SOA in Telecoms –
A déjà vu or a new research field?

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Agenda

• Motivation Network Convergence leading to SOA
• Historic SOA Approaches
  – Intelligent Networks – The first SDP in Telecommunications
  – Open Application Programming Interfaces – Parlay, OSA, JAIN
  – Web Services in Telecommunications - Parlay X
• Internet meets Telecommunications – IP Multimedia System (IMS)
• IMS & SDPs & SOA
• FOKUS Open SOA Telco Playground
• Summary
Evolution towards Converged Networks

From Separate Networks To Converged Networks
**The Emerging Split of Operator Roles**

So far Operators offered network specific services, but in the future they need to focus their business activities as:

- **NetCos** = Bitpipe Providers
- **ServiceCos** = Platform Providers / Enablers / Brokers
- **Sales Cos** = Customized Application Providers with direct Market Access

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**ServiceCos: enabling Services over Bipipes**

- Today: Service Offers are linked to network technologies and thus have a limited reach (compare with over the top providers, i.e. Google)
- Tomorrow Operators have to focus their business activities as either
  - **NetCos**: Bitpipe Business
    - Efficient provision of Bitpipes
    - Enablement of several ServCos
  - **ServicCos**: the „middleman“
    - Operate on top of many different NetCos
    - Provision of service enablers to various SalesCos
  - **SalesCos**: facing the customer
    - Make use of ServiceCo enabling services for high efficiency
    - Concentrates on Content and Customers
**Internet impact on Telecoms: Service Diversity**

Differentiation and Efficiency is needed to survive
NGN Service platforms / IMS has the potential to link Internet / web 2.0 and telecommunications

**Strategy of the broadening „T(elecoms)“: Broad top, sleek bottom**

<table>
<thead>
<tr>
<th>Consumers</th>
<th>Business Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communities</td>
<td>Kids Youth Families Retired Small SMEs Big enterprises MNE</td>
</tr>
</tbody>
</table>

**Differentiation!**

**Efficiency!**

**ServCo. = Service Delivery Platform**

- Modular
- Fast
- Segment specific
- One Platform
- Operations optimized
- Infrastructure(operations) partially outsourced

**Evolution of Service Delivery Platforms**

**Web 2.0**

- SOA
- Multimedia Services
- SIP App. Server
- Parlay X
- OSA/Parlay Interface
- IN / CAMEL Services
- Stored Program Control Services

**NGN / IMS**

- 3rd Party Application Services
  - Enterprises / Content
- INAP/CAP Interface
- GPRS/UMTS
- VoIP
- GSM
- PSTN

|= Services|
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SOA Principles  (Def. by The Open Group, or OASIS, IBM …)

- Service-Oriented Architecture (SOA)
  Service-Oriented Architecture (SOA) is an architectural style that supports service orientation.
- Service orientation is a way of thinking in terms of services and service-based development and the outcomes of services.
- a service:
  - is a logical representation of a repeatable business activity that has a specified outcome (e.g., check customer credit; provide weather data, consolidate drilling reports)
  - is self-contained
  - may be composed of other services
  - is a “black box” to consumers of the service
SOA Principles (2)

• An architectural style is the combination of distinctive features in which architecture is performed or expressed.

The SOA architectural style has the following distinctive features:

• It is based on the design of the services – which mirror real-world business activities – comprising the enterprise (or inter-enterprise) business processes.

• Service representation utilizes business descriptions to provide context (i.e., business process, goal, rule, policy, service interface, and service component) and implements services using service orchestration.

• It places unique requirements on the infrastructure – it is recommended that implementations use open standards to realize interoperability and location transparency.

• Implementations are environment-specific – they are constrained or enabled by context and must be described within that context.

• It requires strong governance of service representation and implementation.

Evolution of SOA Concepts in Telecoms
IN as a Universal API / Service Platform

IN platform provides service and network independence
- Service decomposition
- Separation of switching and service control network elements

- IN can be considered as an additional (network) layer on top of any bearer network, e.g. PSTN, ISDN, B-ISDN

OSA/Parlay/JAIN: One Set of Open APIs

Parlay/OSA (Open Service Access) define an API that enables operator and 3rd party applications to make use of network functionality through a set of open, standardised service interfaces

Applications (independent of underlying network technology)

Mapping to network specific protocols
Motivation for Parlay X Web Services

Note: Network Operator acting as Web Service Provider

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IMS Architecture Principles

- IMS does NOT standardise specific services, but enablers
- BUT supports inherently multimedia over IP, VoIP, IM, presence (SIP)
- IMS enables the flexibility in providing IP-based applications!!

Horizontal Architecture defining a “docking station” for applications

Defines service enabler capabilities

Build on existing IETF and telco SDP standards

Provides compared to standard internet

Better security, Service based QoS, flexible charging and single sign on

3GPP IMS Architecture: IMS Core and Applications

IMS Service Framework

HSS (AAA)

Application Server

IMS enabler Presence

Group Mgt

P-CSCF

I-CSCF

S-CSCF

Media Server

MFRC + MFRP

IMS Core System

Note: IMS Charging Architecture is not reflected on this slides = Diameter Interfaces to many entities
How does a IMS Provide Enhanced Services

• S-CSCF determines that a call requires enhanced service processing
  – Filtering may be based on calling / called party or other mechanism (defined by filtering criteria) eg. SIP message type, header fields, etc.

• Based on filtering criteria, the S-CSCF determines the address of the Application server and relays the call to the AS function. The Application Server receives the call and invokes the appropriate service logic taking one of the following actions:
  – Redirects the call to a new destination
  – Send the call back through the S-CSCF in order to monitor subsequent call events (ie act as a SIP Proxy)

• The Application Server (based on some other input) can also set-up calls between other entities in the network (ie. act as a B2BUA)
IMS Initial Filter Criteria

- The IFC is the key point for service provisioning in IMS and specified in 3GPP TS 23.218 and 29.228.
- The S-CSCF downloads the IFC’s for a particular user from HSS and has the ability to forward SIP messages to an appropriate Application Server (SIP AS, OSA SCS).
- AS application/service invocation is triggered as a result of a pattern matching on any SIP header or body.

IMS Application Server Options
Different AS Alternatives

- **CAMEL Services via Camel Support Environment (CSE):**
  - intended for the support of existing IN Services (provides service continuation).

- **OSA Services via Open Service Access Service Capability Server:**
  - intended for the support of 3rd Party Application Providers. OSA SCS provides access and resource control.

- **IMS services on SIP-Application Server:**
  - intended for new services. A multitude of widely known APIs (CGI, CPL, SIP Servlets) is available.

- **IMS services directly on the CSCF (similar to SIP AS):**
  - SIP-AS co-located on the CSCF
  - seems to be useful for simple services. May be beneficial for the Service Availability and the Service Performance.

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**CAMEL Reuse within IMS**

SIP 2 CAP mapping needed!

- **SIP Interface**
- **SIP Server**
- **S-CSCF**
- **HSS**
- **IM SSF**
- **SIP 2 CAP**
- **IN App 1**
- **CAMEL Support Env. (Application Server)**
- **Online & Offline Charging (ECF, CCF)**
- **Filter criteria**
- **Sh = Diameter**
- **Cx = Diameter**
OSA / Parlay AS within IMS

Service Delivery Platform (Application Server)

HSS

Sh = Diameter

Cx = Diameter

S-CSCF

SIP-Server

Filter criteria

Parlay GTW

SIP Interface

Diameter

Parlay AS (API)

Parlay X GW

Ro + Rf = Diameter

Parlay X App

Parlay App 1

Parlay App 2

Sh

FW

MPCC

PRES

CHARG

SIP Interface

Diameter

Online & Offline Charging (ECF, CCF)

JAIN over IMS

HSS

Sh = Diameter

Cx = Diameter

S-CSCF

SIP-Server

Filter criteria

SIP Interface

Diameter

Online & Offline Charging (ECF, CCF)
IMS Enablers = Reusable IMS Application Servers

- IMS did not address the standardisation of specific application by purpose
- Only major AS interfaces are defined = IMS is a “docking station” for ASs!
- Open Mobile Alliance (OMA) is supposed to do service specific standardisation on top of IMS
- Examples include Presence, Group Management, Instant Messaging (IM), Push to Talk over Cellular (PoC), etc.
- Over time it became clear that there is a set of common servers, i.e. enabling servers → IMS Enablers, which can be used in the implementation of more complex IMS services
- Major enablers today to be used in IM, PoC and Group Video Calls, etc.:
  - XML Document Management System (XDMS) enabler for group configuration
  - Presence Server (PS) enabler for maintaining presence information
  - Device Management (DM) enabler is used for client system configuration, as ASs and enablers may need specific software on the client system!
OMA Service Environment (OSE)

- The Open Mobile Alliance has defined plenty of service enablers
- But how to provide and combine these enablers?
- Based on OSA/Parlay ideas OMA decided in 2005 to start its work on the OSE
  
  http://www.openmobilealliance.org/release_program/ose_ad_archive.html
- OSE is based on policy based service interface provision and separates:
  - Applications
    - either resident on an in-house platform or a third party application
  - Policy enforcer
    - applies policies to the interaction between the application and the Enablers and
      between Enablers wherever applicable and in some cases the Policy may be
      null.
  - Enabler
    - contains intrinsic functions which can interact with other functions, within the
      domain of the architecture and underlying network resources.
  - Execution environment
    - deals with aspects such as Life Cycle management, load balancing, OA&M etc.

OMA OSE Execution Model / Flows
**IMS Application Orchestration Options**

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NGN Application Layer – IMS as docking station

Service Enablers
- CORBA / C++ / Java
- OMA
- OSE
- Web Services
- Parlay X

Unified NGN session control system

Bearer Control with QoS

NGN Application Layer – IMS as docking station

Bearer Control with QoS

Web Services

Parlay X

Plain VoIP

SIP Servers

AAA Servers

Unified NGN session control system

Mobile Access Networks (GSM, GPRS)

Fixed Access Networks (PSTN/ISDN)

Fixed and Mobile Internet Access

Cable / TV Networks

NGN

A Service Delivery Platform enables Seamless Services

Enablers (incl. Content Delivery)

Service Creation Environment

Service Execution Environment

Exploitation Layer

SOA

IMS

fits here

Access Network Layer

Public network

Mobile Access

Fix Access

Mobile Access

Fix Access

Operation & Maintenance

Processing

Public network

Mobile Access

Fix Access

Mobile Access

Fix Access

Supervision

IMS fits here

LBS

Content Delivery

MRF

Service Execution Environment

Service Creation Enablers (incl. Content Delivery)
**IMS vs. SDP aspects**

<table>
<thead>
<tr>
<th>IMS</th>
<th>Service Delivery Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>• provides network overlay</td>
<td>• Service Creation</td>
</tr>
<tr>
<td>• secure authentication, authorization</td>
<td>• Service Execution</td>
</tr>
<tr>
<td>• charging mechanisms</td>
<td>• OSS/BSS interfaces</td>
</tr>
<tr>
<td>• message routing</td>
<td>• Service activation interfaces</td>
</tr>
<tr>
<td>• media handling</td>
<td></td>
</tr>
<tr>
<td>• user database</td>
<td></td>
</tr>
<tr>
<td>• legacy interworking</td>
<td></td>
</tr>
<tr>
<td>• inter-domain functionality</td>
<td></td>
</tr>
<tr>
<td>• …</td>
<td></td>
</tr>
</tbody>
</table>

You cannot compare apples with oranges, but only a SDP on top of IMS provides the services needed to justify the investments into a NGN.

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**The Role of SOA in Telecommunications**

- **Unifying Architecture**
  - Strategic enterprise alignment
  - Cost reduction, agile delivery, innovation
- **Service Delivery for IMS**
  - IMS provides the session control infrastructure and network enables
  - In addition it needs the service delivery, service assembly – it needs applications.
- **IMS is being deployed incrementally – the reality is a mix of 2G/PSTN service control and IMS parts**
  - The challenge for operators is to use their suite of intelligent service infrastructure.
  - SOA provides a solution to integrate the old with the new and compose applications across the infrastructure.
- **Open platforms changes the delivery model for applications**
  - Applications traditionally were provided by NEPs with limited internal development
  - SOA enables applications to be used along side operator driven developments.
- **OSS/BSS needs to be part of the application development**
  - SOA promotes the inclusion of billing, provisioning and services management as an integral part of the application development
SOA-based Service Delivery Platforms

- NGN Service delivery Platform components like policy managers, service exposure mechanisms and network abstraction functionalities are only one half of the medal.
- Equally important for the dynamic and stable delivery of NGN services is the tight integration and interworking with Operation Support Systems and Business Support Systems.

- SOA principles have to be applied to both domains:
  - SOA governance for Service Composition and Orchestration
  - SOA governance for Service Activation, Fulfillment and Assurance

- Only if SDP Component's and OSS/BSS mechanisms’ tight interworking is provided, SOA-based NGN SDPs are capable of meeting future requirements.

- SOA based service lifecycle management also includes a MDA based Service Creation Environment and Service Deployment Environment.

A SOA-based NGN Reference Architecture

[Diagram of an NGN Reference Architecture]
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**Open NGN Test & Development Center**

- Is a set of several technology testbeds
- Provides all NGN layers but focus is on IP and service platform layers
- Foundation for industrial and academic projects
  - Applications development support
  - Applications validation
  - Service Platform prototyping
  - Infrastructure component testing
  - Network Technologies integration
IMS Testbeds as R&D Base @ FOKUS

- In November 2004 – after 2 years of development sponsored by BMBF and FOKUS – the FOKUS Open IMS Playground has been officially opened
  - www.open-ims.org
  - Technical foundation was the expertise and available software in the fields of Open Source SIP Express Router (SER) and FOKUS OSA/Parlay Gateway (OCS)
  - The Open IMS Playground is the globally pioneering open IMS Testbed and contains FOKUS own developed and industry partner IMS products
- In November 2006 the FOKUS Open Source IMS (OSIMS) Core System - the core of the IMS playground - has been officially released to the general public via the BerliOS Download site
  - www.openimscore.org
  - OSIMS allows industry and academic institutions to setup own testbeds (with or without FOKUS support and components)
  - Since then OSIMS has been downloaded many thousand times from all over the world

FOKUS Open IMS Playground

- FOKUS components covering all the major IMS nodes
- Based on a powerful legacy in IP communication – e.g. SIP, SIP Express Router, iptel.org
- In 2003 FOKUS started prototyping IMS protocol stacks and IMS components
- 2004 Open IMS Playground opened featuring
  - Open Source IMS Core
  - Add on components: Client, AS, XDMS, Presence Server
- 2006 Open Source IMS Core published
FOKUS Open IMS Playground and Core

Beyond SER - The FOKUS OPEN IMS Core

- The Open IMS Core (OSIMS) is constantly being developed and was already successfully tested with commercial IMS products.
- provides first time implementations of open IMS core components
- offers an open source IMS platform to make use of the ISC interface
- can act as a tool for IMS services proof-of-concept
- allows to test alpha/beta versions of commercial IMS products
- does not intend to compete with carrier grade developments but wants to create an Open IMS community and to accelerates IMS adoption
- This software is for establishing IMS testbeds only, not for implementing commercial IMS systems!
- Note: Users have to check potential IMS patents and standards licenses!
OSIMS – Components & Licensing

- a Home Subscriber Server
  - GNU General Public License v.2

- 3GPP compliant IMS Call Session Control Functions (CSCFs)
  - Proxy-CSCF
  - Interrogating-CSCF
  - Serving-CSCF
  - GNU General Public License v.2

Some feedback so far ... from Google Analytics

- > 40,000 visits
- > 13,000 unique visitors
- Approx. 150 visitors/day
- Region breakdown

Region Breakdown:
- Asia: 31.62%
- Europe: 52.39%
- Americas: 13.95%
Getting started with IMS – An IMS Testbed

- Operators and vendors are challenged strongly by the ongoing convergence (VoIP, FMC, Triple Play, Internet multimedia / web 2.0)
- IMS is a complicated subject due to convergence domains
- Success of IMS will depend strongly on open / interoperably solutions and many niche market services
- Instead of deciding for one or two vendors and/or integrators the establishment of a local IMS/NGN testbed enables all players to gain early insight into the IMS
- Currently many international testbeds are under development
- Testbeds and related tools allow to engage all players of the emerging convergence ecosystem at an early stage to develop many and really demanded services
- Universities could be part of this approach to educate staff as soon as possible

FOKUS Open IMS Playground Concept

1. **Free Download**
   - Universities & R&D Centers
   - NGN Open Testbeds
   - Cooperation
   - FOKUS SOA / MIL Components
   - Industry NGN Components

2. **Cooperation**
   - Operators & Vendors
   - Industry Testbeds
   - Remote Testbeds
   - Local Operator-specific Testbeds at FOKUS

Universities
& R&D Centers

NGN Open Testbeds

Cooperation

FOKUS SOA / MIL Components

Industry NGN Components

Operators & Vendors

Industry Testbeds

Remote Testbeds

Local Operator–specific Testbeds at FOKUS
NGNI F&E Work Areas around IMS/NGN

IMS / NGN Management Service Provisioning
IMS / NGN AAA, Data / ID Management HSS
LTE / SAE E2E QoS
VoIP / IMS Security & Reliability
Open IMS Playground

FMC / IMS Call Continuity IP Handover
Open Source IMS Core
IMS Application Server & Client
R&D Projects (BMBF / EU)

Consulting for Operators & Vendors
Interoperability Testing & Benchmarking

Evolution of FOKUS NGN Testbeds

OSA/Parlay Playground
www.opensoaplayground.org

BMBF National Host NGN Testbed
www.open-ims.org

Iptel.org Testbed
Smart Lab

www.mediainteroperabilitylab.org
IMS Testbeds as R&D Base @ FOKUS (cont.)

- In September 2007 the FOKUS Open SOA Telco Playground has been officially opened to address R&D in the IMS application layer
  - www.opensoaplayground.org
  - Extends the R&D activities above the IMS core layer in face of emerging IMS enablers and their orchestration (SCIM, service brokering), SOA principles and Web 2.0 APIs
  - Focus is on service creation / service orchestration, service brokering and execution, service provisioning, SOA based NGN services management, etc

- In September 2007 the Media Interoperability Laboratory (MIL) has been officially opened based on the existing activities in the fields of Triple Play, Quad Play, IPTV and home entertainment
  - www.mediainteroperabilitylab.org
  - Extends the R&D activities in the field of emerging IPTV, interactive TV, converged services (integration communications and entertainment services)
  - First IMS-based prototype has been shown at IFA 2007 Fair, Berlin

Towards SOA over IMS

- A lot of work in the Open IMS playground has been performed in the context of IMS applications prototyping and IMS – SDP integration
- Today the new buzzword SOA (Service Oriented Architecture) is used to describe a service delivery platform, which features reusability of service components and service orchestration
- Therefore, we have established the Open SOA Telco Playground on top of the Open IMS Playground in summer 2007 to reflect our activities in this domain
- See www.opensoaplayground.org
### Open IMS Client Full Version

**Customizable User Interface**

- VoIP
- Presence
- Registration
- Event Package
- Messaging
- Contact List
- XML/HTML
- Content Sharing

**Media Manager Framework**

- RTP Stack

**Extended SIP Stack**

**MSRP Stack**

**HTTP API**

**Device Media API**

**Java VM**

**.NET Framework**

**Handset / fixed Platform**

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### Client Functionalities

<table>
<thead>
<tr>
<th>Features</th>
<th>Java version</th>
<th>.NET version</th>
<th>Comment</th>
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</thead>
<tbody>
<tr>
<td>AKA, MD5 authen.</td>
<td>●</td>
<td>●</td>
<td>Essential feature</td>
</tr>
<tr>
<td>SIP Event Packages</td>
<td>●</td>
<td>●</td>
<td>Add on feature</td>
</tr>
<tr>
<td>Presence</td>
<td>●</td>
<td>●</td>
<td>Presence server needed</td>
</tr>
<tr>
<td>Instant Message / Chat</td>
<td>●</td>
<td>●</td>
<td>Add on feature</td>
</tr>
<tr>
<td>Voice Call</td>
<td>●</td>
<td>●</td>
<td>Essential feature</td>
</tr>
<tr>
<td>File Transfer</td>
<td>●</td>
<td>○</td>
<td>MSRP being tested</td>
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<tr>
<td>Address book</td>
<td>●</td>
<td>●</td>
<td>Essential Feature</td>
</tr>
<tr>
<td>Call History Mang’t</td>
<td>●</td>
<td>○</td>
<td>Local management</td>
</tr>
<tr>
<td>Call Conference</td>
<td>●</td>
<td>●</td>
<td>As needed. Add on Feat.</td>
</tr>
<tr>
<td>XDMC</td>
<td>●</td>
<td>●</td>
<td>XDM needed. Add on</td>
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<tr>
<td>MSRP</td>
<td>●</td>
<td>●</td>
<td>Add on feature</td>
</tr>
<tr>
<td>DTMF enabled</td>
<td>○</td>
<td>●</td>
<td></td>
</tr>
</tbody>
</table>

**Dialler**

- ● Full support
- ○ Partial Support
- ○ Not supported
Java Version - Screenshots

Actions on Contact

Outgoing Call

Instant Message

SIPSEE – The IMS SIP AS

- **SIP Servlet Execution Environment**
- HTTP/SIP Converged IMS SIP Application Server based on SIP Servlet Technology (version 2.0)
- Pure JAVA Implementation
  - Running on JRE 1.5/1.6, Tested under LINUX/Windows
- SIP Servlet Technology
  - SIP Servlet API 1.0 (JSR 116)
  - *SIP Servlet API 1.1 (JSR 289)
- Baseline SIP Spec
  - RFC 3261 SIP Protocol Spec
  - RFC 3262 Reliability of Provisional Responses
  - RFC 3265 Subscribe-Notification
SIPSEE - Features

- IP Multimedia System (IMS)
  - Designed as IMS SIP AS
  - ISC Interface (3GPP TS.24.229, TS.23.228)
  - Sh Interface (3GPP TS. 29.328/29.329)
  - IMS Charging Function - Ro, Rf Interface (TS 32.260, 32.299)
  - HTTP based Ut interface

- Service based on SIPSEE
  - Parlay X Gateway (Web Service)
  - Emulation IN-Telecom Service (mailbox, Conference)
  - Presence based multimedia Community Service
  - Call Center (115)

FOKUS Presence Server

- Enabler Service for: IM, PoC, Video Conferencing, IPTV.
- SIMPLE & 3GPP standard compliant
- Features:
  - Publication, Subscription and Notification for Event: presence
  - Publication, Subscription and Notification for Event: presence.winfo
  - A basic Resource Lists functionality
  - Parlay X for presence module ➔ Interoperability between IMS and Parlay X clients
Architecture and technical details

- A layered model was used for independence of the modules and clarity
  - The **Connection Layer** assures the communication with the IMS components
  - The **Core Layer** implements the basic functionality in a generic way and it is usable by any event package
    - **Watcher-Info**
    - **Presence**
- Implementation based upon:
  - **Java**
  - **NIST, the JAIN SIP reference implementation**

Supported Specs (detailed)

- RFC 3265 - SIP - Specific Event Notification
- RFC 3856 - A Presence Event Package for the SIP
- RFC 3857 - A Watcher Information Event Template Package for the SIP
- RFC 3858 - An XML Based Format for Watcher Information
- RFC 3863 - Presence Information Data (PIDF)
- RFC 4480 - RPID: Rich Presence Extensions to the Presence Information Data Format (PIDF)
- RFC 4479 - A Data Model for Presence
- ETSI ES 202 391-14 v1.1.1: Open Service Access (OSA) – Parlay X Web Services; Part 14: Presence
- 3GPP TS 23.141 v7.1.0 – Presence Service; Architecture and functional description
- 3GPP TS 24.141 v7.2.0 – Presence Service using the IP Multimedia Core Network subsystem
FOKUS XML Document Mgt Server (XDMS)

- SIPSEE-based implementation
- Central storage of application specific user data
- Client can access and manipulate XML document using the XCAP interface
- Application Server can access and manipulate XML documents
- ParlayX interface for 3rd party access

More about XDMS:
Web: [www.open-ims.org/XDMS](http://www.open-ims.org/XDMS)
Contact: xdms@open-ims.org

PEEM Integration at FOKUS Testbed

- The PEEM at FOKUS is situated on top of the Parlay X WS.
- Policies are to protect the Parlay X Web Service and also to enforce Web Service orchestration.
- The implementation of the PEEM at FOKUS uses XACML as its policy expression language.
- For authorization policies, Sun’s XACML is being implemented.
- For orchestration, the BPEL engine from Active Endpoints (ActiveBpel) is being used.

T. Magedanz (TU Berlin / Fraunhofer FOKUS) - 2007
FOKUS work in the context of SOA Telco

Based on the long term practical experiences in international projects performed for various vendors and network operators, FOKUS is currently concentrating on the following areas of work within a SOA-based Telecommunications Environment:

- Integration of telecommunications and Web 2.0 services under exploitation of SOA principles, focusing on both end system based as well as server based service orchestration. This leads to a very flexible service implementation infrastructure for
- Development of advanced service brokers for IMS (= SIP-based) services and non IMS (= HTTP-based) services.
- Development and extension of SOA-based IMS application servers.
- Prototyping of community based SOA services on top of IMS and legacy networks based on Parlay X and OMA PEEM
- Design and Development of an extensible Management solution for SOA-based NGN/IMS environments, including service provisioning systems for SOA-based IMS environments and monitoring and fault management systems
- Development of SOA-based Autonomic Communications Infrastructures (as part of the Composite Services Management Workgroup of the Autonomic Communications Forum (ACF)
OMA PEEM for SOA-based Service Orchestration

- Resource delegation through policies
- Resources can be enabler or other (3rd party) resources
- PEEM may function as Policy Decision Point (PDP) or Policy Execution Point (PEP)

Web 2.0 Enabler in a Telco Environment
**Integrating Web 2.0 Apps with IMS**

Basically different approaches:

- **Walled Garden:**
  - Integration of IMS Enabler and information into Web 2.0 applications
    - IMS Enabler as part of a Web 2.0 mashup
  - Offering Web 2.0 functionality towards IMS clients through specific IMS enablers
    - Translation of Web 2.0 APIs into SIP/IMS mechanisms

- **Open Garden:**
  - Integration of IMS Clients into Web 2.0 applications
    - Web 2.0 specific functionalities as part of a rich IMS client
    - Bypassing of operator infrastructure

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**Integrating IMS Services into the Web**

- Telco services as part of a Web 2.0 mashup

- Development of Web 2.0 specific application sources like Atom, RSS, JavaScript- or REST-based APIs

- Utilization Policy-based functions to manage service and information access from the Web
**Mashup Architecture**

Central mashup node

Telco enabler layer

Telco enabled IMS/Web2.0 clients

**FOKUS Community Facebook Application**

Legacy Messaging  
IMS Presence  
IMS Conferencing  
Legacy Call Control  
IMS Messaging  
IMS Location  
GEO blogs / Feeds  
Google Maps  
IMS Messaging  
IMS Presence  
IMS Conferencing  
Legacy Call Control  
IMS Messaging  
IMS Location  
GEO blogs / Feeds  
Google Maps
Web 2.0 enabled IMS client

Web 2.0 / Telco Enabler:
• MMS / SIP Instant Messaging
• SMS legacy messaging
• Conferencing
• Location
• Rich Presence

JSON RPC allows easy integration into AJAX-based applications.
Gateway (JSON to Parlay X) Functionality

- JSON-RPC access (request and response)
- map JSON Request to Parlay X Interface
- manage internal characteristics transparently (like Polling or Notifications)

- abstract IMS functionality
- enable WebService access for JavaScript

The JSON to Parlay X Wrapper
**Example: Presence**

```
getPresence()
```

**Example: Conference**

```
callUsers()
```
Agenda

- Motivation Network Convergence leading to SOA
- Historic SOA Approaches
  - Intelligent Networks – The first SDP in Telecommunications
  - Open Application Programming Interfaces – Parlay, OSA, JAIN
  - Web Services in Telecommunications - Parlay X
- Internet meets Telecommunications – IP Multimedia System (IMS)
- IMS & SDPs & SOA
- FOKUS Open SOA Telco Playground

Summary

- SOA in telecommunications has a long tradition to implement an open services market
- BUT SOA has not always been called SOA!
- Definition of reusable Services Components was always a target of Service Delivery Platforms (SDPs)
  - Service Independent Building Blocks (SIBBs) in IN
  - Service Broker / Trader in TINA
  - Service Interfaces in OSA/Parlay
  - Service Building Blocks (SBBs) in JAIN
  - Service Enablers and SCIM in IMS
  - PEEM in OMA Service Environments
- FOKUS has always prototyped new SDP concepts and provided testbeds and tool kits to develop proof of concept applications for SDP validation
  - FOKUS Open OSA/Parlay Playground
  - FOKUS Open IMS Playground
  - New Open SOA Telco Playground will address SOA principles in more detail
- For more information visit www.opensoaplayground.org
Any Questions?

About the Speakers

Prof. Dr. Ing. habil Thomas Magedanz

Thomas Magedanz (PhD) is professor in the electrical engineering and computer sciences faculty at the Technical University of Berlin, Germany, leading the chair for next generation networks (Architektur der Vermittlungsknoten – AV) supervising Master and PhD Students

In addition, he is director of the “NGNI” division at the Fraunhofer Institute FOKUS, which also provides the national NGN/IMS test and development centre in Germany. Prof. Magedanz is one of the founding members of FOKUS (1988) and member of the management team.

Furthermore he is principal consultant of Direct Link Consult e. V., a FOKUS Consulting spin off focusing on professional services, strategic studies and technology coaching.

Prof. Magedanz is a globally recognised technology expert, based on his 18 years of practical experiences gained by managing various research and development projects in the various fields of today’s convergence landscape (namely IT, telecoms, internet and entertainment).

He acts often as invited tutorial speaker at major telecom conferences and workshops around the world.

Prof. Magedanz is senior member of the IEEE, editorial board member of several journals, and the author of more than 200 technical papers/articles. He is the author of two books on IN standards and IN evolution.

Since 2006 he is also extraordinary professor at the University of Pretoria and University of Cape Town in South Africa.
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Useful References – IMS Overviews


• T. Magedanz: IMS – IP Multimedia Subsystem – Towards a unified platform for multimedia services”, EURESCOM Mess@ge Issue 1/2006 (march 2006), pp. 18, ISSN 1618-5196 (print edition), ISSN 1618-520X (Internet edition), Publisher: Eurescom GmbH, Heidelberg


Useful References – Open IMS Playground

- Fraunhofer FOKUS Open IMS Playground, www.open-ims.org

Useful References – Open SOA Telco Playground

- Fraunhofer FOKUS Open SOA Telco Playground, www.opensoaplayground.org