An Introduction to IMS in Mobile Networks

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Abstract

The IP Multimedia Subsystem or IMS has a significant impact on the telecommunications industry, both wired and wireless. As a result, the use of IMS has crossed the frontiers of mobile, wireless and fixed-line technologies. Indeed there is very little within IMS that is wireless or mobile-specific, and as a result, there are no barriers to its use in any telecommunications environment. To this end, a short survey on IMS and its architecture is here presented and discussed, including also a graphical representation of the architectural framework.

Keywords: IMS, Mobile Networks

1 Introduction

IMS was initially created for mobile applications by 3GPP and 3GPP2. However, its use is now much more widespread since fixed-line providers are also being forced to find ways of integrating mobile or mobile associated technologies into their portfolios.

IMS itself is not a technology but rather an architectural framework for delivering IP multimedia services. It is based on Internet standards which are currently the primary way to deliver services on new networks.

With users needing to activate many sessions using different applications and often concurrently, IMS provides a common IP interface to simplify signaling, traffic, and application development.

In addition to this, an IMS architecture means that subscribers can connect to a network using multiple mobile and fixed devices and technologies. With various applications from Push to talk over Cellular (PoC), gaming, video, and more becoming available, it will be necessary to integrate them seamlessly for users to gain the most from these applications.

It has advantages for operators as well. Apart from enabling them to maximize their revenues, functions including billing and "access approval" can be unified across the applications on the network, thereby considerably simplifying this area.

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2 Architecture

The architecture of an IMS system can be split into several main areas.

- **User equipment:** As the name implies, the user equipment or UE is part of the IMS architecture that resides with the user - it is the endpoint.
- **Access network:** This is the portion of the IMS architecture through which the overall network is accessed.
- **Core network:** This is a significant element within the IMS architecture and provides all the core functionality.
- **Application layer:** The application layer contains the web portal and the application servers, which provide the end-user with service and enhanced service controls.

2.1 IMS architecture functional view

The overall IMS architecture uses several components to enable multimedia-based sessions between two or more end devices. Although a complete architecture diagram is quite complicated, a general IMS architecture, containing some main elements, is shown in 1.

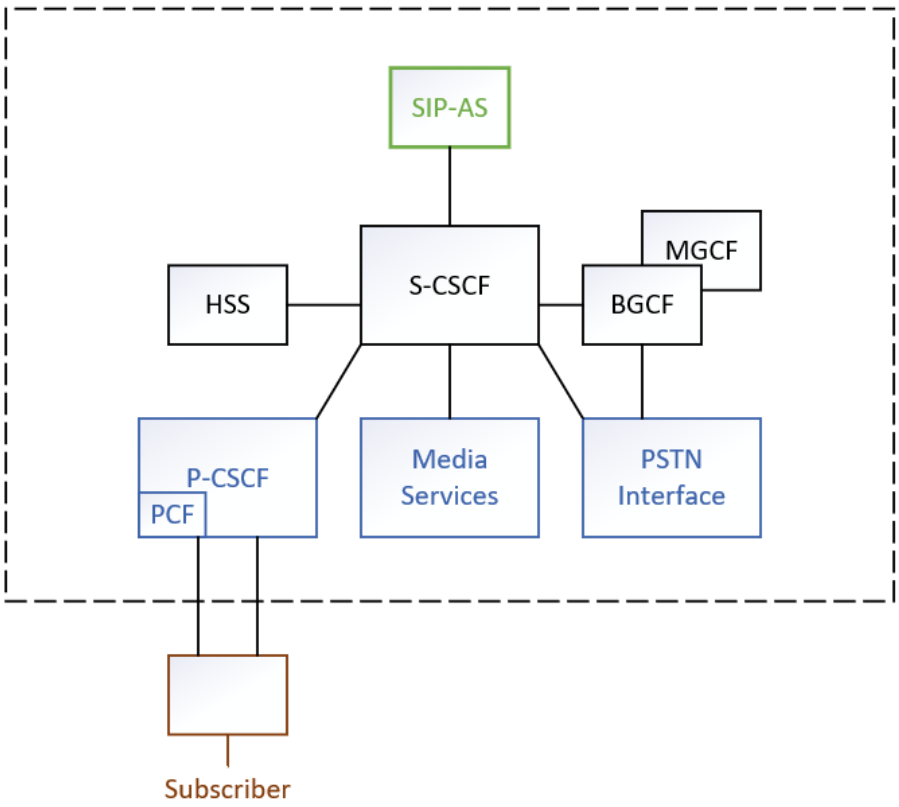

FIGURE 1: IMS architecture functional view

- **IMS Call Session Control Server (IMS-CSCF):** is the section of the architecture that provides the registration of the endpoints. It provides routing for the SIP signaling messages and also provides links to the interworking and transport layer for QoS satisfaction. The IMS-CSCF can be further split into further entities.
  - **Server CSCF (S-CSCF):** is a session control entity in the overall IMS CSCF for endpoint devices, and it maintains the session state.
  - **Proxy CSCF (P-CSCF):** is the entry point to IMS for devices. The P-CSCF is the first point of contact for the UE, and it forwards SIP messages to the user's home S-CSCF. It provides device control interworking security. Within the P-CSCF, the PCF or Policy Control Function provides QoS management.
  - **Interrogating CSCF (I-CSCF):** is a session control entity within the IMS CSCF, for endpoint devices that maintains session state.
- **Home Subscriber Server (HSS):** is an important element within the IMS architecture which provides the subscriber data base for the home network.
- **Breakout gateway control function (BGCF):** selects the network in which a PSTN breakout is to occur. If this is to occur in the same network as the BGCF, then the BGCF selects a media gateway control function.
- **Media gateway control function (MGCF):** interworks the SIP signalling. It manages the distribution of sessions across multiple media gateways.
- **Media server function control (MSCF):** manages the use of resources on media servers.
- **SIP applications server, (SIP-AS):** is a service execution platform on which one or more services are deployed.
- **PSTN Interface:** interfaces with PSTN circuit switched (CS) networks.

3 Protocols

Some of the key protocols and enablers for IMS technology are as follows.

- **Session Initiation Protocol (SIP):** is the main signaling protocol used in IMS networks. The function of SIP is to establish, modify and terminate multimedia sessions – with media such as voice, video, and chat – over IP networks, where the media delivery part is handled separately.
- **Diameter:** is chosen as the policy support and Accounting, Authentication, Authorization (AAA) protocol for IMS.

- **H.248 media control protocols:** is the key enablers for the architecture. It is a control protocol used between media control functions and media resources. It offers the possibility to connect terminals of the old legacy networks to the new generation of networks based on IP networks.
- **IPv6:** is a network-layer IP standard used by devices to exchange data across a packet-switched network.

4 Conclusion

IMS is the logical choice to address the transformation of communication culture. It is a standardized way to deliver IP-based services enabled by one common core and control for all types of networks.

IMS has the tools and functions necessary to handle numerous non-standardized services in a standardized way: interoperability; access-awareness; policy support; security; QoS, interworking with existing networks, the properties necessary to meet ever-increasing consumer demand for attractive and convenient offerings. Above all, IMS links the quality and interoperability of telecom with the rapid and innovative development of the Internet – making the unique values.

References

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