

## Voice in 5G – 2 days

---

### CONTENTS

This course presents the handling of multimedia telephony service in 5G (Standalone deployment) and related interworking procedures with 4G, as specified in the current R17 3GPP standards.

The course focuses on the voice/multimedia telephony service under IMS control for networks with 5G deployed. It presents the UE and network features and definitions that guarantee establishment, handling, and service continuity for the telephony service within the 5G ecosystem. Significant parts of the course focus on the interworking between 4G and 5G on the core network and radio network level to support device mobility and service continuity in a multi-access environment.

### PREREQUISITES

Technical knowledge of the voice service handling in mobile telecom networks is crucial.

Understanding the technical solutions for the handling of the voice service in 5G requires a good grasp of voice handling in 4G (VoLTE, with IMS control) and the general 5G network architecture. Attending Apis “VoLTE – Voice over LTE”, “IMS Architecture” and “IMS for VoLTE in Half a Day” courses, or having the equivalent knowledge, will allow the participants to benefit fully from the course.

### Network Architecture

- Brief overview of the 4G and 5G System architecture and basic mobility and data connection establishment procedures.
- Overview of deployment options for 4G and 5G core networks.
- Overview of deployment options for connecting 4G/5G radio to 4G/5G core networks.
- Brief overview of the IMS functionalities.
- Deployment options for HSS/UDM/UDR.
- Protocol used for communication on various interfaces within 4G/5G core networks, towards RAN, and to/inside IMS network elements.
- Overview of idle and connected mode mobility procedures for UEs moving between 2G/3G/4G/5G radio and core network.
- Overview of various possibilities to handle IMS signaling and media between 4G/5G RAN and core network.

### IMS Voice over PS: 4G versus 5G

- IMS usage of PDN Connections and EPS Bearers in 4G.
- IMS usage of PDU Sessions and QoS Flows in 5G.
- Selected details of IMS procedures and IMS related procedures in 5G.
- Subscription data synchronization for IMS.
- Requesting the multimedia service: setting up telephony-specific behavior and resources at 5G Registration, PDU Session Establishment, IMS Registration and IMS Session Setup.
- Protocol stack for IMS media transport over NR, E-UTRA, and in Dual Connectivity scenarios.
- Signaling and media flow for various roaming scenarios.
- Single or dual IMS registration for UE.
- SMS transport options over 4G, 5G, and IMS over 4G or 5G.

### 5GS Support for Telephony

- UE Capabilities related to IMS voice support and IMS related network procedures.
- Handling of UE related capabilities and IMS related subscription parameters between 5G core network functions.
- IMS PDU Session attributes.

- PS Data Off service exemptions for IMS service handling.
- ANDSP and URSP for IMS services.
- P-CSCF discovery procedure.

## IMS Support for telephony

- HTTP-based communication for IMS service handling; mapping of Diameter messages to HTTP service requests and responses.
- Selected UE and network features to be supported according to GSM Association “IMS Profile for Voice, Video and Messaging over 5GS”.
- UE inputs for Originating Access Domain Selection for MO IMS calls.
- Media codecs for IMS over 5G and media transport.
- Role of Telephony Application Server.
- Selected SIP message parameters for multimedia telephony.

## Interworking: Core Network

- UE idle mode mobility procedures between 2G, 3G, 4G, and 5G.
- UE connected mode mobility procedures between 2G, 3G, 4G, and 5G.
- Handling of UE network capabilities in EPC and 5GC.
- Selected details of UE Policy Delivery Service signalling between UE and PCF.
- Handling of data connections in idle/connected mode mobility procedures.
- PDN Connection/PDU Session establishment aspects: CN domain selection, redirection, etc.
- Single and dual registration mode UEs.
- Mapping and handling of EPS-GUTI and 5G-GUTI.
- Interactions between HSS and UDM in interworking scenarios.
- Interworking with and without N26 interfaces between 4G and 5G core networks.
- RAT Fallback and EPS Fallback for IMS sessions.
- Signalling details of selected interworking procedures.
- Interworking and session related parameters exchanged between HSS/UDM and MME/AMF/SMF.

## Interworking: Access Network

- 5G Access Network options: NR, E-UTRA, Wi-Fi.
- Handling of UE radio capabilities related to IMS and 4G/5G interworking, including UCMF role.
- Overview of RAN-based Dual Connectivity procedures.
- CN-based and RAN-based User Plane splitting options.
- Interworking with Wi-Fi access: session transfers, Multi-Access PDU Sessions.
- RAN procedures for Dual Connectivity handling: Secondary Node handling, handover procedures.
- Brief introduction to radio relays: donor eNBs in E-UTRAN and IAB nodes in NG-RAN.
- Radio connection suspension: overview and comparison of 4G and 5G details.
- Unified Access Control in 5G and IMS related options for UAC.
- SRVCC between 5G NR and 3G UTRA.