

Course ID
5GTUTE
Course Duration
5 days

Course Title
5G RAN Training: Technology & Planning

Related Courses

- 5G Wireless Training: Layers 1, 2, 3 (5G-TF1, 4-5 days)
- 5G Wireless: Technology and Applications (5GTA, 5 days)
- 4G LTE Evolution to 5G Wireless (5G1, 5 days)
- LTE / LTE-A Deep Dive: RAN and Core (LTE-DIVE, 4 days)

Aimed At

This *5G RAN Training* workshop will benefit technical specialists, network planners, hardware/software designers, and others who need to understand the 5G wireless technology and planning issues in some depth.

Prerequisites

Basic knowledge of the current wireless and mobile communications systems and standards including LTE and LTE-A.

Course in a Nutshell

In this in-depth five-day *5G RAN Training* workshop, you will study what 5G is, 5G wireless standards, 5G RAN technologies, and preliminary planning issues. The course is continually updated to synch with the state-of-the-art of technology, standards, and planning techniques.

Customize It!

We can tailor this *5G RAN Training* workshop to include or exclude certain topics, to make it shorter or longer, or to make it more or less technical to suit your audience.

Learn How To

- Describe 5G wireless and its objectives, requirements, and major services and applications.
- Describe the 5G standards and proposals
- Describe the 5G wireless RAN technologies
- Describe the 5G wireless planning issues and techniques and its co-operation with LTE-A

**Course
Outline**

- 5G RAN Training Part 1: Introduction
 - What is 5G
 - Why 5G?
 - How 5G will differ from 4G
 - 5G technical objectives
 - Major requirements for 5G RAN and Core
 - 5G services and applications
 - Roadmap to 5G
- 5G RAN Training Part 2: 5G Standards
 - 3GPP standards for 5G: Features and technical proposals
 - 5GPPP partnership
 - 5G Americas
 - Chinese alliance
 - IEEE approach
 - ETSI
 - ITU-T
 - LPWAN approach
 - European Union FP7
- 5G RAN Training Part 3: 5G RAN Technologies Overview
 - Machine-to-Machine (M2M) communications
 - Device-to-Device (D2D) communications
 - IoT and 5G
 - Cloud Radio Access Networks (C-RAN)
 - LoRA alliance/LoRAWAN technology
 - Sigfox technology
 - Short-range wireless: ZigBee, Z-Wave, Bluetooth
 - Software Defined Radio (SDR)
 - Unlicensed band for 5G; cognitive radios
 - Mobile Ad-hoc Networks (MANET) for 5G smart sensors
 - mmWave (Millimeter Wave) approach
- 5G RAN Training Part 4: 5G RAN: Proposed Technologies
 - The available 5G spectrum
 - The propagation model for 2.5 GHz, 3.6 GHz, 5 GHz, 26 GHz and 60 GHz
 - LTE-TDD overview
 - LTE-LAA technology
 - 5G air interface overview
 - Pros and cons of new radio access technologies: GFDM, FBMC, UFMC, f-OFDM, NOMA (Non-Orthogonal Multiple access), RSMA (Resource Spread Multiple Access (RSMA))

- Self-Organized Networks (SON)
- Modulation enhancements
- Adaptive modulation and coding enhancements
- Interference Cancellation (IC): Mitigation features and algorithms
- Single frequency full duplex radio technologies
- Beam-forming and massive MIMO technology
- Heterogeneous Networks (Het-Nets)
- Radio Resource Management (RRM)
- 5G RAN Training Part 5: 5G Preliminary Planning
 - 3GPP LTE-A optional features for enabling 5G
 - Smart cells: Small cell approach (available optional features)
 - Li-Fi for 5G indoor
 - Planning LTE-A for 5G coverage: Link budget analysis up to 5GHz spectrum
 - Planning 5G coverage: Link budget analysis for mmWave
 - Planning Li-Fi parameters and channel modeling
 - NB-IoT technology air interface description (MAC and physical layer)
 - LTE-A planning for IoT coexistence: Capacity and coverage
 - Improving RACH accessibility for LTE-A and IoT
 - Li-Fi small cells indoor planning: Coverage and capacity considerations
 - 5G NB-IoT over satellite: Technical requirements and ITU recommendations
 - 5G NB-IoT over satellite: Parameter and planning configurations
- 5G RAN Training; Wrap-up
 - Course Recap
 - Discussion

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