



# 5G Core Network Signaling and Operations

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. Network Slicing is a new capability that permits the operator to hone the network to meet specific applications' requirements. 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 learner 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 charging in 5G and how is it handled for a PDU session

## What You Can Expect

- Prerequisite: 5G Core Network Overview
- Prerequisite: 5G Networks and Services
- Total Expert-Led Live Duration: 9 HOUR
- Total Self-Paced Duration: 12 HOUR

Session 1	Session 2	Session 3
3 hrs	3 hrs	3 hrs

## Outline

### 1. 5G Core Network Essentials

- 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

- 2.1 3GPP defined use cases
- 2.2 UE slice assignment and requests
- 2.3 SMF and UPF assignment for slices

**Exercise:** Network Slicing

### 3. UE Registration in 5G

- 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
- 4.8 Charging framework in 5G and role of CHF
- 4.9 PDU session and charging

**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 4G EPC

- 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 EPC

**Exercise:** Mobility Management

**Final Assessment**