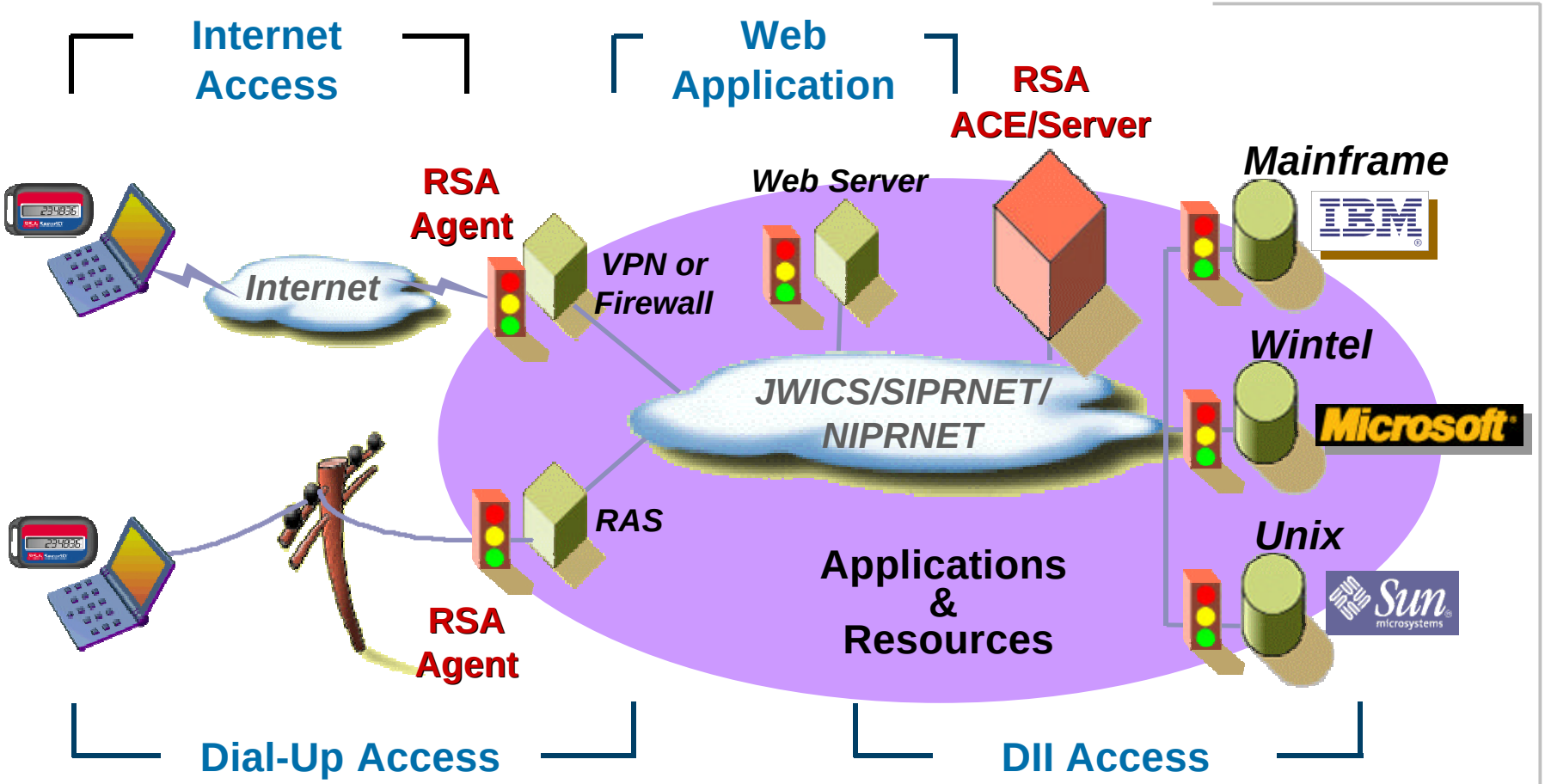
Defense Information Infrastructure-wide (DII-wide) Strong Authentication



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Authentication Scorecard

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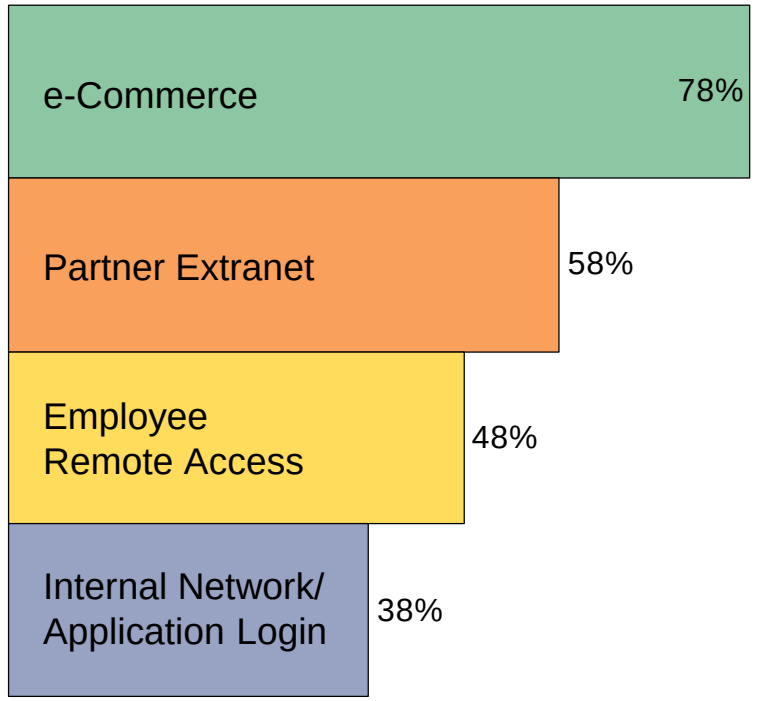
Authentication Technologies
Under Re-evaluation

- Most significant authentication issues
  - Password maintenance
    - 20%-50% of Help Desk calls
  - Password security
  - Password cost
    - Average $80 per Help Desk call

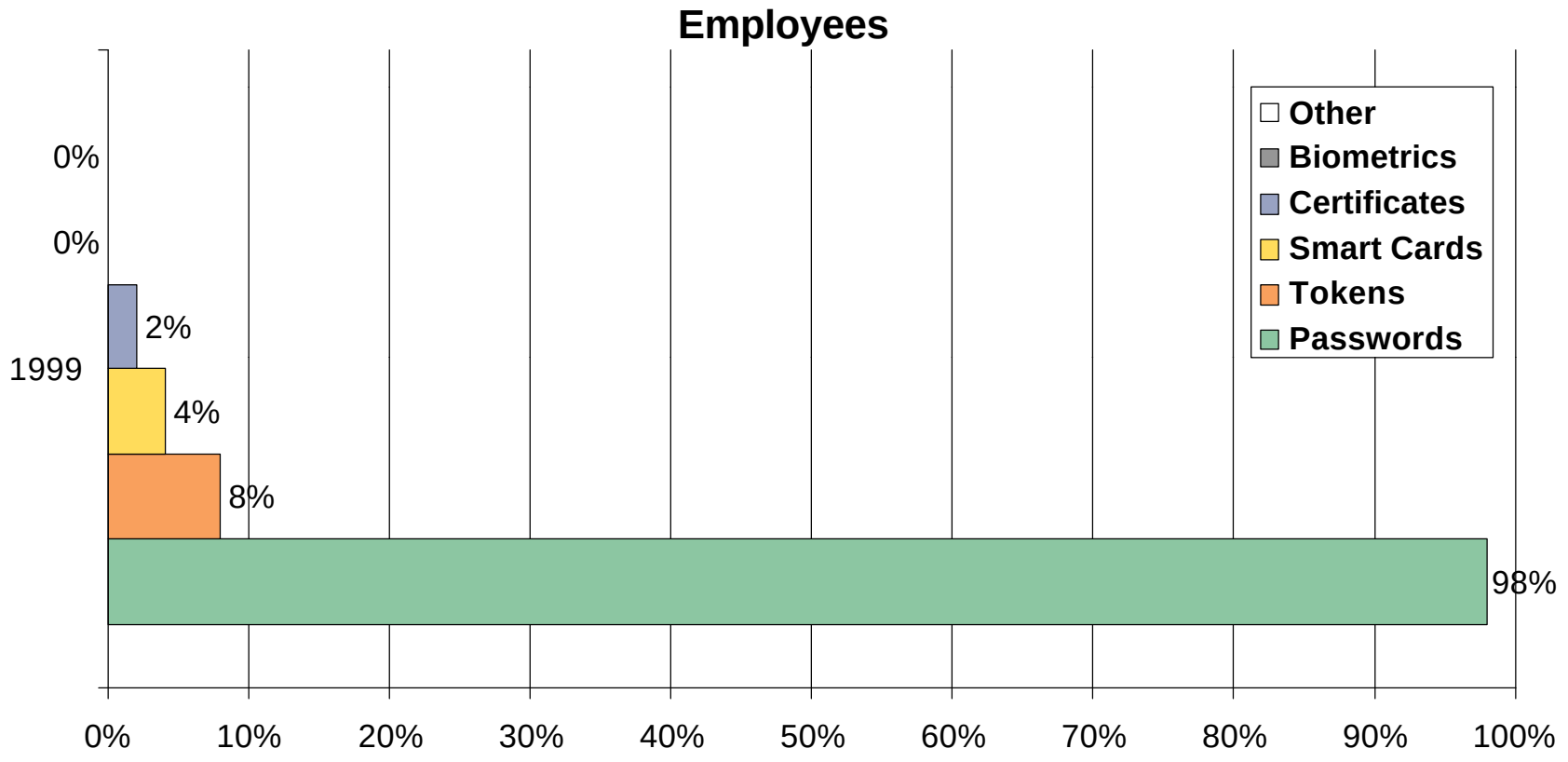
"What applications are causing you to re-evaluate your authentication strategy?"



Source: Forrester Research, "A Digital Certificate Road Map"

Authentication Status Quo

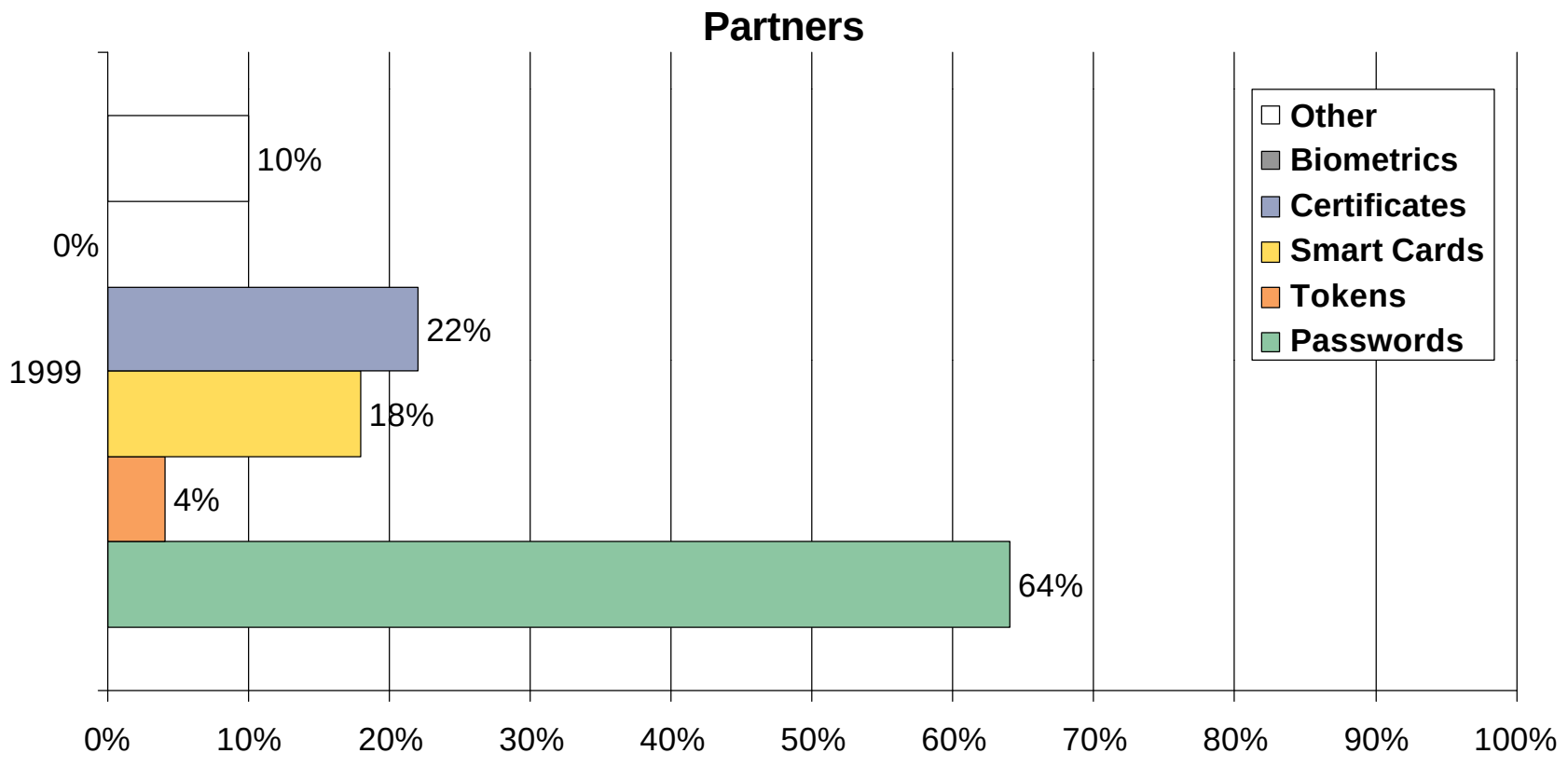
Employees



Source: Forrester Research, “A Digital Certificate Road Map”

Authentication Status Quo

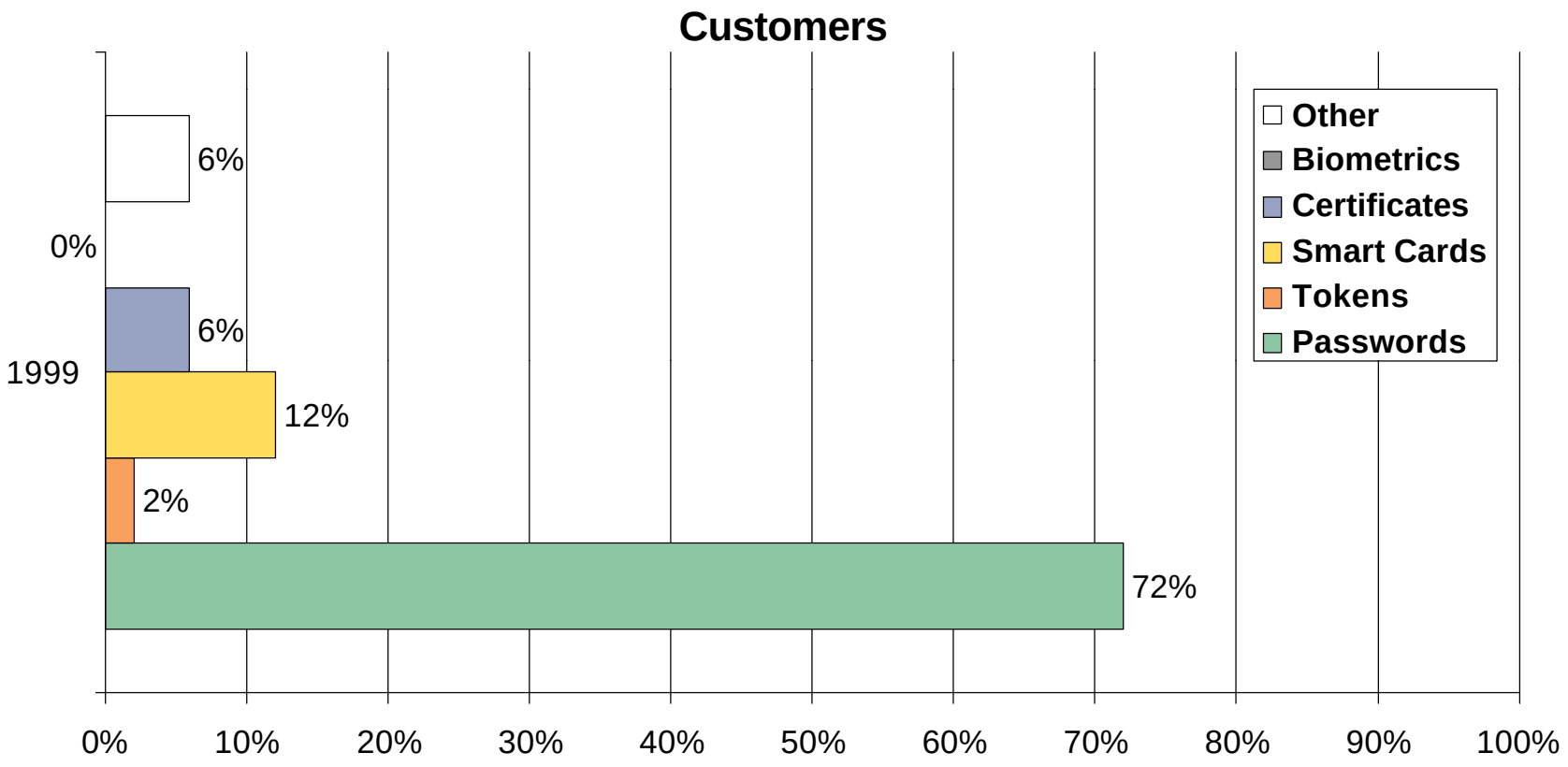
Partners



Source: Forrester Research, “A Digital Certificate Road Map”

Authentication Status Quo

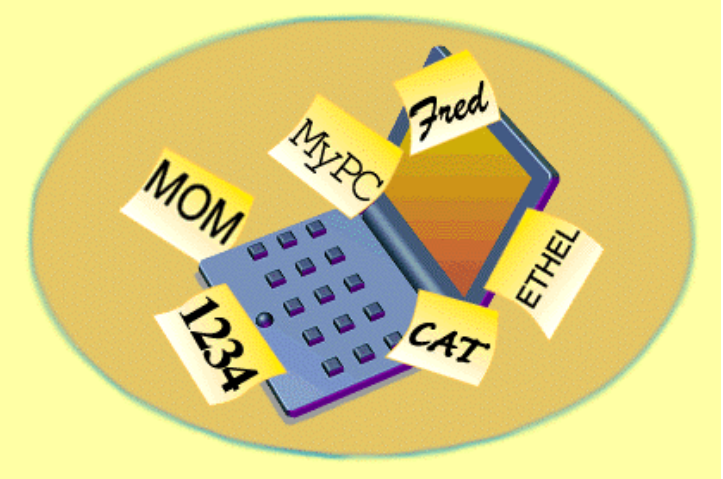
Customers



Source: Forrester Research, “A Digital Certificate Road Map”

The Problem with Passwords (I)

- Shoulder-surfing coworkers
- Finding written passwords
  - Post-It notes
  - Day-Timer
- Guessing passwords
  - “password”, “secret”
  - Spouse/dog/kid’s name
  - Username



The Problem with Passwords (II)

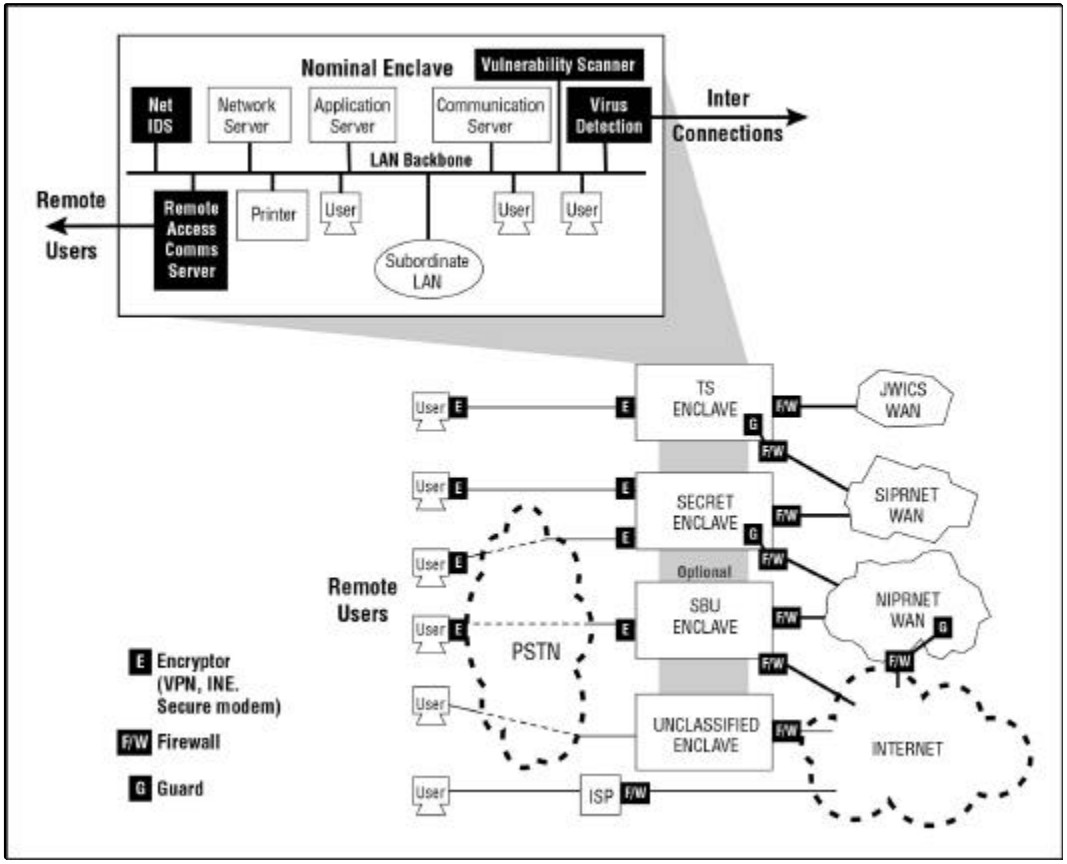
- "Social engineering"
- Password cracking tools
  - "Crack"
  - "L0phtCrack"
  - "Cracker Jack"
- Network sniffing
- All of the "casual" approaches

The Problem with Passwords (III)

- Passwords are *surprisingly* expensive
  - 20 - 50% of Help Desk calls are password related
  - Help Desk calls cost an average of $80 each
  - Lost user productivity from lack of network access
- Exposure to loss from password breaches far greater than Help Desk costs
- Security fears keep organizations from pursuing new e-government opportunities

Strong Authentication In Use Today with DII Components

- 7+ million users at 4500+ companies
- 150+ strong authentication-ready COTS products from 100+ vendors
  - Firewalls/RAS
  - VPNs
  - Operating Systems
- Scalable to 100,000s of users
- Broad range of form factors



IATF, Figure 6-1, "Defend the Enclave Boundary/External Connections"

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U.S. Government
Strong Authentication Users

Executive

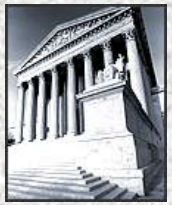
- Office of the President of the United States
- Every Cabinet Department
- Several Independent Agencies and Commissions

Legislative

- United States House of Representatives
- United States Senate

Judicial

- United States Supreme Court
- United States Court of Appeals
- United States Federal Courts



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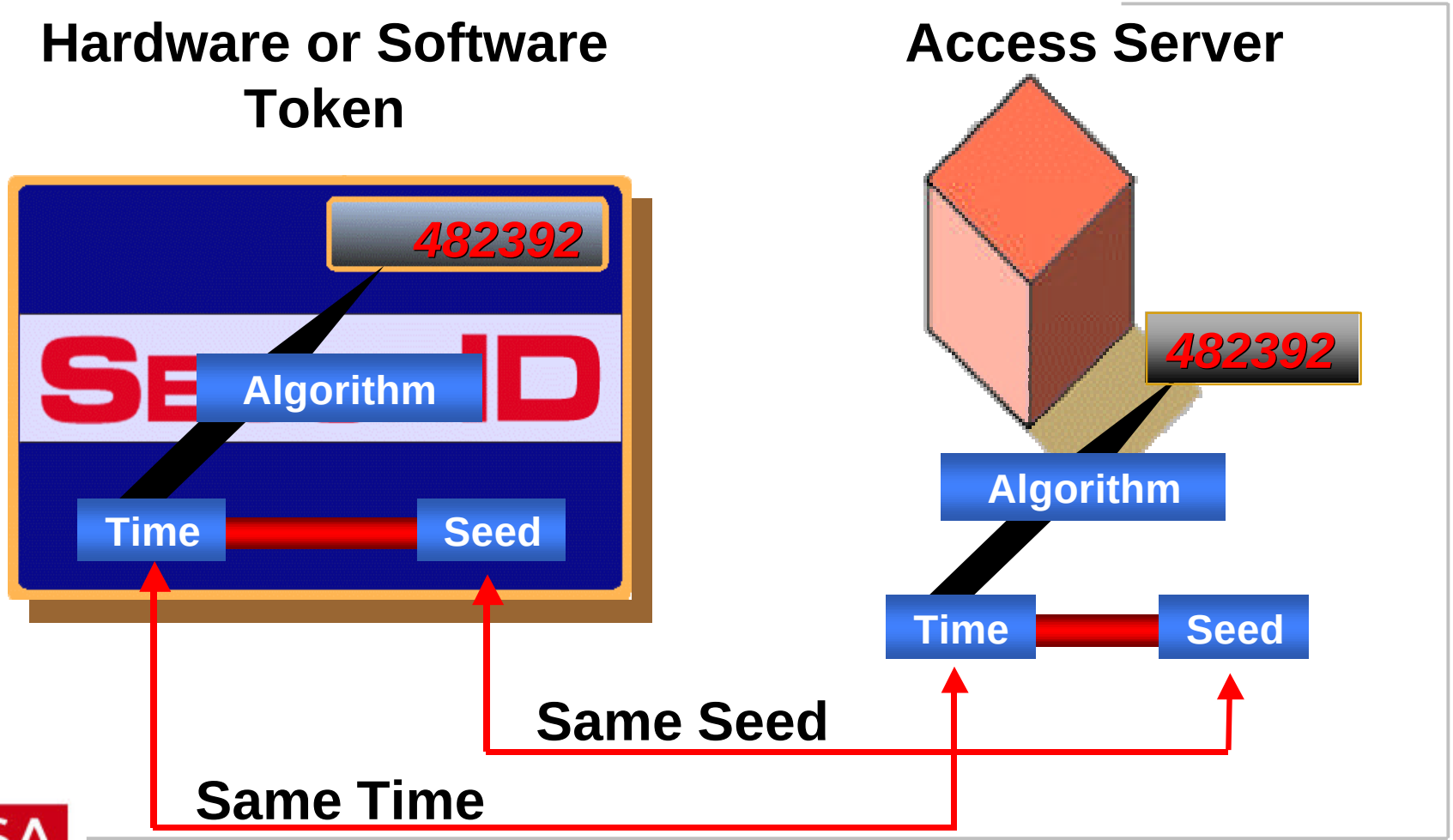
State-Of-The-Art

Time-Synchronous Tokens



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State-Of-The-Art
Digital Certificates

RSA Keon™

Serial Number: 6cb0dad0137a5fa79888f

Validity: Nov.08,1997 - Nov.08,1998

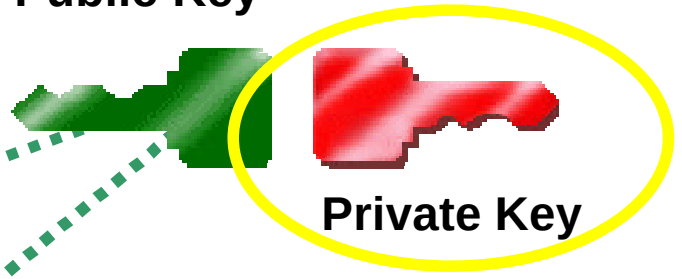
Subject / Name / Organization

Locality = Internet
Organization = VeriSign, Inc.
Organizational Unit = VeriSign Class 2 CA - Individual Subscriber
Organizational Unit = www.verisign.com/repository/CPS Incorp. by Ref.,LIAB.LTD(c)96
Organizational Unit = Digital ID Class 2 - Netscape
Common Name = Keith H Erskine
Email Address = kerskine@ne.mediaone.net
Unstructured Address = 160 Boston Rd Chelmsford

Public Key:
ie86502hhd009dkias736ed55ewfgk98dszbc
vcqm85k309nviidywtoofkkr2834kl

Status: Valid

Signed By: VeriSign, Inc.:
kdiowurei495729hshsg0925h309afhwe09721h
481903207akndnxnzkjoaioeru10591328y5



Certificate Authority

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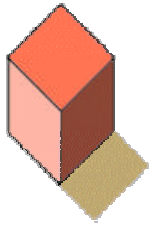
Digital Certificates

How Secure is the Private Key?

Where is it stored?	How is the store protected?
Hard Drive 	Nothing, or Password
Software 	Authenticator of Choice
Smart Card 	PIN

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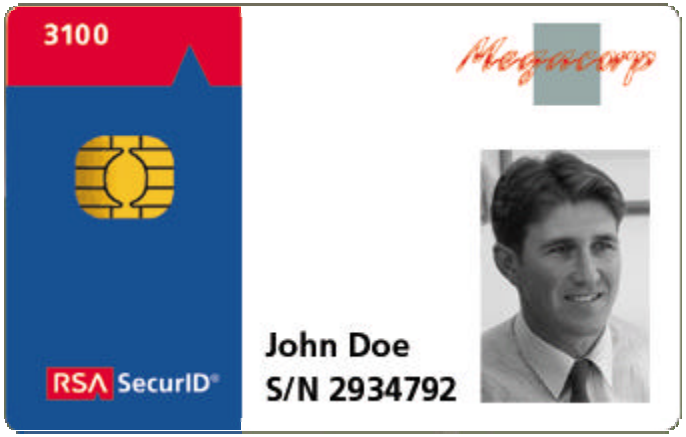
State-Of-The-Art
Multi-Application Smart Cards

- Highest security
  - On-card digital signatures
- Supports latest application features
  - Dual keys and certificates
- Mobility
  - Credential store on-card with keys, certificates, network login information, and software token seed record
- Versatile
  - Supports PKI applications and traditional token-protected systems
  - Magnetic stripe for physical access
  - Personalization for employee identification



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State-Of-The-Art
Biometrics

- Biometric authentication depends on something unique about you personally
  - Fingerprints
  - Iris pattern
  - Voiceprint
  - Faceprint
  - Retinal Pattern

- A pattern of the physical characteristic is recorded in advance
- The physical characteristic is re-read at the time of authentication
- The read characteristic is compared with the stored version
- If the match is good enough, the access is granted

Confusing Market Messages

- Industry Analyst
  - "Use proprietary random PIN tokens only where they are already deployed or are urgently needed in the next 6-9 months."
  - "Expensive."
  - "Smart cards … can do more at a lower cost."
- Industry Analyst (4 months later)
  - "Implementing certificate-based solutions is complex and costly at this time, and will take 12 - 24 months to be widely deployed. Consider other mechanisms for authentication such as ... proprietary tokens in the interim".

A consistent framework for comparison is needed!

Authentication Scorecard

- Why Focus on Authentication?
- What are the Requirements for Authentication?
- What is the State of Authentication Technology?
- *What is the Authentication Scorecard?*

Authentication Scorecard
Why??

- Companies are reevaluating authentication strategies
- Several authentication technologies are available
  - How to objectively position alternatives?
  - How to objectively choose most appropriate?
  - How to objectively allocate investments?

- Market buzz ≠ Market reality, e.g.,
  - Biometrics gets hugely disproportionate share of press coverage relative to actual deployment
  - "Year of the PKI": ~~1997 1998 1999~~ 2000
  - "Tokens are Dead" vs "Long Live Tokens"

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Authentication Scorecard
Methodology

- Select key authentication technologies for evaluation
- Establish consistent evaluation criteria
- For each authentication technology, assign values (scale of 1-10) for each evaluation criteria
- Weight evaluation criteria according to relative importance for a particular application or environment
- Compare results

Authentication Scorecard
Technologies Considered

- UserID / Password (baseline)
  - Near-universal use
  - Growing awareness of inadequacy
  - Growing problems with scale
- Two-factor authentication (Time-Synchronous Tokens)
  - Hardware (multiple form factors)
  - Software (multiple platforms)
- Digital certificates (standalone)
  - PKI
- Two-factor authentication (use with certificates)
  - Smart cards
  - Biometrics
  - Tokens

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Authentication Scorecard
Evaluation Criteria (I)

- Interoperability
  - Does the authentication method work natively with multiple products, or does it work only if all parties install additional software on their desktops or servers?
- Back-end integration
  - How easy is it to integrate into the access control mechanisms of the back-end resources or applications?
- Portability
  - How portable is the authentication method?
    Can it be used to gain access from multiple systems?
- Scale/Robustness
  - Does the authentication solution scale to the degree required now?
    Three years from now?

Source: RSAS, adapted from Giga Information Group, "The Hows and Whys of Online Authentication"

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Authentication Scorecard
Evaluation Criteria (II)

- Ease of deployment
  - How easy is it to deploy the technology? This includes the distribution of any necessary hardware or software; ease of installation; ease of configuration; etc.
- Ease of adoption / Ease of use
  - How easy is it for end-users to learn how to use the authentication method? How convenient is it for end-users to use the authentication method, day in and day out?
- Multi-Purpose
  - Can the authentication method be used for more than one purpose? E.g., physical access, network access, application access, digital signature, etc.

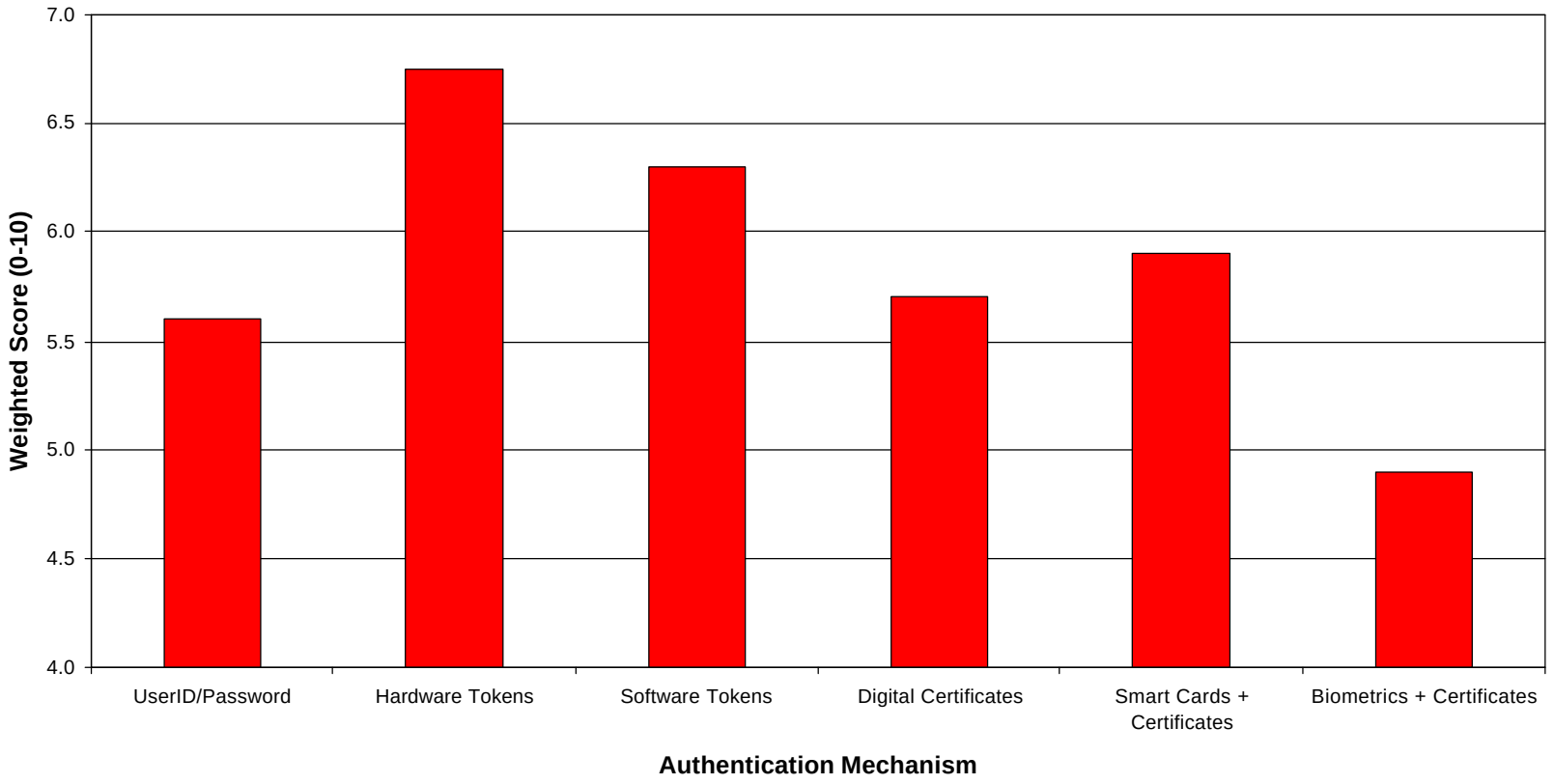
Source: RSAS, adapted from Giga Information Group, "The Hows and Whys of Online Authentication"

Authentication Scorecard
Evaluation Criteria (III)

- Initial costs
  - What are the initial acquisition and deployment costs? This may include additional hardware, software, servers, readers, services, etc. associated with acquiring and deploying the authentication solution.
- Operating costs
  - What are the ongoing operating costs? This may include costs for replacement (e.g., expired / lost / stolen / broken) authentication mechanisms; ongoing management; upgrades; support; help desk; etc.
- Relative strength
  - How strong is the authentication? Is it adequate for the information being protected? Does it meet regulatory requirements (if any) for the protection of information?

Source: RSAS, adapted from Giga Information Group, "The Hows and Whys of Online Authentication"

Authentication Scorecard
Example



Source: RSAS, adapted from Giga Information Group, "The Hows and Whys of Online Authentication"

Authentication Scorecard
Example

Authentication Scorecard							
Evaluation Criteria	Weight	UserID/Password	Hardware Tokens	Software Tokens	Digital Certificates	Smart Cards + Certificates	Biometrics + Certificates
Interoperability	10.0%	8	3	3	4	4	2
Back-end Integration	10.0%	7	8	8	5	5	3
Portability	5.0%	9	8	2	4	6	6
Multi-Purpose	5.0%	2	5	5	5	9	5
Scale/Robustness	10.0%	4	7	7	7	7	3
Ease of Use	10.0%	4	6	6	8	9	7
Ease of Deployment	10.0%	9	7	6	6	4	3
Initial Costs	10.0%	8	6	7	6	3	3
Operating Costs	15.0%	3	8	7	6	5	7
Relative Strength	15.0%	4	8	8	5	8	8
Weighted Score	100.0%	5.60	6.75	6.30	5.70	5.90	4.90
	SUMMARY	UserID/Password	Hardware Tokens	Software Tokens	Digital Certificates	Smart Cards + Certificates	Biometrics + Certificates
	Weighted Score	5.60	6.75	6.30	5.70	5.90	4.90

- Make your own evaluation - Interactive Authentication Scorecard
  - Visit the RSA booth at the Conference
  - Visit the RSA Web site

Source: RSAS, adapted from Giga Information Group, “The Hows and Whys of Online Authentication”

Scorecard
UserID/Password

- Pros
  - Easy to use
  - Platform/hardware independent
  - No acquisition cost
  - Interoperable
  - Minimal end-user training
- Cons
  - Weak security
    - Static value - can be intercepted, guessed, spoofed, cracked
    - Most are poorly chosen
  - High operating costs
    - Help Desk for forgotten passwords
  - End-user aggravation
    - Inconsistent formats between applications
    - Hard to remember if frequently changed

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Scorecard
Hardware Tokens

- Pros
  - Strong security
    - Two-factor
    - Dynamic value; difficult to hack or predict; negates replay attacks
  - Platform-independent
  - Portable
  - No desktop software required
  - High interoperability
  - No password administration
- Cons
  - End-user training required
  - Acquisition and deployment cost
  - Replacement cost for lost, stolen or expired tokens
  - Single-purpose device
    - Cannot be used as ID badge or physical access

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Scorecard
Software Tokens

- Pros
  - Low acquisition cost
  - Strong security
    - Mechanisms to bind token to specific machine
  - High interoperability
  - End-user does not have to carry separate device
- Cons
  - Need to install software on desktop
  - Platform-dependent
  - Not portable

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Scorecard
Digital Certificates

- Pros
  - Low acquisition cost
  - Support for Web-based applications
  - Multiple use
    - SSL, S/MIME, IPSec
  - Digital signature
  - Scaleability
- Cons
  - Medium security
    - Private key often unprotected, or protected by password
    - No copy protection
  - Limited certificate-enabled applications
  - High administrative costs
  - Complex to deploy

Scorecard
Smart Cards + Certificates

- Pros
  - Multi-purpose
    - ID badge
    - Physical security
  - Strong security
    - Two-factor
  - Easy end-user adoption
- Cons
  - High acquisition cost
  - Limited certificate-enabled applications
  - Need to deploy hardware and software to each user
  - Limited interoperability
    - Standards emerging

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Scorecard
Biometrics + Certificates

- Pros
  - Perceived ease-of-use
    - Minimal end-user training
  - Always have it with you
  - Strong security
    - Two-factor
- Cons
  - Maturity of technology
  - End-user acceptance
  - Very high acquisition and deployment cost
  - Hard to scale
  - Limited interoperability

Conclusions

- Authentication is the essential foundation for e-government
  - Establish trust
- Organizations should understand tradeoffs between authentication alternatives
  - Balance tradeoffs with security requirements
  - Avoid evaluation based on a single criteria (price, scale, etc.)
- Markets and technologies will continue to evolve
  - Near-term: tokens
  - Longer-term: digital certificates and smart cards

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How To Contact

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