



# 5G NR Air Interface

5G\_308d | On-Demand | 5G Access | ⚙️

Course Duration: 2 days

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

## Course Prerequisites

[Welcome to 5G](#)

## 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