COVERTEL
TELECOMMUNICATIONS GROUP

Certified Optical Network Engineer (CONE)

COURSE DESCRIPTION

The Certified Optical Network Engineer (CONE) course provides advanced knowledge of optical networking technologies used in high-capacity telecommunications systems. Over five days, participants explore modern optical network design, including coherent transmission, wavelength division multiplexing (WDM), and high-speed data transmission technologies.

The course focuses on the challenges facing optical networks today, including increasing capacity, extending reach, improving flexibility, controlling latency and ensuring interoperability. Participants will gain a deep understanding of how optical and electronic technologies work together to support high-performance networks operating at 100G, 400G, 800G and beyond.

Through real-world scenarios and case studies, the course develops the skills required to design, optimise and manage modern optical networks while balancing performance, cost and power consumption.

WHO SHOULD ATTEND

Optical network engineers, telecommunications engineers, network planners, data centre engineers and professionals involved in the design, optimisation and operation of optical communication networks.

PREREQUISITES

Participants should have prior knowledge of optical networking fundamentals, such as the Certified Optical Network Associate (CONA) course or equivalent experience.

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SOME COURSE BENEFITS

- Advanced understanding of high-capacity optical network design
- Ability to optimise network performance and transmission efficiency
- Knowledge of coherent transmission and advanced modulation techniques
- Understanding of dispersion, amplification and latency challenges
- Insight into software-defined networking (SDN) and open optical systems

COURSE OBJECTIVES

Participants will gain the knowledge and skills required to:

- Design optical networks to avoid non-linear transmission effects
- Select appropriate fibre types and transmission technologies
- Plan high-capacity links using WDM and coherent transmission
- Evaluate pluggable optics and transceiver options
- Design networks for optimal reach, performance and flexibility
- Assess amplification strategies including EDFA and Raman systems
- Analyse latency and quality of service in optical networks
- Specify ROADM configurations and optical switching technologies
- Understand SDN, open optical systems and network disaggregation
- Develop long-term network design strategies and policies

FORMAT

5-day interactive classroom training including theory sessions, case studies and practical exercises.

Maximum attendees: 10 per course.

CONTENT

Optical Network Evolution

- Evolution of optical networks (6th and 7th generation)
- Industry trends and future developments
- Case study and network requirements

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Managing Light in Optical Systems

- Non-linear effects in optical transmission
- Causes and impact of non-linearity
- Mitigation and compensation techniques
- Fibre types for advanced transmission systems

Optical Transmission Technologies

- Data rates and transmission formats
- Pluggable optics and transceivers
- Co-packaged optics
- Challenges in high-speed transmission

Increasing Network Capacity

- **Modulation formats and signal complexity**
- **Polarisation multiplexing**
- **Coherent detection technologies**
- **Optical signal generation and detection**

Wavelength Division Multiplexing (WDM)

- WDM principles and technologies
- Channel spacing and wavelength selection
- Dynamic wavelength allocation
- Optical spectrum management

Optical Amplification

- Extending network reach using amplifiers
- EDFA and Raman amplification
- Amplifier performance optimisation
- Developments in optical amplification

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Submarine & Long-Haul Systems

- Submarine cable systems
- Subsea transmission technologies
- Testing and performance considerations

Dynamic Optical Networks

- Managing channel and power levels
- Flexible grid (Flexgrid) technologies
- Adaptive optical transmission systems

Optical Switching & ROADMs

- ROADM architectures and applications
- Colourless, directionless and contentionless ROADMs
- Open and flexible optical networks

Latency & Network Performance

- Understanding latency in optical networks
- Measuring and calculating latency
- Minimising latency for critical applications

Quality of Service (QoS)

- Identifying performance issues
- Improving system performance

Software Defined Networking (SDN)

- SDN in optical networks
- Network disaggregation
- Open optical networking systems
- White box solutions

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Network Design & Strategy

- Design strategies and policies
- Network constraints and challenges
- Transmission technologies and data rates
- Amplifier and ROADM deployment

Assessment

- Design assignment (DCI scenario)
- Case study assignment
- Theory-based assessment

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