Microwave Transmission Link Design & Network Planning

Telecom Engineering
Baku (Azerbaijan)
24 - 28 Mar 2025

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Introduction

Microwave transmission Link design and network planning training course provide a strong background in the area of planning telecommunication transmission networks using modern Microwave systems. It covers in detail all the important aspects of microwave signal propagation, starting from free-space loss, absorption loss, and others, followed by statistical analysis of various phenomena impairing microwave reception process like rain, multipath fading both flat and selective, Fresnel zones, K-factor variation and ducting based on ITU-T/ITU-R standards. Also, this course will introduce basic parameters that identify the microwave link like antenna characteristics, Tx/Rx power, modulation coding, and others. All the above can be explained and applied practically upon students' needs with pathloss 5 including interference study and PtMP coverage map preparation.

Training Objectives of Microwave Transmission Link Design & Network Planning

- Concept and characteristics of digital microwave communications
- Functions and principles of each component of digital microwave equipment
- Common networking modes and application scenarios of digital microwave equipment
- Propagation principles of digital microwave communication and various types of fading
- Anti-fading technologies
- Microwave link budget calculation for Point-to-Point PtP and Point-to-Multi-Point PtMP, and network planning
- Procedure and key points in designing microwave transmission link
- Microwave link design, PtMP coverage map and interference study with Pathloss 5

Training Outlines of Microwave Transmission Link Design & Network Planning

Day 1

Microwave Communication Overview

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- What is Microwave?
- Microwave Vs Fiber Optics
- Microwave History
- Digital Microwave Communication
- Microwave Frequency Band Selection
- RF Channel Configuration
- Digital Microwave Communication Modulation and coding
- Microwave Frame Structure
- Trunk Microwave Equipment
- All Outdoor Microwave Equipment
- Split Mount Microwave Equipment
- Outdoor Unit ODU / Indoor Unit IDU
- Microwave Antenna
- Antenna Adjustment

Day 2

Microwave Networking, Application, Propagation and Link Budget

- Networking modes of Digital Microwave
- Types of Digital Microwave Stations
- Relay Stations
- Active Relay station / Passive Relay Station Parabolic and Plane Reflector
- Application of Digital Microwave
- Key Parameters in Microwave Propagation
- Fresnel Zone
- Fresnel Zone Radius
- Clearance Factors Affecting Microwave Propagation, LOS survey process.
- Atmosphere Types of Fading in Microwave Propagation, Free Space Loss, Absorption Fading, Rain Fading ....
- Ground Reflection and Multipath
- Radio path link budget and Fade Margins

Day 3

Anti-Fading Techniques

- Frequency domain equalization
- Time-domain equalization
- Automatic transmit power control ATPC
- Adaptive Coding & Modulation ACM
- Cross-polarization interference cancellation XPIC
- Diversity technologies
- Frequency diversity
- Space diversity
- Some useful Anti-fading tips
- Protection Modes of Digital Microwave Equipment

Day 4

Frequency planning, Availability, and Recommendation

- Frequency planning for different network topologies
- Interference study
- Quality and Availability
- Practical Recommendations
- BoQ Planning
- Towards 4G/5G

Day 5

Microwave network planning and link design with Pathloss 5

- What’s Pathloss.
- PtP microwave link design.
- PtMP microwave link design and coverage map.
- Interference study.
- Reports.

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