IP Multimedia Subsystem (IMS): Concepts and Architecture

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Outlines

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 Introduction

 IMS Concepts
   Introductory concepts and IMS general terminology

 Functional Entities and their Roles
   Major nodes/entities
   Roles and functions provided
   Architecture associated with major functional entities

 Overall Architecture

 Summary
Service providers are looking to migrate voice services to VoIP for cost and revenue generating advantages.

- to provide more revenue generating new services to have competitive advantage.

These new services include

- Instant Messaging
- Push to Talk
- NetMeeting
- Presence Services
- Real Time Multimedia Services

To implement these converged and new classes of services, the network must have a consistent and robust architecture to ensure QoS.
The solution must include next-generation Voice & data systems, software and professional services to meet the needs of both wire line and wireless operators.

The requirement to have that kind of solution includes:

- Separation of Access and Transport Layer from Service layer.
- Session Management across multiple real-time communication services.
- Transparent interworking with legacy TDM networks.
- Consistent mechanism for sharing user profile across network.
- Consistent mechanism for authenticating and billing end users.
- Open standard interfaces and APIs for new service providers and 3rd parties.

The answer is IP Multimedia Subsystem (IMS) to get these features and services.
IMS is a technology that defines how to set up advanced services for 3G cellular networks.

IMS provides a service control platform that allows creation of new multimedia and multi-session applications utilizing wireless and wireline transport capabilities.

IMS-based services enable communications in variety of modes including voice, text, location, pictures, video or any combination of these.
What is IMS?

- **IP Multimedia Subsystem (IMS)** is a Service Delivery Architecture
  - Standardized architecture to provide Internet Protocol (IP)-based mobile and fixed multimedia services
- IMS architecture has evolved over the past few years
- Today, IMS could allow operators who own different types of networks with varying architectures to offer the same services to all of their customers
How did we arrive at IMS?
Technology Evolution

PSTN
- Circuit switched
- Analog
- Digital
- SS7
- ISDN

Wireless
- Circuit switched
- Analog
- Digital
- 2G (GSM & CDMA ANSI-41)

IP
- Internet
  - VoIP
  - Instant Messaging
  - Web Applications

3G Wireless
- W-CDMA
- GPRS/UMTS

IMS
- 3G wireless + IP ++
  - Standard Services Platform
  - Converged Applications & Content
  - Access Independence

IMS
- Internet
- VoIP
- Instant Messaging
- Web Applications

Wireless
- Internet
- VoIP
- Instant Messaging
- Web Applications

PSTN
- Circuit switched
- Analog
- Digital
- SS7
- ISDN
<table>
<thead>
<tr>
<th>Benefits for the User</th>
<th>Benefits for the Operator</th>
</tr>
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<tbody>
<tr>
<td><strong>Single sign on</strong></td>
<td><strong>Fast and flexible service creation</strong> <em>(1 SIP client)</em></td>
</tr>
<tr>
<td><strong>Application bundling</strong> in realtime (e.g. simultaneous usage of voice and data applications)</td>
<td><strong>Innovative realtime multimedia</strong> service offers</td>
</tr>
<tr>
<td><strong>Realtime</strong> messaging without store &amp; forward</td>
<td><strong>Full control</strong> of services by operator</td>
</tr>
<tr>
<td><strong>Multiparty communication</strong> services (e.g. chatting, conferencing)</td>
<td><strong>Service differentiation by flexible bandwidth allocation and guaranteed QoS</strong></td>
</tr>
<tr>
<td><strong>Enrichment and personalization</strong> (e.g. realtime multimedia, buddy lists, presence, push services, subscriber self administration)</td>
<td><strong>Fixed / mobile convergence</strong></td>
</tr>
<tr>
<td><strong>Anywhere service access</strong> from various access networks</td>
<td><strong>Common service control</strong> infrastructure for PS domain for cost optimization and easy service introduction</td>
</tr>
<tr>
<td></td>
<td><strong>Longterm CS migration</strong> by shifting voice traffic towards PS domain</td>
</tr>
</tbody>
</table>
IMS Concepts

✧ How Did We Arrive At IMS?
✧ Definition of IMS
✧ UE (User Equipment)
✧ User Identities
✧ IP Connectivity Access Network (IP-CAN)
✧ IP Multimedia Sessions
✧ Transition to IMS Architecture
Today, IMS could allow operators who own different types of networks with varying architectures to offer the same services to all of their customers.
IMS Concepts
User Equipment (UE)

✧ UE: A device that has IP connectivity and is able to request an
  IP address from the network
  ✧ Examples: SIP phone, PC, PDA

✧ UE negotiates its QoS requirements and other capabilities
during a session setup

✧ UE negotiates items, such as:
  ✧ Media Type
  ✧ Direction of traffic
  ✧ Bit rate, packet size, bandwidth adaptation
An IMS user is allocated one or more Public User Identities by the home operator.

A Public User Identity is either a SIP URI or a TEL URL:

- When the Public User Identity contains a SIP URI, it typically takes the form of sip:first.last@operator.com
- When the Public User Identity contains a TEL URL representing a phone number in international format it typically takes the form of tel:+1-212-555-0293
- It is possible to include a telephone number in a SIP URI using the following format: sip:+1-212-555-0293@operator.com;user=phone
- TEL URLs are needed for inter-working with PSTN phones

In IMS, Public User Identities are used to route SIP signaling.
Each IMS subscriber is assigned a Private User Identity by the home operator

Unlike Public User Identities, Private User Identities are not SIP URIs or TEL URLs

They take the format of a NAI (Network Access Identifier)

The format of a NAI is username@operator.com

Private User Identities are exclusively used for subscription identification and authentication purposes

This identity shall use for NAI (Network Access Identity)

Private User Identities are not used for routing SIP requests

Characteristics of Private user identities:

It will not use for routing SIP messages.

It will be used for all registrations (including de-registration and re-registration)

It will be a unique Global identity

It will be used to identify the user’s information (for example user authentication) stores in HSS
Relationship between Public & Private User Identity

 Paramount

  The home network operator is responsible for defining private and public user identities. (other user identities which are not defined by operator may also exist)
  The IMS Service profile is a collection of services and user data.
  The IMS service profile is defined and maintained by HSS.
  The service profile is downloaded from HSS to S-CSCF (like HLR to VLR).
  S-CSCF can have only one public user identity at a time. One public user identity can use only one service profile while one service profile can be given to many public user identities.
Relationship Between User Identities

IMS Subscriber  Private User Identity

- zzeb@tmobile.com

Public User Identities

- Sip:zehan.zeb@newstore.com
- tel:+17324567888
- Sip:zehan.zeb@example.com
- tel:+88028112347
IMS network utilizes IP-CAN to transport multimedia signaling and bearer traffic.

It is the network that connects the UE to the IMS network.
An IP Multimedia Session is comprised of session management control connections and media flow connections between two or more users.

IMS users are able to mix and match a variety of IP-based services in a way they choose during a single communication session.
IMS Concepts- Transition Public Land Mobile Network (PLMN)

Carrier A
GSM / ANSI Network

Carrier B
GSM / ANSI Network

SS7/ISUP

MSC

HLR

SCP
IMS Concepts-Transition
IMS Architecture: High Level View

IMS Network Carrier A

UE1

IMS Network Carrier B

UE2

HSS
ASs
CSCFs

SIP
IMS Concepts-Transition
Interoperability: High Level View

UE

IMS Network Carrier A

HSS

ASs

CSCFs

Interworking Functions

ISP

IMS Network Carrier B

HSS

ASs

CSCFs

SIP

ISUP

SCP

SSP

PSTN
Functional Entities

✧ IMS Architecture Planes or Layers
✧ Various Functional Entities and their Roles
Functional Entities
IMS Architecture Planes

- Services plane (Application Layer)
- Session Control Plane (Session and DB Layer)
- Media Control Plane (Media Control & Gateway Layer)
- Network Plane (Access and Transport)

Wireline Broadband Res./Enterprize
Wireless Broadband
2G/3G Mobile
PSTN

Centralized Databases

Application Server
Application Server
Application Server
Session Control
Media Control & Gateways

Wireless Broadband
2G/3G Mobile
PSTN
Functional Entities
Network Plane: Access and Transport

Session Controllers

Network Plane Access and Transport

IP

Wireline Broadband Res./Enterprize

Wireless Broadband/3G

2G Mobile/PLMN

MSC

EO/SSP

PSTN

Circuit Switched Gateways

SS7
Functional Entities
Network Plane: Access and Transport

✧ This layer initiates and terminates SIP signalling to setup sessions and provide bearer services such as Voice/Media Streaming over IP packets using RTP (Real Time Protocol).

✧ This also provides Media Gateways for converting VoIP bearer streams to PSTN TDM format.

✧ These Media Servers provide many media related services including conferencing, playing announcements, collection of in-band signalling tones, speech recognition, etc.

✧ The Media Server resources are shared with all applications. Consequently, each application that requires playing announcements, collecting digits, etc can use a common server. These applications may be voicemail, advance 800, interactive VXML services, etc.

✧ The Media Server can also support non-telephony function like Push-to-talk. So, using common pool of media servers across multiple services, service operators do not have to forecast or engineer media resource for each application.
Functional Entities
Session Control Plane

CSCF

DB

HSS

C_X
Functional Entities
Session Control Plane

✧ It is also called CSCF (Call Session Control Function) layer.
✧ The function of this layer to provide registration of the end points and routing of the SIP signalling messages to appropriate application server.
✧ The CSCF interworks with transport layer to guarantee QoS across all services.
✧ The call session layer also includes HSS (Home Subscriber Server) database, which maintains unique service profile for each end user.
✧ HSS includes end users registration information (i.e. IP address), roaming information, telephone services (i.e. call forwarding), voice mailbox options, etc.
✧ To have this central database of subscribers, applications can share information to create unified personal directories, multi client type presence information and many more other services.
✧ The Call Session Control Layer also includes Media Gateway Control Function (MGCF). MGCF interworks the SIP signalling with the signalling used by Media Gateway (i.e. H.248/Megaco). The MGCF manages the distribution of sessions across multiple media gateways.
Functional Entities
Session Control Plane: CSCF

Call Session Control Function

P-CSCF → ISC → I-CSCF → ISC → S-CSCF

UE’s first point of contact
Interrogating to load balance
UE session management

HSS → Cx → DB
Functional Entities Session Control Plane: P-CSCF

Roles

Proxy- CSCF

- UE’s first point of contact
- Authenticates and asserts an identity to the UE
- Manages QoS, resource allocation, and controls charging function
- May contain a PDF which
  - Manages resource allocation and QoS
- May reside in the visited or home network
Interrogating-CSCF

- Determines UE location by communicating with the HSS
- Finds the appropriate S-CSCF
- Performs load balancing
- Typically resides in the home network
Serving-CSCF

- Responsible for all session management activities
- Retrieves user profile and authentication information from the HSS
- Enforces the policy of the network operator
- Finds the appropriate AS
- Provides SIP routing
- Always resides in the home network
Home Subscriber Server (HSS) is the main data storage for all subscriber and service-related data of the IMS subscriber.

The HSS contains all the user-related subscription data required to handle multimedia sessions.

- All the data related to a particular user are stored in a single HSS.

The HSS is always located in the home network.

Although the functionalities are the same, 3GPP and 3GPP2 HSSs are described differently.
Functional Entities Session Control Plane: HSS (3GPP)

- CSCF

Home Subscriber Server

- IMS Functionality
- HLR/AUC Function for PS
- HLR/AUC Function for CS

Contains a user profile - bound to a Private User Identity and to the collection of Public User Identities.

The user profile contains a number of service profiles.

The service profile is divided into three parts:

- a collection of one or more public identifications
- an optional service authorization
- zero or more filter criteria
Relationship Between User Identities and Service Profiles

A user profile is bound to a Private User Identity and to the collection of Public User Identities.
**Functional Entities**

**Media Control Plane: MRF**

- **MRF (Media Resource Function)** deals with the media in the IMS network.
- **MRFC**: The MRFC handles communication with the S-CSCF and controls the resources in the MRFP.
- **MRFP**: The MRFP in the media plane implements all the media-related functions, such as playing media, providing announcements and mix media.
- **MRF** resides in the home network.
Inter-working Functions
BGCF, SGW, MGCF, & MGW

- The **MGCF** receives SIP call control signal from the IMS network and performs conversion to ISUP/IP and sends to SGW. MGCF also controls MGW.
- The **SGW** performs signaling conversion in the transport layer and interfaces with PSTN in the control plane.
- The **MGW** performs media conversion and interfaces with PSTN.
- The **BGCF** selects another BGCF OR an appropriate PSTN/CS gateway.
Inter-working Functions
BGCF, SGW, MGCF, & MGW (ctd.)

- **BGCF**
- **SGW**
- **MGCF**
- **MGW**

**Signaling (e.g., ISUP/MTP)**

**Media (e.g., Voice bit stream)**

IMS Network

PSTN Network

Switch
Functional Entities
Services Plane: Applications Servers

- SIP AS
- OSA-SCS
- IM-SSF
- HSS
- S-CSCF
- MRFC

Connections:
- Sh
- ISC
- Cx
- Mr
The application server layer contains the application servers, which provide the end-user service logic. The IMS architecture and SIP signaling is flexible enough to support a variety of telephony and non-telephony applications servers.

Telephony Application Server (TAS): The IMS architecture supports multiple application servers for telephony services. The TAS is back-to-back SIP user agent that maintains the call state. The TAS contains the service logic which provides the basic call processing services including digit analysis, routing, call setup, call waiting / forwarding / conferencing, etc.

TAS provides
- IP Multimedia – Service Switching Function (IM-SSF)
- Supplemental Telephony Application Servers
- Non Telephony Application Servers
- Open Service Access – gateway (OSA-GW)
IMS Architecture (3GPP View)

IP-CAN (GPRS-based)

UE

SGSN

GGSN

RAN

P-CSCF

I-CSCF

S-CSCF

MGCF

BGCF

MRFC

MRFP

PDF

IM-MGW

SGW

HSS

SLF

CS

Other IP/IMS

Other
Example: CNAM Call Flow

1. Initiate SIP Invite
2. Retrieve Subscriber Profile (if needed)
3. Apply Service Logic
4. Retrieve Address of CLD Party Home Network
5. Identify Registrar of CLD Party and Forward INVITE
6. Retrieve Subscriber Profile
7. Apply Service Logic to access IM-SSF AS
8. IM-SSF queries a GSM-SCF if inter-working with PLMN needed
9. Forward INVITE to CLD Party
10. SDP Negotiation / Resource Reservation Control
11. Ringing / Alerting
12. Answer / Connect
13. Session Active

Diagram:
- **Calling Party Home Network**
  - HSS
  - ENUM
  - Diameter
  - S-CSCF
  - AS

- **Called Party Home Network**
  - HSS
  - Diameter
  - S-CSCF
  - I-CSCF

- **Calling Party Visited Network**
  - P-CSCF
  - Backbone Packet Network
  - RAN

- **Called Party Visited Network**
  - P-CSCF
  - Backbone Packet Network
  - RAN

- **UE1**
- **UE2**
Summary
IMS Architecture: High Level View

- UE
- SIP
- IMS Network
  - Carrier A
  - Carrier B
- ASs
- HSS
- Interworking Functions
- CSCFs
- ISUP
- SCP
- SSP
- PSTN
Although the functionalities are the same, 3GPP and 3GPP2 HSSs are described differently.

<table>
<thead>
<tr>
<th>IMS services - examples</th>
<th>IMS QoS class</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice-over-IP (VoIP), communication video</td>
<td>Conversational</td>
<td>Mostly Variable Bit Rate (VBR), delay sensitive, delay variation sensitive, limited tolerance to packet loss (typically up to 7%, depending on the VoIP codec used)</td>
</tr>
<tr>
<td>Push-to-talk, Push-to-Video</td>
<td>Streaming</td>
<td>Variable Bit Rate (VBR), tolerant to delay, delay variation sensitive, very limited tolerance to packet loss (target typically: 10e-7 loss)</td>
</tr>
<tr>
<td>Whiteboard collaboration</td>
<td>Interactive</td>
<td>Variable Bit Rate (VBR), delay sensitive, delay variation sensitive, rather loss sensitive (target typically: 10e-5 loss)</td>
</tr>
<tr>
<td>Instant Messaging (IM), Chat (session based messaging)</td>
<td>Background</td>
<td>Variable Bit Rate (VBR), not delay sensitive, not delay variation sensitive, tolerant to packet loss</td>
</tr>
</tbody>
</table>
Policy-based control

PEP: Policy Execution Point

PDP: Policy Decision Point

COPS: Common Open Policy Service used for policy data transport

<table>
<thead>
<tr>
<th>Interface</th>
<th>Perpose</th>
<th>Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go</td>
<td>Media authorization/charging correlation</td>
<td>COPS</td>
</tr>
<tr>
<td>Gq</td>
<td>Transports policy set up information between the application function (P-CSCF) and the PDF</td>
<td>Diameter</td>
</tr>
</tbody>
</table>
Guaranteed QoS

1. SDP
2. Connection Information
3. SDP
4. SDP
5. Connection Information
6. Req
7. Authorization
8. Resp.
9. SDP
10
11. COPS
12. COPS
13
14. Session with Guaranteed QoS
Conclusion

✧ The 3GPP has specified the IP multimedia subsystem (IMS) for the provisioning of multimedia services in UMTS Release 5 and later.
✧ The IMS must be complemented with a guaranteed QoS control architecture that implements resource admission control, policy control and makes sure that proper policy enforcement is available in the network.
✧ Interconnection at the service layer between 3GPP and LAN networks requires interworking between IMS and WLAN functionalities.
### IMS White Paper

#### Acronyms

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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>3G</td>
<td>Third Generation</td>
</tr>
<tr>
<td>3GPP</td>
<td>3rd Generation Partnership Project</td>
</tr>
<tr>
<td>3GPP2</td>
<td>3rd Generation Partnership Project 2</td>
</tr>
<tr>
<td>AAA</td>
<td>Authentication, Authorization and Accounting</td>
</tr>
<tr>
<td>AMF</td>
<td>Account Management Function</td>
</tr>
<tr>
<td>ANI</td>
<td>Application-to-Network Interface</td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>AS</td>
<td>Application Server</td>
</tr>
<tr>
<td>ASN</td>
<td>Abstract Syntax Notation</td>
</tr>
<tr>
<td>ATIS</td>
<td>Alliance for Telecommunications Industry Solutions</td>
</tr>
<tr>
<td>ATM</td>
<td>Asynchronous Transfer Mode</td>
</tr>
<tr>
<td>ATP</td>
<td>Acceptance Test Plan</td>
</tr>
<tr>
<td>AUC</td>
<td>Authentication Center</td>
</tr>
<tr>
<td>BGCF</td>
<td>Breakout Gateway Control Function</td>
</tr>
<tr>
<td>BT</td>
<td>British Telecom</td>
</tr>
<tr>
<td>CAMEL</td>
<td>Customized Applications for Mobile Network Enhanced Logic</td>
</tr>
<tr>
<td>CAP</td>
<td>CAMEL Application Part</td>
</tr>
<tr>
<td>CBF</td>
<td>Charging and Billing Function</td>
</tr>
<tr>
<td>CCF</td>
<td>Charging Collection Function</td>
</tr>
<tr>
<td>CDF</td>
<td>Charging Data Function</td>
</tr>
<tr>
<td>CDMA</td>
<td>Code Division Multiple Access</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
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<td>---------</td>
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<tr>
<td>CDR</td>
<td>Charging Data Records</td>
</tr>
<tr>
<td>CGF</td>
<td>Charging Gateway Function</td>
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<tr>
<td>CLEC</td>
<td>Competitive LEC</td>
</tr>
<tr>
<td>CN</td>
<td>Core Network</td>
</tr>
<tr>
<td>COPS</td>
<td>Common Open Policy Service</td>
</tr>
<tr>
<td>CPE</td>
<td>Customer Premises Equipment</td>
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<tr>
<td>CS</td>
<td>Circuit-switched</td>
</tr>
<tr>
<td>CSCF</td>
<td>Call Session Control Function</td>
</tr>
<tr>
<td>CTIA</td>
<td>Cellular Telecommunications and Internet Association</td>
</tr>
<tr>
<td>DB</td>
<td>Database</td>
</tr>
<tr>
<td>DHLR</td>
<td>Distributed Home Location Register</td>
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<tr>
<td>DIAMETER</td>
<td>AAA or HSS protocol; successor/upgrade of RADIUS</td>
</tr>
<tr>
<td>DMS</td>
<td>Dual Mode Services</td>
</tr>
<tr>
<td>DNS</td>
<td>Domain Name System</td>
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<tr>
<td>DSL</td>
<td>Digital Subscriber Line</td>
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<tr>
<td>E9-1-1</td>
<td>Emergency Services</td>
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<tr>
<td>ECF</td>
<td>Event Charging Function</td>
</tr>
<tr>
<td>EDGE</td>
<td>Enhanced Data Rates for GSM Evolution</td>
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<tr>
<td>EIA</td>
<td>Electronics Industry Association</td>
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<tr>
<td>ENUM</td>
<td>Telephone Number Mapping</td>
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<tr>
<td>GGSN</td>
<td>Gateway GPRS Support Node</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Service</td>
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<tr>
<td>GSA</td>
<td>Global Mobile Suppliers Association</td>
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<tr>
<td>GSM</td>
<td>Global System for Mobile Communication</td>
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<tr>
<td>HLR</td>
<td>Home Location Register</td>
</tr>
<tr>
<td>HSS</td>
<td>Home Subscriber Server</td>
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<tr>
<td>Acronym</td>
<td>Definition</td>
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<tr>
<td>HTTP</td>
<td>HyperText Transfer Protocol</td>
</tr>
<tr>
<td>I-CSCF</td>
<td>Interrogating Call Session Control Function</td>
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<tr>
<td>IETF</td>
<td>Internet Engineering Task Force</td>
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<tr>
<td>IM</td>
<td>Instant Messaging</td>
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<tr>
<td>IM-SSF</td>
<td>IP Multimedia Services Switching Function</td>
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<tr>
<td>IMS</td>
<td>IP Multimedia Subsystem</td>
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<tr>
<td>IMS-MGW</td>
<td>IMS Media Gateway Function</td>
</tr>
<tr>
<td>IMT-2000</td>
<td>International Mobile Telecommunications 2000</td>
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<tr>
<td>IN</td>
<td>Intelligent Networks</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>IP-CAN</td>
<td>IP Connectivity Access Network</td>
</tr>
<tr>
<td>IPDR</td>
<td>Internet Protocol Detail Record</td>
</tr>
<tr>
<td>IPsec</td>
<td>IP Security</td>
</tr>
<tr>
<td>IPv4</td>
<td>IP Version 4</td>
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<tr>
<td>IPv6</td>
<td>IP Version 6</td>
</tr>
<tr>
<td>ISC</td>
<td>IMS Service Control</td>
</tr>
<tr>
<td>ISDN</td>
<td>Integrated Services Digital Network</td>
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<tr>
<td>ISG</td>
<td>Intelligent Services Gateway</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standards</td>
</tr>
<tr>
<td>ISUP</td>
<td>ISDN User Part</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
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<tr>
<td>LEC</td>
<td>Local Exchange Carrier</td>
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<tr>
<td>LNP</td>
<td>Local Number Portability</td>
</tr>
<tr>
<td>MAP</td>
<td>Mobile Application Part</td>
</tr>
<tr>
<td>MCS</td>
<td>Multimedia Communications Server</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
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<tr>
<td>MEGACO</td>
<td>Media Gateway Control (protocol)</td>
</tr>
<tr>
<td>MGCF</td>
<td>Media Gateway Control Function</td>
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<tr>
<td>MGF</td>
<td>Media Gateway Function</td>
</tr>
<tr>
<td>MGIF</td>
<td>Mobile Gaming Interoperability Forum</td>
</tr>
<tr>
<td>MGW</td>
<td>Media gateway</td>
</tr>
<tr>
<td>MPLS</td>
<td>Multi-Protocol Label Switching</td>
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<tr>
<td>MRF</td>
<td>Media Resource Function</td>
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<tr>
<td>MRFC</td>
<td>Media Resource Function Controller</td>
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<tr>
<td>MRFP</td>
<td>Media Resource Function Processor</td>
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<tr>
<td>MSF</td>
<td>Multiservice Switching Forum</td>
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<tr>
<td>MSO</td>
<td>Multi-Service Operator</td>
</tr>
<tr>
<td>MTP</td>
<td>Message Transfer Part</td>
</tr>
<tr>
<td>NAI</td>
<td>Network Access Identifier</td>
</tr>
<tr>
<td>NANP</td>
<td>North American Numbering Plan</td>
</tr>
<tr>
<td>NE</td>
<td>Network Element</td>
</tr>
<tr>
<td>NGN</td>
<td>Next Generation Network</td>
</tr>
<tr>
<td>NNI</td>
<td>Network Node Interface</td>
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<tr>
<td>OAM&amp;P</td>
<td>Operations, Administration, Maintenance and Provisioning</td>
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<tr>
<td>OCF</td>
<td>Online Charging Function</td>
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<td>OCS</td>
<td>Online Charging System</td>
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<tr>
<td>OMA</td>
<td>Open Mobile Alliance</td>
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<tr>
<td>OSA</td>
<td>Open Service Access</td>
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<tr>
<td>OSI</td>
<td>Open Systems Interconnection</td>
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<tr>
<td>OSS</td>
<td>Operations Support System</td>
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<tr>
<td>PC</td>
<td>Policy Controller</td>
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<tr>
<td>P-CSCF</td>
<td>Proxy Call Session Control Function</td>
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<tr>
<td>Acronym</td>
<td>Definition</td>
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<tr>
<td>---------</td>
<td>------------------------------------------------</td>
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<tr>
<td>PDA</td>
<td>Personal Digital Assistant</td>
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<tr>
<td>PDF</td>
<td>Policy Decision Function</td>
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<tr>
<td>PDS</td>
<td>Packet Data Subsystem</td>
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<tr>
<td>PDSN</td>
<td>Packet Data Service Node</td>
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<tr>
<td>POTS</td>
<td>Plain Old Telephone Service</td>
</tr>
<tr>
<td>PSTN</td>
<td>Public Switched Telephone Network</td>
</tr>
<tr>
<td>PLMN</td>
<td>Public land Mobile Network</td>
</tr>
<tr>
<td>QoS</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>RAN</td>
<td>Radio Access Network</td>
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<tr>
<td>RADIUS</td>
<td>Remote Authentication Dial In User Service</td>
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<tr>
<td>RF</td>
<td>Rating Function</td>
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<tr>
<td>RTP</td>
<td>Real-Time Transport Protocol</td>
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<tr>
<td>RTCP</td>
<td>RTP Control Protocol</td>
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<tr>
<td>SBC</td>
<td>Session Border Controller</td>
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<td>SCCP</td>
<td>Signaling Connection Control Part</td>
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<td>SCF</td>
<td>Session Charging Function</td>
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<tr>
<td>SCIM</td>
<td>Service Capability Interaction Manager</td>
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<tr>
<td>SCP</td>
<td>Service Control Point</td>
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<td>S-CSCF</td>
<td>Serving Call Session Control Function</td>
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<td>S-CSCF</td>
<td>Serving CSCF</td>
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<td>SCTP</td>
<td>Stream Control Transmission Protocol</td>
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<td>SCF</td>
<td>Service Control Function</td>
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<td>SCP</td>
<td>Service Control Point</td>
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<td>SCS</td>
<td>Service Capability Server</td>
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<tr>
<td>SDO</td>
<td>Standards Development Organization</td>
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<td>SDP</td>
<td>Session Description Protocol</td>
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Acronyms

SGF  Signaling Gateway Function
SGSN  Serving GPRS Support Node
SGW  Signaling Gateway
SIGTRAN  Signaling Transport
SIP  Session Initiation Protocol
SLA  Service Level Agreement
SLF  Subscriber Locator Function
SMS  Short Message Service
SNMP  Simple Network Management Protocol
SOA  Service Oriented Architecture
SS7  Signaling System 7
SSL  Secure Sockets Layer
SSF  Service Switching Function
SSP  Service Switching Point
TAS  Telephony Application Server
TBCP  Talk Burst Control Protocol
TCAP  Transaction Capabilities Application Part
TCP  Transmission Control Protocol
TDM  Time Division Multiplexing
TIA  Telecommunications Industry Association
TSG-CT  TSG Core Network and Terminals (3GPP)
TSG-GERAN  TSG GSM EDGE Radio Access Network (3GPP)
TSG-RAN  TSG Radio Access Network (3GPP)
TSG-SA  TSG Service and System Aspects (3GPP)
UDP  User Datagram Protocol
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>UE</td>
<td>User Equipment</td>
</tr>
<tr>
<td>UMTS</td>
<td>Universal Mobile Telecommunications System</td>
</tr>
<tr>
<td>UNI</td>
<td>User-to-Network Interface</td>
</tr>
<tr>
<td>URI</td>
<td>Universal Resource Identifier</td>
</tr>
<tr>
<td>URL</td>
<td>Uniform Resource Locator</td>
</tr>
<tr>
<td>UTRA</td>
<td>Universal Terrestrial Radio Access</td>
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<tr>
<td>UWB</td>
<td>Ultra-Wideband</td>
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<tr>
<td>VCC</td>
<td>Voice Call Continuity</td>
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<td>VoIP</td>
<td>Voice over IP</td>
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<td>VPN</td>
<td>Virtual Private Network</td>
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<td>VSP</td>
<td>Virtual Service Provider</td>
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<tr>
<td>WCIT</td>
<td>World Conference on International Telecommunications</td>
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<td>WIN</td>
<td>Wireless Intelligent Network</td>
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<tr>
<td>WG</td>
<td>Working Group</td>
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<tr>
<td>WiFi</td>
<td>802.11x wireless technology</td>
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<tr>
<td>WiMAX</td>
<td>802.16x wireless technology</td>
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<td>WIN</td>
<td>Wireless Intelligent Network</td>
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<td>WLAN</td>
<td>Wireless LAN</td>
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<tr>
<td>WTSC</td>
<td>Wireless Technologies and Systems Committee (ATIS)</td>
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<tr>
<td>xDSL</td>
<td>Variations of DSL</td>
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</table>
IMS Architecture

References

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