

IMS Signalling for VoLTE – 2 days

CONTENTS

This course presents the VoLTE/SRVCC signalling for the voice service. It is designed for participants that will work with traces from the IMS/VoLTE networks.

The EPS and IMS network architecture and procedures for the voice service in VoLTE solution will be presented, on a level allowing understanding and analyzing SIP and Diameter traces from a VoLTE environment. The course includes EPS procedures supporting IMS voice over PS domain, detailed IMS signalling scenarios with traces of selected messages, enhanced SRVCC description, etc. Some 5G interworking topics are briefly mentioned.

PREREQUISITES

Knowledge of the IMS network architecture is assumed, as well as a general understanding of signalling principles in telecom networks. Attending Apis “VoLTE – Voice over LTE” course prior to this event, or having the equivalent knowledge, is necessary.

IMS Architecture

- 3GPP and GSM Association: history of IMS standardisation
- IMS subscription: Service Profile and Filter Criteria
- IMS identities: IMPI, IMPU, GRUU, ICSI
- Roles of basic core IMS nodes: P-CSCF, I-CSCF, S-CSCF, SLF, HSS/UPSF and AS
- IMS breakout: BGCF, MGCF, MGW
- Roles of IMS nodes for additional user plane handling functions: IMS-ALG/IMS-AGW, IBCF/TrGW, MRFC/MRFP, ATCF/ATGW
- SIP addressing and routing functions, SIP and tel URI identifiers, SIP nodes, SIP messages and responses
- Diameter addressing and routing functions, Diameter applications, Diameter messages

EPS for VoLTE

- Life cycle of a UE in a VoLTE environment: power-up sequence, LTE Attach, PDN Connection Establishment, IMS Registration, Invitation, SRVCC
- Selected requirements on UE, the LTE and the IMS nodes
- VoLTE-specific parameters in HSS
- Identities used for call anchoring and for SRVCC: STN-SR, ATU-STI, C-MSISDN
- Functionalities and usage of TAS and SCC AS
- UE idle mode procedures
- Registration for CS fallback
- VoLTE-specific parameters and settings at LTE Attach and PDN Connection Setup
- APN and QoS recommendations for Default Bearers
- Roaming: local breakout and home-routed traffic
- VoWiFi Architecture with Untrusted Access

VoLTE procedures

- IMS Registration: different cases, involved IMS nodes, EPS parameters for bearer(s) and SRVCC, SIP extensions in VoLTE
- IMS Access Network Security: SIP extensions for Authentication and Key Agreement and IPsec
- The Registration traffic case with analysis of a trace
- Subscription to registration events and notification procedure

- IMS invitation: IMS session setup, involved IMS nodes, SIP extensions in VoLTE
- Service handling in IMS: TAS and Supplementary Services handling
- Originating and Terminating Access Domain Selection for voice call delivery: PS vs CS
- Session anchoring in ATCF/ATGW for enhanced SRVCC
- The IMS session setup traffic case with analysis of a trace
- Abandoning of the call and call forwarding scenarios
- Protocol interworking in breakout-to-CS cases
- Brief overview of IMS call handling in 5G system, EPS fallback and RAT fallback
- UE with or without ISIM on UICC, derivation of IMS parameters from USIM data
- SMS handling options for IMS registered UEs, SMS signalling flow with IP-SM-GW

Single Radio Voice Call Continuity (SRVCC)

- SRVCC standardization history and overview of possible cases between various access network types
- Functions of network elements involved in SRVCC: ATCF/ATGW, SCC AS, enhanced MSC Server
- Trigger criteria for SRVCC
- SRVCC Access Transfer: SIP extensions at IMS registration and session setup in enhanced SRVCC
- The detailed PS-to-CS enhanced SRVCC traffic case from E-UTRAN to UTRAN with PS handover
- Brief overview of SRVCC from 5G NR to UTRAN
- Integrating CS domain with IMS: MSC Server enhanced for ICS
- A birds-eye view of the ICS procedures from the GERAN/UTRAN access