IMS 10B Signalling

LZU 108 7193 R2B

Description

This course provides a detailed introduction to signalling in IMS by presenting the protocols involved and different traffic cases from the IMS/MMTel system (optionally PTT).
The following protocols are described with reference to the Ericsson IMS solutions and to the relevant IETF and 3GPP specifications:

- SIP protocol and the most important IMS related extensions to SIP;
- SDP (Session Description Protocol);
- Diameter protocol and IMS related Diameter applications;
- H248/MeGaCo.

In addition, other related protocols, such as DNS & RTP (optionally MSCML & TBCP),will be described.

Actual signalling traces are used where possible to show the practical aspects of signalling in an IMS network.

Learning objectives

On completion of this course the participants will be able to:

1 Describe the architecture of IMS; the functions of the main logical nodes in the IMS System; the main IMS specifications and protocols.
1.1 Describe the roles of IETF, 3GPP, TISPAN & OMA in IMS.
1.2 Describe the main 3GPP specifications and IETF RFCs relating to IMS.
1.3 Describe the concepts related to mobile and fixed access to IMS.
1.4 Describe the main protocols, signalling flows and node functions for typical IMS Sessions, including Registration, IMS/MMTel to IMS/MMTel Sessions; IMS/MMTel to GSTN sessions and Push To Talk sessions.

2 Understand and describe the structure, specifications and usage of Session Initiation Protocol (SIP).
2.1 Describe what SIP is and the reasons why SIP is required in IMS.
2.2 List and describe the main RFCs related to SIP and SDP.
2.3 Explain the basic functions and capabilities of SIP and SDP.
2.4 Describe the function of SIP Components, SIP Proxies and SIP User Agents (UAC, UAS).
2.5 Explain stateful and stateless SIP Proxies.
2.6 Describe the specifications, functions and usage of all the SIP Methods and the more common SIP Responses.
2.7 Explain SIP Transactions and Dialogs.

2.8 Explain Telephone numbers, SIP-URIs, Tel-URLs for addressing end-users.
2.9 Explain the routing and addressing principles of SIP messages and the function of the SIP routing header fields (Request URI, Via, Route, Record-Route, Contact and others).
2.10 Describe the function and uses of the more common SIP header fields used in IMS and their related RFCs.
2.11 Describe the Registration process, including Authentication.
2.12 Describe SIP to SIP and SIP to ISUP Session establishment.
2.13 Describe SIP/ISUP interworking including specifications, and the function and use of Number Normalization, ENUM and External Network Selection (Breakout – BGCF).
2.14 Explain SIP forking.
2.15 Analyze detailed SIP IMS signalling flows and Message content for Registration, Session Establishment and other call scenarios.

3 Understand and describe the structure, specifications and usage of Session Description Protocol (SDP) in IMS.
3.1 Explain the function of SDP and the offer / answer model for SDP in IMS.
3.2 Describe the structure of SDP and the function of the SDP fields with reference to the associated RFCs.
3.3 Describe the use of SDP in SIP and MeGaCo signalling sequences.
3.4 Analyze detailed SDP messages from traces for a range of scenarios.

4 Describe the use of RTP/RTCP in IMS
4.1 List the rfc standards associated with RTP & RTCP.
4.2 Describe the function and content of the RTP header fields, including payload types for speech, video and DTMF (rfc2833).
4.3 Describe RTCP functions and messages.

5 Describe the function of DNS in IMS.
5.1 Describe when DNS is used in IMS signalling flows.
5.2 Describe the location of SIP servers using DNS.
5.3 Describe the purpose and structure of NAPTR, SRV and A-Record queries.
5.4 Describe the function and purpose of the ENUM function.

6 Understand and describe the structure, specifications and usage of the Diameter Protocol in IMS
6.1 Describe the base functions and capabilities of Diameter and the associated RFCs.
6.2 Describe the routing principles of Diameter in IMS.
6.3 Describe the structure of Commands.
6.4 Describe the structure, types and format of AVPs.
6.5 Describe the main Diameter base protocol messages and AVPs.
6.6 Describe Vendor specific Commands & AVPs
6.7 Describe the services provided by the Cx/Dx, Zx, Sh/Dh and Rf interfaces in IMS.
6.8 Describe the main IMS Diameter messages and AVPs associated with the Cx/Dx, Zx, Sh/Dh and Rf interfaces in IMS.
6.9 Analyze detailed Diameter signalling flows and Message content for Registration (Cx/Dx and Sh/Dh), Session Establishment and Charging (Rf).

7 Understand and describe the structure, specifications and usage of H248 (MeGaCo)

7.1 Describe the main function and usage of H248 in IMS and the main RFCs.
7.2 Describe the H248 Context Model.
7.3 Describe the H248 Commands, Descriptors and Parameters and their use in IMS.
7.4 Describe Packages and Profiles.
7.5 Describe typical H248 signalling sequences in IMS and their relationship with SIP and ISUP signalling.
7.6 Analyze detailed H248 signalling traces between MGC & MGW during call establishment and clearing.

8 Describe the IMS architecture and signalling flows for typical PTT sessions (Optional)
8.1 Describe the PTT services and the mobile IMS architecture.
8.2 Describe the signalling sequences for a typical PTT session.
8.3 Analyze detailed Signalling Trace Analysis for a range of SIP & PTT session scenarios.

Target audience

The target audience for this course is: System Technicians, Service Technicians, System Engineers, Service Engineers.

Prerequisites

The students should have attended

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In addition the students should have a good basic understanding of general datacom and telecoms networks and good knowledge of IP networking and the TCP/IP protocol family.

Duration and class size

The length of the course is 18 hours (3 days) and the maximum number of participants is 16

Learning situation

This course is based on theoretical instructor-led lessons and theoretical exercises based on WireShark traces.