COVERTEL
TELECOMMUNICATIONS GROUP

DWDM & Optical Transport Networks

Modern DWDM, Coherent Optics, OTN, DCI & Network Automation

COURSE DESCRIPTION

A practical two-day course covering modern DWDM, coherent optics, ROADM, OTN, DCI, 400ZR/800ZR, IP-over-DWDM and network automation.

Participants will learn how 100G, 400G and 800G services are transported across modern metro, backbone and data centre networks, and how optical networks are evolving for cloud, AI and hyperscale infrastructure. The course is vendor-neutral and focused on real-world architectures, operations, troubleshooting and automation, giving teams a shared technical foundation for designing, operating and supporting modern optical transport networks.

WHO SHOULD ATTEND?

Network engineers, optical engineers, technicians, commissioning and maintenance engineers, NOC engineers, and stakeholders involved in designing, operating or supporting modern optical transport networks.

PREREQUISITES

Basic knowledge of digital communications, networking or optical transmission is recommended.

SOME COURSE BENEFITS

- Understand the evolution of modern optical transport networks
- Identify key technologies used in modern DWDM systems
- Understand coherent optical transmission and high-capacity services (100G/400G/800G)
- Understand optical components, amplifiers and ROADM architectures
- Understand the role of OTN in modern transport networks
- Compare OTN, IP-over-DWDM and coherent pluggable architectures
- Understand DCI requirements and modern optical networking approaches
- Understand basic network automation concepts including APIs, telemetry and programmability

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- Apply optical troubleshooting concepts to real-world scenarios

COURSE OBJECTIVES

By the end of this course participants will be able to:

- Understand modern DWDM and coherent optical transmission technologies
- Explain key WDM network elements and optical architectures
- Understand ROADM, flexible optical networks and DCI architectures
- Explain the evolution from 100G to 400G and 800G optical transport
- Understand OTN principles, hierarchy and applications
- Describe OTN multiplexing, mapping and performance monitoring concepts
- Compare OTN-based transport with IP-over-DWDM and coherent pluggable solutions
- Understand modern optical network management and automation concepts

FORMAT

2 days.

- Technical presentations
- Interactive discussions
- Practical exercises
- Quizzes
- Real-world case studies
- Troubleshooting scenarios
- Maximum attendees: 12 per course

CONTENT

DAY 1 — Modern DWDM, Coherent Optics & DCI

1. Optical Networks in the AI Era

- Evolution of optical transport
- Cloud, AI and hyperscale infrastructure
- Bandwidth, latency and scalability requirements

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2. DWDM & Optical Fundamentals

- Fibre and optical spectrum
- CWDM vs DWDM
- ITU-T wavelength grid
- Optical power, OSNR and link budgets

3. Coherent Optical Transmission

- Coherent detection and DSP
- Modulation and FEC
- 100G → 400G → 800G
- Introduction to 1.2T/1.6T

4. Modern DWDM System Architecture

- Transponders and coherent pluggables
- Optical line systems
- EDFA and Raman amplification
- Multi-span networks
- Power and OSNR management

5. ROADM & Flexible Optical Networks

- ROADM architecture
- Colorless, Directionless, Contentionless
- CDC-ROADM
- Flex-Grid
- Dynamic optical networking

6. Modern Optical Network Architectures

- Metro, regional and long-haul networks
- Backbone and data centre networks
- IP/optical integration

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7. Data Centre Interconnect (DCI)

- Metro, regional and long-haul DCI
- AI and hyperscale connectivity
- Bandwidth, latency and resilience
- Layered optical network architecture
- 400G/800G DCI architectures

8. 400ZR, 800ZR & ZR+

- Coherent pluggables
- Router-to-router connectivity
- IP-over-DWDM
- DCI applications
- ZR vs ZR+

9. Traditional Transport vs IP-over-DWDM

- Transponder-based transport vs coherent pluggables
- OTN/DWDM vs router-based architectures
- Carrier vs hyperscale applications
- Architecture selection and trade-offs

DAY 2 — OTN, Network Automation & Operations

10. Why OTN Still Matters

- OTN as a digital transport layer
- Where OTN fits today
- OTN vs IP-over-DWDM
- Where OTN is valuable and where it may be bypassed

11. OTN Architecture & Standards

- ITU-T G.709 / G.872
- OTU, ODU and OPU
- OTN frame and client mapping
- FEC and performance monitoring

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12. High-Speed OTN

- 100G, 200G and 400G OTN
- Evolution towards 800G
- Performance monitoring
- End-to-end and segment monitoring

13. OTN Grooming & Switching

- OTN grooming
- ODU switching
- Service aggregation
- Multi-service transport
- Bandwidth efficiency

14. OTN vs IP-over-DWDM vs ZR/ZR+

- Architecture comparison
- Capacity and reach
- Latency and resilience
- Service aggregation
- Operational considerations
- Choosing the appropriate architecture

15. Open & Disaggregated Optical Networking

- Open optical networking
- Open line systems
- Multi-vendor interoperability
- Disaggregation
- Controller-based architectures

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16. Network Management & Automation

- Traditional NMS/EMS vs modern network management
- Telemetry, monitoring and alarms
- APIs, REST, JSON and Python for network automation
- Short practical demos and walkthroughs using simple API/Python examples
- Network programmability and orchestration
- Introduction to closed-loop and AI-assisted operations

17. Operations, Troubleshooting & Case Studies

- DWDM and optical power problems
- OSNR and coherent link issues
- ROADM and OTN alarms
- DCI troubleshooting
- Real-world transport scenarios
- Automated monitoring concepts

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