Network & Design

Advanced

OTT Certified Optical Network Associate (CONA)

This five-day instructor-led course examines how to design, plan, and implement cost-effective, high-speed networks from single channel systems to multiple channel options using CWDM and DWDM. Attendees will work together on interactive design projects to establish requirements for proper system performance and determine how the network can be affected by the properties of the physical infrastructure.

Audience: Outside plant and network engineers

Prerequisite: Knowledge of fiber theory and basic network engineering concepts

Credentialing

OTT Certified Optical Network Associate

OTT Licensed and Delivered by **Fiber Insight**

Click or scan for detailed course information and upcoming training locations.

OTT Certified Optical Network Engineer (CONE)

Learn to meet the fast-evolving challenges of increasing capacity, reach, and flexibility, controlling latency, migrating to open/interoperable systems, and providing quality of service while keeping costs under control and reducing power consumption. Learn how the combination of coherent transmission and digital signal processing has transformed optical communications at the higher data rates of 100 to 800 Gb/s and about the changes necessary for DWDM systems to operate efficiently at data rates of 400 Gb/s and above.

Understand how a mix of optical and electronic technologies is used to overcome limitations, and the role of SDN and its implications for facilitating open line systems, ROADMs, and white box solutions. Appreciate the fundamental limitations that apply and the trade-offs and compromises necessary to make strategic decisions about the long-term plans for your network.

Audience: Anyone deploying advanced communication networks of 100 Gb/s and above. Typical roles include network designers, planners, network engineers and managers, and strategic network managers.

Prerequisite: OTT Certified Optical Network Associate (CONA) certification.

Credentialing

OTT Certified Optical Network Engineer

IEEE credits available for additional fee.

OTT Licensed and Delivered by **Fiber Insight**

Click or scan for detailed course information and upcoming training locations.

Certified Optical Network Associate (CONA)

5 days

Planners course

Purpose

This introduces optical networking and the types of systems that are in widespread commercial deployment. You will learn how to design, plan and implement cost effective, efficient, high capacity optical networks or interconnects.

The course focuses on networks that use either a single channel per fibre, or multiple channels using CWDM and DWDM technology, providing typically up to 10 or 25Gb/s per channel and up to 80 channels per fibre. This may include metro or core networks, mobile backhaul/FTTA, Data Centre Interconnect (DCI), or dark fibre links and long haul systems that also use fibre amplifiers.

You will learn what is required for satisfactory system performance of such networks & how the performance can be affected by the properties and the quality of the physical fibre infrastructure including such issues as attenuation, chromatic dispersion & polarisation mode dispersion (PMD).

A great course for those that need a broad foundation of knowledge of optical networks, it suits job roles such as: planner, project manager, operations staff, network manager

Features

- ❑ scenario based
- ❑ ongoing case study
- ❑ uses OTT's unique WhizzieKit virtual optical network training system
- ❑ comprehensive course support materials
- ❑ pass the assessment to gain Certified Optical Network Associate (CONA) status

Key outcomes

- ✓ design optical links that provide high capacity, typically up to 10 or 25Gb/s per channel and up to 80 channels per fibre
- ✓ specify the components that are required to build a transmission link and describe how they should be configured
- ✓ identify basic building blocks that can be controlled via SDN
- ✓ determine the optical power budget of different transmission systems
- ✓ calculate the optical loss budget for a transmission link
- ✓ assess the quality of existing fibre infrastructure and its suitability for different systems
- ✓ decide when and where optical amplifiers are needed and identify suitable products
- ✓ calculate whether chromatic dispersion compensation is required for a link, and if so specify an appropriate DCM
- ✓ verify that a link design is viable in terms of power levels, chromatic dispersion limits and PMD levels

This is a foundation course so there are no pre-requisites.

Delegates or their colleagues may also be interested in the CFCE course which covers characterisation of the dark fibres and analysis of results in order to ensure that the infrastructure is of a good quality and will support the required applications.

A great foundation course before taking the more advanced **CONE** course

Certified Optical Network Associate (CONA)

BECOMING A CONA
- ❑ What are optical networks?
- ❑ The different generations
- ❑ The role of standards
- ❑ The week ahead

CASE STUDY
- ❑ Background, roles, project
- ❑ Introduction to WhizzieKit

UNDERSTANDING LIGHT
- ❑ Light as a wave
- ❑ Wavelengths & frequencies used in fibre optics
- ❑ Singlemode fibre as a waveguide
- ❑ Using light to transfer information
- ❑ Chromatic dispersion
- ❑ Polarisation mode dispersion

MANAGING LIGHT
- ❑ Using passive components to manage light
- ❑ Managing power levels
- ❑ Directing light
- ❑ Multiplexing light
- ❑ Managing different wavelengths of light

INTRO TO MULTIPLEXING
- ❑ Electronic TDM
- ❑ WDM
- ❑ SWDM
- ❑ CWDM
- ❑ DWDM

LIGHT IN OPTICAL FIBRES
- ❑ How fibres work
- ❑ Multimode fibre
- ❑ Singlemode fibre
- ❑ Launch conditions
- ❑ Attenuation
- ❑ Dispersion
- ❑ Bend loss performance

INFRASTRUCTURE

OPTICAL FIBRES FOR TELECOMS
- ❑ Fibres for datacomms
- ❑ Fibres for telecoms
- ❑ Standards

SPECIFYING FIBRE OPTIC CABLES
- ❑ Sourcing cable links
- ❑ External and internal cable performance issues
- ❑ Typical constructions
- ❑ Cables for different environments

JOINTING EXTERNAL CABLES
- ❑ The challenges
- ❑ Scenarios
- ❑ Installation issues
- ❑ Splice closures

TERMINATING EXTERNAL CABLES
- ❑ The challenges
- ❑ Scenarios
- ❑ Termination location components
- ❑ Specifying an ODF

CONNECTORS
- ❑ Connector styles
- ❑ Connector performance
- ❑ Pre-terminated assemblies
- ❑ Inspection and cleaning
- ❑ Inspection standards
- ❑ Performance requirements for joining fibres

INFRASTRUCTURE TESTING
- ❑ Why test?
- ❑ What tests are needed
- ❑ Analysis and extracting relevant information
- ❑ Monitoring systems

SYSTEMS

INTRODUCTION TO SYSTEMS PERFORMANCE
- ❑ Satisfactory communications
- ❑ Quantifying signal quality
- ❑ Electrical measurements: BER, Q-factor
- ❑ Optical measurement: OSNR

POWER LEVELS IN LOSS LIMITED SYSTEMS
- ❑ Target distances
- ❑ Loss budgets
- ❑ Transmitter power levels
- ❑ Receiver power levels
- ❑ Interface definitions
- ❑ Example power levels

OPTICAL AMPLIFIERS
- ❑ Benefits & drawbacks
- ❑ EDFAs
- ❑ Raman amplifiers
- ❑ Amplifier types
- ❑ Configurations
- ❑ Specifications
- ❑ Amplifier performance
- ❑ Implementation checklist

TRANSCEIVERS
- ❑ Light sources & transmitters
- ❑ Receivers & detectors
- ❑ Transceiver modules
- ❑ Performance comparisons
- ❑ Key parameters

DISPERSION

CHROMATIC DISPERSION
- ❑ What is it?
- ❑ What causes it?
- ❑ Dispersion slope
- ❑ CD characteristics of common fibre types
- ❑ Dispersion limited systems

CHROMATIC DISPERSION MANAGEMENT
- ❑ Optical versus electronic dispersion compensation
- ❑ Strategic issues
- ❑ Dispersion compensating fibre
- ❑ DCM performance examples
- ❑ Dispersion compensating modules
- ❑ Bragg grating DCMs
- ❑ Dynamic compensation
- ❑ Dispersion accommodation

POLARISATION MODE DISPERSION
- ❑ What is PMD?
- ❑ Polarised light
- ❑ Polarisation in fibres
- ❑ PMD and system performance

OPTICAL NETWORKING

PHOTONIC NETWORKS
- ❑ Photonic network topologies
- ❑ Multiplexers
- ❑ Add drop technologies
- ❑ ROADMs

PRACTICAL IMPLEMENTATION
- ❑ Equipment configurations
- ❑ What do I need?
- ❑ What type?
- ❑ Where does it go?
- ❑ Rules and constraints

ASSIGNMENT
- ❑ Case study assignment
- ❑ Theory assessment