

5G RF Planning and Design

This course takes an in-depth look at the RF planning and design aspects of 5G. It summarizes the essentials of the 5G air interface. MIMO and beamforming in 5G and suitable propagation models are discussed. The link budgets for 5G for different scenarios are calculated and compared with the LTE link budget. The RF cell configuration and RF operational parameters are discussed. Finally, the overall process of the RF design for 5G is described including traffic mapping and propagation modeling. The use of an RF planning tool to carry out the RF design is illustrated.

Intended Audience

This detailed technical course is intended for design, engineering, performance optimization and related job functions.

Objectives

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

- Describe how the 5G air interface and the network infrastructure help deliver target 5G services
- Explain beamforming and MIMO concepts and list propagation models suitable for mmWave
- Specify key 5G RF design inputs and calculate the downlink and uplink cell capacity and throughput
- Explain components of a 5G link budget for different services and compare with LTE link budget
- Summarize the planning process for different RF configuration and operational parameters
- Illustrate steps of 5G RF design process, including traffic mapping and propagation modeling
- List the steps for 5G RF design using an RF Planning tool

What You Can Expect

- Prerequisite: 5G NR Air Interface
- Required Equipment: Laptop with RF propagation tool supporting 5G NR
- Expert-Led Live Duration: 21 HOUR

Outline

1. 5G Air Interface Essentials

- 1.1 5G Use Cases and Performance Goals
- 1.2 5G NR Technology
- 1.3 5G NR Numerology
- 1.4 DL and UL Channels and Signals

2. MIMO, Beamforming and Propagation Models

- 2.1 MIMO and Beamforming in LTE
- 2.2 MIMO Techniques in 5G NR
- 2.3 Propagation Models

3. 5G Throughput and Capacity

- 3.1 DL Throughput and Cell Capacity
- 3.2 UL Throughput and Cell Capacity

4. 5G NR Link Budget

- 4.1 Principles of Link Budget
- 4.2 UL Link Budget for 5G
- 4.3 DL Link Budget for 5G
- 4.4 Factors Affecting Link Budget

5. 5G RF Parameter Planning

- 5.1 PCI Planning
- 5.2 Random Access Planning
- 5.3 NR Carrier Add/Mod
- 5.4 Uplink Power Control
- 5.5 TA and RNA Planning

6. 5G RF Design

- 6.1 5G RF Design Process
- 6.2 5G RF Planning Tool Process
- 6.3 5G RF Design – Site Selection

7. RF Planning Tool

- 7.1 Key Parameters in RF Planning Tool
- 7.2 Project Configuration
- 7.3 Site Configuration
- 7.4 5G Analysis