Virtual Home Environment (VHE)

Personalised Mobile Services Concept
Virtual Home Environment

- VHE is the concept of a portable Personal Service Environment (PSE)

- Specified by ETSI/3GPP
Virtual Home Environment

**Goal:**

“The user shall have access to the same personalised features, customised UI and services no matter what network or terminal is currently in use, and no matter where the user is located.”
Virtual Home Environment

- A foreign network emulates the behaviour of the user’s home network
- The user can access the same services, in the same way, as he is used to in the home network
Virtual Home Environment

The VHE concept is supported by mechanisms in several other ETSI/3GPP standards:

- Open Service Access (OSA)
- Customised Applications for Mobile Enhanced Logic (CAMEL)
- Mobile Station Application Execution Environment (MExE)
Virtual Home Environment

- The mechanisms in VHE are realised using various technologies:
  - JAIN
  - CORBA
  - XML
  - WAP
  - J2ME
Internet Technologies

Mobile Terminal

Network

Web Service

Session Initiation Protocol

OMA

Liberty Alliance

J2ME

VHE

OSA

MExE

SAT

Gateway

Internet

Mobile network

Gateway

Enterprise Intranet

WEB/WAP server

WEB browser

IP telephone

Tutorial on Open Mobile Services, by Do van Thanh
Session Initiation Protocol (SIP)

Application-layer Signaling Protocol for the Next Generation Internet
Session Initiation Protocol (SIP)

- Introduction
- SIP Signaling Architecture
  - Registration, multimedia call initiation, IP and PSTN interworking, event notification framework
- SIP Service Creation Tools
  - Basic SIP signaling, CPL, CGI, Servlets
- SIP in 3G Network Architecture
  - IP Multimedia Subsystem (IMS)
- More SIP Topics
  - AAA interaction, NAT and firewall traversal, QoS setup
- Remarks
Introduction

- A protocol to initiate Internet multimedia sessions: voice, video, conference etc.
  - Other applications: Event notification, instant messaging etc.
- Developed in IETF (www.ietf.org): RFC 3261
- Key features
  - Request messages ("methods") & responses (numeric codes)
  - SIP messages are text-encoded similar to HTTP
  - SIP messages can be sent over UDP or TCP (or SMTP)
    - Each hop can potentially use different transport protocol
  - Web-like addressing (user@domain or user@host)
    - sip: thanh-van.do@telenor.com or sip: do@172.19.165.243
  - Distributed, open, scalable and extensible architecture
SIP Signaling Architecture
Key Network Elements

Application Servers
DNS
Location Server

SIP Server/
SIP Proxy

User Agent
sip.here.com

Non SIP

SIP

SIP Server/
SIP Proxy

User Agent
sip.there.com

IP Network

User Agent

Tutorial on Open Mobile Services,
by Do van Thanh
Registration: Pre-call Personal Mobility

App. Servers | DNS | Loc. Server
---|---|---
SIP Proxy | SIP Proxy | SIP Proxy

REGISTER sip:there.com
From: Tom Cat <sip:tom@there.com>
Contact: <sip:tom@172.12.34.100>

REGISTER sip:here.com
From: Jerry Mouse <sip:jerry@here.com>
Contact: <sip:jerry@192.30.40.22>

Tutorial on Open Mobile Services,
by Do van Thanh
Multimedia Call Initiation
INVITE/200 OK/ ACK

DNS

INVITE sip:tom@there.com
Via: SIP/2.0/UDP sip.here.com:5060
Via: SIP/2.0/UDP 192.30.40.22:5060
To: Tom Cat <sip:tom@there.com>
From: Jerry Mouse <sip:jerry@here.com>
Contact: <sip:jerry@192.30.40.22>
Session Description in SDP

SIP Proxy

INVITE sip:tom@there.com
Via: SIP/2.0/UDP 192.30.40.22:5060
To: Tom Cat <sip:tom@there.com>
From: Jerry Mouse <sip:jerry@here.com>
Contact: <sip:jerry@192.30.40.22>
Session Description in SDP

SIP Proxy

INVITE sip:tom@cell.com
Via: SIP/2.0/UDP 172.12.20.130
Via: SIP/2.0/UDP sip.here.com:5060
Via: SIP/2.0/UDP 192.30.40.22:5060
To: Tom Cat <sip:tom@there.com>
From: Jerry Mouse <sip:jerry@here.com>
Contact: <sip:jerry@192.30.40.22>
Session Description in SDP

Location Server

INVITE sip:tom@there.com
Via: SIP/2.0/UDP sip.here.com:5060
Via: SIP/2.0/UDP 192.30.40.22:5060
To: Tom Cat <sip:tom@there.com>
From: Jerry Mouse <sip:jerry@here.com>
Contact: <sip:jerry@192.30.40.22>
Session Description in SDP

INVITE

100 Trying

INVITE

100 Trying

Tutorial on Open Mobile Services,
by Do van Thanh
Multimedia Call Initiation
INVITE/200 OK/ ACK

DNS
sip.there.com
SIP Proxy
sip.here.com
SIP Proxy
sip.there.com
Location Server

180 Ringing
200 OK
ACK
ACK
ACK

Media data transfer over RTP

Tutorial on Open Mobile Services,
by Do van Thanh
Session Description Protocol

- SDP specifies format to describe multimedia session
  - Initially specified (RFC 2327) for announcing multicast conferences on MBONE
    - SDP payload carried in SAP, HTTP or email
  - Modified for use with SIP: The “offer/answer” model
    - SDP payload carried in SIP as MIME type “application/sdp”
SDP Offer/Answer Model

**CALLER**

- v=0
- c=IN IPv4 192.30.40.22
- m=audio 62986 RTP/AVP 0 4
- a=rtpmap:0 PCMU/8000
- a=rtpmap:4 GSM/8000
- m=video 51372 RTP/AVP 31
- a=rtpmap: 31 H261/90000
- b=100
- a=sendrecv
- m=video 53000 RTP/AVP 32
- a=rtpmap:32 MPV/90000
- a=sendonly
- a=application 32416 udp wb
- a=orient:portrait

**CALLEE**

- v=0
- c=IN IPv4 172.12.10.130
- m=audio 54344 RTP/AVP 0 4
- a=rtpmap:0 PCMU/8000
- m=video 0 RTP/AVP 31
- a=rtpmap: 31 H261/90000
- b=100
- a=sendrecv
- m=video 53244 RTP/AVP 32
- a=rtpmap:32 MPV/90000
- a=recvonly
- a=application 34426 udp wb
- a=orient:portrait

---

**Offer**
(e.g. in INVITE)

**Answer**
(e.g. in 200 OK)

Accepted Stream
Rejected Stream
Accepted Stream
Accepted Stream

Tutorial on Open Mobile Services, by Do van Thanh
IP and PSTN Interworking

- Enables SIP phone to call PSTN phone and vice versa
  - SIP to PSTN: INVITE +1-781-929-1660@carrier.com, user=phone
  - PSTN to SIP: Dial phone number, ENUM maps it to SIP URI

- Requires “Gateway” between IP network and PSTN
  - [MGC] Performs interworking between SIP & SS7 (ISUP) signaling
  - [MG] Performs transcoding between IP/UDP/RTP packetized voice and 64 Kbps (or 56 Kbps) PCM voice

- There are two ways of interworking between SIP & ISUP
  - Complete protocol interworking: Mapping messages
  - Protocol encapsulation (SIP-T): Map & encapsulate ISUP into SIP
    - Avoids losing SS7 information in PSTN-SIP-PSTN calls
    - Carry PSTN messages in SIP messages as a MIME message body
IP and PSTN Interworking

Early media, e.g. Ring tone, busy tone, DMTF etc.

SIP Messages
- INVITE 100 Trying
- INVITE 100 Trying
- 183 Session Progress
- 183 Session Progress
- 200 OK
- ACK

Packetized voice over IP/UDP/RTP
- 200 OK

SS7 Messages
- Initial Address Message (IAM)
- Address Complete Message (ACM)
- Answer Message (ANM)

PSTN PCM Voice
- Q.931

Tutorial on Open Mobile Services, by Do van Thanh
IP and PSTN Interworking

Additional Topics

- **TRIP (Telephony Routing over IP) and TRIP-lite**
  - Finding the gateway for IP to PSTN calls
  - TRIP protocol
    - Exchanges information of the kind (reachable telephone number, cost) between gateways (or collections of gateways)

- **PINT (PSTN and INTernet INTerworking)**
  - To invoke PSTN services from within the IP network
    - Milestone services: Request (click) to call, request (click) to fax, request (click) to speak/send/play content

- **SPIRITS (Service in the PSTN/IN Requesting InTernet Service)**
  - To invoke IP services from PSTN network
    - Example service: Display indication on PC when PSTN call arrives when dial-up Internet is being used
Event Notification Framework

- Ability to request asynchronous notification of (network-wide) events
  - For example, presence notification
- SIP extensions for event notification
  - New methods: SUBSCRIBE, NOTIFY
  - Routed similar to INVITE
  - “Event” header in SUBSCRIBE describes the requested event type
    - Event types are called “Event Packages”, each package is described as separate specification
  - SUBSCRIBE and NOTIFY may contain message body consistent with event package specification
  - Authentication of subscriber, authorization to subscribe and privacy concerns must be addressed by implementations
Event Notification Framework

Subscriber

SUBSCRIBE

200 OK

NOTIFY

200 OK

Subscriber Notifier

Usually User Agents, Applications on Server etc.

Notifier

Usually SIP Proxy or Event Server connected to SIP proxy

Status Change

NOTIFY

200 OK

200 OK
Presence Service

- **Presence**: My status to others, others’ status to me!
- **Conventionally**, “online” or “offline” on centralized server
- **Presence in broader sense**
  - Status (online, offline, busy, away), communication means (IM, voice call, SMS, email), communication addresses, communication capabilities (voice, video, other applications), location, other preferences (personalized logos) etc.
  - Distributed, scalable and interoperable architecture
- **Presence adds new dimension to communication**
  - “Polite calling” is expected be a norm in the future
SIP for Presence

- Implementation of presence service
  - “Watcher” subscribes to presence information of presentity (SUBSCRIBE)
    - “Event: presence” header in the SUBSCRIBE request
  - “Presentity” uploads change of communication state (REGISTER)
  - “Watcher” receives notifications (NOTIFY)

- Aside:
  - Another enabler for presence service is available from “Wireless Village” initiative, discussed in OMA!
SUBSCRIBE sip:tom@there.com SIP/2.0
To: Tom Cat <sip:tom@there.com>
From: Jerry Mouse <sip:jerry@here.com>
Contact: <sip:jerry@192.30.40.22>
Event: presence
Accept-Contact: media=audio,video,text; class=personal
More Examples of Event Packages

- **Watcher information event package** ("Event: *.winfo")
  - Notifications upon change in subscription set to any event package
  - For example, when new watcher attempts to subscribe to "presence", notification is generated to application of presententity for authorization
    - Application subscribes to "presence.winfo" event for presentity

- **Message waiting event package** ("Event: message-summary")
  - Notifications about message waiting status and message summaries from a messaging system to User Agent
  - Voice message, text message, multimedia message, fax message ...

- **Dialogue state event package** ("Event: dialogue")
  - Notifications upon change in dialogue state of user
  - Usage example: Automatic call-back

- There are others, more will be defined in future
Basic SIP Service Creation Tools

- Basic tools in SIP signaling architecture
  - Methods (Requests) and responses
  - Proxy functions: Registration, forward, redirect, fork etc.
  - Caller preferences (end-to-end)
    - Request headers “Accept-Contact”, “Reject-Contact” carry caller preferences (feature set)
    - Compared with callee capabilities (feature set) registered with SIP URI in REGISTER request

- Number of services are possible using basic SIP signaling
  - Flexible, programmable service offering
  - Implementation of service logic possible at clients or proxies
  - Examples: Pre-call mobility, multimedia call set up, consultation hold, music on hold, call transfer (attended, unattended), call forward (unconditional, busy, no answer), 3-way conferencing, find me, call pick up, automatic redial, presence notification, instant messaging, message alert etc.
Call Processing Language (CPL)

- Implements caller’s/callee’s call handling preferences
  - CPL scripts are executed on SIP proxies/SIP application servers
    - CPL execution starts upon arrival of request (e.g. INVITE) at the SIP server
  - CPL is an interpreted language
    - Based on XML and specified by IETF IPTEL WG
    - User Agent can upload CPL script on SIP server as message body in REGISTER
    - CPL scripts can be generated manually, using user-friendly GUIs, provided by third parties etc.
- Examples of services with CPL
  - Call forwarding based on caller information
  - Call screening (anonymous incoming, 900 outgoing etc.)
  - Priority routing, language routing, time-of-day routing etc.
Common Gateway Interface

- **Background - HTTP CGI**
  - Interface between HTTP server and application server
- **SIP CGI is similar to HTTP CGI**
  - Interface between SIP proxy and application server

1. Request html page (form)
2. User fills in form data
3. Submit form
4. CGI passes form data as environment variables
5. Application generates customized response (HTML page, GIF file etc.)
6. Server adds HTTP headers & sends response
**SIP CGI Features (that are more than HTTP CGI)**

- Richer functionality: Proxying requests, generating responses, generating new requests etc.
- Persistence: HTTP CGI executes once per transaction, SIP CGI may execute number of times per transaction
- Triggers: It is possible to store trigger conditions in SIP proxy for SIP CGI program instantiation
- Different environment variables etc.
SIP in 3G Network Architecture

- IP Multimedia Subsystem (IMS)
  - Goal: Creation & deployment of multimedia services in 3G networks
  - IP-based transport for real and non-real time services
  - Introduction of multimedia call model – using SIP
    - Some extensions to adapt SIP to cellular network operation

- Example Services
  - Videophone, group communication (conferencing, broadcast presentations), mobile gaming (peer-to-peer, multiparty), presence, messaging (text and multimedia), location-based services, and integration of all these!
3GPP IMS Architecture

IMS
HSS
S-CSCF
I-CSCF
I-CSCF
IMS
HSS
S-CSCF
I-CSCF
IMS
HSS
S-CSCF
I-CSCF
IMS
HSS
S-CSCF
I-CSCF
IMS
HSS
S-CSCF
I-CSCF

PS-CN
GGSN
SGSN
SGSN
SGSN
PS-CN
GGSN
SGSN
SGSN
SGSN

RAN

INTERNET

I-CSCF
I-CSCF
I-CSCF
I-CSCF

CSCF: Call State Control Function aka SIP Proxy

User Agent

User Agent

Media Path
SIP Path

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by Do van Thanh

MWCN2004
3GPP IMS Entities

- **P-CSCF (Proxy Call State Control Function)**
  - Located in visited network IMS domain, discovered during PDP context activation
  - Provides local and emergency services, participates in SIP message compression
  - Authorizes use of resources in visited PS-CN

- **HSS (Home Subscription Server)**
  - Located in home network IMS domain, stores user profile

- **S-CSCF (Serving Call State Control Function)**
  - Located in home network IMS domain
  - Acts as registrar
  - Executes home services for user
SIP Additional Topics

- QoS for calls initiated using SIP
  - SIP signals along control path, QoS signaling (e.g. RSVP, NSIS) occurs along data path
  - COMET method allows rendezvous
- Firewall/NAT traversal for SIP signaling and subsequent media streams
- Security of SIP messaging
- SIP and AAA
SIP References

- Internet Engineering Task Force (www.ietf.org)
  - Working groups: MMUSIC, SIP, SIPPING, SIMPLE, IPTEL, PINT, SPIRITS

- Books
  - “Internet Communications using SIP”, Henry Sinnreich and Alan Johnson, John Wiley and Sons Inc., 2001

- Websites
  - http://www.sipcenter.com
XML Web Services

Concept for Distributed Computing over the Internet

http://www.w3.org/2002/ws/
The WWW

Web server

Documents in HTML

Web browser

Web surfing!

WWW

Tutorial on Open Mobile Services, by Do van Thanh
1. http://www.telenor.com/doc1

2. Locate & fetch doc 1

3. Return doc 1

4. Interpret doc 1

5. Display doc 1 on the screen

<table>
<thead>
<tr>
<th>Web browser</th>
<th>Uniform Resource Locator</th>
<th>Web server</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Web browser" /></td>
<td><img src="image2.png" alt="Uniform Resource Locator" /></td>
<td><img src="image3.png" alt="Web server" /></td>
</tr>
<tr>
<td><img src="image4.png" alt="Diagram" /></td>
<td><img src="image5.png" alt="HTML code" /></td>
<td><img src="image6.png" alt="Tags" /></td>
</tr>
</tbody>
</table>

PANDA, Personal Area Networks & Data Applications

Welcome to PANDA's place on the web

[Klick here to read about the project]
Limitations of HTML

- Allows information navigation but only supports static information i.e. static files
- Made for information in English or using Latin alphabet
- No support for other languages such as Chinese, Arabic, Thai, etc.
- No support for Mathematics, Chemistry or Biology, etc.

Because the content is incorporated together with the presentation.
To remedy the situation, with XML (eXtensible Markup Language), the content is separated from the presentation and logic.

- Tags are no longer predefined but are now defined in Document Type Definition (DTD) or XML schemas
- Declarations define the logical structure
- References
- Processing instructions
Distributed Computing with XML

- XML can now be used to build applications that are distributed over the whole World Wide Web
- XML relieves distributed computing from the need to be based on specialized middleware platforms
- XML enables the use of services over company borders, firewalls, different suppliers, infrastructure and technologies
1. Publish service description

2. Discovery of suitable services and how to communicate with them

3. Service Invocation

XML Web Services Architecture

Web Service Provider

registry

Web Service Client
### Some Core Standards

<table>
<thead>
<tr>
<th>Find</th>
<th>Universal Description Discovery and Integration</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>UDDI</td>
</tr>
<tr>
<td>Describe</td>
<td>Web Service Description Language</td>
</tr>
<tr>
<td></td>
<td>WSDL</td>
</tr>
<tr>
<td>Invoke</td>
<td>Simple Object Access Protocol</td>
</tr>
<tr>
<td></td>
<td>SOAP</td>
</tr>
<tr>
<td>Data format</td>
<td>XML, XML Schema</td>
</tr>
<tr>
<td>Transport</td>
<td>HTTP, SMTP...</td>
</tr>
</tbody>
</table>
Using the Standards

1. Build
2. Publish
3. Find
4. Get WSDL File
5. Make Proxy and client (tools)
6. Use (SOAP)
With the Web service concept, service can be accessed ubiquitously via heterogeneous mobile devices with tailored web service clients.
Web Services for Mobile Devices

- Different mail clients can ubiquitously access to the same mail application
- Content presentation adapted to the device

Mobile phone

PDA

Stationary PC

Different mail clients

Mail Web service

Mail application

SOAP Method Invocation

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Some Web Services Players

- Microsoft .NET
- IBM
- Sun One
- Oracle
- HP
- BEA
- SilverStream
- SAP AG
- Iona
- Systinet
- New entrants every day!

- OASIS
- W3C
- IETF
- OMG
- Uddi.org
- “Acronym factories”
Microsoft .NET

- .NET is Microsoft’s new vision
- .NET framework and platform
  - Server and client software
  - Development environment: Visual Studio .NET
  - C# programming language
- .NET My Services
Compatibility and Interoperability

- Compatibility between .NET platforms
- Compatibility between J2EE platforms

In .NET platform Web Service and WS clients are implemented in C# and are therefore not executable in J2EE platform using Java.

However, Most important:

Since the 3 basic protocols UDDI, WSDL and SOAP are standardised, .NET and J2EE platforms are interoperable!
.NET Framework Architecture

<table>
<thead>
<tr>
<th>VB.NET</th>
<th>C++</th>
<th>C#</th>
<th>Perl</th>
<th>...</th>
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</thead>
<tbody>
<tr>
<td>Common Language Specification (CLS)</td>
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<tr>
<td>Web Services</td>
<td>User Interface</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data and XML</td>
<td></td>
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</tr>
<tr>
<td>Base Class Library</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Common Language Runtime (CLR)</td>
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</tr>
</tbody>
</table>

Visual Studio .NET

Tutorial on Open Mobile Services, by Do van Thanh
.NET’s competition: J2EE

- IBM, SUN, Silverstream, BEA, Oracle, HP, CapeClear, Iona, Systinet, etc. build on J2EE compatible platforms
- J2EE does not include Web Service specification – yet
Liberty Alliance

Technology for Simplified Navigation and Usage of Mobile Services
Motivation

Accessing mobile Internet can be cumbersome today!

• To enter the service you needed a total of:

61 clicks

(7 for navigating and 54 for entering information)
Liberty Alliance Vision

- **Situation Today:** User’s network identity is fragmented across different service providers
  - Multitude of accounts (usernames, password, profiles)
  - Account creation and service usage can be cumbersome
    - Especially, when working from mobile devices keypad

- **Target Situation:** Seamless mobile web transactions across providers while not compromising security and privacy
  - Approach: Federated Network Identity
What is Liberty Alliance?

- Consortium of broad spectrum of companies
  - Objective: To create open, standards-based, platform-agnostic specification for “federated network identity”
  - 18 founder members, 25 sponsor members (at the start in April’02) – now 150 companies & organization

- Status of Work
  - Liberty Identity Federation Framework ID-FF 1.0 released in Q3, 2002
    - See www.projectliberty.org
  - Liberty Identity Web Service Framework ID-WSF released Q2 2003
  - ID-FF 1.2 and ID-WSF final released in Q4 2003
  - 9 conformant products in Q2 2004
Federated Network Identity

- **Circle of Trust**
  - Affiliation of **Identity Providers (IdP)** and **Service Providers (SP)** based on Liberty-enabled technology and on operational agreements

- **Account Federation**
  - Users link isolated accounts within the circle of trust
    - Link SP account(s) to IdP account(s) – opt in policy

- **Service Usage**
  - Users perform web transactions within the circle of trust in a secure and seamless manner
    - Authenticate with IdP and hop across linked SP accounts
Federated Network Identity

User has accounts at:
IdP, SP1, SP3

Account Federation

Circle of Trust

User

IdP (e.g. Operator.com)

SP1 (Yahoo.com)

SP2 (Toys.com)

SP3 (Puppies.com)
End user consent is must before federating accounts

End user allowed to maintain different identities at different IdPs and SPs – JoeSelf, BostonDude, PetBoy

Opaque handles are exchanged between IdP and SP at the time of account federation

- IdP won’t know user’s usernames at SPs

Once accounts are federated, user can do single sign on in future
Single Sign On (SSO)

User browses Yahoo

Yahoo determines IdP as Operator.com using “Introduction Protocol”

Authentication Request

Authenticates user as JoeSelf

Authentication Response (abcd1234)

Confirm

Yahoo logs user in as BostonDude

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Liberty Version 1.x Specification

- Liberty Identity Federation Framework ID-FF 1.0 released in Q3, 2002
  - See [www.projectliberty.org](http://www.projectliberty.org)
    - Federation of User Accounts
    - Simplified Sign On (SSO) & Global Logout
    - De-Federation

- Liberty Identity Web Service Framework ID-WSF 1.0 released Q2 2003 Introduction Protocol

Assumes a single Circle of Trust!
Introduction Protocol

- How does SP know that user has account with or is currently authenticated with IdP?
  - User reaches SP from IdP portal
  - User enters or checks IdP name on SP’s page
  - Common domain cookie

- Introduction useful both at time of account federation and SSO
Liberty v1.x Architectural Components

1. Web Redirection
   - Creates communication channel between IdP and SP rooted at (installed base of) user agent
     - Based on HTTP-redirect or Form-POST

2. Web Services
   - Enables network entities to directly communicate
     - Based on SOAP

3. Metadata & Schemas
   - Information and its format exchanged between IdP and SP
     - Identity (opaque handle), authentication context, provider metadata
Liberty v 1.x Architectural Components

- **SSO profiles**
  - Liberty Browser Artifact
  - Liberty Browser POST
  - Liberty WML POST
  - Liberty Enabled Client/Proxy (LECP)

- **Authentication profile**
  - SP indicates to IdP which user authentication mechanisms are acceptable
Future Releases

- Phase 2
  - Interaction across circles of trust
  - Delegation of authority to IdP for federation
  - Attribute transfer
  - Anonymous attribute transfer
  - Attribute transfer to affiliations
  - Usage attributes
Attribute Transfer (Federation)

User authenticates as CoolGuy. Sets attributes and Permissions

Federation Request (xyz001, Loc)

Obtains user consent for federation

Authenticates user as JoeSelf

Federation Response (xyz001)
Attribute Transfer (Usage)

User

JoeSelf
IdP

Auth (abcd001) + Discovery Request (Loc)

User browses Yahoo

Auth Response (abcd0001)

Discovery Response (xyz001)

SP (Yahoo.com)

Location Attribute Req (xyz001)

Response with Loc of CoolGuy

Welcome BostonDude, how is Scottsdale?

BostonDude

CoolGuy

AP (LocP.com)

Welcome BostonDude, how is Scottsdale?

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Other SSO Technology

- Microsoft .NET Passport
  - Launched in 1999
- Provides following services
  - Single Sign-In (SSI)
    - SSI vs SSO, just a different name
  - .NET Passport express purchase
    - Fast purchasing capability
    - Stores user billing (e.g. credit card number) and shipping information
    - Others
  - Kids Passport
    - Enables website compliance with COPPA (April 2000, US)
- Debate - not here please!
  - Proprietary or open?
Summary

- **SIM Application Toolkit, MExE, J2ME**
  - Terminal environments for creation & execution of mobile applications
  - Sophisticated mobile applications for end user, ability for application developers to reach out to large population of end users

- **Open Mobile Alliance (OMA)**
  - Technology enablers for future mobile services
  - Interoperable services

- **Parlay/Open Service Access (OSA)**
  - Generic APIs to access wireless network capabilities
  - 3rd party services, rich service spectrum for end user, control point for revenue generation for wireless operator

- **Virtual Home Environment (VHE)**
  - Personalized services concept
Summary (cntd.)

- **Session Initiation Protocol (SIP)**
  - Personal mobility, multimedia call initiation, event framework (instant messaging and presence)
  - Flexible service creation and provision, 3rd party services, personalization of call handling preferences, aligned with Internet protocols (standardized by IETF)

- **Mobile Web Services**
  - Framework for distributed computing on the Internet
  - Ubiquitous access to services, assembly of mobile service through components from different application providers

- **Liberty Alliance**
  - Simplified sign on, navigation, and attribute and credential sharing across mobile services
  - Ease of usage and navigation of mobile services, simpler deployment and integration of services
Towards Open Mobile Services

- Mobile Terminal
- Network
- Web Service
- Session Initiation Protocol
- OMA
- Liberty Alliance
- J2ME
- VHE
- OSA
- MExE
- SAT
- Gateway
- Internet
- Mobile network
- Enterprise Intranet
- Gateway
- WEB browser
- IP telephone
- WEB/WAP server

Tutorial on Open Mobile Services, by Do van Thanh
Section III:

Future Directions
The User in Focus

The user will be using

- several devices
- connected to heterogeneous networks
- to access to services offered by
  - Wireless operators
  - Service Providers
  - Content Providers
  - Enterprises
- in a personalised way.
Total Convergence

- Fixed Mobile Convergence
  - Ubiquitous service access from any device

- Communication Computing Content Convergence
  - All types services are accessible via the same device

- Public Private Convergence
  - Service providers and private enterprises

- Personal Company Convergence
  - Personal services and enterprise services
Issues to be Addressed

Technological issues are important, but there are others too:

- **Judicial:**
  - Who owns the user profile used in the personalisation?
  - Who may have access rights to the use profile?

- **Economic:**
  - How should the service subscription be?
  - Who is paying for what piece service?

- **Administrative:**
  - Who defines the service access rules (company vs. operator, user vs. service provider)
A Few More Steps in the Future

Communications between Devices

- Local short-range wireless technologies enable device communication
- Devices can collaborate to serve the user better
- Applications and services will be intelligently distributed over multiple heterogeneous devices and provide a coherent interface to the user
- New type of services will be born
Thank you!