Services Over IP
IMS Architecture Overview

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Agenda

- Evolution of Softswitch Architecture
- What is IMS?
- Standards Efforts
- IMS Benefits
- The IMS Service Architecture
- Role of the Softswitch
- Deployment Options
- Conclusion
Evolution of the SoftSwitch

Traditional Switch Model
- Circuit Wireline
- Wireless Subscriber
- Features
- Call Control
- Signalling
- Switch Fabric

Consolidated SoftSwitch Model
- Circuit Wireline
- Wireless Subscriber
- App Servers
- Embedded Services
- Signalling Gateway
- Media GW Controller

3GPP/3GPP2 IMS Model
- Circuit Wireline
- Wireless Subscriber
- SIP
- MGCF
- Media Gateway
- Media GW Controller

NGN Migration Options

**Evolve**
- **TDM** with NGN/VoIP capabilities
- **Strength:** Introduce VoIP trunking, POTS/ISDN features to NGN endpoints, leverages installed TDM base
- **Weakness:** High upfront investment to upgrade all COs, jeopardizes stability of PSTN

**Replace**
- **TDM** by NGN/VoIP
- **Strength:** Short migration phase, all new NGN technology
- **Weakness:** Huge upfront investment, jeopardizes POTS/ISDN service

**Overlay**
- **TDM** with NGN/VoIP
- **Strength:** No huge upfront investments, keeps existing TDM for highly reliable POTS/ISDN services, protects investments
- **Weakness:** Longer migration phase
Next Generation VoIP Services Architecture

- Historically next generation network technology has been driven by standards bodies and industry forums (e.g. AIN, DSL, FTTP..)
- Standards help speed the deployment of next generation technology
  - Multiple vendors address service provider’s needs (price competition)
  - Allows vendors to sell the same product to multiple customers
- VoIP service architecture standards organizations:
  - IETF develops protocols not services architecture
  - ETSI, 3GPPs, Parlay Forum propose IMS VoIP service architecture
  - ATIS has recognized the need for VoIP standards including the services architecture issue

What is IMS?

- An IP multimedia and telephony core network
- IMS is defined by 3GPP and 3GPP2 standards organizations
- Based on IETF (internet) protocols
- IMS applies equally well to wireless and wireline access carriers
  - Supports IP to IP sessions over cable, DSL, 802.16, 802.11, CDMA packet data, GSM/EDGE/UMTS packet data, etc.
- Equivalent to IP telephony systems being invented by some operators such as Verizon wireline. Both use IETF protocols. But IMS is standards-based.
The IMS Vision: Access-Independent, Services-Enabled Network

IMS will enable a wireless operator to be a true converged service provider, with services that work regardless of how they are accessed by the user.

IMS Standards

- **3GPP and 3GPP2**
  - Have both defined the IP Multimedia Subsystem (IMS)
  - The harmonization effort has kept the definitions as similar as possible.

- **IETF - Internet Engineering Task Force**
  - Provide the definitions for SIP, SDP and other protocols underlying IMS
  - IMS is driving some of the work in IETF

- **ANSI - American National Standards Institute**
  - Provides protocol definitions used by IMS
  - T1.679 covers interworking between ANSI ISUP and SIP

- **ITU - International Telecommunication Union**
  - Provides protocol definitions used by IMS as part of comprehensive NGN effort
  - H.248 for media control
  - Q.1912 SIP covers interworking between ITU-T ISUP and SIP (3 Profiles)

- **OMA - Open Mobile Alliance**
  - Defining services for IMS architecture, e.g. Instant Messaging, Push-to-Talk

- **ETSI - European Telecommunications Standards Institute**
  - **TISPAN** - TISPAN is merger of TIPHON (VoIP) and SPAN (fixed networks)
  - Agreement on reuse of 3GPP/3GPP2 IMS in comprehensive NGN plans

- **ATIS - Alliance for Telecommunications Industry Solutions**
  - Addressing end-to-end solutions over wireline and wireless
  - Nearing agreement to use 3GPP/3GPP2 IMS
IMS Benefits for End-Users

- Common contacts and buddies across multiple services
  - Enterprise lists, personal lists
  - Lists can be enhanced with capability indicators (e.g., PTT, gaming, IM, voice, picture-phone buddies)
- Ability to use multimedia information to enrich communication
  - Text/Pictures/Video/Audio, schedule, presence, availability, location information can be sent and received during a voice call
  - Visual “automated attendant” can speed navigation through call centers
  - Services are not limited by voice and data separation as they are today
- Enables data applications to be enriched with voice
  - E.g., enhance online shopping experience with real-time conversation with a sales rep.
  - Gamers can talk to each other during play
- Predictable interactions between multiple services
  - Operator can set reasonable defaults for service interactions so that ease of use and service quality is maximized
  - Subscribers can set policies on how they want their services handled, e.g. my boss can interrupt a phone call with a PTT, but not my child

IMS Benefits for Service Providers

- Retain ownership of the subscriber and their services
  - Provide better quality, more integrated services than IP service providers
  - Avoid migration of value to the client device (e.g. Nokia strategy)
- Differentiate services from competition and sell more services
  - Home control means that services and call control are provided by the home server in the home network even when the user roams
  - Enables easy to use, custom blended service bundles to better address target market segments and increase “stickiness” of service (reducing churn)
  - Visual user interfaces facilitate discovery of new cool services
- Provide transparent services across multiple access methods
  - Wireless, broadband, 802.11, …
- More cost-effectively bring new services to market
  - Reduce startup costs of new services by leveraging common applications infrastructure (media servers/gateways, presence, subscriber databases, …)
  - Enables central location of applications, enabling rapid deployment of new services across large regions
Delivering Blended Services

- Applications access agnostic
- Converged / blended applications are enabled
- QoS managed across voice and video services

Role of Softswitches in IMS Architecture

APPLICATION LAYER
- Non Telephony Servers
- IM-SSF
- Telephony Server
- Supplementary Telephony Servers
- OSA GW

SESSION LAYER
- SCIM (Service Broker)
- HSS
- MGCF
- MGC
- SG
- H.248

ACCESS LAYER
- Media Server
- SBC
- SIP
- WiMAX VoIP Network
- Wi-Fi Access Network
- IP Multimedia Subsystem (IMS)
- MGCF
- SG
- MG1
- MG n
- WiMAX Access Network
- SIP
- VLR
- PSTN

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Graceful Evolution to IMS

Early-IMS
Centralized Location
- Messaging Server
- PSTN Access
- IP/MPLS Core Managed Network

IMS – 06 & Beyond
Centralized Location
- Lucent Session Manager
- Service Delivery
- PGCF
- PSTN Access
- IP/MPLS Core Managed Network

Evolution
- Introduce Session Manager and Network Resource (HSS, DNS, ENUM)
- All equipment can be reused
  - Software Coding or Lucent Network Controller and Signaling Gateway to SIP/IN, interface
  - Software Coding on Broadcasts and messaging platforms to SIP Interface
  - Processing of Active Packets to modifiy new message/forward
- Can add other applications such as mobility management, location, presence, etc.

Softswitch-based PSTN Replacement

Softswitch
- Softswitch
- POTS/ISDN feature transparency through re-use of TDM feature logic
- Early availability
- Most (classic-TDM) vendors supporting this model

Strengths:
- POTS/ISDN feature transparency through re-use of TDM feature logic
- Early availability
- Most (classic-TDM) vendors supporting this model

Weaknesses:
- Reduced scalability when growing network to multiple softswitches
- Requires 1,646 routing tables in each softswitch to locate end users
- OPEX
- Likely no support of geographical redundancy
- Can not re-use OAM&P mechanisms/technology from IMS
- Need for dedicated OAM&P solution
- Intrinsic complexity to evolve to or align with IMS

Combines “Class 5” and “Class 4” functions in monolithic entity
IMS-based PSTN Replacement

**Strengths:**
- Separation of “Class 5” functions from “Class 4” functions
- Highly scalable
  - Class 5: add POTS/ISDN App. Servers
  - Class 4: add Trunk Gateways + MG Controllers
- No need to create “E.164 routing mesh” between softswitches
- Telephony Server using ENUM/DNS to locate end-users (no need for distributed E.164 routing tables)
- Geographical redundancy from IMS architecture
- Leverage technology commonalities with IMS

**Weaknesses:**
- Still being standardized (ETSI TISPAN)
- SIP extensions required to provide full POTS/ISDN feature transparency

Geographically Distributed IMS Scenario - 1

Jane in LA
Gary On Mt. Hood

SIP session set-up (voice +http-url) for Gary@lucent.com

Which system provides S-CSCF for Jane@lucent.com ?

S-CSCF

Finds out that Gary is roaming in Oregon (+service triggers)

Service triggers + address/number analysis

Which system provides S-CSCF for Gary@lucent.com ?

SIP session set up is delivered to Gary
Conclusion

The IMS Services Architecture Solution Brings:
- True converged Wireline/Wireless architecture for multimedia applications
  - Access agnostic to multimedia applications
  - Home control allows service differentiation and promotes roaming
  - Common IMS network for voice and data allows for integrated multimedia services
- Investment protection
  - Walled session control avoids becoming a bit pipe
  - Based on existing and emerging standards we are helping to define
- Product and service differentiation through managed network features
  - Highly adaptable bandwidth management and security
  - Guaranteed and adjustable QoS to meet individual customers needs
  - Supports value bearing attributes for NGN applications
- Common multi-market segment applications and databases
  - Same applications & customer data available regardless of access method
- Fosters and promotes the introduction of new services
  - Allows the integration of disparate applications by carrier instead of supplier

Thank You.