GEMINI TrustEnabler

Federal PKI Technical Working Group
(FPKITWG)
25 May 2005

Peter Hesse (pmhesse@geminisecurity.com)

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Agenda

- Overview
- Problem Description
- What is TrustEnabler?
- Our target: SSL
- How TrustEnabler Works
- Today's Demo
- Conclusion

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Overview

- Public Key Infrastructure is a very useful technology for establishing trust in on-line transactions
  - SSL, VPN, Signed Forms, etc.
- "PKI-capable" implementations typically have concentrated on working well with simple PKIs
  - Single-CA environments
  - Trust lists of multiple CAs
  - Users directly issued by CAs, or through simple hierarchical relationships

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Overview (2)

- As this audience is quite aware, there are efforts to expand PKI relationships through cross-certification and Bridge certification authorities
  - Federal Bridge CA is the best-known example
  - Pharmaceutical Industry “SAFE” initiative is another
- Typical “PKI Capable” implementations are not capable of dealing with these more complicated relationships
  - Path discovery and validation implementations are incomplete

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Overview (3)

- Personally, I have been working on certification path discovery and validation efforts with the U.S. Government since 1998.
  - "PKI Capable" implementations are only slightly more "Capable" now than they were in 1999!
- TrustEnabler is our first effort to reduce the delta between existing trust relationships and existing "PKI Capable" products
  - Enhance existing systems rather than replace them

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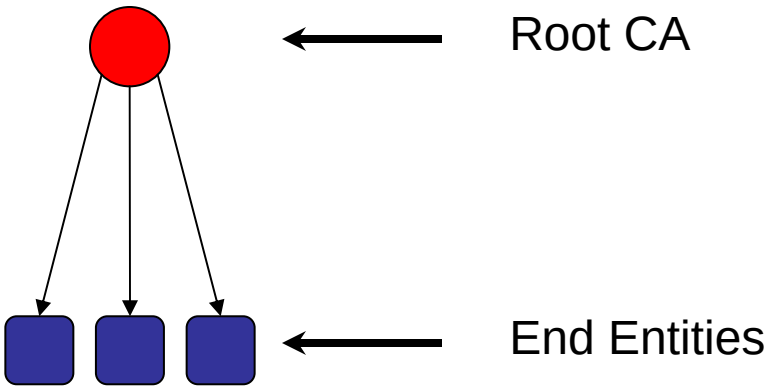
Problem Description

- Typical "PKI Capable" software is capable of processing simple PKIs
  - By "simple" we're talking about a flat hierarchy



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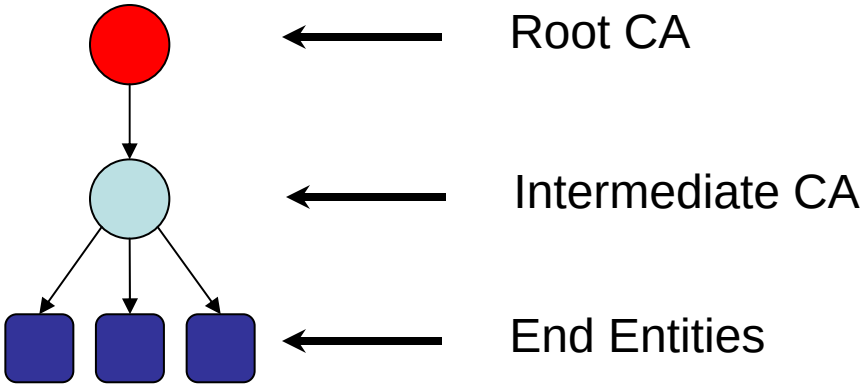
Problem Description

- Typical "PKI Capable" software is capable of processing simple PKIs
  - By "simple" we're talking about a flat hierarchy
  - Some support use of (known) intermediate CAs



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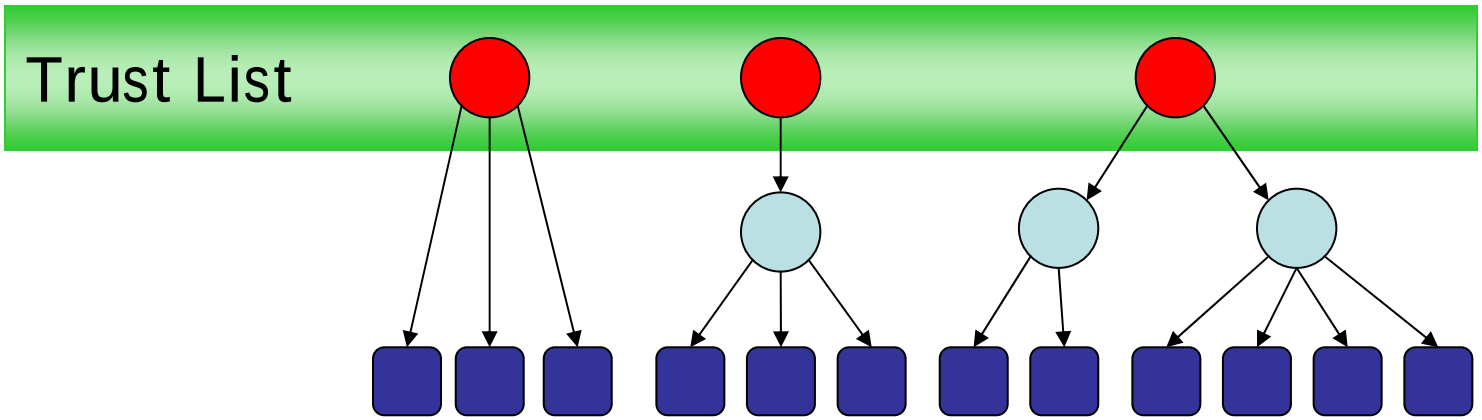
Problem Description

- Typical "PKI Capable" software is capable of processing simple PKIs
  - By "simple" we're talking about a flat hierarchy
  - Some support use of (known) intermediate CAs
  - Trust lists can allow multiple simple PKIs



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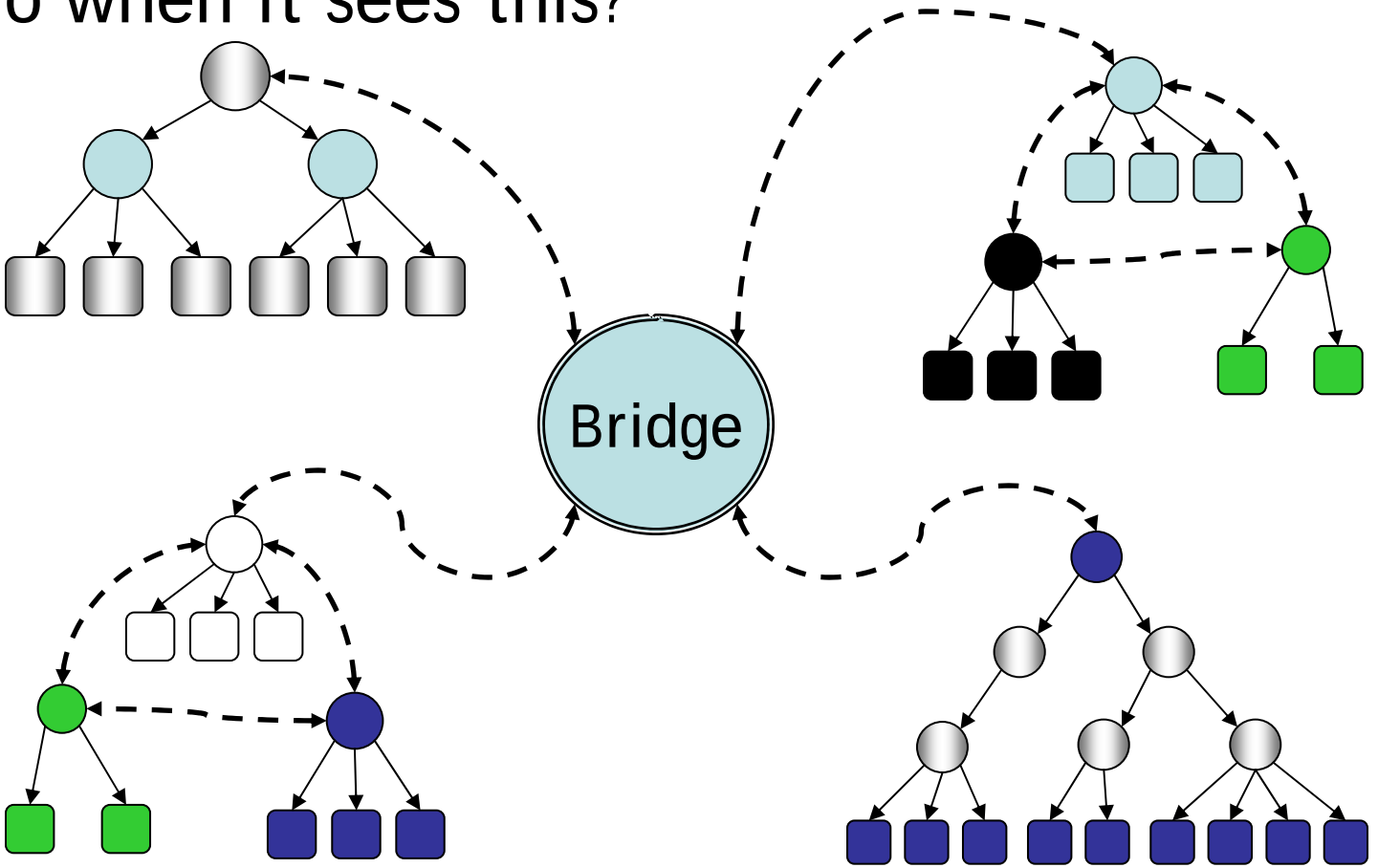
Problem Description (2)

- If typical software is looking for that, what will it do when it sees this?



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What is TrustEnabler?

- TrustEnabler provides services to improve the certification path discovery and validation of "PKI capable" products
- TrustEnabler is currently focused on providing a solution for applications that base their PKI capabilities around the technology of SSL with Mutual Authentication
  - Future TrustEnabler versions may expand the scope to other technologies

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What is TrustEnabler?

- TrustEnabler consists of three parts:
  - **TrustEnabler plugin**
    - Checks client's digital certificate to ensure that it is trustworthy (with full certification path validation capability)
  - **TrustEnabler Explorer**
    - Explores and stores the interconnections between PKIs (provides complex certification path discovery capability)
  - **TrustEnabler Documentation**
    - Full installation and usage documentation

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SSL Process

- SSL with Mutual Authentication allows a user to authenticate to the server using a certificate and private key
- The following slides outline this process
  - Sometimes called Client Authenticated SSL
  - TLS also has this capability
- Also in the following slides are the impacts that the TrustEnabler software has on the process

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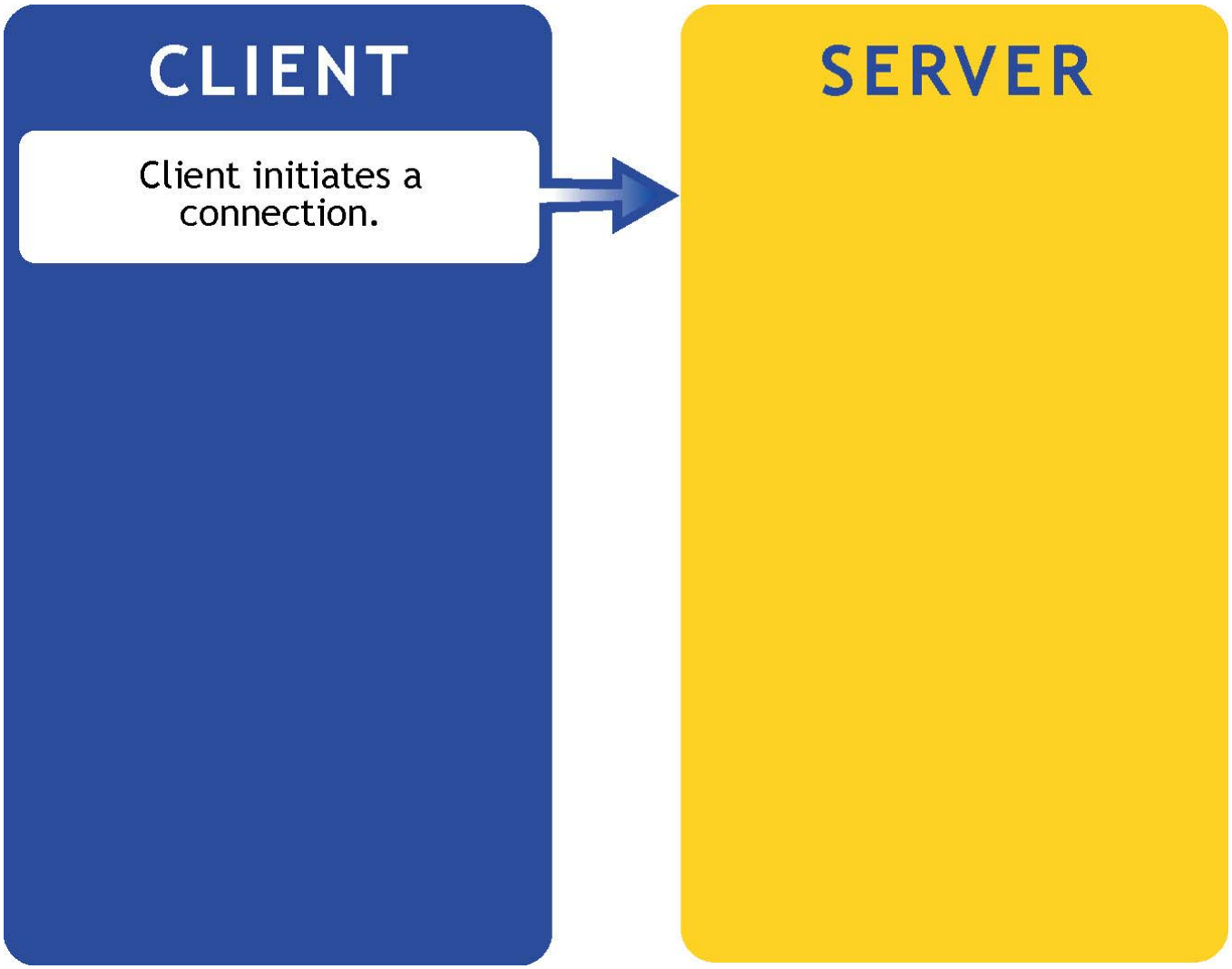
SSL Process



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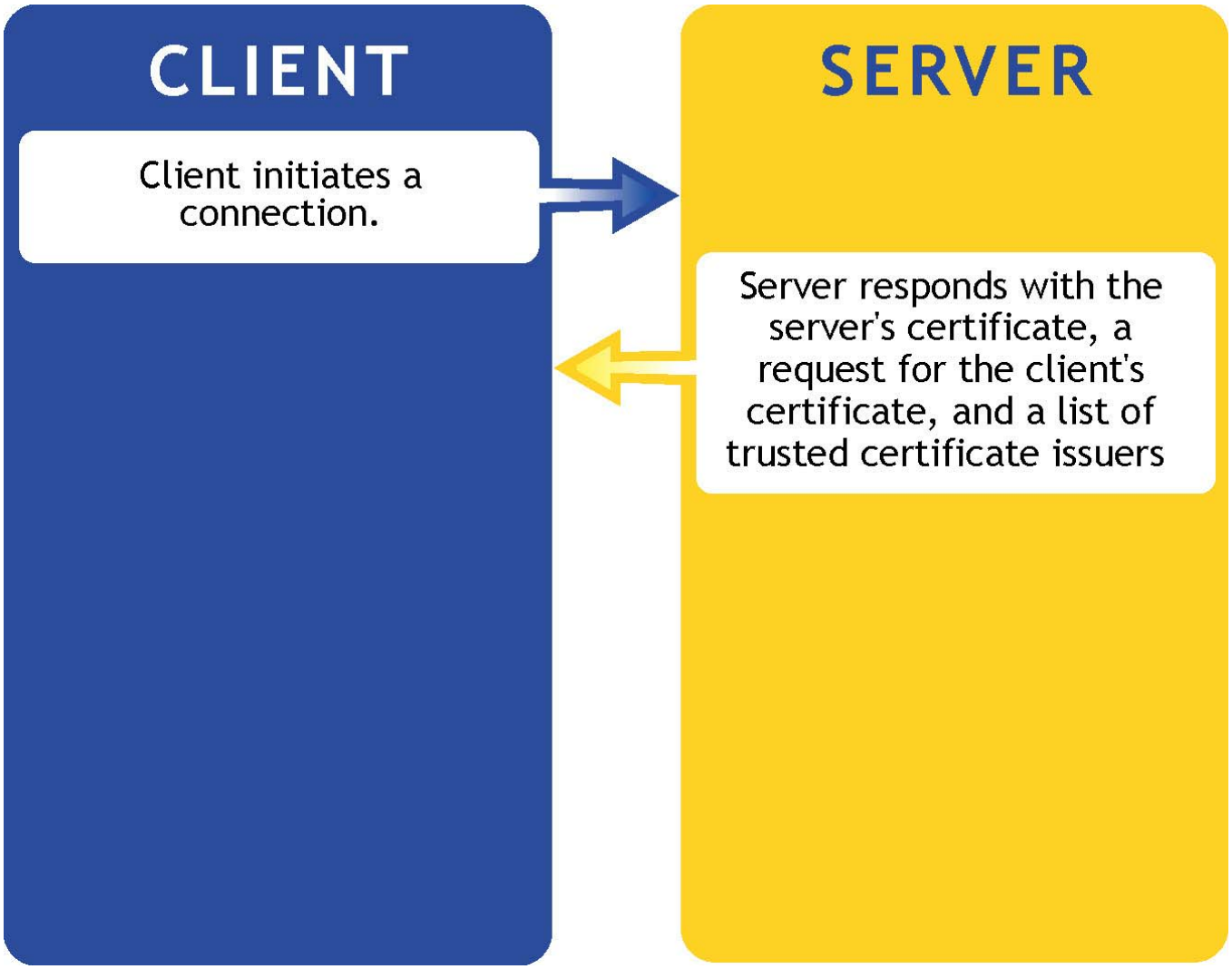
SSL Process



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TrustEnabler IMPACT

- Typical implementations just send the contents of the SSL server's trust list in this response
  - Trust lists typically don't know anything about complex PKIs
- **TrustEnabler Explorer** populates the SSL server's trust list with all other issuers it has found while exploring the PKI
  - This is just to enable more clients to get in the front door with their certificate
  - They won't get to the application unless the certificate can be validated back to the trust root

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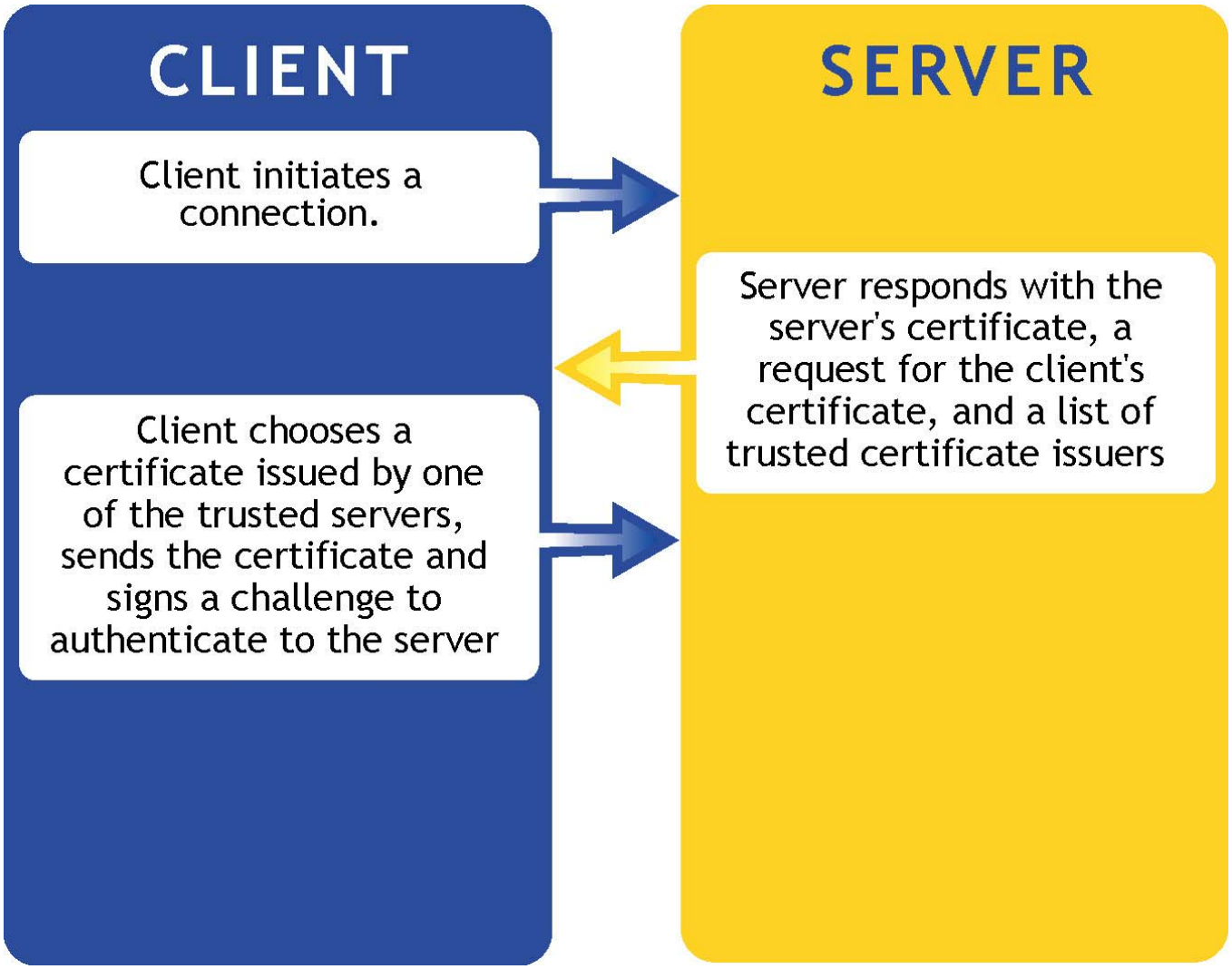
SSL Process



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TrustEnabler IMPACT

- In typical implementations, a user from another PKI will not be able to select their certificate
  - Unless their certificate issuer is stored in the SSL server's trust list
- Since **TrustEnabler Explorer** populated the SSL server's trust list with other issuers, the client can now select their own certificate and begin the process of authenticating to the server

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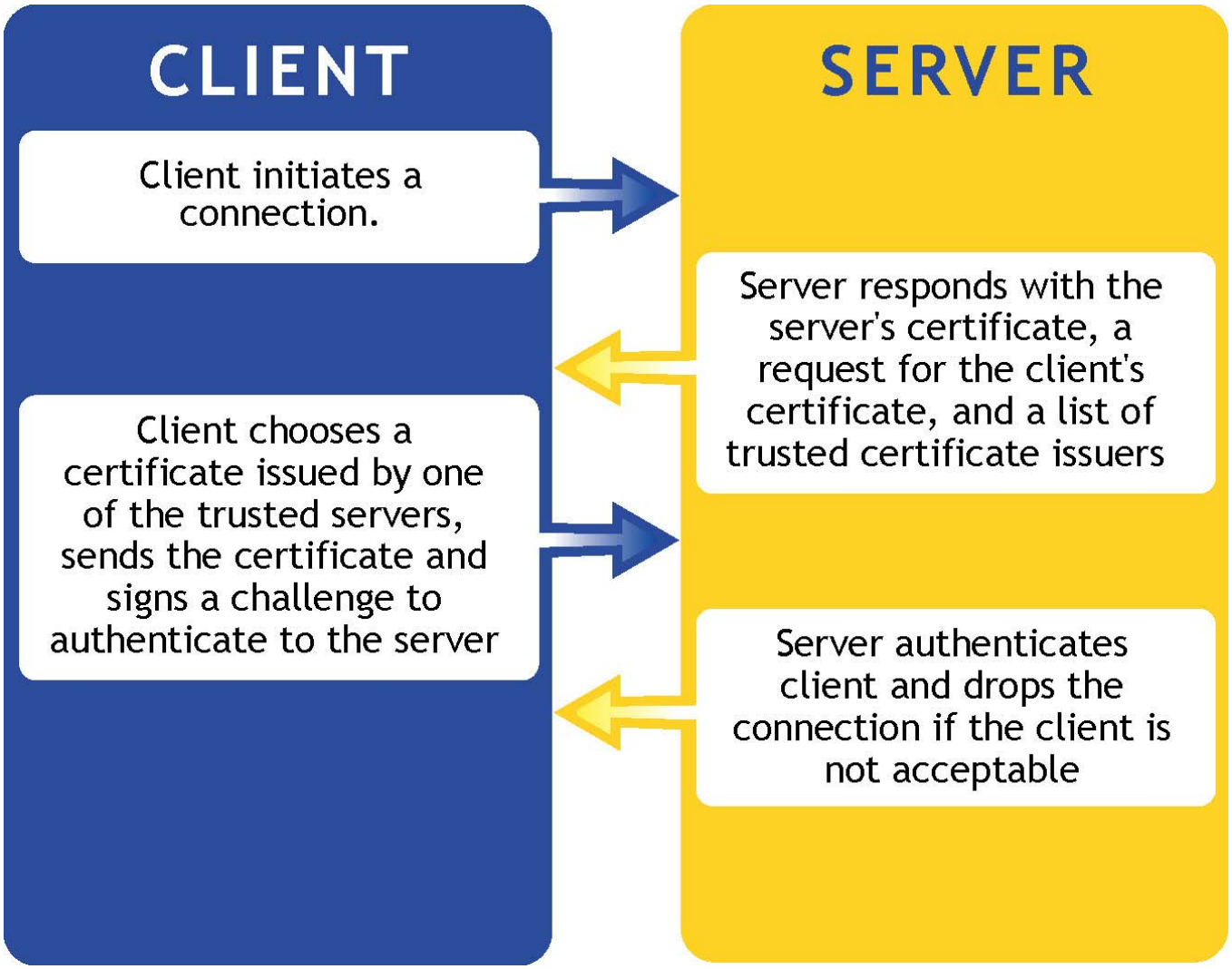
SSL Process



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TrustEnabler IMPACT

- Many SSL server implementations are lacking in their certification path validation capabilities
  - Some do not perform revocation checking
  - Others do not check name constraints, certificate policies, etc.
- The **TrustEnabler Plugin** provides full certification path validation capabilities to ensure that the certification path is truly valid before allowing the user to continue

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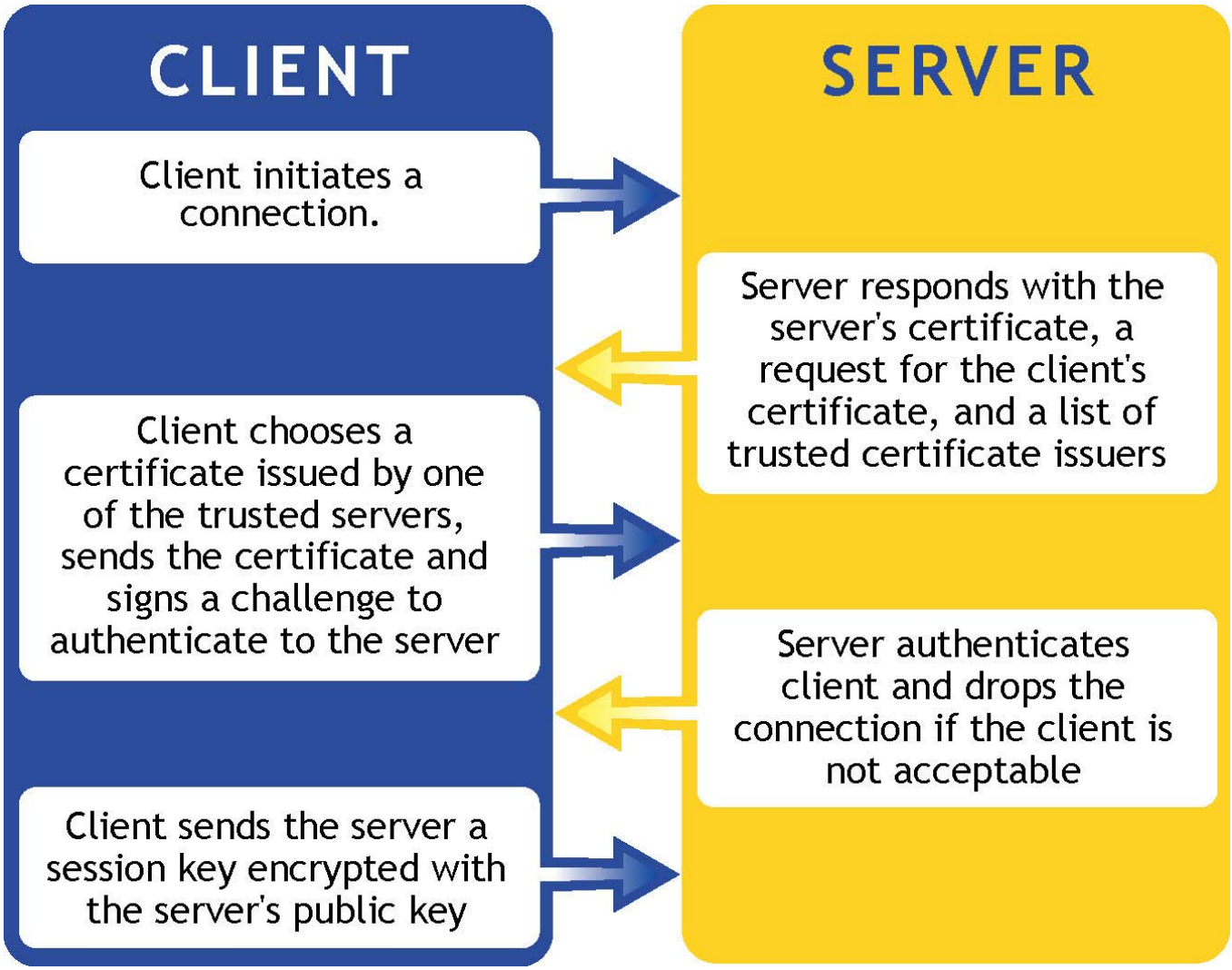
SSL Process



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How TrustEnabler Works

- The **TrustEnabler Explorer** periodically performs path development starting from one or more trusted root certificates
  - Utilizes an LDAP/X.500 directory to find relationships
  - Future versions will support SIA/AIA extensions to find additional relationships
- The discovered certificate issuers are inserted into the SSL server's trust list

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How TrustEnabler Works

- The **TrustEnabler Plugin** is an access control plugin which is invoked after the SSL negotiation process is completed, but before any pages are served to the client
  - Uses the Certificate Management Library (CML) v2.4 to perform certification path validation
- The plugin is invoked upon every request to the server
  - Validation state of client certificates is cached for a configurable amount of time to ensure responsiveness
    - Don't want to re-do validation for every request

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Today's Demo

- Demonstration setup:
  - Virtual machine acting as Acme server/client
    - Windows 2000 Server SP4 / IE 6
    - OpenLDAP directory server
    - Two instances of Sun ONE Web Server 6.1 set up for SSL w/mutual authentication
      - One with TrustEnabler 1.4, one without
  - Desktop acting as Widgets server/client
    - Windows XP SP2 / IE 6

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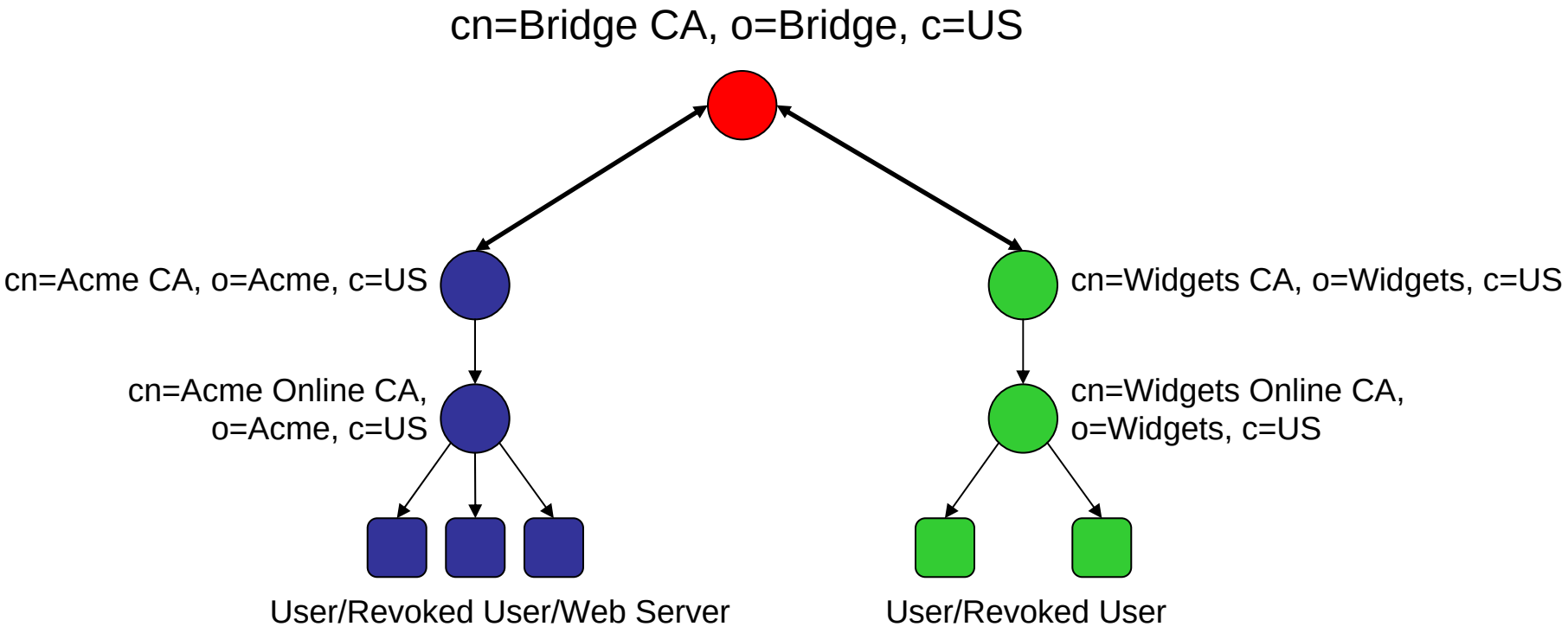
Demonstration PKI



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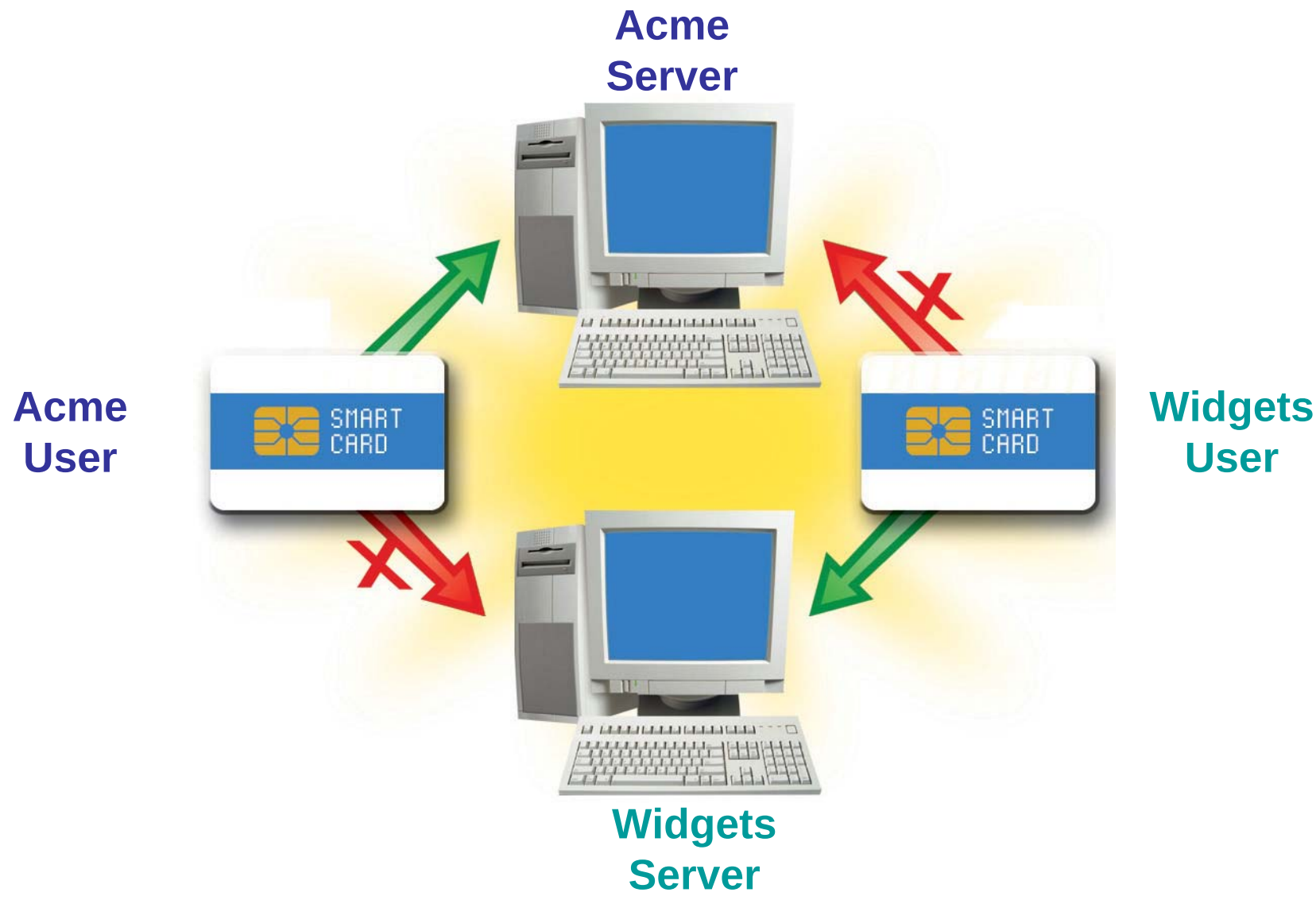
Without TrustEnabler



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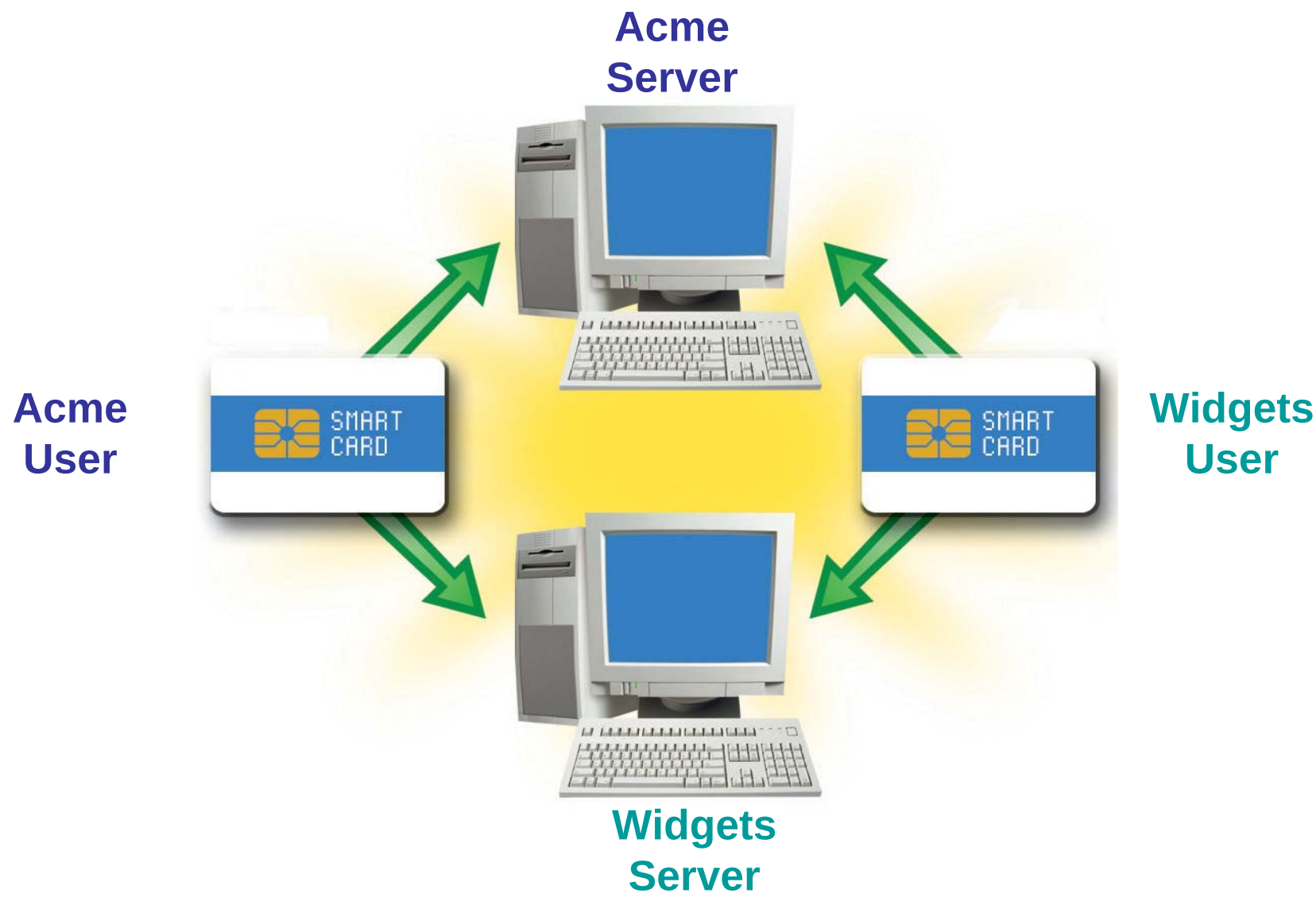
With TrustEnabler



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Today's Demo

- Demonstration points:
  - Demonstrate out-of-box behavior of Sun ONE Web Server with mutual authentication
    - Acme users (revoked or not) are permitted
    - Widgets users cannot log in
  - Demonstrate Sun ONE Web Server with TrustEnabler installed
    - Valid Acme users are permitted
    - Valid Widgets users are permitted
    - All others (revoked, other PKIs) are not permitted

DEMO

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Conclusion / Future Plans

- TrustEnabler provides a solution for enabling **today's** applications to work with the current *and growing* Federal PKI
  - Combined solution to allow a web-based application to accept and trust certificates from non-local PKIs
- TrustEnabler is currently available for the Netscape/iPlanet/SunONE series of web servers
  - Platforms include Windows, Linux, other *NIX
- Under Development:
  - SunONE on HP-UX
  - Microsoft IIS Version
  - OCSP Support

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More Information

- For more information, contact me directly, or visit our website:
  http://www.trustenabler.com

Peter Hesse, President
Gemini Security Solutions, Inc.
+1-703-378-5808
pmhesse@geminisecurity.com