



VoIP, IMS and VoLTE Voice Core Networks Training Course: SIP Call Flows and Voice Quality



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Introduction:

VoIP, IMS and VoLTE voice core networks are the subject of this 5-day training course for core network engineers and enterprise voice engineers, ending with a Voice Core Design and Troubleshooting Plan. Voice services fail through rejected sessions, one-way audio and poor call quality that teams cannot trace across signalling domains, raising fault costs and complaints. Nominees already operate core or enterprise voice platforms, and teaching is by lab on call traces and signalling flows. CoreConcept Training Center delivers this VoIP, IMS and VoLTE voice core networks course.

Course Objectives:

- Explain how IP voice, IMS and VoLTE services separate signalling from media and where each network element sits in a call
- Read SIP and SDP exchanges to confirm registration, session setup, codec agreement and call release
- Trace IMS registration and call routing across the P-CSCF, I-CSCF, S-CSCF, HSS and application server
- Configure session border controller rules, trunk interconnect routing and number handling for a voice domain
- Estimate voice quality from jitter, loss and delay and isolate call setup and audio faults from traces
- Produce a Voice Core Design and Troubleshooting Plan covering emergency calling, fallback and quality alarm thresholds

Target Audience:

- Core network engineers responsible for IMS and packet voice platforms in mobile and fixed operators
 - Enterprise voice engineers accountable for SIP trunks, session border controllers and unified communications links
 - Interconnect and signalling specialists who maintain routing and number rules between voice domains
 - Voice service assurance engineers who investigate call setup failures and quality complaints
 - Network integration engineers who commission voice platforms and test them before service launch
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Course Outline:

Day 1: Voice Core Foundations and Current-State Review

- Circuit-Switched Voice Versus Packet Voice Architecture Compared
- VoIP Media Path with RTP, RTCP and Codec Negotiation Basics
- 3GPP and IETF Standards Map for IP Voice Services
- Voice Service Topology Inventory for the Case Organisation
- Call Setup Time and Voice Quality Targets per Service Type

Day 2: SIP, SDP and IMS Architecture

- SIP Methods and Response Classes Under RFC 3261
- SDP Offer and Answer Exchange for Codec and Media Selection
- IMS Registration Through P-CSCF, I-CSCF and S-CSCF with HSS Lookup
- Application Server Roles in Proxy and B2BUA Modes
- MGCF and Media Gateway Interworking with Circuit-Switched Networks

Day 3: VoLTE, VoWiFi, Session Border Controllers and Codecs

- VoLTE Dedicated Bearer Set-Up with QoS Class Identifier Mapping
- VoWiFi Access Through Untrusted Wi-Fi and Handover to LTE Voice
- EPS Fallback and SRVCC Handover Call Flow Walkthrough
- Session Border Controller Topology Hiding and NAT Traversal Configuration
- AMR-NB, AMR-WB and EVS Codec Selection for HD Voice

Day 4: Interconnect, Emergency Calling, Quality and Fault Cases

- SIP Trunk Interconnect Routing and Number Normalisation Rules
- Emergency Call Handling with Location Delivery and Fallback Paths
- MOS Estimation from Jitter, Packet Loss and Delay Measurements
- SIP Ladder Diagram Reading for Registration and Call Setup Failures
- One-Way Audio, Ringback and Dropped Call Fault Isolation Cases

Day 5: Lab on a Voice Core Design and Troubleshooting Plan

- Case Trace Lab Isolating a VoLTE Call Setup Failure
 - Case Lab Reviewing SBC Logs for an Interconnect Rejection Pattern
 - Quality Alarm Threshold Sheet with MOS and Setup Success Targets
 - Emergency Call and Fallback Test Plan for the Case Organisation
 - Voice Core Design and Troubleshooting Plan Completion and Peer Review
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Skills You Will Gain:

- SIP Message Interpretation
- SDP Codec Negotiation Analysis
- IMS Call Flow Tracing
- Session Border Controller Configuration
- Voice Quality Estimation
- Interconnect Routing Design
- Emergency Call Path Verification
- Call Failure Fault Isolation

Why Attend This Course:

- Deliver a Voice Core Design and Troubleshooting Plan to the core network manager, voice service owner and operations lead
- Decide whether a failed call points to registration, routing, session border controller, codec or radio fallback behaviour
- Avoid prolonged outages, rejected interconnect traffic and untested emergency call paths after platform changes
- Coach colleagues on reading SIP ladder diagrams and quality measurements in a consistent way

Conclusion:

Back at work, the participant presents the Voice Core Design and Troubleshooting Plan to the core network manager, voice service owner and operations lead, who use it to approve session border controller rules, interconnect routing and emergency call tests. Assurance teams apply its fault isolation sequence and quality thresholds to separate signalling, media and access faults. After the first release or interconnect change under the plan, the unit should review setup success, quality scores and unresolved trace findings, then refine alarm limits and test cases.

Frequently Asked Questions FAQ:

What should participants know before a VoIP, IMS and VoLTE voice core networks course?

Participants should already operate or support voice or core network platforms and understand IP addressing and basic routing. Bringing anonymised call traces, signalling logs or a trunk configuration from their own platform makes the lab work more useful.

How does a VoIP, IMS and VoLTE voice core networks course differ from a general telecom or packet analysis course?

It concentrates on voice signalling, IMS elements, session border controllers and call quality. A general telecom course explains networks broadly, a radio course covers cell planning, and a packet analysis course teaches capture tools across many protocols.

Why does VoLTE depend on IMS in a voice core network?

VoLTE carries voice as packet sessions, and IMS provides the registration, routing and service control for those sessions. Without IMS, an LTE device cannot set up an IP voice call and must fall back to circuit-switched networks.

What do participants take back from the VoIP, IMS and VoLTE voice core networks course?

Participants take back a Voice Core Design and Troubleshooting Plan, a SIP trace reading checklist, a quality threshold sheet, an interconnect rule review template and an emergency call test plan adaptable to their own platforms.
