5G RAN Capacity Planning

5G_227x | Expert-Led Live | 5G Access | Expert
Course Duration: 1 day

This hands-on training takes an in-depth look at the 5G RAN capacity in the context of use of low, mid, and mmW frequency spectrums, FDD and TDD modes of operations, and EN-DC, NR-DC, and Carrier Aggregation. This training provides essential foundation of 5G NR Air Interface and its DL and UL channels, signals, flexible numerologies, use of massive MIMO for beamforming and MU-MIMO for capacity calculations. Training provides introduction to Supervised Learning approach to capacity planning and compare benefits with current time series analysis approach. Participants use capacity planning calculators for both DL and UL cell capacity for traffic and control channels.

Intended Audience

RAN Capacity engineers

Objectives

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

- Identify 5G NR features important to RAN Capacity, e.g., NR numerology, FR1, FR2
- Explain beamforming and massive MIMO and impact to capacity in low, mid, and mmW
- Identify key planning inputs and calculate the downlink and uplink cell capacity and throughput
- Identify key planning inputs and calculate control channel capacity needs
- List RAN capacity KPIs for control and traffic channels
- Describe role of PRB utilization, capacity headroom, and spectral efficiency in RAN capacity
- Discuss planning guidelines for control and traffic channel resources
- Explore the concept of Supervised Learning for Capacity Planning and compare with Time Series analysis

Course Prerequisites

5G NR Air Interface

Outline

1. 5G NR for RAN Capacity Considerations
1.1 5G NR features and support for FR1 and FR2
1.2 5G NR numerology and bandwidth adaptation
1.3 TDD formats for capacity considerations
Exercise: Numerology impact on RF design

2. Massive MIMO and Beamforming
2.1 AAS and beamforming techniques
2.2 MIMO schemes in low, mid, and mmW spectrum
2.3 Cell capacity considerations using MU-MIMO
Exercise: MU-MIMO and beamforming impact on Capacity

3. Control Channel Capacity Considerations
3.1 Control channel capacity KPI
3.2 Control Resource Set (CORESET) Configurations
3.3 Impact of CCE on RF coverage and Cell capacity
Exercise: PDCCH capacity calculation

4. 5G Throughput and Capacity
4.1 User and Cell Capacity KPIs
4.2 PRB utilization analysis
4.3 Spectral efficiency analysis
4.4 5G NR DL and UL throughput and cell capacity
4.5 Influence of TDD operation on user experience and cell capacity
Exercise: Throughput and capacity calculations for DL/UL

5. 5G RAN Capacity Analysis and Forecasting
5.1 Cell and user capacity guidelines
5.2 Capacity Planning, using time series analysis
5.3 Capacity forecasting, influencing factors
5.4 Introduction to Supervised Learning Models
5.5 Highlights, SL models vs Time Series Analysis
Exercise: Forecasting, cell capacity for Data services

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