BLACKBIRD FOR TRAINING

Microwave Communication Link Design & Network Planning

30 August – 3 September 2027
Amsterdam (Netherlands)



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Introduction

The Microwave Transmission Link Design and Network Planning training course provides a comprehensive foundation in planning telecommunication transmission networks using modern microwave systems. In this course, you will gain an in-depth understanding of microwave transmission networks, including microwave link design, propagation principles, and the various fading phenomena that impact microwave signals. You will explore important aspects such as free-space loss, absorption fading, and multipath fading, and learn how to calculate microwave link budgets for Point-to-Point PtP and Point-to-Multi-Point PtMP links. Additionally, this course covers practical applications with tools like Pathloss 5, including interference studies and the creation of PtMP coverage maps.

This course is crucial for professionals involved in microwave network design, planning, and deployment, providing valuable insights into how microwave transmission works and the fundamental principles of microwave networks.

Course Objectives

By the end of this training course, participants will:

- Understand the concepts and characteristics of digital microwave communications.
- Learn the functions and principles of each component involved in digital microwave systems.
- Be familiar with common networking modes and application scenarios for digital microwave equipment.
- Grasp the key propagation principles of microwave transmission, including different types of fading and their effects on signal quality.
- Apply anti-fading technologies to mitigate signal degradation.
- Calculate microwave link budgets for both PtP and PtMP configurations.
- Learn about the microwave link design process, including the creation of PtMP coverage maps and conducting interference studies with tools like Pathloss 5.



Course Outlines

Day 1: Microwave Communication Overview

- What is a Microwave and how it works in transmission networks.
- Comparing microwave transmission with fiber optics.
- The history and evolution of microwave transmission.
- Key features of digital microwave communication.
- Selecting the appropriate microwave frequency band for transmission.
- RF channel configuration and the modulation/coding of microwave signals.
- Overview of the microwave frame structure.
- Various types of microwave equipment: trunk microwave, all-outdoor microwave, and split-mount microwave.
- Understanding microwave antennas and their adjustment.

Day 2: Microwave Networking, Application, Propagation, and Link Budget

- Common networking modes in digital microwave systems.
- Types of digital microwave stations, including relay stations active and passive.
- Essential parameters in microwave propagation, such as Fresnel zones and their radius.
- Understanding clearance factors that affect microwave signal quality, including the LOS survey process.
- The impact of fading on microwave transmission: free space loss, absorption fading, rain fading, and multipath effects.
- Calculating radio path link budgets and understanding fade margins.

Day 3: Anti-Fading Techniques

- Frequency domain equalization and time-domain equalization.
- Techniques like automatic transmit power control ATPC and adaptive coding & modulation ACM to improve signal quality.
- Reducing cross-polarization interference using XPIC.
- Exploring diversity technologies in microwave transmission: frequency diversity and space diversity.
- Practical tips for protecting against fading and signal degradation.
- Understanding protection modes for digital microwave equipment.

Day 4: Frequency Planning, Availability, and Recommendations

- Key principles in frequency planning for various network topologies.
- Conducting an interference study to improve network performance.
- Assessing quality and availability of microwave transmission networks.
- Practical recommendations for optimizing network planning.
- Planning for future technologies like 4G/5G in microwave networks.



Day 5: Microwave Network Planning and Link Design with Pathloss 5

- Introduction to Pathloss and its application in microwave network analysis.
- Point-to-Point PtP microwave link design.
- Point-to-Multi-Point PtMP microwave link design and coverage map creation.
- Conducting a comprehensive interference study.
- Understanding the significance of path loss 5 in microwave network connection and link design.

Why Attend This Course: Wins & Losses!

- Gain a deep understanding of microwave transmission: Learn the fundamentals of microwave transmission networks, from the basics of microwave link design to advanced anti-fading techniques.
- Improve your microwave network planning skills: Learn to design and optimize microwave networks, ensuring reliable performance across various environments.
- Master the use of Pathloss 5: Equip yourself with hands-on experience in using Pathloss 5 to design and analyze microwave link budgets, prepare PtMP coverage maps, and conduct interference studies.
- Learn best practices in microwave communication: Stay ahead in microwave transmission networks with the latest anti-fading technologies, frequency planning, and design techniques.
- Boost your professional expertise: With knowledge of the microwave transmission link design process, you'll be well-equipped to tackle challenges in modern microwave network deployment and management.

Conclusion

The microwave transmission network design course provides essential knowledge for professionals looking to excel in microwave network planning, link design, and deployment. With a deep dive into key aspects like microwave propagation, link budgets, anti-fading techniques, and frequency planning, this course offers hands-on skills to ensure successful microwave communication systems. By attending, you'll gain the expertise to stay ahead of the competition in the fast-evolving field of microwave transmission networks.

Sign up now to elevate your skills and achieve excellence in microwave transmission and network planning!

