

COURSE OUTLINE

WiMAX RF Design Process

- RF Planning workflow
- Inputs to and targets for the planning; expected outputs
- Coverage and capacity requirements
- Planning constraints
- Significant differences in planning when compared to GSM and UMTS

WiMAX Architecture and Air Interface (tool-based)

- WiMAX waves, releases and system profiles; WiMAX Forum certification
- WiMAX network architecture: nodes and interfaces
- BS and MS architecture
- Radio frame for mobile WiMAX (FDD and TDD)
- OFDMA parameters for WirelessMAN-OFDMA
- Data mapping for downlink and uplink
- Preambles and pilots
- FUSC, PUSC, OPUSC, AMC
- Link-level radio interface simulations

Radio Propagation Principles (tool-based)

- Spectrum considerations and WiMAX frequency bands
- RF channel definitions
- MS and BS transmitter power parameters
- Large-scale and small-scale propagation effects; pathloss, shadowing and fading
- Propagation models: statistical, empirical and deterministic
- Configuration and tuning of the propagation model

Antenna Considerations and MIMO

- Antenna properties - size, gain, beam-width, polarization, front-to-back ratio
 - WiMAX diversity techniques
 - Spatial multiplexing, single-user and multi-user MIMO
 - Transmission modes and MIMO feedback signaling
 - Impact on WiMAX link budget and capacity
- Antenna system sharing options

Coverage Planning and Link Budgets (tool-based)

- Link budgets, gains and losses
- Role of adaptive modulation and coding scheme
- Requirements for signal-to-noise-and-interference ratio (SNIR) and receiver sensitivity
- Thermal noise calculations and interference estimation
- Maximum allowed path loss
- Impact of cyclic prefix length on the link budget
- Indoor considerations
- Impact of antenna configuration
- Range determination and site-to-site distance estimation

- Signal level and best server coverage plots
- SNIR and spectrum efficiency coverage plots
- Site sharing options coverage with the use of repeaters
- WiMAX downlink and uplink link budget exercises
- Planning tool configuration and simulations

Frequency Reuse and Interference Management (tool-based)

- Interference avoidance, cancellation and coordination
- Interference management vs. FUSC, PUSC and AMC
- Interference scenarios for FDD and TDD
- Considerations for Single Frequency Network (SFN)
- Frequency-parallel schemes (OFDMA) in SFN
- Classical frequency reuse concept (integer reuse)
- Fractional frequency reuse methods including soft reuse and partial reuse
- Frequency planning performance evaluations and simulations

WiMAX Capacity Planning (tool-based)

- QoS concept and QoS classes
- Traffic types and device types
- Impact of MCS and SNIR distribution on
- Capacity planning with MIMO
- Influence of Modulation and Coding Scheme distribution on sector capacity
- Overview of backhaul network options and requirements
- Exercises in capacity calculations
- Planning tool configuration and simulations

RAN Procedures Configuration

- Preamble planning
- Configuration of FUSC, PUSC, OPUSC, AMC
- Cell reselection and handover parameters
- Uplink and downlink transmit power control

WiMAX Inter-working with Other Networks

- Roaming: data access via home network and data access via visited network
- Inter-working with 3GPP E-UTRAN and CDMA 2000 networks

Note: the course content is subject to minor changes and adaptations to the customer needs.