



RF Planning Training

Our RF Planning Training is focused on carrying out RF planning and Design and capacity planning for networks. It provides a solid understanding of how to plan, design and optimize and a high quality network. Learn how to plan and design wireless networks, techniques to boost capacity, and how to lower interference and increase quality in the network. RF Planning Training Course will show the attendees how to plan, design and optimize networks efficiently. RF Planning Training includes following modules:

TRAINING DURATION	25 Hrs / 2 Weeks / Customized
TRAINING CHARGE	12,000+ Service Tax

Training Modules Details:

Radio Network Design & Optimization Fundamentals

1. RF Overview

- RF engineering principles
- Performance characteristics
- Testing & measurement
- Drive testing
- Performance counters and key performance indicators (KPIs)
- Data collection and post processing of data
- Root Cause Analysis (RCA)
- Spectrum utilization
- Dropped calls
- Poor coverage
- Hard hand over failures
- Soft hand over failures
- Overview of optimization process for FFR modulation technologies
- Overview of optimization process for CDMA modulation technologies

2. RF Operating Environment

- Propagation models
- Link budget analysis
- Path loss
- Reflection
- Okamura/HATA
- Noise & interference

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- Polarization distortion
- Diversity
- Rayleigh effect
- Detection of co-channel interference
- Coverage maps
- Site acquisition process in RF engineering
- Cell splitting process

3. Antennas

- Antenna properties, elements and performance, characteristics
 - Impedance
 - Radiation
 - Polarization
 - Gain
 - Diversity
 - Antenna noise temperature
 - Dipole definition
 - Bandwidth
 - Radiation patterns
 - Antenna materials
 - Isotropic radiation theory
 - Effect of ground
 - Mutual impedance
 - Angle of incidence
 - Refractive index
 - Azimuth & down tilt
- Antenna types
 - Yagi
 - Slot
 - Omnidirectional
 - Dipoles & monopoles
 - Microstrip
 - Periodic/Resonant
 - Reflector
 - Loop, Slot, Spiral, Horn
 - Microstrip patch or, patch antenna
 - Half wave dipole
 - Folded dipole
 - Crossed dipole
 - Quadri-filar Helix
- Antenna Arrays
- What is an array
- How can arrays help in capacity and performance?
- What are the tradeoffs of using antenna arrays?

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- Antenna array types
 - Log periodic dipole array
 - Phased array
 - Coliner
 - Yagi-Uda
 - Broadside
- Smart Antennas
 - Operation
 - Basic components of
 - What is the trade offs of using smart antennas?
 - Beam forming
 - MIMO
 - Direction of arrival (DOA)
 - Switched beam
 - Adaptive array

4. FFR modulation technologies

- Frequency planning
- Interference matrices
- Neighbor planning
- GSM logical channels (BCCH, FCH, SCH, SACCH, TCH, RACH)
- Cell Tiering
- Frequency hopping
- Congestion
- RF parameter datafills
- Picocells
- Femtocells
- Cell on wheels (COW)
- In building coverage
- Towntop Mounted Amplifiers (TMA)
- GPRS/EGRS Overview & interfaces
- GPRS attach process
- PDP context activation process
- Throughput measurements
- Impact of retransmissions on throughput
- LAC/RAC boundaries

5. RF Optimization Process

- Setting the optimization criteria
- Optimization in fractional frequency reuse networks
 - Sources of information
 - Interference matrices

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- Frequency reuse plan
- Parameter investigation
- Analysis of the existing RF plan
- Cell tiering
- Performance of cell site audit
- Post processing and analysis of data
- Corrective actions
- Correlation of customer complaints to possible root cause (RCA)
 - Capacity and loading examples
 - Dropped call, poor coverage
 - Dropped call, system resources
 - Dropped call, other
- Mobile drive testing and data collection Tools available
 - Post processing, what does it mean
 - Root cause analysis
 - Tracking and benchmarking
 - PN scanners and their capabilities

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GSM Radio Planning & Optimization

1. Introduction to Radio Network Planning

- The Overall Process
- Outage
- Initial Preparation
- Cell Count Estimation
- Detailed Network Planning

2. Radio Network Planning

- Parameter Planning
- GSM Channels
- Network Optimization
- When IP Gets Involved
- Mobility Management
- Location Areas
- Capacity Evolution
- Intelligent Underlay/Overlay

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- Frequency Hopping
- SFH and IFH
- Railways
- GSM Coding Schemes and the effect on Cells

3. Radio Network Planning Tools

- Planning Methodology
- Tools Overview
- Frequency Planning
- System Planning
- Signalling Capacity
- Bearer Dimensioning
- The Testmobile

4. Introduction to GSM Planning

- Cell Types
- Cell Reuse Distance
- Co-channel Interference
- The GSM Air Interface

5. Network Capacity

- The Erlang and the Erlang Formulae

6. Network Planning Tasks

- Creating a Nominal Plan
- Getting Sites
- Ten Commitments to Best Siting Practice
- Objectors

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UMTS Radio Planning & Optimization

1. Radio Planning and Deployment Process

- Factors for Dimensioning and Optimization -
- Capacity, Costs, Flexibility, Reliability.
- Initial Planning.

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- Dimensioning - Soft Handover Gain, Interference Margin, Fast Fading Margin.
- Detailed Planning - Combined Capacity and Coverage, Code and Frequency, Configuration.
- Results Analysis.
- Continuous Optimization.

2. Antenna Selection

- Base Station Configuration.
- Antenna Selection and Antenna Line Configuration.
- Antenna Characteristics.
- Antenna Diversity - Space, Polarization.
- Site Configuration - Sectorization, Antenna Beam Width.
- Antenna Implementation - Height, Down Tilt.

3. Traffic and QoS Considerations

- UMTS Services - Multimedia, Packet Data.
- HSDPA, HSUPA, HSPA and HSPA+.
- UMTS Traffic Characteristics.
- Service Characteristics, Traffic Total.
- Radio Propagation Environment.
- Radio Propagation Channel.
- Impact to Services.

4. UMTS Site Location and Integration

- Non-hexagonal Site Locations.
- UMTS Site Planning.
- Site Sector Orientation.
- Repeaters
- Hot Spots.
- Site Integration.

5. Planning Tools

- Key Requirements of Planning Tools.
- Planning Tool Types - Initial, Coverage, Capacity, Scrambling Code etc.
- Planning Tool Input Requirements.
- Optimization Tools.

6. UMTS Planning

- TRF and Service Capabilities of the UE and Node B.
- UMTS Link Budget - Max Cell Range and Sizes.
- UMTS Propagation Environment.
- UMTS Capacity and Coverage Planning.
- Traffic Disruption.

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- Planning Issues.

7. Planning and Optimizing Handovers

- UMTS Mobility - Connected Substates.
- Handovers and Handover Triggers.
- Measurement Reporting - Intra and Inter Frequency, Inter RAT.
- UE Internal Measurement Reporting.
- Soft Handover Settings.
- Handover Procedures - Common Channel Procedures.
- Handover Optimization

8. Optimizing UMTS

- Network Loading Factors - User Mobility, Events, Emergency, New Services and Users.
- Optimization Parameters - CPICH and SCH Power Levels, Neighbour Lists, Cell Parameters.
- Optimizing Capacity - Capacity Upgrades, Link Planning, OTSR, STSR.
- Power Optimization - Uplink and Downlink.
- Mobility - Cell Selection, Idle Mode Reselection, UMTS to GSM Cell Reselection.
- Optimizing Connection Establishment.
- Optimizing Connections and Resources.

9. Diversity

- Transmit Diversity.
- Space Time Transmit Diversity.
- Smart Antennas - Advantages and Disadvantages.
- MIMO.
- Associated Coverage and Capacity Gains.

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LTE Radio Network Design & Optimization

1. LTE Architecture and the Physical Layer

- LTE Network Architecture

2. Duplexing, Coding and Modulation in LTE

- LTE Physical Channel

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- Coding, Modulation, and Multiplexing
- 3. Propagation Modeling**
 - Propagation Environment
 - Empirical / Statistical Path Loss Models
 - Deterministic Path loss models
 - Link Budget
 - CW Testing
- 4. LTE Drive Test Process**
 - **Cell Planning**
 - Coverage
 - Cell ID's
 - Cell Types
 - Multiple Input Multiple Output Systems (MIMO)
 - Diversity
 - Antenna Arrays
 - Model Tuning
- 5. Network Performance Parameters**
 - Performance Parameters
 - Traffic
 - Measurement Types
- 6. Post deployment Optimization and open issues**

TRAINING SCHEDULE - Please contact us for latest training schedule

TRAINING MODE

We give flexible learning options to trainees

- Instructor Lead (REGULAR / ONLINE / WEEK-END / PART-TIME / COMBINED-FLEXIBLE)
- INSTRUCTOR LEAD LIVE ONLINE TRAINING MODE - You can join the training from any part of world

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