Course : VoLTE, deployment and new services

Voice over LTE
Seminar - 2d - 14h00 - Ref. LTE
Price : 2170 CHF E.T.

This seminar introduces you to VoIP over LTE, for which IMS is mandatory. You'll learn about the characteristics of 4G and IMS networks, concepts for establishing VoLTE service and maintaining telephone communication when handovering to 2G/3G networks, and charging mechanisms.

Teaching objectives

At the end of the training, the participant will be able to:

- Study the evolution of mobile networks
- Understand the solutions proposed in the LTE standard to offer multimedia services (voice, presence...)
- Understanding IMS network operation and SIP signaling for VoLTE deployment
- Differentiating VoLTE services from OTT solutions
- Analyze taxation concepts

Intended audience

This seminar is aimed at project leaders and managers working in the VoLTE environment who want to learn the basic concepts.

Prerequisites

Knowledge of 2G and 3G networks, and notions of the SIP protocol are required.

Course schedule

PARTICIPANTS

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PREREQUISITES

Knowledge of 2G and 3G networks, and notions of the SIP protocol are required.

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

1 2G and 3G cellular networks

- Presentation of 2G network architecture. GSM: separation of radio core and network core.
- Description of the evolution from GSM to GPRS.
- Network evolution with the arrival of 3G: study of the UTRAN radio core.
- Core network evolution: from R.99 to NGN.
- 2G and 3G network entities. Role and functionality.
- Radio resource management procedure.
- Voice and data services for 2G and 3G networks.
- The circuit- and packet-switched network.
- Call study: Mobile Originating Call and Mobile Terminating Call.
- Attachment to the Data network.
- Notions of PDP Context.

2 The LTE network

- EPS network architecture: LTE - SAE.
- Description of entities: eNB, MME, SGW, PGW, PCRF, HSS.
- Network interfaces X2, S1-U, S1-MME, S5/S8, S6, S11, Gx.
- Signposting in the control plan and user plan.
- Protocols: RRC, S1-AP, X2-AP, GTP-C, Diameter.
- AS and NAS protocol overview.
- Description of mobility management (EMM) and session management (ESM) protocols.
- Description of the physical layer: modulation, multiplexing, PRB.
- Bearer concept, QoS parameters.
- Default bearer, dedicated bearer.
- The PCC: QoS and charging.

3 SIP: presentation and architecture

- Principles and definitions.
- SIP architecture and description of functional entities: Proxy. Registrar. Redirection - Location.
- SIP protocol: signaling and voice flow mechanisms.
- SIP messages: description of requests and responses.
- RTP protocol: voice transport.
- Codec presentation: impact on MoS.
- SIP addressing mechanisms (URI, IP, E164).
- The methods. Details of methods: INFO, OPTION, MESSAGE.
- SIP and mobiles. GSM, GPRS. 3GPP.
- Example of SIP communication: study of call FLows (recording, calling...).

4 IMS architecture

- Presentation of IMS.
- Protocols used.
- IMS (IP Multimedia Subsystem) server: P-CSCF, I-CSCF, S-CSCF.
- HSS, PCRF, MGCF, MGW/SGW equipment.
- AAA in IMS: Diameter protocol study.
- Customer authentication.
- Billing architecture (online and offline).
- Signaling in IMS: the SIP/SDP protocol.
- Service registration and management procedures: Call Flow study.
- IMS services and application servers.

5 Radio functionality for Voice

- Voice Bearer management: QoS, QCI, ARP, GBR, non GBR.
- Admission policy.
- Preemption of eNb.
- Scheduling strategy: dynamic, semi-persistent.
- DRX mode, VAD (Voice Activity Detection) options and comfort noise generation.
- TTI Bundling features.
- IP header compression: RoHC, principles and performance.
- Handover management.
- Practical study: limiting the number of simultaneous calls according to the number of PRBs.

6 Voice over 4G solutions

- CSFB technology solutions.
- MSC/MME interconnection.
- Registration on the circuit-switched network and on the IMS network: notion of double attachment.
- VLR derivation: TAI/LAI.
- SG and SV interface.
- SR-VCC (Single Radio Voice Call Continuity) function.
- SRVCC: session transfer in the network core and call transfer on the radio layer.
- Receiving/transmitting an SMS on the 4G network.
- Roaming and interconnection.
- Charging and QoS.

7 Voice over LTE

- Attachment procedure. Default bearer creation.
- IMS network registration procedure: study of SIP signaling and SIG 4G.
- Private/Public IMS addressing.
- Codec negotiation and radio resource availability.
- Setting up a SIP call/session: creating a dedicated bearer.
- Telephone services provided by the IMS server.
- Call flow on user registration.
- Interconnection between the LTE/EPC network and the IMS? Role of the P-CSCF.
- Study of SIP requests: NOTIFY/SUBSCRIBE.
- RCS and OTT services: Joyn, Skype.
- SRVCC function: impact on registration and session establishment, PS-CS handover, session maintenance.
- ATCF/ATGW entity and SCC AS server.
- Evolution of LTE and IMS architecture: e-SRVCC, v-SRVCC, r-SRVCC.

Case study
Call FLow: SMSoSG and Mobile Originated Call (MOC), Mobile Terminate Call (MTC) and roaming.

8 Voice over WiFi: WiFi Calling

- WiFI call.
- Extension of the LTE network to WiFI: ePDG gateway, T-ADS (Terminating Access Domain Selection).
- Authentication on WiFI network.
- Call continuity. Handover.
- Vi-WiFI evolution.