Structuring the Next Generation Network using Standard-based Service Delivery Platforms

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Presentation Outline

• Telco Evolution and Service Platforms
• Problem, Aim and Approach
• Next Generation Network
• Service Delivery Platform
• Generic Service Oriented Architecture
• Service Delivery Platform Framework
• Proof of Concept
• Conclusion
Telco Evolution

• Legacy telco **infrastructure** provides voice and data **services** to customers.

• Infrastructure **evolves** to support and interwork with diverse transports:
  – Circuit, packet, fixed and mobile, Internet, IT.

• Infrastructure supports **multimedia** services:
  – Voice, video, data and includes IT and Internet type services.

• IT, Internet and telco networks **converging**.
Telco Evolution

• Telco business and infrastructure changing.
• Infrastructure is *packet-based* supporting:
  – FMC, IT enterprise and Internet interworking.
• Business model includes *external* partners.
  – Build services, provide content, …
• Telco is evolving into a Next Generation Network (NGN).
  – Manage network *interoperability*.
  – Support *service* development, delivery and management.
Service Platforms

• Satisfy requirements using service enablers.
  – Provide abstractions of network resources, capabilities and data.

• Types of service platforms:
  – Telco uses the Service Delivery Platform (SDP).
  – Enterprise service platforms are based on Service Oriented Architecture (SOA) based.

• SOA based on Internet technology standards.

• As yet there are no SDP standards.
  – Mostly proprietary solutions.
Problem, Aim and Approach

• The SDP is the service platform for the NGN.
  – But is mostly proprietary.

• Requires standardisation to support Interoperability and portability of apps.

• We motivate a standardisable architecture named the SDP framework, that:
  – exposes standard-based service enabler interfaces.
  – is defined by generalising SOA concepts into the Generic Service Oriented Architecture (GSOA).
Next Generation Network

- Packet-based **transport** operates across enterprise, Internet, fixed, mobile networks.
- Provides old and new **services** to customers across any network.
  - Voice to streaming content.
- Separates network functions and service.
- Services operate **independently** of network functions.
- Visualise properties in a **reference** model.
Service Delivery Platform

- Is an **IT-based** platform used by fixed/mobile telcos to provide services to customers.
- Manages service creation, provisioning, execution and **billing**.
- Enables service delivery is network and device **independent**.
- Provides developers with access to network capabilities and **content**.
- Satisfies NGN service stratum requirements.
General SDP Architecture

- Parlay/Parlay X
- Service Exposure Layer
- Service Execution Platform
- Content Delivery Platform
- Network Abstraction Layer
- Protocols
- Converged Networks

- AAA
- OSS
- BSS
- SCE
- SME
- Media

Parlay
Parlay
Parlay/Parlay X/JAIN/OMA/IMS
Web Services
Web Services
Generic Service Oriented Architecture

- Collection of technology, implementation and distribution independent concepts.
- Distributed system architecture containing:
  - services (service enablers) with interfaces abstracting infrastructure capabilities.
  - applications that invoke service interfaces.
  - a middleware plane to hide distribution.
- GSOA seen in WS SOA, Parlay X and Parlay.
  - Is a design pattern used to structure various service platform architectures.
GSOA Representation

Middleware Plane

Service
Service
Service
Service

Application Interface
Application
Application Interface

Peer to Peer
SDP Framework

End-User

Simple Applications

Service Subscriber

Simple Services (Intermediate Apps)

Service Platform

Intermediate Services (Complex Apps)

Complex Services

Service Functions

Resource Functions

Physical Resources

End-User

Service Subscriber

Service Platform

Enterprise

Simple Applications

Simple Services (Intermediate Apps)

Intermediate Services (Complex Apps)

Complex Services

Service Functions

Resource Functions

Physical Resources

Web App

Parlay X

Parlay

SIP App

SIP Services

Adaptor Services

S-CSCF

HSS

P-CSCF

SGW

Switch

IVR

Connectivity Provider

Converged Network

OSS/BSS
Applying the GSOA to the Framework

- \( R_{CS} \)
- \( R_{SS} \)
- \( R_{ST} \)
- \( R_{CT} \)
- \( R_{TT} \)
Proof of Concept

• SDP must support an Internet Protocol Television (IPTV) service.

• IPTV Requirements:
  – Deliver content to customers.
  – Enable voice communication.
  – Presence enabled messaging.

• Extend the SDP framework to define an architecture that delivers services
  – Voice, Messaging, Presence and IPTV.
Mapping Technologies

- Parlay X web services for simple service layer.
- Parlay SCFs and **SCS** for intermediate and complex service layer respectively.
- IMS for service and resource function layers.
- Remaining layers reuse telco infrastructure.
- Alternative mappings:
  - Collapse *layers* for e.g. Parlay X web services invoke IMS directly.
  - Remove *domains* for e.g. join end-user and service subscriber domains.
Implemented SDP Architecture

- **Client**: IPTV App
- **Display Service**: Input Manager
- **Intermediate Service Middleware**
  - Charging SCF
  - Account SCF
  - Session SCF
  - MPOC SCF
  - PAM SCF
- **Simple Service Middleware**
  - Payment
  - Short Message
  - Media Manage
  - 3rd Party Call
  - Presence
- **Complex Service Middleware**
  - SCS Client
  - SCS
  - SCS Client
- **Service Function Middleware**
  - i-CSCF
  - SCSCF
  - HSS
  - MRFC
- **Resource Function Middleware**
  - PDF
  - MRFP
  - BGFC
  - MGCF
- **Resource Middleware**
  - SGSN/GGSN
  - Resource
  - Resource
  - Resource
  - Resource

**IPTV Provider App**

**Media Provider App**

**Record Service**

**Content Service**

**Service**

**SCS Client**

**Terminal**

**Resource**

**Billing System**

**Billing System**
Results

- Parlay X APIs exposed to 3rd parties, but some new APIs needed.
- ESB middleware not fully standardised.
- Parlay APIs with modifications abstracted lower network functionality.
- Provided some Parlay SCS to SIP mappings.
- Network simulator simulated rich service enablers.
- Evaluated service interfaces for the SDP.
Conclusion

• SDP framework promotes a standards-based service platform architecture for NGN.
• Used multiple GSOAs to consistently implement NGN reference points.
• Framework is extendable.
• Proof of concept evaluated technologies service interfaces for the SDP.
• Framework provides a foundation of concepts and abstractions that contribute to SDP standardisation.
Appendix: Interfaces

• Data Session Web Service (New):
  – SessionManager:startSessionRequest, pauseSessionRequest, resumeSessionRequest, stopSessionRequest.

• Data Session Controller SCF (Modified):
  – IpDataSessionControlManager:createSession, pauseSession, resumeSession, endSession

• Mapping to SIP (New):
  – connecReq – INVITE
  – Pause, resume and end session requests are mapped to new SIP messages.