iBwave CERTIFICATION COURSE SYLLABUS

LEVEL 3: 5G DESIGN, CAPACITY PLANNING, MIMO

LEARNING OBJECTIVES

At the end of this certification program, you will be able to:

✔ Describe the main features and characteristics of 5G NR networks.
✔ Configure systems and small cells for 5G NR networks.
✔ Build, analyze and optimize 5G NR designs to achieve required coverage inside buildings.
✔ Configure and generate reports required for deeper analysis or proof of compliance.
✔ Plan capacity in venues considering the major factors that influence capacity in mobile networks
✔ Identify factors influencing MIMO performance

5G NEW RADIO FUNDAMENTALS

✔ Overview of 5G Requirements
✔ 5G Building Blocks
  • Millimeter Wave (mmWave)
  • Sub-6-GHz
  • Flexible Frame Structure
  • Massive MIMO
  • Beamforming
  • Bandwidth Parts and Network Slicing
✔ Overview of 5G NR Deployment
  • Non-Standalone Option
  • Standalone Option
  • Next Generation RAN (NG-RAN)
  • 5G NR Core Network

5G NEW RADIO TECHNOLOGY

✔ Frequency of operation
✔ Key Features
  • New Radio (NR) Numerology
  • Bandwidth Partitioning
  • NR Slot formats
✔ 5G NR Signals
  • Reference Signals
  • Synchronization Signals
  • Coreset
✔ Beamforming in 5G NR
  • Basics of Antennas and Radio Wave Propagation
  • Basic Concepts and Techniques for Beamforming
  • Beamforming Types (Analog, Digital, Hybrid)
  • Antenna Phased Array (Multi Beam Antennas)
  • Beamforming in 5G NR Standard

CREATING 5G NR PROJECTS USING iBWAVE DESIGN

✔ Setting up 5G NR Wireless Services and Technologies
✔ Designing with 5G NR Signal Sources
✔ Running 5G NR Predictions
✔ Generating 5G NR Reports

CAPACITY PLANNING (INCLUDES 5G)

CAPACITY PLANNING THEORY

✔ Capacity background
✔ Grade of service / Quality of service
✔ User profiles
✔ Capacity limits
✔ Sample capacity calculations

CAPACITY PLANNING IN iBWAVE DESIGN ENTERPRISE

✔ Capacity planning process
✔ Capacity definition (template)
✔ Market share
✔ Usage profile
✔ Subscriber service
✔ Capacity requirements (project-specific)
✔ Requirements
✔ Sector limits
✔ Capacity zones
✔ Capacity map

MIMO

MIMO THEORY

✔ MIMO background
✔ MIMO operation modes: Diversity vs. Multiplexing
✔ Open loop vs. closed loop
✔ MIMO gains compared to SISO systems
✔ Factors influencing MIMO performance
✔ MIMO DAS deployments

MIMO IN iBWAVE DESIGN ENTERPRISE

✔ MIMO calculations in iBwave Design
✔ Modeling MIMO in iBwave Design
✔ Creating a MIMO source
✔ MIMO gain configuration
✔ Creating and running output maps for MIMO systems

DESIGN FROM SCRATCH WORKSHOP

Review exercise in class to prepare for final exam

FINAL EXAM

(3 hours)