Professional Education Programs

Course
Optical Fiber Communications: Theory & Measurements

Overview
The explosive growth of data, particularly internet traffic, has led to a dramatic increase in demand for transmission bandwidth. This requirement was initially addressed by widely employing single-mode optical fibers to interconnect discrete network locations in a point-to-point fashion offering high capacity and long reach transmission capabilities. These links were terminated by SONET/SDH equipment forming ring network topologies.

With recent technology advances, Wavelength Division Multiplexing (WDM) is introduced to enhance further the available bandwidth while the WDM transport layer is migrating into elaborate networks with improved features, higher manageability, lower complexity and cost. Currently there is a drive to enable intelligent optical/IP internetworking that will dramatically reduce the operation costs and will enable service providers to create dynamic new services for their customers.

Objectives
This course gives an overview of the enabling technologies and provides an in depth understanding of the design criteria and methodologies used in the various segments of this type of networks including long-haul, metro and access networks. It will also cover the optical networking design principles and architectures.

The considerations for near term optical network deployments will be presented together with the evolution path towards advanced next generation optical networks with build-in intelligence and optimum performance.

Lectures designed to build the theoretical knowledge on the topic cover 50% of the course duration. The rest 50% is devoted to acquiring hands-on experience through laboratory exercises and demonstrations to be carried out in AIT's optical communications lab. At the lab measurements of key parameters characterizing an optical communication system will be demonstrated. The practical part of the course includes introduction to the VPI Transmission Maker simulation tool and some simulation studies using the tool and laboratory demonstration of certain aspects of the physical optical layer

Who should attend

Prerequisites

Duration

Instructor
Dr. I. Tomkos

Course outline
Day 1:

Introduction to optical networks

Fiber transmission – Attenuation, chromatic dispersion, PMD and non-linearities

Transmitters – Lasers and modulators

Receivers – Fundamentals (Receiver design) and performance measures (bit error rate, power penalty, Q-factor)

Optical amplifier types (e.g. EDFAs, SOAs, Raman, hybrids) and noise

Introduction to the VPI Transmission Maker simulation tool

Studies using the VPI simulation tool

Day 2:
Multiplexing techniques including WDM, OTDM, CDMA
WDM components (e.g. filters) and subsystems (e.g. wavelength converters, gates, regenerators)
Network elements including Optical Add/Drop Multiplexers and Optical Cross-Connects and associated impairments
WDM system design, engineering rules

Laboratory demonstration:
- Network Devices
- Instruments for measurements and testing
- Basic demonstration of optical transmitter-receiver

Day 3:
Principles of 1st generation optical networks (e.g. point-to-point links, SDH/SONET, ATM, FDDI)
Principles of 2nd generation optical networks (e.g. WDM networks, wavelength routed networks)
Optical network control and management - Introduction to GMPLS and ASON
Metropolitan area optical networks
Optical access network architectures: optical networking and WDM for the local loop
Current deployment considerations

Laboratory demonstration:
- Advanced measurements
- WDM transmission, impairments and measurements
- OTDR measurements

Tuition Fee

N/A
Discount Policy
Cancellation Policy

Program Registration

www.ait.edu.gr/profPrograms/reg_form/admission_form.asp

Contact

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