IP Based Multimedia Services Platform

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Topics to be Covered

• IMS Motivation and Overview
• IMS within the 3GPP
• Architecture/Components of IMS
• Services Built upon IMS
• Sources for More Information
IP Multimedia Session Domain

- Multimedia Service Platform based upon internet protocols
  - SIP/SDP
  - Diameter
  - COPs
  - IPv6
- Independent of Radio Access Technology
  - 3GPP currently uses WCDMA, GRPS, EGPRS
- Independent of underlying IP Transport Technology
  - 3GPP currently uses GPRS as IP Transport
- Developed in 3GPP
  - Work begun in mid 1999
  - Called IP Multimedia Subsystem by 3GPP
  - Replacement of term “All-IP”
Advantages of IMS

• Unified Handling of All Information
  – Combining Applications
  – Easy Mixing of Media and Parties

• Flexibility in Resource Utilisation
  – Mix of Network and Terminal Based Resources
  – No Binding to specific providers

• Open Interfaces
  – Sourcing applications from anywhere
  – Common for all user equipment and all application servers

• Access Convergence
IMS Overview

Problems with the end-to-end model:
- QoS
- Fraud/Privacy
- Voicemail, forwarding, conf calling
- CS interworking
- Charging

IMS uses SIP/SDP End to end protocols
IMS activities in 3GPP

SA

SA1 Services
SA2 Architecture
SA3 Security
SA4 Codecs
SA5 Charging // OAM

CN

CN1 "SIP"
CN2 "IM-SSF"
CN3 "Interworking & QoS/ bearer"
CN4 "Cx i/f"
CN5 "OSA"

GERAN

UTRAN

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IMS activities in 3GPP

SA

SA1 Services
- IPMM Services Requirements
- VHE/OSA service requirements

SA2 Architecture
- IPMM architecture & high level information flows (includes QoS)
- VHE/OSA arch.

SA3 Security
- Access Security for IPMM
- Legal Intercept

SA4 Codecs
- “recommended” codecs for IPMM

SA5 Charging // OAM
- “Charging” aspects for IPMM
IMS activities in 3GPP

- **SA1 Services**
  - IPMM Services
  - Requirements
  - VHE/OSA service requirements

- **SA2 Architecture**
  - IPMM architecture & high level information flows (includes QoS)
  - VHE/OSA arch.

- **SA3 Security**
  - Access Security for IPMM
  - Legal Intercept

- **SA4 Codecs**
  - “recommended” codecs for IPMM

- **SA5 Charging // OAM**
  - “Charging” aspects for IPMM
IMS activities in 3GPP

- **CN1** "SIP"
  - Detailed Information Flows from SIP
  - Protocol for SIP
  - Call/session State Model

- **CN2** IM-SSF
  - SIP-CAP for IM-SSF

- **CN3** "Interworking & QoS/ bearer"
  - Bearer and QoS protocol “wrapping”
  - Go interface (local policy)
  - CS-IMS interworking

- **CN4** "Cx i/f"
  - "Sh i/f"
  - "Si i/f"

- **CN5** "OSA"
  - OSA-APIs for IP multimedia
IMS activities in 3GPP

- Detailed Information Flows from SIP
- Protocol for SIP
- Call/session State Model
- SIP-CAP for IM-SSF
- Bearer and QoS protocol “wrapping”
- Go interface (local policy)
- CS-IMS interworking
- Cx, Sh, Dx interface
- OSA-APIs for IP multimedia
IMS activities in IETF

- SIP WG
  "SIP"
- SIPPING WG
  "SIP"
- "AAA / Diameter"
- MMMUSIC
  "SDP"
- "Security"
  - ipsec
  - pki
- IPv6
- Robust Header Compression (rohc)
- others
For 3GPP, the PDF is within the P-CSCF. For 3GPP2, the PDF is a network entity of its own.

For 3GPP the HSS also contains HLR functionality which is not shown here. For 3GPP2 the AAA function shown in the HSS is a stand-alone entity.

Additional interfaces exist in both the 3GPP and 3GPP2 reference models but are not included in this proposal for harmonization.
IMS Architecture – Session Control Function

<table>
<thead>
<tr>
<th>S-CSCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>- SIP proxy providing the access to the network based services for the subscriber</td>
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</tbody>
</table>

- **I-CSCF**
  - SIP proxy providing the access to the network based services for the subscriber
  - First point of contact for the mobile station
  - Proxy SIP messages home
  - (enforce policy in GGSN)

- **P-CSCF**
  - Entry point to home network
  - Performs a mapping of the static DNS mapping to the dynamically allocated S-CSCF (HSS helps)

- **S-CSCF**
  - Proxy SIP providing the access to the network based services for the subscriber

- **GGSN**
  - GPRS Gateway Support Node

- **MGCF**
  - Media Gateway Control Function

- **MG**
  - Media Gateway

- **BGCF**
  - Call Session Control Function
  - Provides basic session handling using the SIP-CSCF
  - First point of contact for the mobile station
  - Proxy SIP messages home
  - (enforce policy in GGSN)

- **HSS**
  - Home Subscriber Server

- **MRFC**
  - Media Resource Function

- **MRFP**
  - Media Resource Function Proxy

- **SLF**
  - Session Location Function

- **BGCF**
  - Bandwidth Gateway Control Function

- **WCDMA Network**
  - Wideband Code Division Multiple Access Network

- **PSTN**
  - Public Switched Telephone Network

- **CS Domain**
  - Circuit Switched Domain

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IMS Architecture - Databases

- IMS Subscriber Database
- Registration/Location Data
- Service Data
- Evolved from HLR

**HLR**
- Provides means to locating the HSS for the indicated subscriber.
- IMS Subscriber Database
- Registration/Location Data
- Service Data
- Evolved from HLR

**Home Network**
- WCDMA Network
- GGSN
- PSTN CS Domain
- Home Network

**Key Components**
- IMS-SSF
- SIP-AS
- USA-SCS
- BGCF
- MGCF
- MRFP
- I-CSCF
- SLF
- S-CSCF
- P-CSCF
- MG

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IMS Architecture – Interface to Legacy Networks

<table>
<thead>
<tr>
<th>MG</th>
<th>IMS-SSF</th>
<th>SIP-AS</th>
<th>OSA-SCS</th>
</tr>
</thead>
</table>

- Performs the bearer interworking between RTP/IP and the bearers used in the PSTN/ISDN/PLMN networks.

- Performs the signalling interworking between the IMS and the PSTN/ISDN/PLMN networks.

- Controls the MG connections.

- May drop out of the signalling after session establishment.

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**Networks:**
- WCDMA Network
- GGSN
- PSTN CS Domain
- Home Network

**Components:**
- MRFP
- P-CSCF
- S-CSCF
- SLF
- BGCF
- MGCF
- MG
- HSS

**Operators:**
- May choose an MGCF in their network, or an MGCF/BGCF in another network.
IMS Architecture – Media Resources

MRFP
- Provides media stream processing resources for e.g. media mixing, media announcements, media analysis ...

- Controls the media stream resources in the MRFP
- Interprets the commands from the "applications" to control the MRFP

- Provides media stream processing resources for e.g. media mixing, media announcements, media analysis ...

WCDMA Network
GGSN
P-CSCF
MGCF
BGCF
MRFC
SLF
S-CSCF
HSS
I-CSCF
PSTN CS Domain
Home Network

IMS-SSF
SIP-AS
OSA-SCS
BGCF
MGCF
MG

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IMS Architecture – Service Platforms

OSA-SCS
- Allows the operator to provision network based OSA based services for IMS users.

- Allows the access to the existing CAMEL services.
- Not evolved for IMS.

- Allows the operator to provision network based OSA based services for IMS users.

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Services on IMS

• Examples of Services that can be built on IMS
  – Presence
  – Instant Messaging
  – Streaming
• 3GPP Standardizes IMS Service Capabilities NOT Services
• Services are implemented in Home Network
  – Service knowledge not required in visited network
  – Local Services still being worked on
• 3 Service Platforms
  – CAMEL (IMS-SSF)
  – OSA (OSA-SCS)
  – SIP (SIP-AS)
To find out more

- www.3gpp.org
  - Specifications (23.218, 23.228, 24.228, etc.)
  - technical reports (23.815, 23.821, etc.)
  - mailing lists
  - meeting reports
  - contributions
  - IETF dependencies
- www.ietf.org
  - Internet drafts (MMUSIC, SIP, ROHC, AAA, IPV6, RAP, etc.)