



5G NR Air Interface Overview - Part I

5G_102Ad | On-Demand | 5G Access | ⚙️

Course Duration: 1 hour

5G promises to enable a variety of new services, ranging from high-speed, high-capacity broadband access to ultra reliable low-latency communications to massive machine-type communications. To deliver on these promises, the wireless network must change, including the devices, the radio interface, the radio access network (RAN), and the core network. Part I of this on-demand course offers a high-level technical overview of 5G NR (New Radio) air interface – its features, the use of low-mid-high band spectrum, the reuse of the principles of OFDM/OFDMA, and the use of massive antennas for beamforming and MIMO. Part II covers the flexible numerologies, channels and frame/slot structure, and steps through the life of a 5G UE.

Intended Audience

This course is designed for a broad audience of wireless network engineers. This includes those in RF, RAN planning, engineering, operations, troubleshooting and support groups.

Objectives

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

- List the performance goals of the 5G network
- Compare the different 5G frequency spectrums and their characteristics
- Describe MIMO and the beamforming techniques used in 5G
- List the key features of the 5G NR air interface
- Sketch the flexible frame and slot structure of 5G NR

Course Prerequisites

No Prerequisites

Outline

1. 5G Scenarios and Performance Targets
 - 1.1 Higher data rates
 - 1.2 Lower latency
 - 1.3 Higher connection density
2. 5G NR Air Interface Enhancements
 - 2.1 Key features of 5G air interface
 - 2.2 Flexible numerologies
 - 2.3 Air interface protocol stack
3. Frequency Spectrum for 5G
 - 3.1 Spectrum considerations
 - 3.2 Low, mid, and high bands
 - 3.3 Channel bandwidths
 - 3.4 Radio signal propagation
4. MIMO and Beamforming
 - 4.1 Massive antenna
 - 4.2 Beamforming and beam tracking
5. Protocol Stack of 5G NR
 - 5.1 Protocol Stack EnhancementsExercise: Protocol Stack
6. 5G Operating Bandwidth
 - 6.1 Channel bandwidths
 - 6.2 Use of OFDM
7. 5G NR Frame and Slot Structure

7.1 Flexible sub-carrier spacing

7.2 Flexible frame and slot structure

7.3 Carrier bandwidth part

8. Numerology

8.1 Importance of numerology in 5G NR

Putting It All Together