



# IP Multimedia Subsystem (IMS) Essentials Training

## 5 Day Course | Lecture & Labs

### COURSE DESCRIPTION

In a weeklong class, you will thoroughly study the IMS, including relevant wireless access systems that are used by the IMS. You will begin by studying the systems surrounding the IMS to gain a clear vision of the big picture. Once you understand where the IMS fits into the PSTN, you will study the IMS architecture through a process of lecture and hands-on training.

You will learn key IMS protocols including SIP, SDP, H.248, COPS, and Diameter. You will learn what each IMS component is and how it functions in an actual test network. You will also examine how IMS weaves into the current telecommunications network - both wired and wireless.

The lessons in this course are clear, very technical, and always practical. Since at least 60% of them are hands-on, you can both investigate and reinforce each lesson.

#### 1. The IMS Standards Bodies

- 3GPP, 3GPP2, IETF, Open Mobile Alliance (OMA)
- TISPAN and IETF

#### 2. Accessing IMS with VoLTE

- Interfaces Associated with EPC
- E-UTRAN, EPC & IMS
- MME, SGW, and PGW

#### 3. The IMS for GPRS and CDMA2000

- GSM vs. CDMA2000 3G Architecture Comparison
- IMS and 4G Interoperation
- IMS Connectivity into a CDMA2000 Network
- Migrating CDMA2000 to Support the IMS Using LTE Access
- SIP Anchoring

#### 4. IMS Architecture

- Components: HSS, Proxy-CSCF, Serving-CSCF, Interrogating-CSCF, Policy Decision Function
- IMS Identifiers
- IMS Message Paths Introduction (Via and Record-route)
- The Service Path
- Initial Filter Criteria Introduction

#### 5. SIP Architecture

- Requests and Responses
- SIP Message Flow & SDP Introduction

## **6. IMS Service Path**

- The Service Path
- Path Header (RFC 3327)
- Service-Route: (RFC 3608)

## **7. The Via Path**

- The Via: Header
- Establishing the Response Path
- Forking - Response Merging
- Loops and Spirals
- Max Forwards

## **8. The Route Path**

- Route Path vs. Via Path
- Record-route and Route Headers
- Establishing the Route Path
- The Role of the S, I, and P Proxies

## **9. IMS Identifiers**

- IMSI
- UICC
- Home Network, Public ID, Private ID
- SIP URI Format

## **10. Initial Filter Criteria**

- The User Profile
- How the iFC is Used
- Understanding xml
- Disjunctive and Conjunctive Normal Form

## **11. IMS Reference Points**

- Gm, Mw, Cx, Dx, Sh, Si, Dh, Mm, Mg, Mi, Mj, Mk, Ut, Mr, Mp, Go, Gq, ISC
- Specific Analysis of the Cx and Dx Interfaces
- DIAMETER

## **12. DIAMETER**

- DIAMETER vs. RADIUS
- AVPs
- SCTP vs. TCP
- IMS Command Values
- IMS DIAMETER example

## **13. SIP Headers (BASIC)**

- Via, Branch, Max-Forwards
- SIP Dialog (To, From, tag= fields, Call-ID:)
- CSeq, Contact: Expires:
- Proxy-Authenticate:, Proxy-Authorize:,
- User-Agent:, Allow:, Supported:,
- Content-Type:, Content-Length:,

## **14. IMS SIP Headers (Advanced)**

- P-Access-Network-Info
- P-Charging-Vector:, P-Preferred-Identity:, P-Asserted-Identity:, Authorization:
- Security-Client:, Security-Server:
- IMS Signaling Compression (SigComp Architecture)

## **15. Session Description Protocol (SDP)**

- Session Parameters
- SDP Format
- Extending SDP
- SDPng
- Media Negotiation
- Changing Session Parameters

## **16. SIP Timers**

- T1, T2, T4
- Timer A - K

## **17. IMS QoS Management**

- IMS QoS Info Exchange During Call Setup
- New SDP Fields (RFC 3312)
- COPS Integration

## **18. IMS and the DNS**

- DNS basics
- A-record
- The SRV Record (RFC2782)
- How SIP Uses the SRV Record (RFC3263 Locating SIP Servers)
- How to Configure a SRV Record
- The NAPTR Record (RFC 2915)
- How the P-CSCF Locates the I-CSCF
- Introduction to ENUM (RFC 3761: ENUM Protocol)
- How the S-CSCF Uses ENUM

## **19. IMS Call Flow Examples**

- Registration
- Service Discovery
- Identity Modules
- IMS Authentication and Key Agreement (User Identities)
- Service triggers
- Initial Filter Criteria
- Network Domain Security
- Secure HTTP-Based Service
- Controlling Bearer Traffic
- Controlling the Media
- Anonymous Calling (Hide Caller ID)
- S-CSCF Assignment Processes
- MEGACO and SIP-Controlled PSTN Connectivity
- Creation of Via-Path for Response Routing
- Response Merging
- Control Models
- Role and Functions of the HSS
- Third-Party Call Control
- Conferencing (REFER)
- Access and Location Information
- P-Access
- P-Visited
- IMS Messaging (Immediate, Session-Based, Deferred)

## **20. Charging and IMS**

- Charging Entities and Functions
- P-Headers Related to Charging

- Diameter and How It is Used for Ro Interface

## **21. Security**

- IPSEC
- Key Selection at Registration
- Security for Call Setup
- Authentication
- Securing the Media
- Privacy and Identity

## **22. Presence**

- SIMPLE: SIP for Instant Messaging and Presence Leveraging Extensions
- Terminology
- Framework
- Resource List Manipulation Requirements
- Authorization Policy Manipulation
- Acceptance Policy Requirements
- Notification Requirements
- Content Requirements
- General Requirements

## **23. Organization of Subscriber Data**

- Subscriber Data
- Data related to Mobile Station Types
- Data related to Authentication and Ciphering
- Data related to Roaming
- Data related to Basic Services

## **IP Multimedia Subsystem Labs**

- IMS Lab Network Diagram
- Lab 1: Start the IMS
- Lab 2: How to Bounce your IMS (Reference)
- Lab 3: Manage your IMS with FHOSS
- Lab 4: Alice IMS User Addition
- Lab 5: Bob IMS User Addition
- Lab 6: Configure Linksys Phone as 'Bob'
- Lab 7: Using Twinkle Softphone with the IMS
- Lab 8: How to Use Wireshark (Reference)
- Lab 9: Wireshark Call Flow – REGISTER
- Lab 10: Wireshark Call Flow – INVITE
- Lab 11: Service Profile Walkthrough
- Lab 12: DNS Configuration Walkthrough
- Lab 13: ENUM
- Lab 14: Write Your Own Service Profile
- Lab 15: Roaming
- Lab 16: Exploring the Home S-CSCF Set
- Lab 17: Registration Termination Request (RTR)
- Lab 18: Push Profile Request