5G NR Air Interface Overview - Part I

5G_102Ad | On-Demand | 5G Access | Express
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 Enhancements
Exercise: 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

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