5G Core Network Signaling and Operations

5G_304x | Expert-Led Live | 5G Core | Expert
Course Duration: 3 days

The 5G Core (5GC) network architecture is a significant evolution from the 4G LTE EPC. Network functions have been de-composed and re-architected to enable more flexible usage of network resources. Multi-Access Edge Computing (MEC) and Network Slicing are new capabilities that permit the operator to hone the network to meet specific applications' requirements, for example very low latency. The 5GC architecture enables implementation in virtualized networks. Students will step through various network operations and related call flows using actual logs where applicable and will be able to highlight key differences of 5G operations from LTE operations.

Intended Audience

This technical course is intended for planning, design, engineering and operations related job functions who require a detailed understanding of the 5G core network architecture and operations.

Objectives

After completing this course, the student will be able to:

- Identify the Network Functions (NF) of the 5G core network and their roles in the 5GC
- Sketch the connectivity for the 5G network functions
- Describe the 5G UE registration procedure
- Describe PDU session setup procedures and the relationship to QoS in 5G
- Identify the 5G core components for user traffic routing
- Step through the procedures for Idle mode and connected mode mobility
- Describe the procedures for network slice assignment and selection for a 5G UE
- Illustrate the architecture for MEC and describe traffic flow for MEC applications

Course Prerequisites

5G Core Network Overview

Outline

1. 5G Network Architecture
1.1 End-to-end 5G NG-RAN to 5GC architecture
1.2 5GC Network Functions - AMF, SMF, etc.
1.3 SBA, APIs and NRF
1.4 5G and virtualization technologies
Exercise: 5GC Network Functions

2. Network Slicing and MEC
2.1 3GPP defined use cases
2.2 UE slice assignment and requests
2.3 SMF and UPF assignment for slices
2.4 MEC deployment options and traffic flow
2.5 MEC and NEF
Exercise: Network Slicing and MEC

3. 5G UE Registration Procedure
3.1 5G Identifiers and UE States
3.2 Initial Registration
3.3 Network slicing and AMF selection
3.4 Authentication using AUSF and UDM
3.5 AS and NAS Security
Exercise: Registration call flow

4. PDU Session Establishment
4.1 User Plane Traffic Path
4.2 UE signaling for PDU Session Establishment
4.3 SMF and UPF selection
4.4 UE signaling for PDU Session Modification
4.5 UE signaling for PDU Session Release
4.6 UE signaling for UP deactivation/re-activation
4.7 UE signaling for UP
Exercise: PDU Session Management call flows

5. QoS in 5G
5.1 5G Quality of Service (QoS)
5.2 PCF and QoS enforcement
5.3 Use of multiple UPFs
5.4 IMS Services in 5G and GBR flow establishment
5.5 External application access and NEF
Exercise: QoS Management

6. Mobility and Interworking with LTE
6.1 Idle Mode Mobility
6.2 Connected Mode Mobility - Xn HO
6.3 Connected Mode Mobility - N2 HO
6.4 Session continuity
6.5 Interworking with 4G LTE
Exercise: Mobility Management

Final Assessment

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