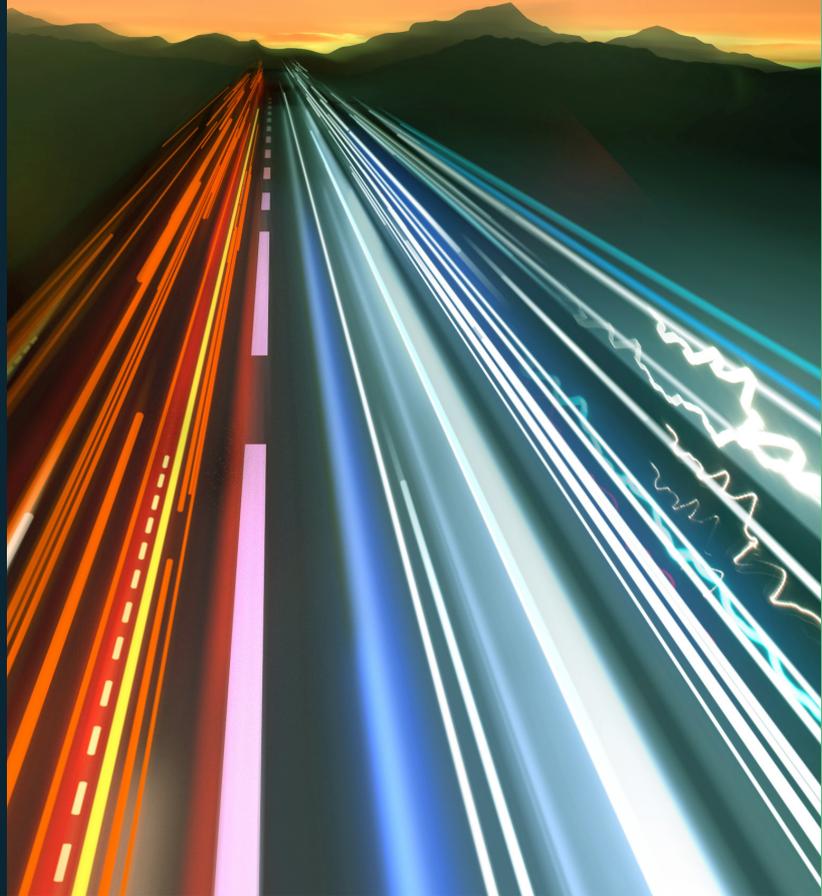




Very informative and beneficial,  
thank you!



Watch our course intro video.



## Delivering 5G Voice

### Course Description

This course will explain how voice services are delivered across a 5G system, utilizing IMS based voice services termed VoNR (Voice over New Radio). The course will cover areas such as architectural requirements, protocols, APIs and initial procedures. In addition, a variety of call scenarios will be examined, including service continuity scenarios related to LTE and CS networks.

Note that this course is similar in content to VoLTE System Engineering from an IMS operational perspective. However, the key differences relative to 5G will be explored.

This course has no prerequisites.

**2** days  
(LiveOnsite,  
LiveOnline)

**12** hours  
learning  
(OnlineAnytime)

**12**

CPD Learning  
Credits



Level: 2  
(Intermediate)

**This course will contain the following sections:**

## **1. Architectural Requirements for 5G Voice**

**Topic areas covered include:**

- Deploying VoNR:
  - Deployment Considerations.
- VoNR High Level Network Architecture:
  - Key Components.
  - VoNR Standardization.
- 5G Access Network:
  - Key Architectural Components.
  - 5G Service Based Architecture.
- IMS Call Control Network:
  - High Level Concept.
  - IMS Requirements.
  - IMS Protocols.
- IMS Architecture:
  - Call Session Control Functions:
    - P-CSCF, S-CSCF, I-CSCF, E-CSCF.
  - Access Transfer Functions:
    - ATCF, ATGw.
  - Home Subscriber Server.
  - IMS Voice Application Servers.
  - Session Border Controllers.
  - IMS Deployment.
- End to End VoNR Architecture.

## **2. VoNR Foundation Technologies**

**Topic areas covered include:**

- VoNR Protocols – Session Initiation Protocol:
  - SIP User Agents.
  - SIP Message Exchange.
  - SIP Message Format.
  - Routing SIP Messages.
- VoNR Protocols – Diameter:
  - Diameter Base Protocol.
  - Diameter Base Header.
  - Diameter Client and Server.
  - Diameter Agents.
- VoNR Protocols – Service Based Architecture:
  - Service Based Interface Concepts.
  - SBI Protocol Stack.
  - IMS Service Based Interfaces.
- 5G Key Concepts Associated with VoNR:
  - QoS Model in 5G.
  - QoS Rules and Packet Detection Rules.
  - QoS Flow Parameters.
  - Resources for VoNR to VoNR Calls.
- PCC Key Concepts Associated with VoNR:
  - SDFs and Flow Filters.

**2** days  
(LiveOnsite,  
LiveOnline)

**12** hours  
learning  
(OnlineAnytime)

**12**

CPD Learning  
Credits



LiveOnsite, LiveOnline,  
OnlineAnytime

## 3. Initial Procedures for 5G Voice

### Topic areas covered include:

- IMS Identities:
  - Private User Identities.
  - Public User Identities.
  - USIM Derived Temporary Identities.
  - Public Service Identity.
- IMS Registration Analysis:
  - 5G Network Specifics.
  - IMS Network Specifics.
- IMS Registration Analysis – Initial Registration:
  - Initial Registration Request (UE to P-CSCF).
  - Forwarding the REGISTER (P-CSCF to I-CSCF).
  - S-CSCF Selection.
- IMS Authentication and Key Agreement:
  - Authentication Vector Acquisition.
  - Authentication Challenge.
- Reregistration and Subscriber Profile Acquisition:
  - Second Register.
  - Authentication and Subscriber Profile Acquisition.
  - Service Profile.
- Registration Acceptance:
  - Third Party Registration.
  - Registration Event Subscription.
  - Service Configuration (Ut Interface).

## 4. 5G Voice Call Procedures

### Topic areas covered include:

- VoNR Media:
  - Port Usage for RTP/RTCP.
  - Describing the Media Stream – SDP.
- High Level SIP Signalling Flow:
  - Understanding the IMS Signalling Flow.
- VoNR to VoNR Call Establishment.
- Delivering the SDP Offer:
  - SIP INVITE Composition.
  - Media Anchoring (Calling Party).
  - Application Servers (Calling Party).
  - Routing the SIP Signalling to the Called Party.
  - Application Servers (Called Party).
  - Media Anchoring (Called Party).

## 5G Voice Call Procedures (cont.)

- Delivering the SDP Answer:
  - 183 Session Progress.
  - Voice QoS Flow Establishment.
  - Bidirectional Media.
- PRACK, Preconditions and Acceptance:
  - Provisional Response Acknowledgement.
  - Meeting Preconditions.
  - Alerting and Call Acceptance.
- VoNR Call Termination:
  - QoS Flow Removal.
  - Media Path Removal.

## 5. PSTN Interworking

### Topic areas covered include:

- VoNR Supplementary Services:
  - Example – Originating Identification Restriction.
  - Example – CDIV.
- Additional IMS Functions:
  - Multimedia Resource Function.
  - Media Servers.
- Early Media:
  - 1CAT Procedure.
- IMS Messaging Services:
  - Support for SMS.
  - Mobile Originated SMS.
  - Mobile Terminated SMS.
  - OMA Converged IP Messaging.
- IMS Video Calling.

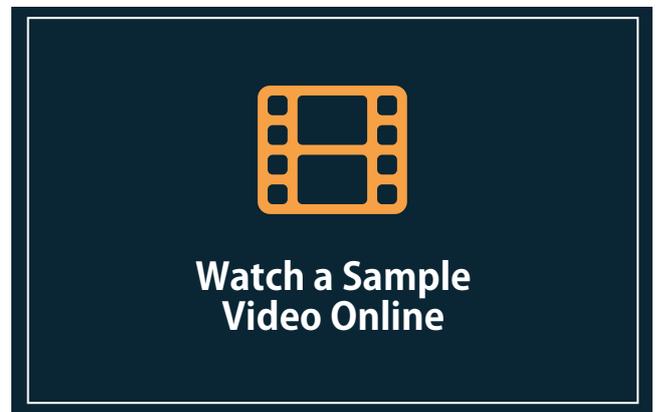
## 6. Interworking Considerations

### Topic areas covered include:

- Supporting Legacy Voice Through the Migration to VoNR.
- Focus on the MGCF and IM-MGW:
  - Media Gateway Control Function.
  - IMS Media Gateway.
  - Gateway Control Protocol (H.248).
- E.164 to SIP Mapping (ENUM).

## Interworking Considerations (cont.)

- VoNR to PSTN CS Procedures:
  - VoNR to PSTN Call Flow – Part 1.
  - VoNR to PSTN Call Flow – Part 2.
- PSTN to VoNR CS Procedures:
  - PSTN to VoNR Call Flow – Part 1.
  - PSTN to VoNR Call Flow – Part 2.
- Emergency Services:
  - Emergency Services Call Flow.



## 7. Interworking with 3GPP Networks

### Topic areas covered include:

- IMS Service Centralization and Continuity.
- Single Radio Voice Call Continuity:
  - SRVCC Evolution.
  - Support for SRVCC.
- VoNR SRVCC Procedure (Release 10+):
  - ATCF and ATGw.
  - Registration Procedure Utilizing an ATCF.
  - Access Transfer Procedure Using the ATCF.
- Fallback Mechanisms:
  - EPS and RAT Fallback.
  - Emergency Services Fallback.

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