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Telecommunication Transport Technologies: From Access to Backhaul in Mobile and Fixed Networks

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Introduction

Welcome to the course "Transmission Technologies in Wired/Wireless Networks: Backhaul, Transport, Mobile & Fixed."

This course is designed to provide participants with a comprehensive understanding of modern transmission technologies that form the backbone of telecommunications networks.

As global connectivity demands continue to grow due to 5G, cloud computing, IoT, and broadband expansion, reliable transport networks have become more critical than ever.

Throughout this course, participants will explore the principles of wired and wireless transmission technologies, including fiber optics, microwave communications, transport architectures, mobile backhaul, and fixed broadband networks.

The course also examines performance optimization, monitoring, troubleshooting, and security considerations in transport environments.

By the end of the program, participants will gain practical knowledge to design, manage, and optimize transmission networks efficiently in modern telecom infrastructures.

Course Objectives

- Understand the fundamental concepts of transmission technologies in telecommunications networks.
- Explore wired transmission systems including fiber optics, optical transport, and Carrier Ethernet technologies.
- Examine wireless transmission solutions such as microwave, millimeter wave, and satellite communications.
- Learn the architecture and design principles of backhaul, fronthaul, and transport networks.
- Understand transmission requirements in both mobile and fixed network environments.
- Develop knowledge of transport network architectures including core, aggregation, and access layers.
- Enhance skills in monitoring, performance analysis, and troubleshooting of transmission networks.
- Identify security challenges and protection mechanisms in transport infrastructure.
- Explore emerging technologies shaping the future of telecom transport networks, including 5G transport evolution and software-defined networking.
- Strengthen the ability to evaluate and select appropriate transmission technologies for different deployment scenarios.



Course Outlines

Day 1: Introduction to Transmission Fundamentals

- Understand the evolution of telecommunications transmission technologies.
- Explore analog and digital transmission principles.
- Learn key performance parameters including bandwidth, latency, throughput, and signal quality.
- Identify common transmission impairments and challenges.
- Examine the role of transmission networks within overall telecom infrastructure.

Day 2: Wired Transmission Technologies

- Explore copper-based transmission technologies and their applications.
- Understand fiber optic communication principles and optical components.
- Learn optical transport technologies including WDM, DWDM, and OTN.
- Examine SONET/SDH and Carrier Ethernet technologies.
- Understand link design considerations and capacity planning.

Day 3: Wireless Transmission & Backhaul Networks

- Understand microwave and millimeter-wave communication technologies.
- Explore radio propagation, frequency planning, and line-of-sight requirements.
- Learn wireless backhaul solutions for mobile networks.
- Differentiate between fronthaul, midhaul, and backhaul architectures.
- Examine synchronization requirements and transport challenges in modern networks.

Day 4: Transport Architectures for Mobile & Fixed Networks

- Understand transport network layers including access, aggregation, and core.
- Explore network topologies such as ring, mesh, and star architectures.
- Examine transmission requirements in mobile networks from 2G to 5G.
- Understand fixed broadband transport technologies including FTTx and PON systems.
- Learn resiliency, redundancy, and scalability strategies in transport network design.

Day 5: Performance, Security & Emerging Technologies

- Learn key performance indicators and monitoring techniques for transmission networks.
- Explore troubleshooting methodologies and fault management approaches.
- Understand security risks and protection mechanisms in wired and wireless transport.
- Examine modern transport innovations including SDN, NFV, and network virtualization.
- Explore future trends such as 5G transport evolution, AI-driven optimization, and next-generation optical technologies.



Why Attend This Course: Wins & Losses!

- Gain comprehensive knowledge of modern transmission technologies used in telecom networks.
- Develop practical skills for designing and optimizing transport and backhaul infrastructure.
- Understand how to improve network performance, reliability, and scalability.
- Learn how to troubleshoot transmission problems effectively and reduce downtime.
- Strengthen your expertise in both mobile and fixed network environments.
- Stay updated with emerging technologies shaping next-generation telecom networks.
- Enhance your professional capabilities in a highly demanding telecommunications field.
- Improve decision-making when selecting appropriate transmission solutions for projects.

Conclusion

This course provides a complete and modern perspective on transmission technologies across wired and wireless environments, covering transport, backhaul, mobile, and fixed networks.

Participants will leave with enhanced technical knowledge, practical insights, and strategic understanding necessary to support the planning, deployment, and optimization of telecom transmission infrastructure.

By attending this program, you will be better equipped to address the challenges of evolving communication networks and contribute effectively to the development of reliable, high-performance connectivity solutions in today's digital world.

