MIT Kerberos consortium

Kerberos as the foundation for the Identity Metasystem

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http://www.identityblog.com

10/21/09 9:30AM

Agenda

The Landscape: Hard Problems of Identity

The Claims Based Model

Using the Identity Metasystem Architecture

Conversation: What role does Kerberos play?

Minimal Disclosure and Multilateral Security

Possible Directions

Two hard problems – one answer

The hardest lines of any application…

- Who are you?
- What are you allowed to do?
- What experience should you have?

The hardest job of any IT architect

- How do I get **applications** that can work together in an architecture?
- How do I get applications that are securable and manageable?

Application Developer Inferno

- It’s hard to get identity decisions to work out in all the contexts customers require
  - As one developer told me, “You are never done”
- Many choices of identity technology
  - Passwords, Kerberos, X.509, SAML, LDAP, OpenID, etc
  - No easy way to go from ID to auth and personalization
  - Choices imply different representations, user experiences, programming models, fit with scenario
- Applications become limited and “siloed” by technology choices
  - Bound to constraints of technology you choose
  - **Difficult to connect across boundaries** (both technical and organizational) where different choices have been made

Now the Cloud Brings New Challenges

- Example: Expense Report App
  - Use case: Employees fill out expense reports that are sent to *manager* for approval and charged to *cost centers…*
- On-premise solution:
  - Enterprise buys solution from ISVs like PeopleSoft that leverage enterprise authentication and look-ups in directory and/or HR databases
- Cloud (outsourced service) solution:
  - Service Provider runs Expense Report **Service** in cloud
  - Even if single signon provides authentication, how does cloud access internal systems to discover manager and cost center?
  - Is everything hand configured? Auto-provisioned? How much does *that* cost?
- **Boundaries reveal conflation inherent in current approaches**

“Claims” Change the Landscape

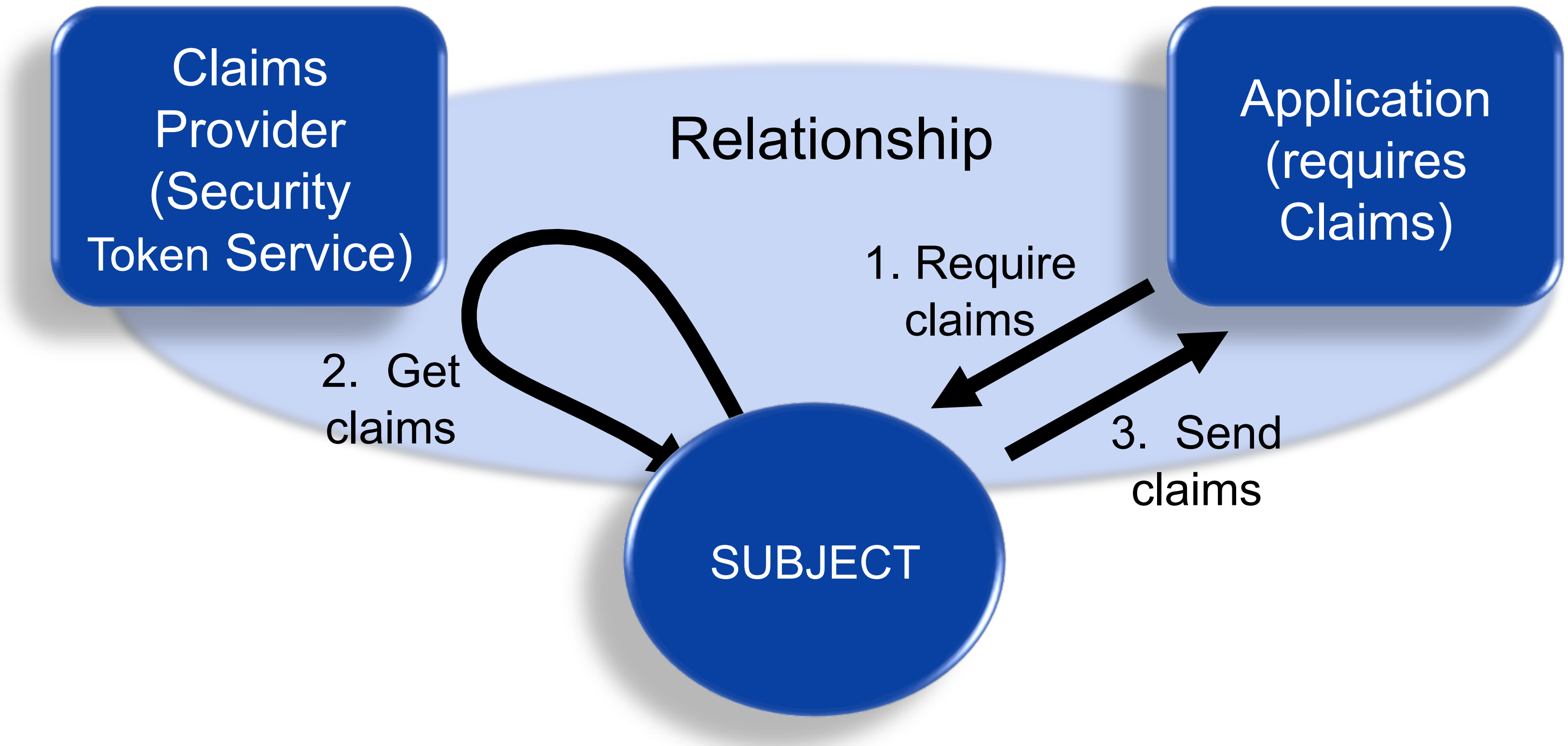
- A new technology that moves us *beyond single sign-on* to “*claim-based” access across administrative boundaries*
  - *Intra and inter-enterprise as well as enterprise-to-cloud*
- Same technology facilitates building and using cloud based services
  - Scaling of services across farms
- Leverage trusted offline proofing in online applications
  - Example – school proofing
  - Sharing data between services.
- Help us cross enterprise administrative and technical boundaries

The Claims-Based Model

What is the Claims-Based Model?

- Claims-based model
  - Abstraction layer for authenticating, authorizing, obtaining information about users and services
- Claim: statement made by one subject about another subject
  - Email = kcameron@microsoft.com
  - Age > 21
  - Manager = Craig Wittenberg
  - Role= Architect
- Identity Metasystem: open standards-based architecture for exchange of claims under user control
  - “Claims transformers” that match impedance
  - Write to model, let infrastructure adapt to environment
  - Not a theological exercise

Claims-Based Model


Claims Provider (Security Token Service)
Relationship
Application (requires Claims)
1. Require claims
2. Get claims
3. Send claims
SUBJECT

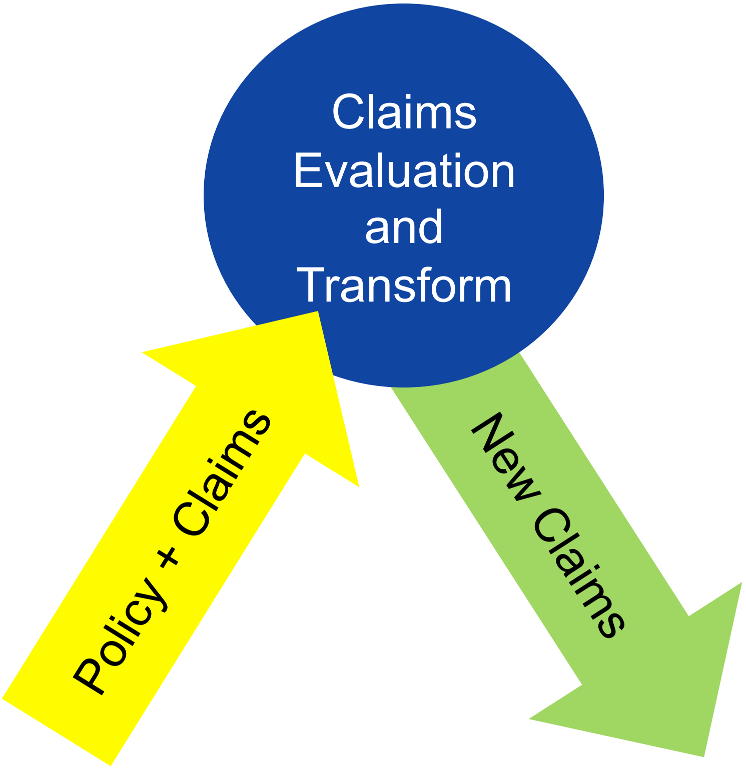
- Application: requires, uses claims to describe users
- Claims provider: supports protocols for issuing claims
- Relationship: context in which meaning of claims is defined

Laws of Identity

- Users control their release of information, understand, and WANT to participate
- Minimal disclosure necessary for any use
- No hidden SHARING of information
- No global identifiers for private relationships
- Multiple providers in a “claims market”
  - E.g., multiple layers of government, banks, employers, and others who people choose to trust
- Individuals are PART of the system
- They must have a consistent experience so they understand what is happening

Identity, Capabilities, Authorization

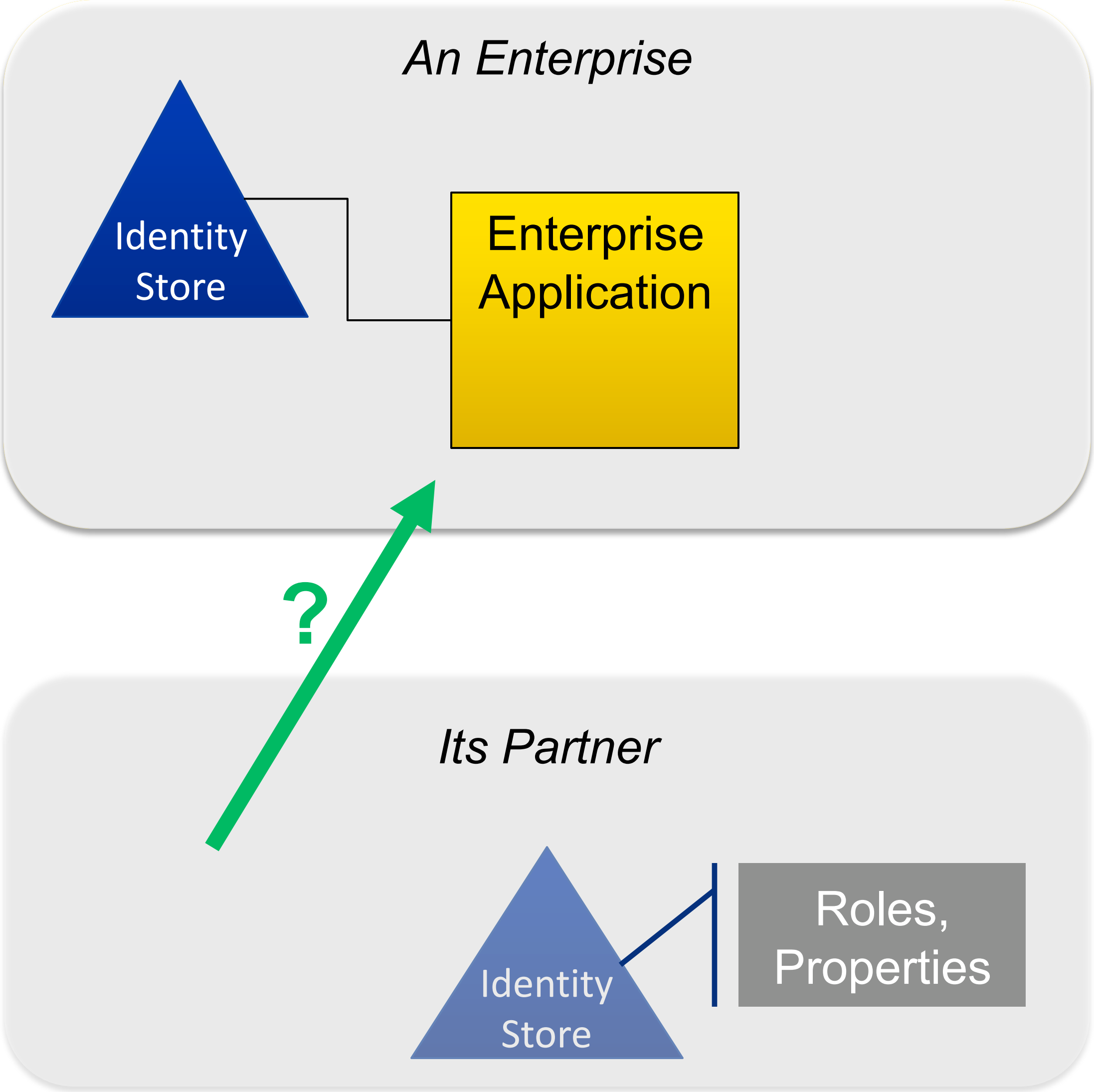
How the Claims Service works



- Claims Transformation
  - New semantics at domain boundaries
  - Different issuer (for example “Local STS”)
  - Transform from Identity to Capabilities
  - Claims Augmentation

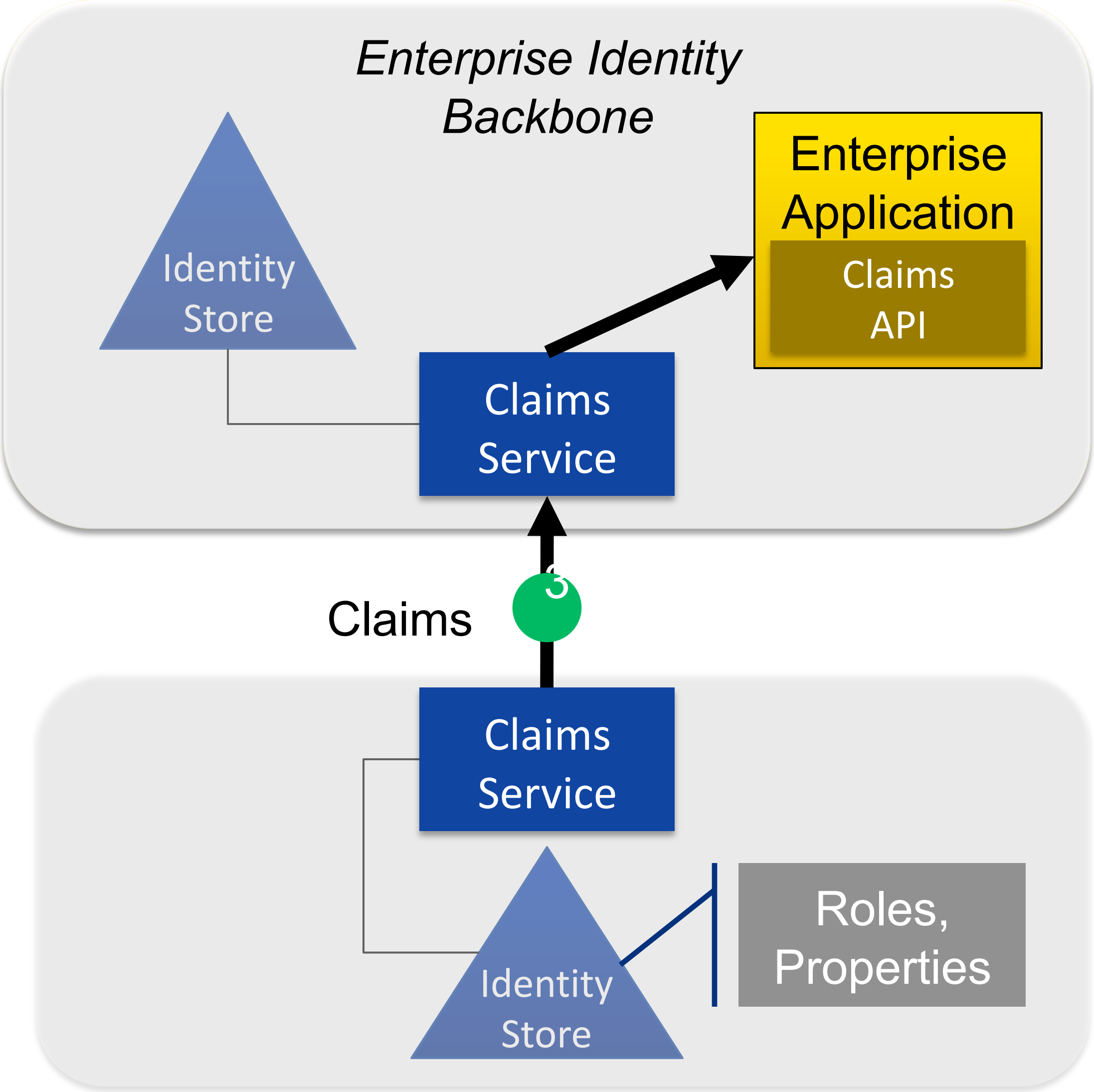
Using the Identity Metasystem Architecture

Architecture, Starting with the Enterprise



- How does an enterprise or government department make its application available to more than just employees?

Industry Standard Components



1 Claims API

- Middleware or framework for building claims-aware applications

2 Claims Service

- Security Token Service (STS) connecting to an identity store (e.g. KDC)

3 Identity Selector

- Client component allowing user to select and control identity

How hard is meta for the Developer?

1. “Who” are you?

Example Config

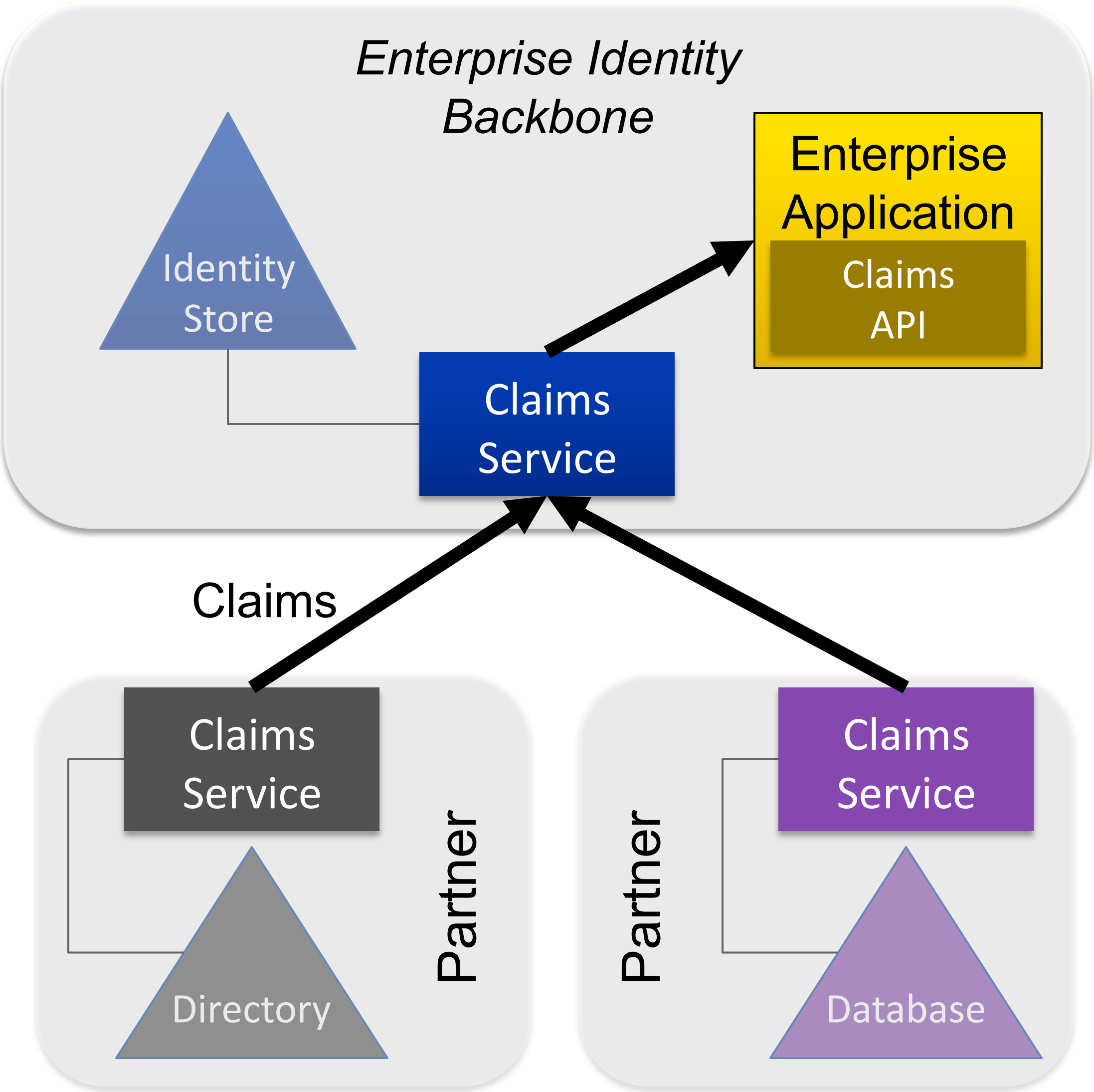
```
<federatedAuthentication enabled="true">
  <wsFederation
      issuer="https://sts1.contoso.com/FederationPassive/"
      realm = “http://web1.contoso.com/MyApp”
      passiveRedirectEnabled = "true"/>
</federatedAuthentication>
```

2. What can you do (Claims API)?

Example API

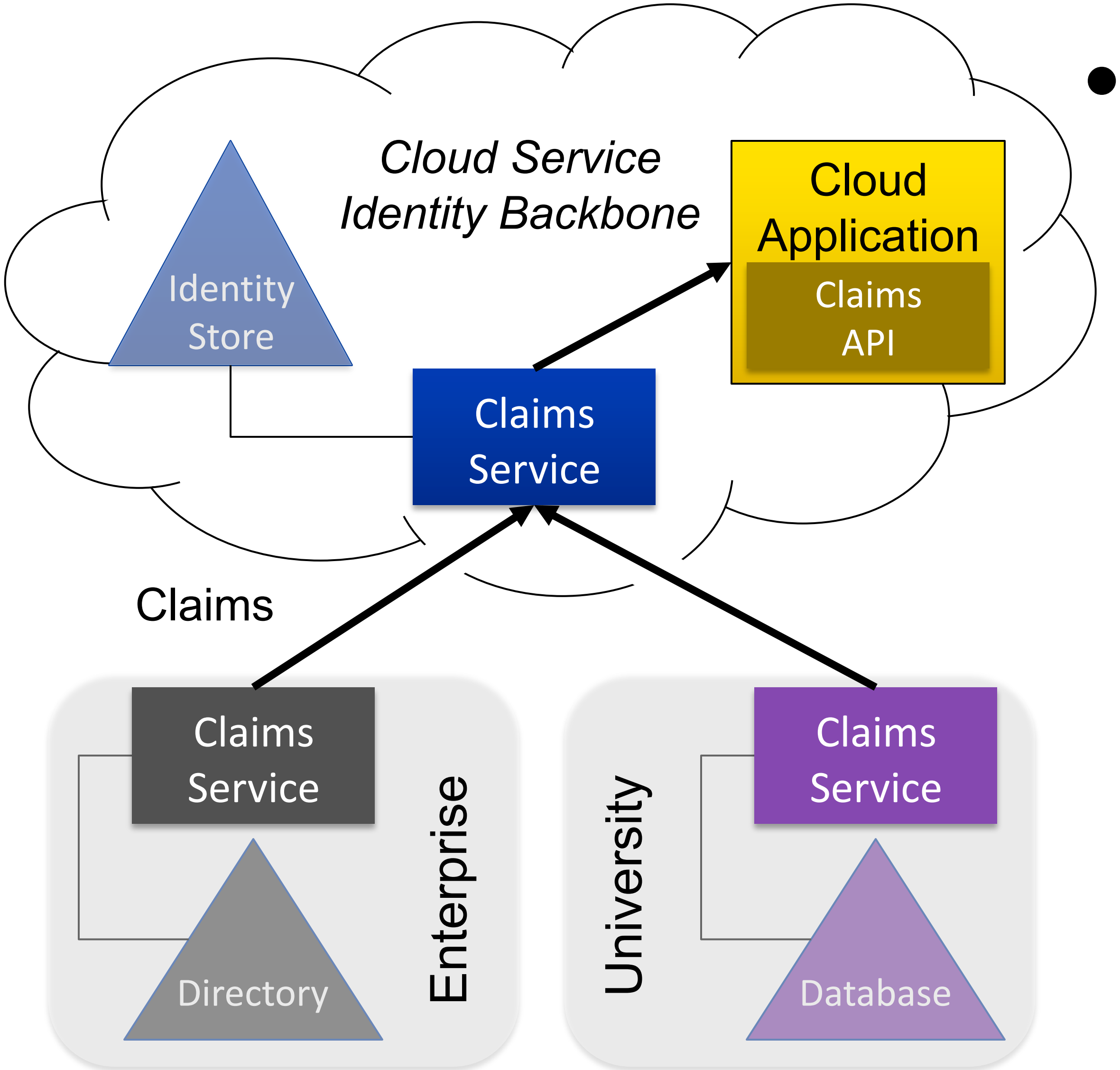
```
IClaimsIdentity caller = Thread.CurrentPrincipal.Identity
                         as IClaimsIdentity;
string Role = (from c in caller.Claims
               where c.ClaimType == MyClaimTypes.Role
               select c.Value).Single();
```

The Claims Service



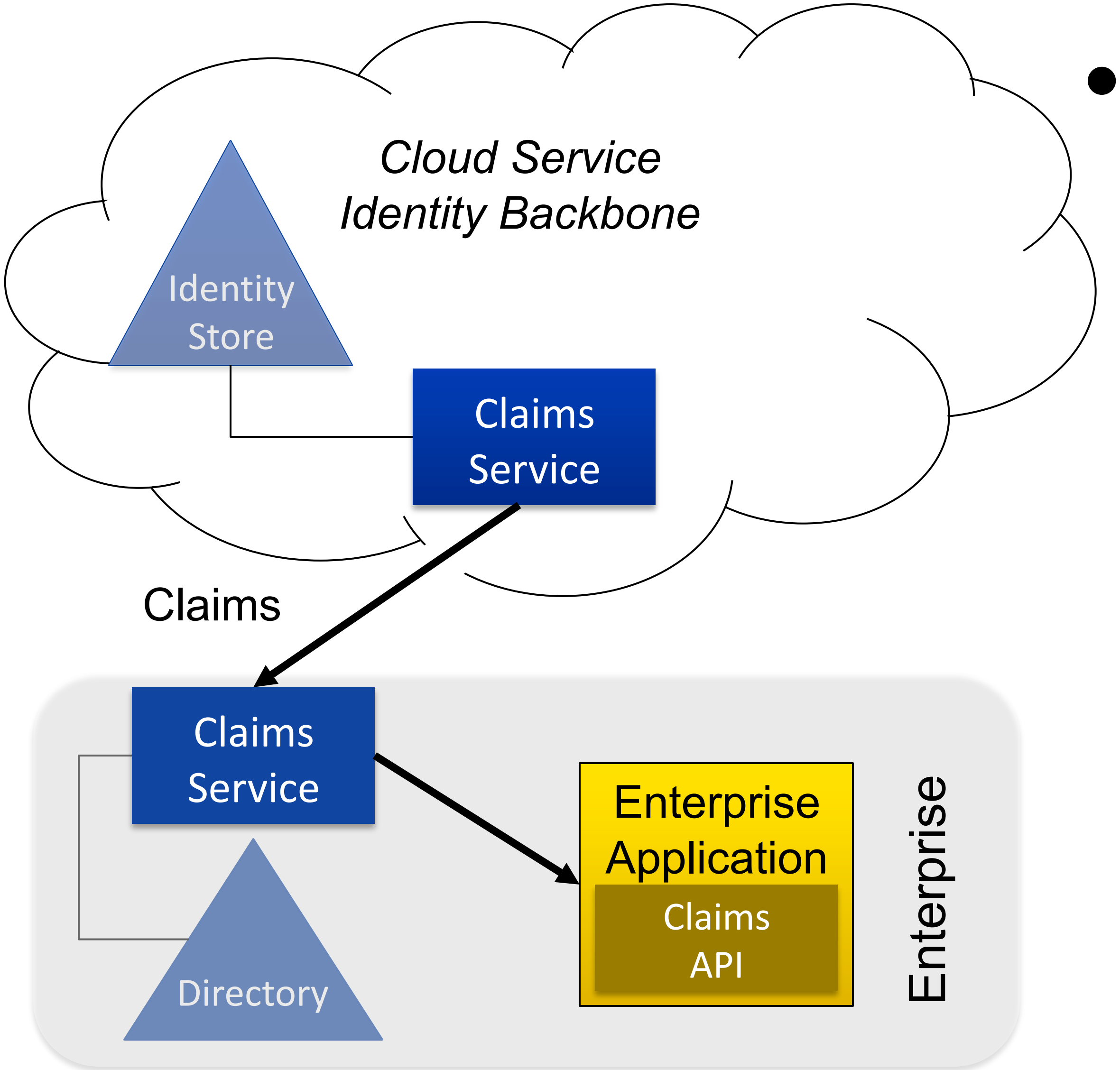
- Claims Service
  - Security Token Service (STS)
  - Standard across vendors
  - Multiple protocols
    - SAML
    - WS-Federation
    - WS-Trust
  - Multiple payloads
  - Multiple vendors
    - Open Source, Microsoft, IBM, Novell, Sun, Siemens, etc

Architecture Works for Cloud, Too



- Claims Service
  - “Enterprise” protocols also used by cloud providers
  - Additional protocol for providers in Consumer space: OpenID
  - Several large cloud service providers already support the model
  - Allows single federation agreement to access many services
  - No lock-in to any cloud provider

Architecture is Reversible



- Claims Service
  - Claims issued by cloud providers can be used by enterprise applications
  - Pattern: Enterprise outsources consumer identity management
  - Enterprise can accept identities from multiple service providers

Conversation: What role does Kerberos play?

Kerberos: Constituent Identity System

- Kerberos is the most widely deployed mechanism for authenticating users and providing them with simple claims
  - Consistent with Metasystem model (or visa versa!)
- STS's like ADFS V2 are Claims Transformers that convert Kerberos UPN (and group) claim(s) to SAML and WS-Trust claims
  - Consistent with Claims Transformer architecture
- Kerberos tickets can be sent as "security tokens" within the WS-Trust Claims Transformation protocol
- On the Relying Party Side, we are starting to see examples of claims transformers ("augmenters") that convert claims back to Kerberos tickets…
  - Poor fidelity…

Kerberos supporting claims

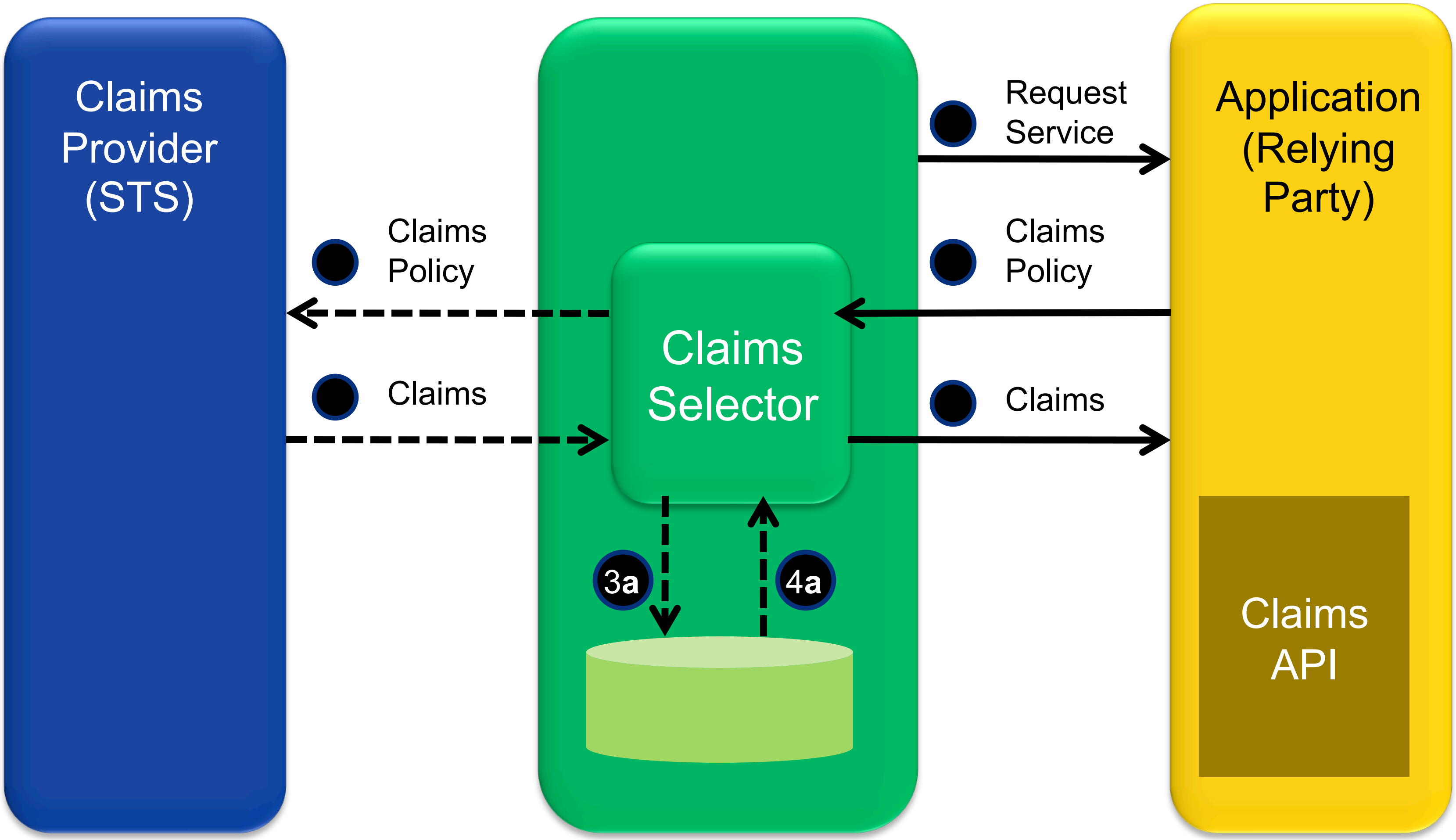
- Possibility of extending Kerberos payload so it supports claims (several ways to do this…)
- Possible “Light-up” scenario on a world scale
- Research project where ACLs are expressed as required claims, and Kerberos vehicles them
- “Inbound” Claims transformer can then become high fidelity
- Huge improvement in manageability is possible
  - Example: “This share can be seen by people in architect roles who report to Joe Long”

Identity Metasystem Inclusiveness

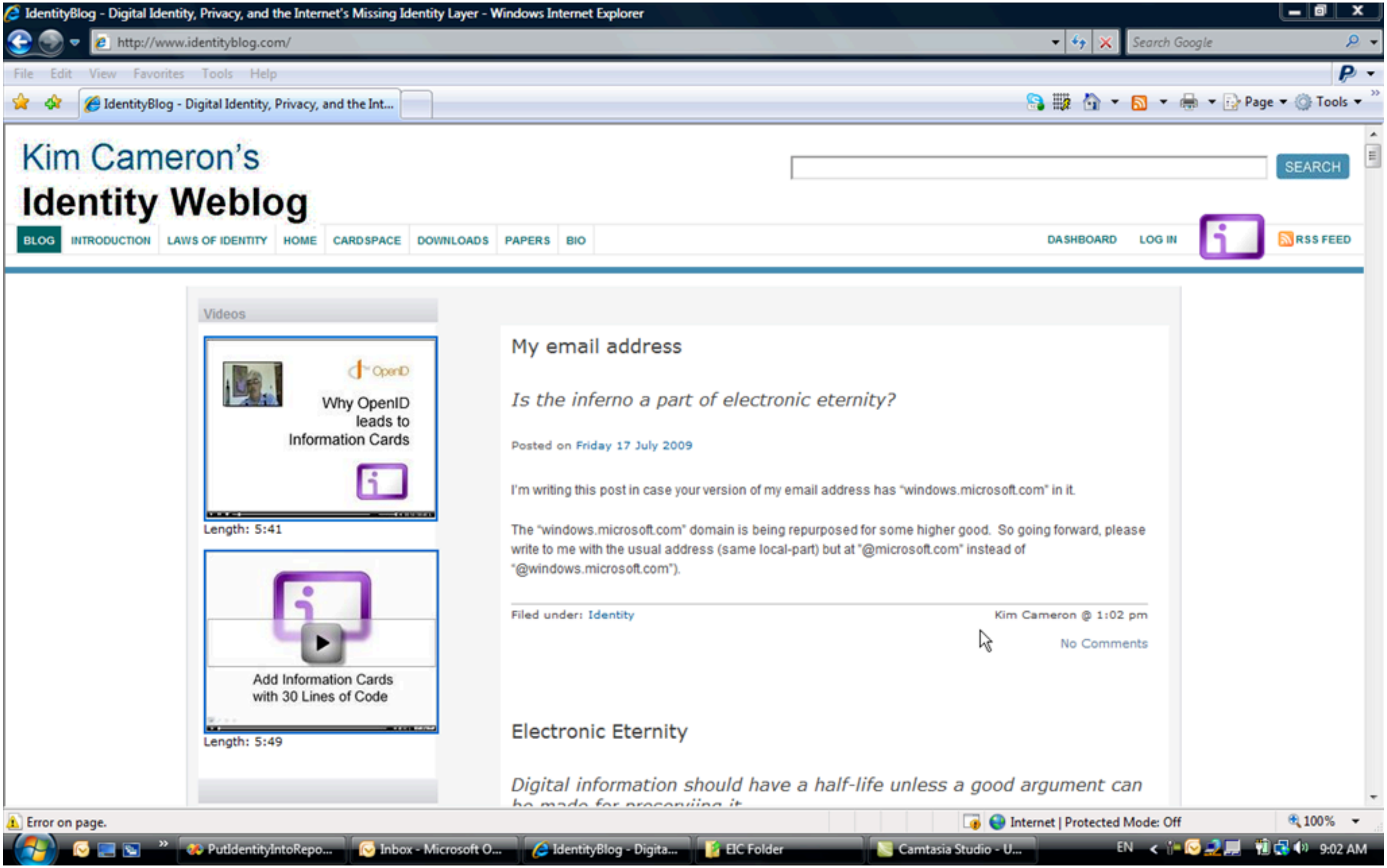
- The security and privacy problems of the internet will not be solved by a single protocol
  - SAML plays an important role
  - Kerberos plays an important role
  - PKI plays an important role
  - WS-Trust plays an important role
  - OpenID plays an important role
- We need a loosely coupled Metasystem, not a single protocol to Rule the World
  - There is a spectrum of use-cases and we are still seeing innovation
  - U-Prove and other zero knowledge technology

Other Frontiers: Minimal Disclosure and Multilateral Security

Claims Selector



Information Card Paradigm



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Videos
OpenID
Why OpenID leads to Information Cards
Add Information Cards with 30 Lines of Code
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Kim Cameron's

Identity Weblog

Length: 5:41

Length: 5:49

My email address

Is the inferno a part of electronic eternity?

Posted on Friday 17 July 2009

I'm writing this post in case your version of my email address has "windows.microsoft.com" in it.

The "windows.microsoft.com" domain is being repurposed for some higher good. So going forward, please write to me with the usual address (same local-part) but at "@microsoft.com" instead of "@windows.microsoft.com").

Filed under: Identity

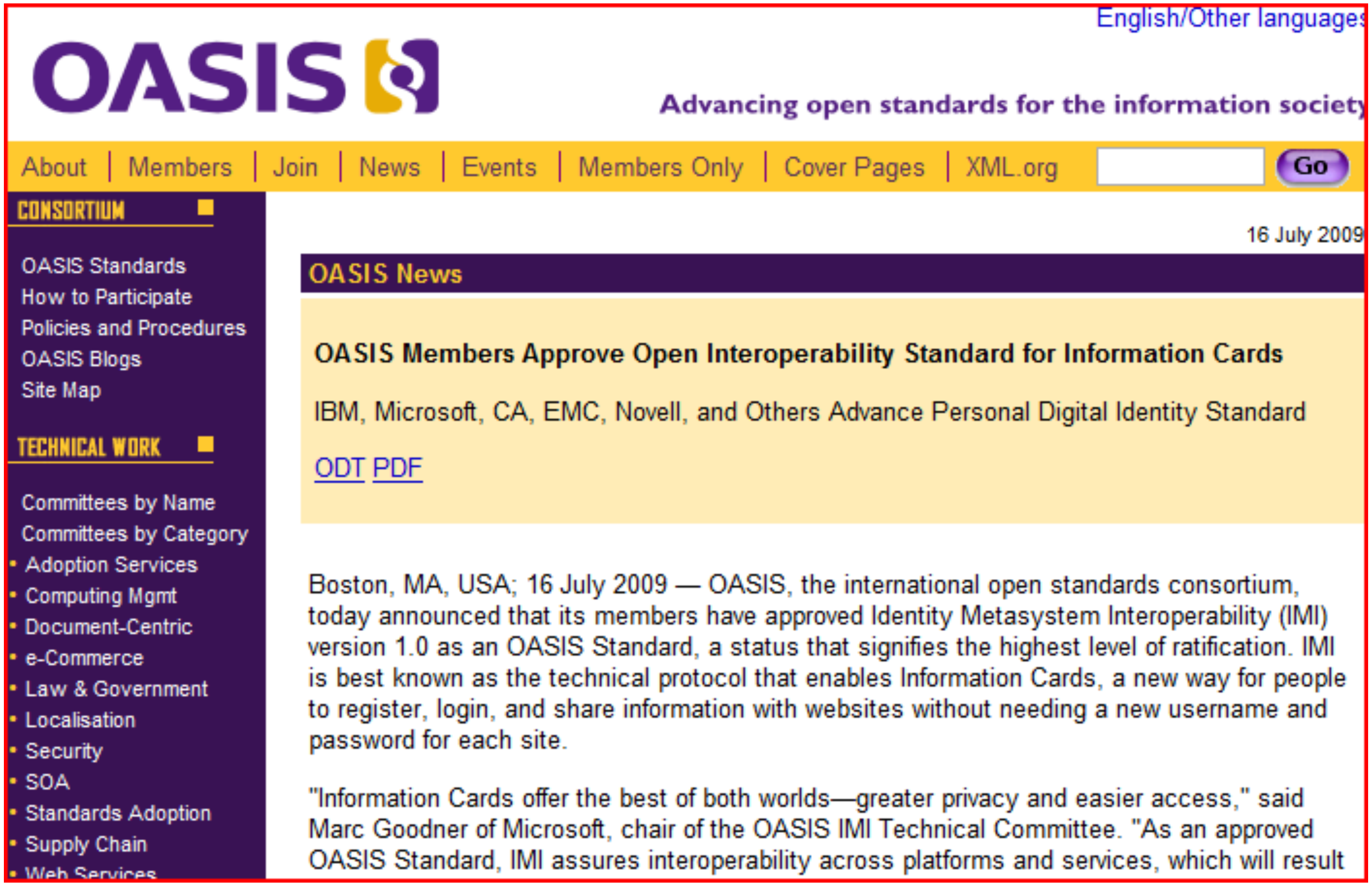
Kim Cameron @ 1:02 pm

No Comments

Electronic Eternity

Digital information should have a half-life unless a good argument can be made for preserving it

OASIS Standard Approved



16 July 2009

OASIS News

OASIS Members Approve Open Interoperability Standard for Information Cards

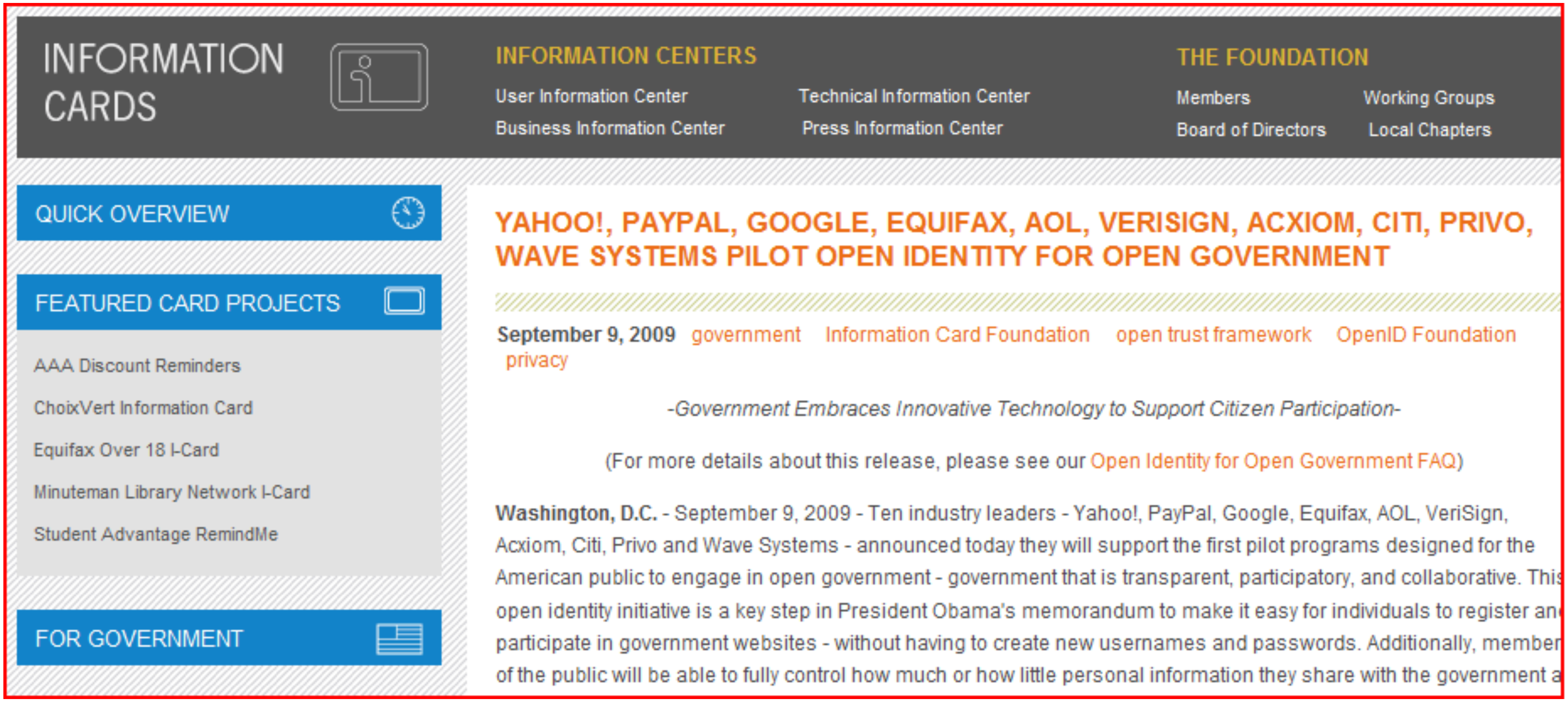
IBM, Microsoft, CA, EMC, Novell, and Others Advance Personal Digital Identity Standard

ODT PDF

Boston, MA, USA; 16 July 2009 — OASIS, the international open standards consortium, today announced that its members have approved Identity Metasystem Interoperability (IMI) version 1.0 as an OASIS Standard, a status that signifies the highest level of ratification. IMI is best known as the technical protocol that enables Information Cards, a new way for people to register, login, and share information with websites without needing a new username and password for each site.

"Information Cards offer the best of both worlds—greater privacy and easier access," said Marc Goodner of Microsoft, chair of the OASIS IMI Technical Committee. "As an approved OASIS Standard, IMI assures interoperability across platforms and services, which will result

US OpenID / Information Card Pilots



YAHOO!, PAYPAL, GOOGLE, EQUIFAX, AOL, VERISIGN, ACXIOM, CITI, PRIVO, WAVE SYSTEMS PILOT OPEN IDENTITY FOR OPEN GOVERNMENT

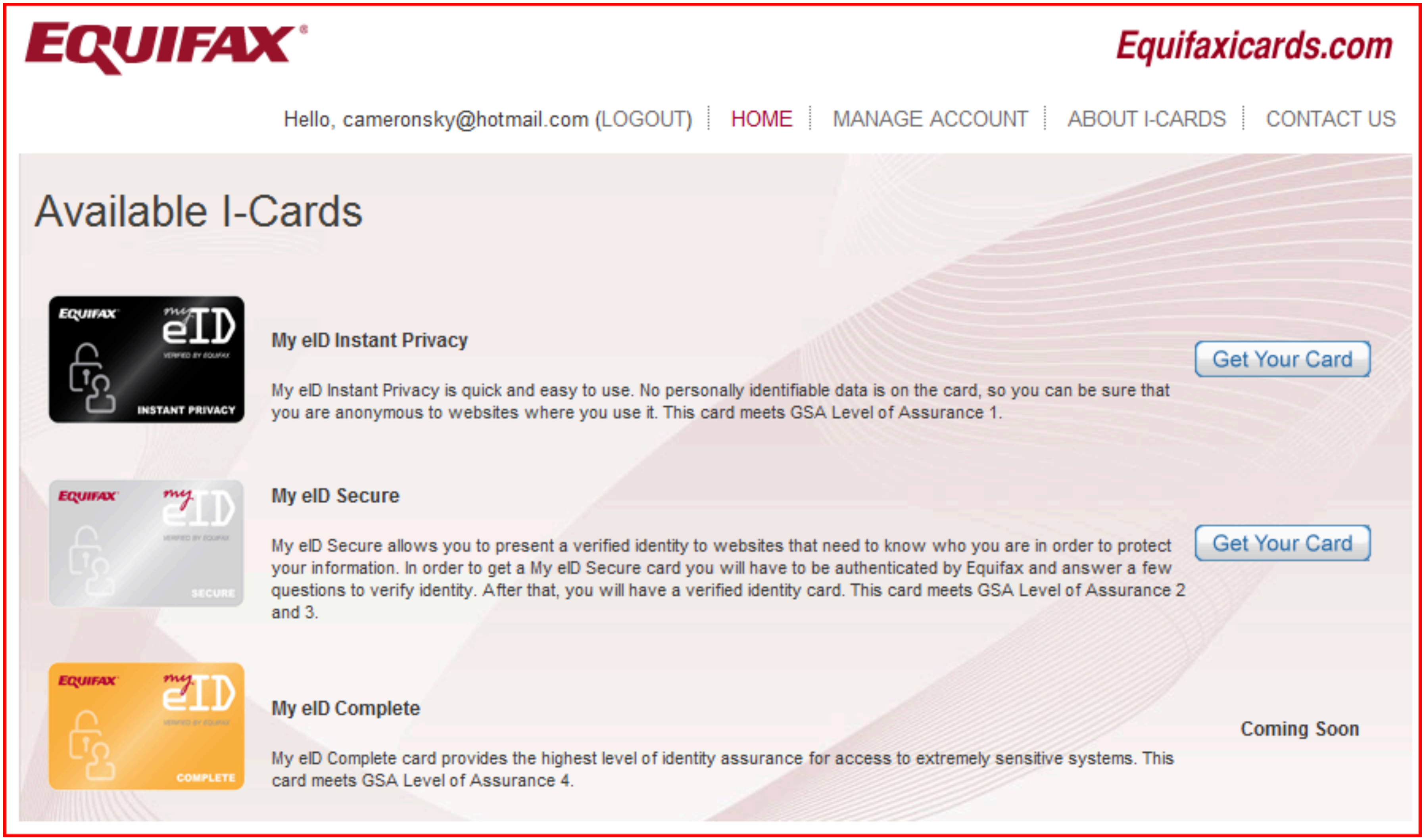
September 9, 2009 government Information Card Foundation open trust framework OpenID Foundation privacy

-Government Embraces Innovative Technology to Support Citizen Participation-

(For more details about this release, please see our Open Identity for Open Government FAQ)

Washington, D.C. - September 9, 2009 - Ten industry leaders - Yahoo!, PayPal, Google, Equifax, AOL, VeriSign, Acxiom, Citi, Privo and Wave Systems - announced today they will support the first pilot programs designed for the American public to engage in open government - government that is transparent, participatory, and collaborative. This open identity initiative is a key step in President Obama's memorandum to make it easy for individuals to register and participate in government websites - without having to create new usernames and passwords. Additionally, members of the public will be able to fully control how much or how little personal information they share with the government a

The Provider's Dilemma



Available I-Cards

My eID Instant Privacy

My eID Instant Privacy is quick and easy to use. No personally identifiable data is on the card, so you can be sure that you are anonymous to websites where you use it. This card meets GSA Level of Assurance 1.

My eID Secure

My eID Secure allows you to present a verified identity to websites that need to know who you are in order to protect your information. In order to get a My eID Secure card you will have to be authenticated by Equifax and answer a few questions to verify identity. After that, you will have a verified identity card. This card meets GSA Level of Assurance 2 and 3.

My eID Complete

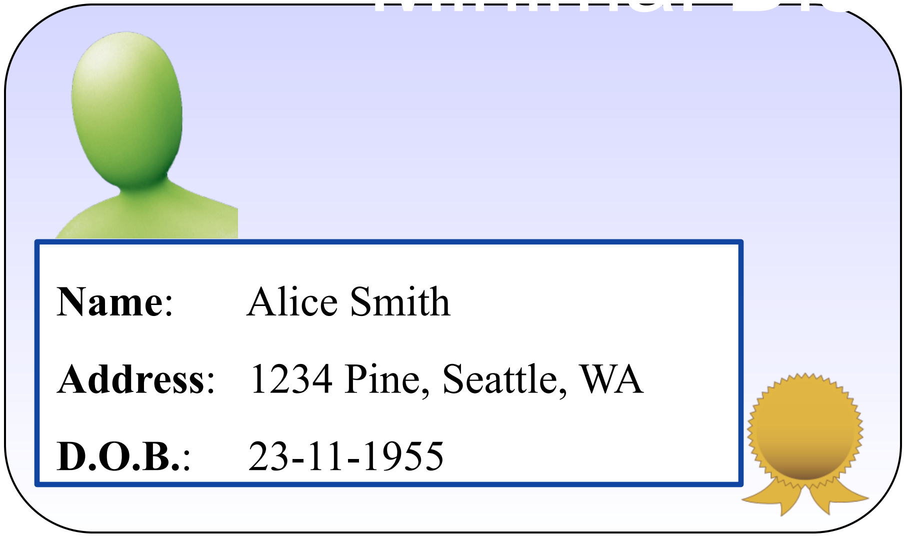
Coming Soon

My eID Complete card provides the highest level of identity assurance for access to extremely sensitive systems. This card meets GSA Level of Assurance 4.

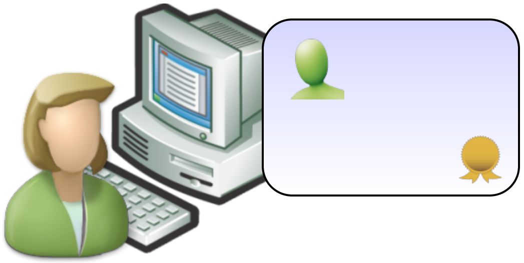
Getting past the obvious: We can resolve apparent contradictions

- Example: Multilateral security
  - Each party minimizes what others can learn, so all participants are protected from each other
  - Disclose subsets and \properties of claims without destroying verifiability
    - Age is GREATER than 21 rather than a specific birth date
    - Expiry date AFTER today's date rather than revealing certificate expiration info
    - Prove a person's identifier is NOT on a list without revealing the identifier
- Example: Proof of knowledge
  - Delivers the useful properties of conventional security
  - Differences: issuer's signature and user's public key remain invisible to the issuer itself, proving properties of claims in addition to values

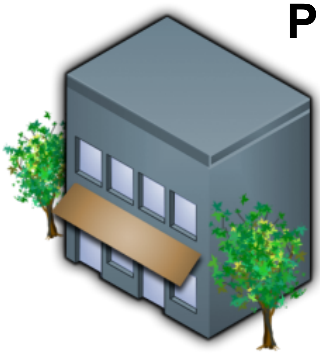
Example:



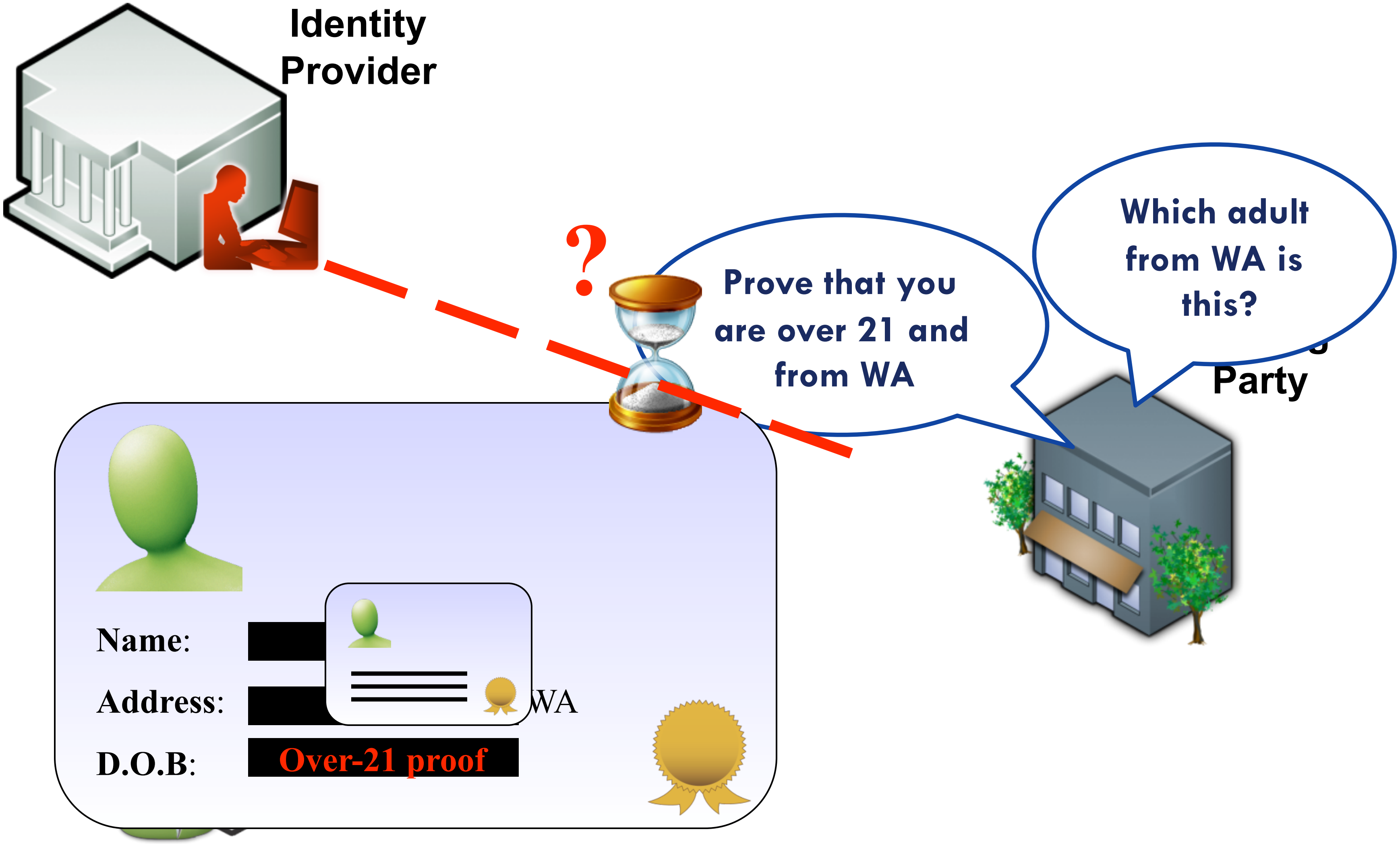
Name:	Alice Smith
Address:	1234 Pine, Seattle, WA
D.O.B.:	23-11-1955



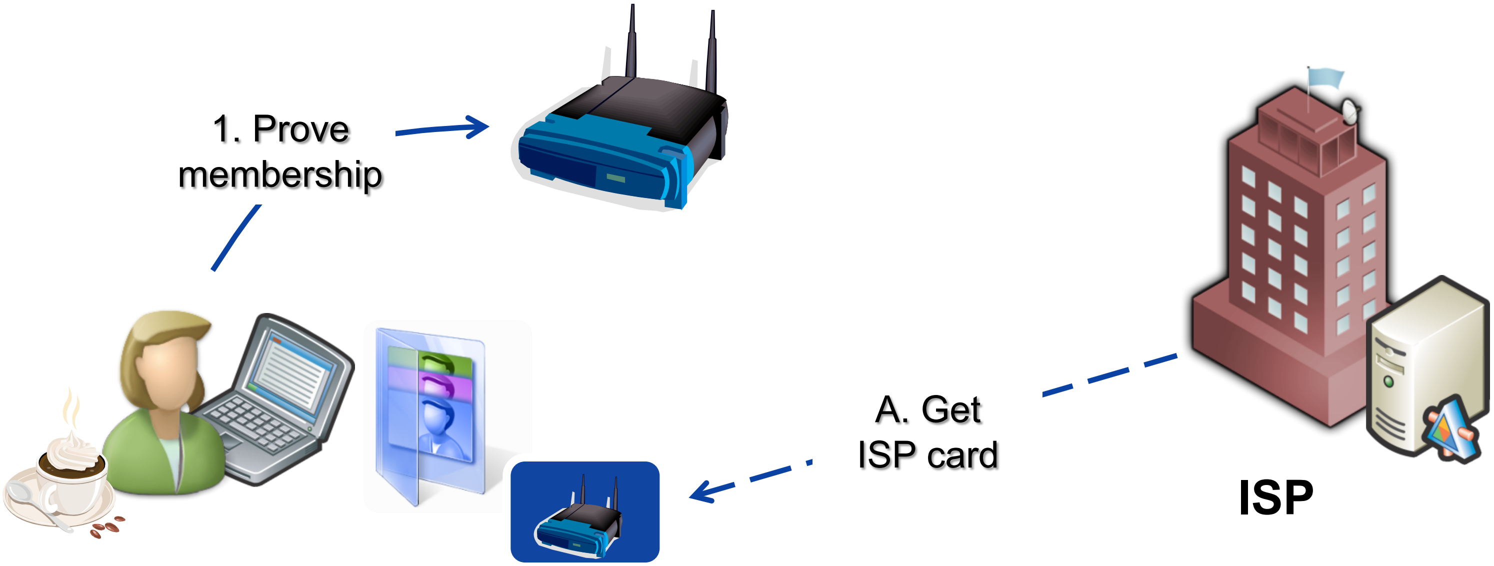
Relying Party



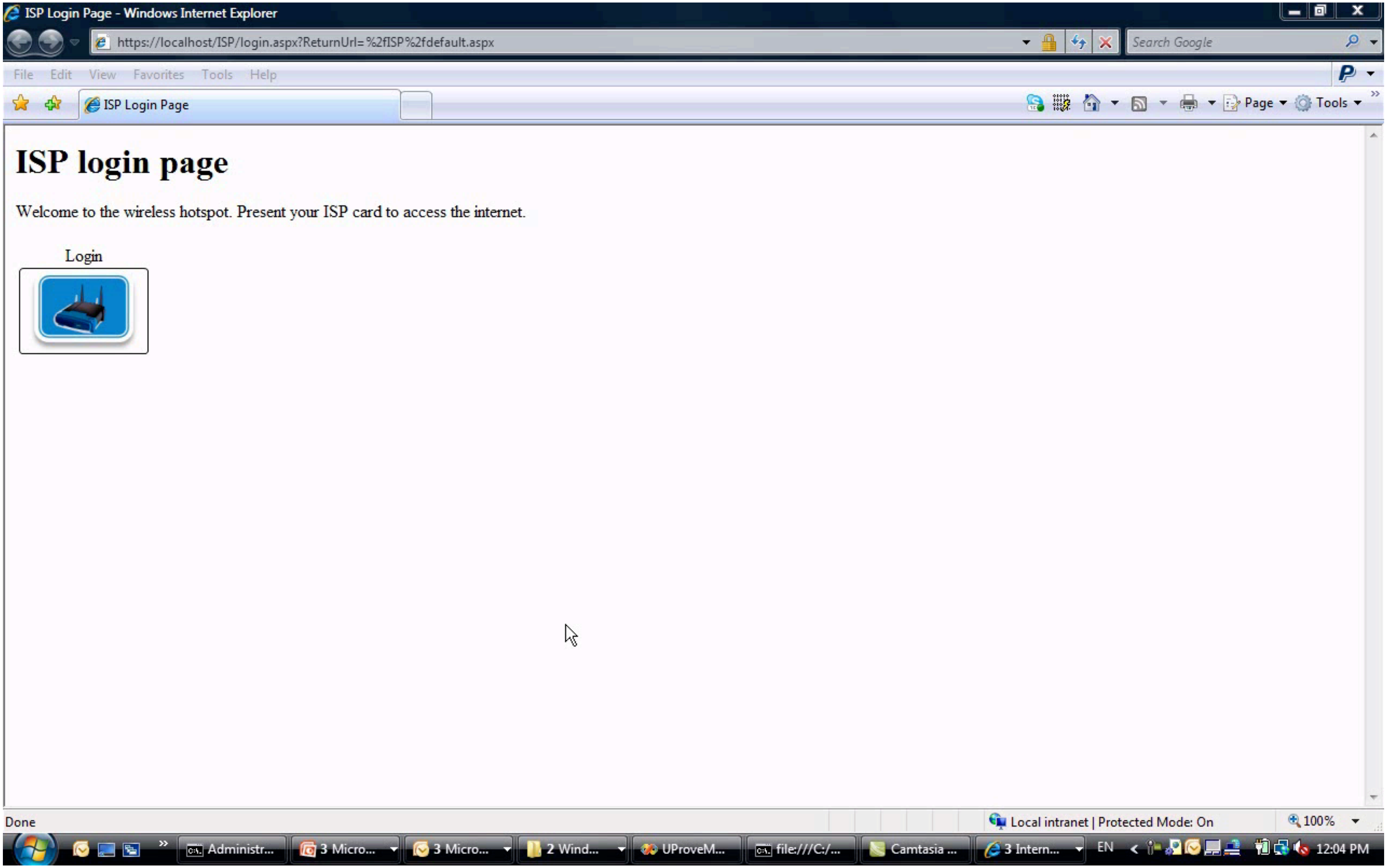
Minimal Disclosure Token



Scenarios



Signing on to a Hot Spot



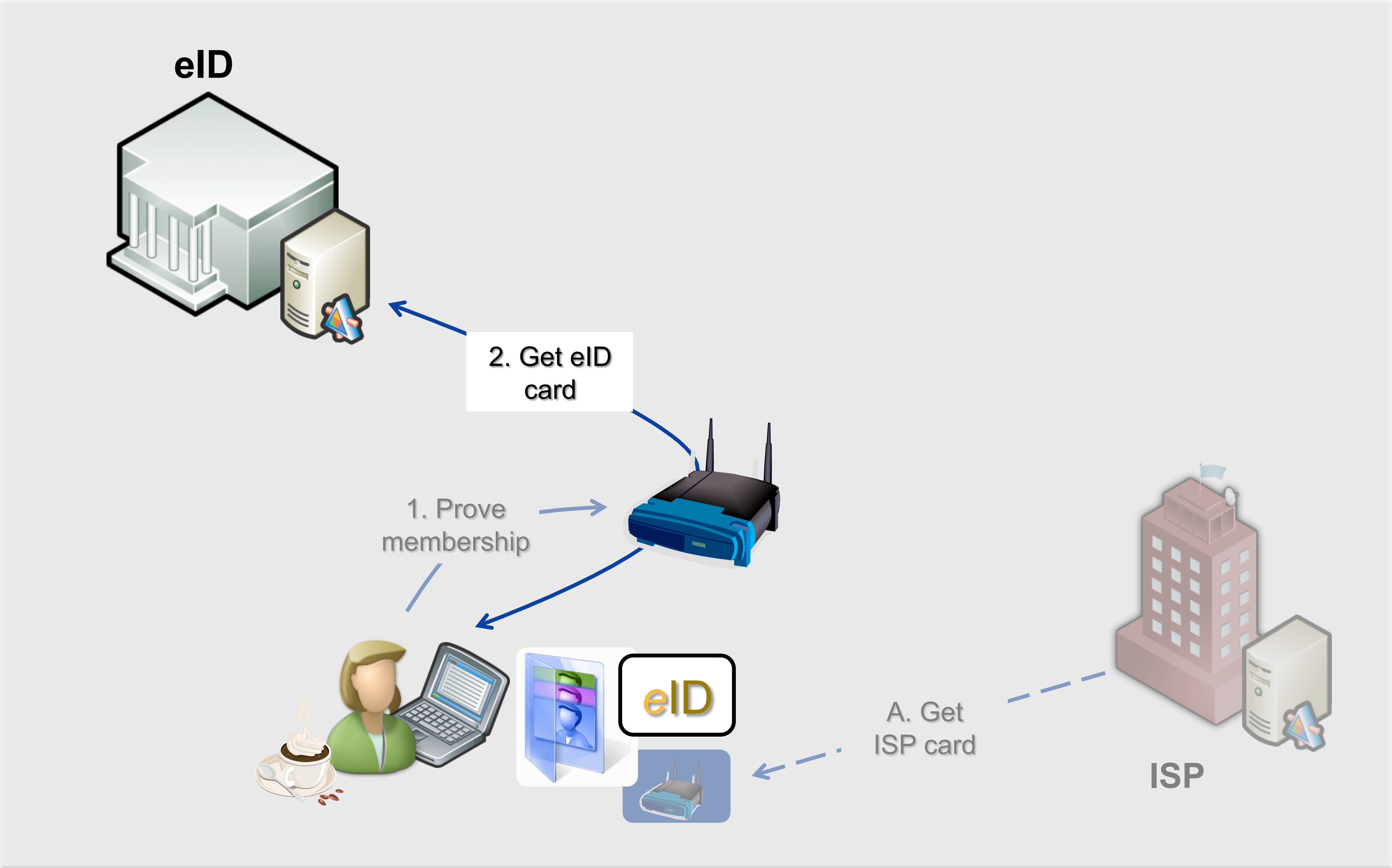
ISP Login Page - Windows Internet Explorer
https://localhost/ISP/login.aspx?ReturnUrl=%2fISP%2fdefault.aspx
Search Google
File Edit View Favorites Tools Help
ISP Login Page
Page
Tools
Done
Local intranet | Protected Mode: On
100%
Administr...
3 Micro...
3 Micro...
2 Wind...
UProveM...
file:///C:/...
Camtasia ...
3 Intern...
EN
12:04 PM

ISP login page

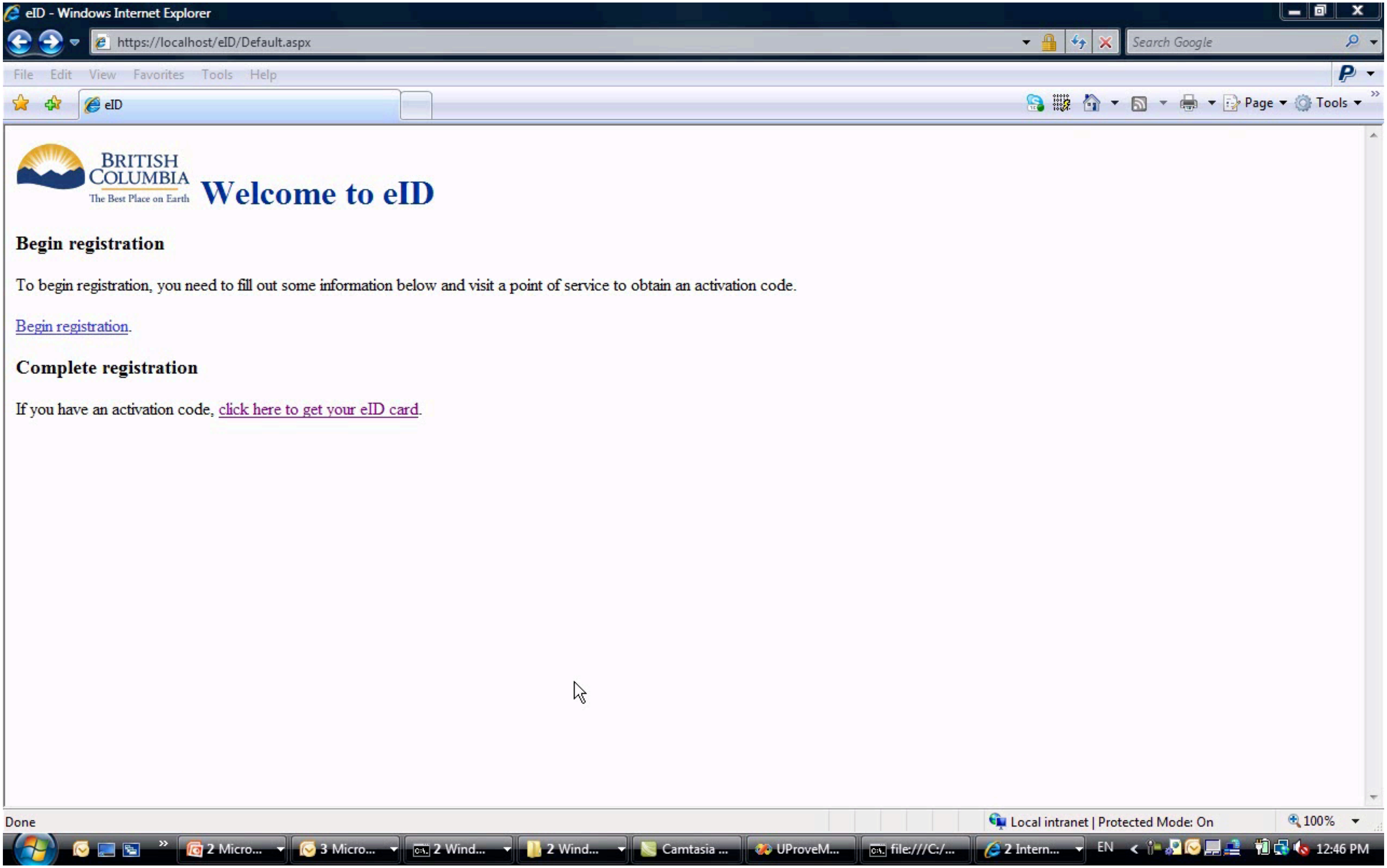
Welcome to the wireless hotspot. Present your ISP card to access the internet.

Login

Scenarios



Getting an eID Information Card



Welcome to eID

Begin registration

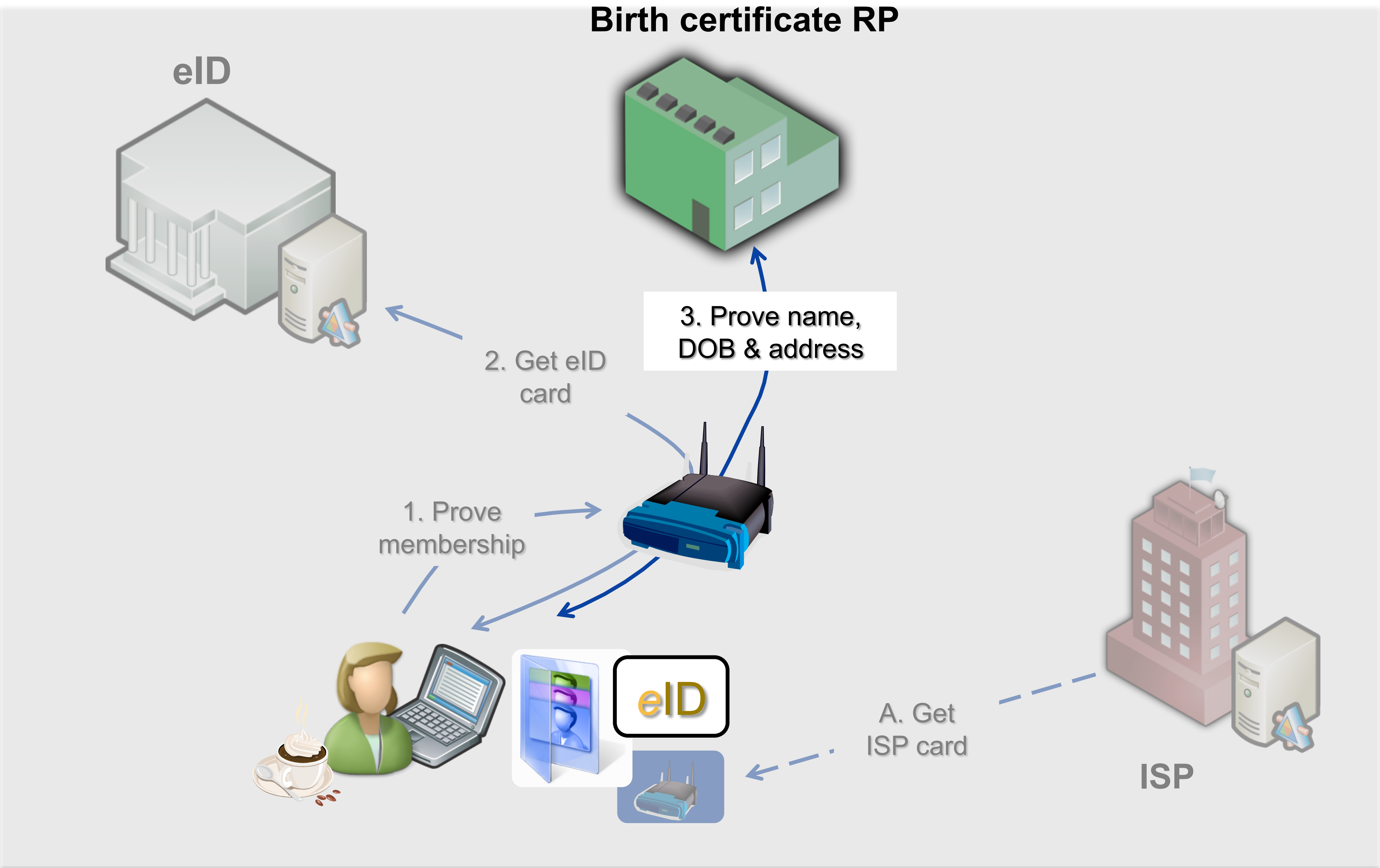
To begin registration, you need to fill out some information below and visit a point of service to obtain an activation code.

Begin registration.

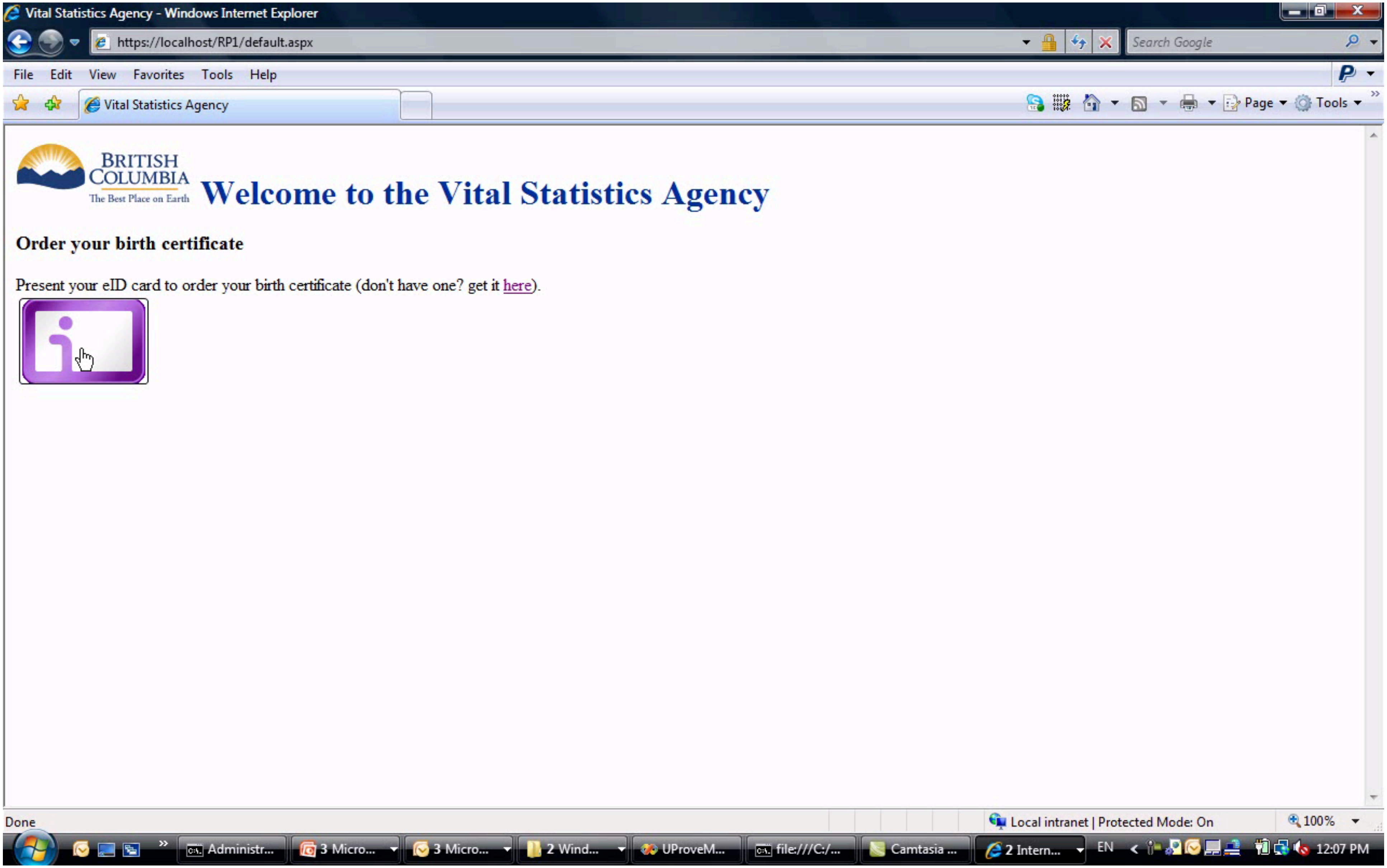
Complete registration

If you have an activation code, click here to get your eID card.

Scenarios


Birth certificate RP
eID
3. Prove name,
DOB & address
2. Get eID
card
1. Prove
membership
eID
A. Get
ISP card
ISP

Ordering a Birth Certificate



Vital Statistics Agency - Windows Internet Explorer
https://localhost/RP1/default.aspx
Search Google
File Edit View Favorites Tools Help
Vital Statistics Agency
Page Tools
BRITISH COLUMBIA
The Best Place on Earth

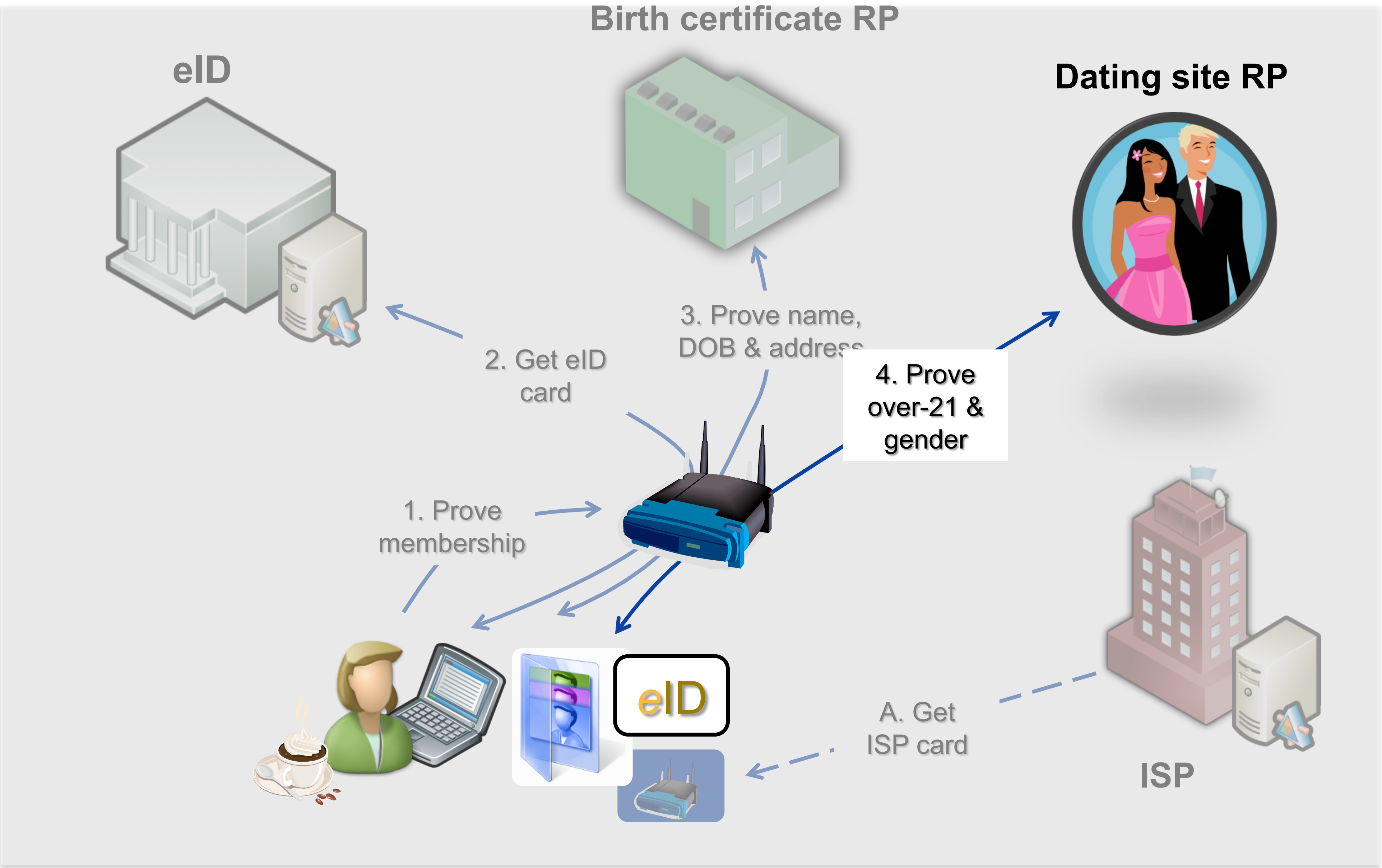
Welcome to the Vital Statistics Agency

Order your birth certificate

Present your eID card to order your birth certificate (don't have one? get it here).

Done
Local intranet | Protected Mode: On
100%
Administr... 3 Micro... 3 Micro... 2 Wind... UProveM... file:///C:/... Camtasia ... 2 Intern...
EN
12:07 PM

Scenarios



Birth certificate RP

eID

Dating site RP

3. Prove name, DOB & address

2. Get eID card

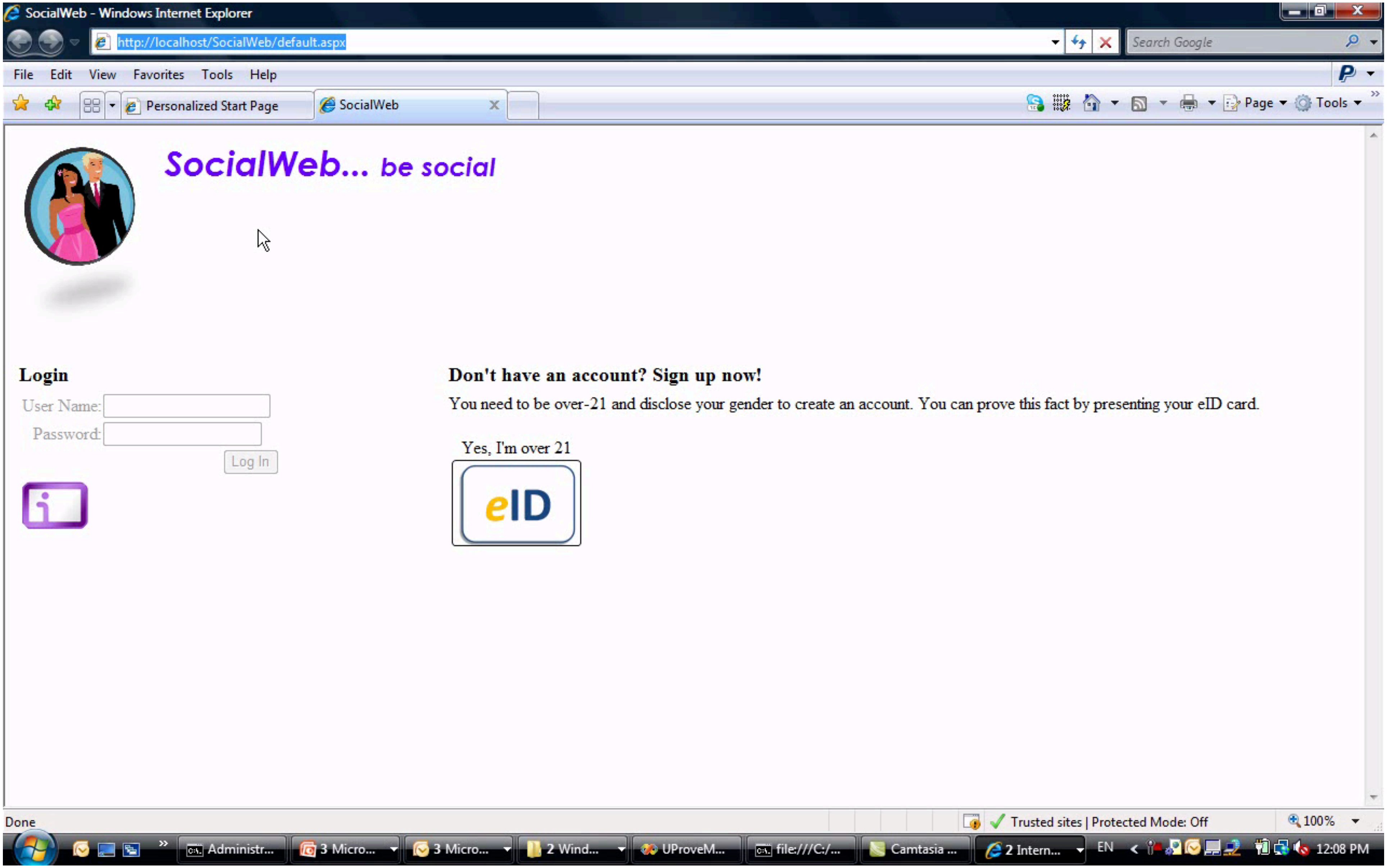
4. Prove over-21 & gender

1. Prove membership

A. Get ISP card

ISP

Visiting a Social Website



SocialWeb... be social

Login

User Name:

Password:

Log In

Don't have an account? Sign up now!

You need to be over-21 and disclose your gender to create an account. You can prove this fact by presenting your eID card.

Yes, I'm over 21

eID

Contact:

http://www.identityblog.com

kcameron at microsoft.com

Chat with Microsoft's identity
and access at the exhibit