5G (NSA) RAN Signaling and Operations

5G_303x | Expert-Led Live | 5G Access | Expert
Course Duration: 3 days

This course takes an in-depth look at the life of a 5G device in the context of Non-Standalone (NSA) Option 3x deployment. It describes successful scenarios through signaling call flows. It steps through key operations such as power up and system acquisition, RRC connection setup, bearer setup with 4G LTE and 5G NR, and DL and UL operations on 5G NR. This course covers key operations through call flows with details of major messages and their key parameters. The course will help students with an in-depth understanding of successful call flows for Option 3x-based signaling and bearer paths.

Intended Audience

This detailed technical course is intended for engineering, systems performance, and operations related job functions who need to get an in-depth understanding of signaling procedures of NSA NR with the EPC deployment.

Objectives

After completing this course, the student will be able to:
• Illustrate the architecture of Option 3x-based NSA deployment
• Sketch and describe the frame structure with numerology of the 5G NR air interface
• Identify key steps of preparing to monitor 5G cell and 5G network acquisition
• Identify key steps of random access and RRC connection setup
• Step through the data transfer operations in DL using different bearers (e.g., a split bearer)
• Step through the data transfer operations in UL using different bearers (e.g., a split bearer)
• Step through the handover and mobility operations for adding, modifying, and removing SgNB

Course Prerequisites

5G NR Air Interface

Outline

1. 5G NSA Network Architecture
1.1 NSA Option 3x network architecture
1.2 Signaling and data radio bearers in Option 3x
1.3 Overview of EN-DC operations
1.4 5G UE capability transfer
Exercise: 5G NSA Operations

2. 5G Cell Acquisition
2.1 Configuration for NR cell measurements
2.2 SS/PBCH block
2.3 NR cell measurements
2.4 Measurement Report by 5G UE
2.5 eNB-gNB X2 setup
2.6 Overview of SgNB addition
2.7 RRC Connection Reconfiguration for SgNB addition
Exercise: 5G Cell Acquisition

3. Connecting to 5G gNB: Random Access
3.1 Overview of random access
3.2 PRACH configurations and radio resources
3.3 Uplink synchronization in an NR cell
Exercise: Random Access

4. DL Data transfer in 5G
4.1 DL signals and UE measurements
4.2 5G measurements by UE
4.3 Reporting of UE measurements
4.4 DL scheduling and resource allocation
4.5 DL data transmission

4.6 DL HARQ in 5G
Exercise: DL Data Transfer

5. UL Data Transfer in 5G
5.1 Overview of UL traffic processing
5.2 Scheduling requests
5.3 Buffer status reports
5.4 Resource allocation for UL
5.5 UL data transmission
5.6 Uplink power control

Exercise: UL Data Transfer
6. Mobility and Idle Mode Operations
6.1 Mobility and RRC states
6.2 Mobility scenarios
6.3 Measurements and handover signaling
6.4 5G connection release
6.5 Idle mode mobility
Exercise: Mobility Operations
Final Assessment

Award Solutions