apistraining

5G Radio Planning – Radio Access Design and Dimensioning – 3 days

Effective 5G radio planning, designing and dimensioning for improved quality of service, capacity and coverage creating value for the business.

CONTENT

The advent of 5G and its applications will greatly impact the world and how we conduct business. An advanced understanding of how the changes and improvements in capacity, transmission, service quality and the impacts on the 5G marketplace will provide business opportunities to optimize the 5G capabilities.

Planning, designing and dimensioning come with their own challenges and role players need to be aware of the risks, challenges and opportunities to truly exploit the future of this technology.

This course upskills delegates on the tools and insights needed to prepare for 5G NSA and SA; focusing on how to maximize network capacity, evaluate service quality, optimize usage of radio networks and enhance data transmission.

PREREQUISITES

LTE/5G introduction, Physical layer and Radio Access Technology – recommended but not essential.

TARGET AUDIENCE

Radio Network Engineers, Radio Network Planners, Radio Network Optimizers, Mobile Network Operators, University Post-Graduate Students.

BENEFITS FOR DELEGATES

- Explore and review the current and future status of 5G NR – both NSA & SA
- Introduction to MIMO/mMIMO technology
- Understand customer quality requirements
- Understand serve to provide requirements
- Plan for coverage of networks and services
- Learn how to dimensioning 5G RAN network resources
- Optimization techniques for 5G communication network resources
- Evaluate the performance of 5G communication networks

BENEFITS FOR THE ORGANIZATION

- Good Planning and Optimization of 5G technologies and Services
- Reduced risks and threats through the successful adoption of new opportunities
- Effective strategy development and goal setting based on good planning

WHAT MAKES THIS COURSE DIFFERENT?

- Delegates will have an opportunity to explore the topic with industry expert-driven content.
- Real-world case studies and scenarios are used to ensure delegates can practically apply their knowledge
- Cutting-edge information delivered by future thinkers and influencers

REVIEW

5G New Radio (NR) Technology Review

- 5G NR Air interface overview
- Scalable numerology
- NR frame structure

- FDD – TDD modes
- NR signals and channels review
- Physical Layer channel mapping
- Power control overview
- Non Stand Alone (NSA) vs. Stand Alone (SA) architecture
- 5G Services – eMBB, massive IoT, URLLC

Massive MIMO Technology

- LTE to 5G MIMO review
- 3GPP Massive MIMO standardization
- Beamforming and Beamwidth principles
- Massive MIMO Beamwidth gain – a practical approach
- Active Antenna Systems – Active Antenna Units

5G Wireless Channel Principles

- What is a Channel model? – general principles
- Non-Line of Site and Rayleigh modelling
- LoS and Rice modelling
- Shadow modelling
- Site modelling – Macro, Micro, Pico
- Doppler effects and channel models
- Pathloss models (3.6-3.8 GHz, 5-6 GHz, mmW 30 GHz, 60 GHz)
- Example: Link Budget analysis overview
- different cases (Rural, Urban, dense Urban, O2I)
- Exercise: Link Budget calculations over excel

BASIC PLANNING

Uplink Planning

- Customer Quality requirements
- Vendor (Equipment) requirements
- RACH and RACH success probability
- Power control factor
- Uplink Interference factor
- Coverage planning for PUSCH channel
- Coverage planning for control channels (PUCCH, RACH)
- Coverage planning for signals (SRS, DMRS)
- Capacity calculations – single service
- Capacity calculation – combined services
- UL Throughput calculation (Average, cell edge) vs SINR

Downlink Planning

- Customer Quality requirements
- Equipment requirements
- Power gain calculation
- Downlink Interference factor
- Coverage planning for PDSCH channel
- Coverage planning for control channel PDCCH
- Coverage planning for signals (PSS, SSS, PBCH, DMRS)
- Capacity calculations – single service
- Capacity calculation – combined services
- DL Throughput calculation (Average, cell edge) vs SINR

NSA Case Scenario Exercises (using excel calculator)

- eMBB service planning

- massive IoT service planning

SA Case Scenario Exercises (using excel calculator)
- eMBB service planning
- massive IoT service planning