

# 5G NR Air Interface

This learning takes an in-depth look at the 5G New Radio (NR) Air Interface and key operations that enable a 5G Standalone (SA) network to support the 5G services.

## Intended Audience

Design, Development, and Performance Engineers of Radio Network, Device, and Tools.

## Objectives

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

- Describe the frame structure with numerology of the 5G NR air interface
- List downlink and uplink signals and channels and describe their function
- Identify key steps of network acquisition, random access, and connection setup
- Explain how data is transferred in the downlink and the uplink
- Step through the handover and idle/inactive mode operations

## What You Can Expect

- Prerequisite: Introduction to 5G
- Total Expert-Led Live Duration: 3 HOUR
- Total Self-Paced Duration: 11 HOUR

## Outline

### 1. 5G NR Foundation

- 1.1 Key features of 5G NR Air Interface
- 1.2 5G Network Deployments
- 1.3 5G Radio Access Network

**Exercise:** 5G Radio Access Network

### 2. Spectrum and Numerology of 5G NR

- 2.1 Frequency Spectrum
- 2.2 OFDM and Numerology Overview
- 2.3 5G NR Frame Structure
- 2.4 Overview and Configuration of DSS

### 3. Spectral Efficiency

- 3.1 Massive MIMO
- 3.2 Beamforming Overview
- 3.3 SDMA and Frequency Reuse

### 4. Meeting Service Requirements

- 4.1 RAN Slicing
- 4.2 Bandwidth Adaptation
- 4.3 Low Latency

### 5. Channels and Signals

- 5.1 5G Channels and Signals
- 5.2 Sync Signals and PBCH
- 5.3 SSB and Random Access in 5G

### 6. 5G Operations

- 6.1 5G NSA Operations
  - 6.2 SA Network Acquisition
  - 6.3 Registration and PDU Session
  - 6.4 Overview of DL and UL Data
- Exercise:** SA Network Acquisition

### 7. Mobility Operations

- 7.1 Beam Switching
- 7.2 Xn Handover
- 7.3 Idle and Inactive in 5G

**Exercise:** 5G Xn Handover

**Final Assessment**

Week 1	Week 2	Week 3
Session 1 (1 hrs)	Session 2 (1 hrs)	Session 3 (1 hrs)