

Optical Networking

Course Description

This seminar will present WDM Networks, their building blocks and design concepts, aspects of control and management and survivability. A short overview on Optical Access Networks will conclude the seminar. This seminar will complement the "hardware" description of the Optical Communication. The seminar covers technical aspects of MPEG-4.

Prerequisites

Previous participation in the Optical Communication – Technology and Potential seminar is recommended but not mandatory.

Duration: 3 days

Course Outline

1. **Introduction**
2. **Optical fiber**
 - Light wave principles
 - Wavelength, Loss, Reflection and refraction
 - Fiber Types (S.M and M.M) and characteristics
 - Ribbon Fibers
 - Dispersion and Non-linear effects
 - Non-silica fibers and fibreless optics
 - Specifications and data pages
 - o MM – Step and Graded index
 - o SM – SMF-28/G.652, DSF and NZDSF fibers
3. **Optical Network components**
 - Optical Cables (indoors, outdoors, Ribbons) Fiber connections
 - o Connectors (types and applications)
 - o Splices
4. **Measurements**
 - End-to-end Loss budget measurement and calculation,
 - Test equipment (OTDR, Power Meter, ..)
 - Acceptance tests and validation
5. **Security in Optical networks**
 - Principle, Tapping, Clip-on device
 - Intrusive tapping on optical Networks and detection
 - RFTS – Network Monitoring
6. **Optical Components**
 - Couplers
 - WDM, CWDM and DWDM
 - Isolators and circulators
 - Diffraction gratings
 - Multiplexers and filters (Fiber bragg gratings, Fabry-Perot, Thin-films, Mach-Zehnder, Arrayed waveguide and Acousto-optic tunable filters)
 - Dispersion Compensators
 - LEDs, LDs transmitters and Detectors
7. **Optical Switching**
 - Erbium Doped-fiber amplifiers (EDFA)
 - Modulators
 - Types, principles and applications
 - Optical Switching components
 - o Types, principles and characteristics
 - o MEMS, Liquid-crystal, Inkjet bubble, Electro/thermo/acoustic-optical and others
 - Optical switching subsystems and engineering
 - Networking and trends
8. **WDM Technologies**
 - DWDM and CWDM
 - Principle, wavelength and operation
 - Wavelength planning
 - Uni and Bi-directional
 - Optical Add/drop multiplexer
 - Applications, advantages and disadvantages
 - Provisioning, Control and management
9. **Introduction to Optical Networks**
 - End-to-end Network architecture
 - Customer side, access, metro and core
 - First, Second and Third generation networks
 - Optical layer
 - Network layers (IP/Ethernet over MPLS over SDH or Optic layers)
 - Network survivability and protection
10. **Market Strategy, Companies and Activities**
 - Explanation of different Network Strategies and targets
 - Example of some Operator's optical networks
11. **Summary**

Who should attend?

This seminar is addressed to Telecom Engineers, wishing to get a full understanding of the potential of the emerging Optical Networks. This seminar assumes a basic understanding of Communication Protocols (such as given in the [Intro to Modern Data Communications](#) seminar).