Course Number H7214A/B Opt. 100, Scheduled, Dedicated

Elements of Lightwave Technology

Course Overview

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Learn why fiberoptic cables in conjunction with high-speed semiconductor lasers and photodiodes are essential parts of today's local, regional and global communication networks. This class introduces you to the background knowledge every technician, engineer or manager needs to understand from the physical layer of a lightwave based communication system.

What you will learn

This course provides easy-to-understand concepts and implementations of the following:

- Physical Basics
- Fibers, Cables, Splices, and Connectors
- Passive Components
- Transmitters and Receivers
- Optical Amplifiers
- Dense Wavelength-Division Multiplexing

Specifications

Course Type

Technology Training

Audience

Technicians, new engineers, managers, and non-technical people in the communication industry who are not familiar with fiberoptics and want to understand the important elements of this important communication technology

Prerequisites

None

Course Length

1 day

Delivery Method

Scheduled (at Agilent training locations) or *Dedicated* (at customer site).
To save you time and travel, many courses can be delivered at your site. Agilent can provide required equipment, or save money by furnishing your own.

Course Format

Course content is lecture complemented with review questions and demonstrations to familiarize students with the principles of lightwave technology.

Detailed Course Agenda

Introduction

- What is lightwave technology?
- Why lightwave technology?
- Use of lightwave technology
- Telephone Networks and Other Networks
- Telecommunication Network Bandwidth Trend
- Basic Link Design and Typical Longhaul System
- Typical Regenerator and Amplifier Units
- Data Communication Trends and Buzzword

Physical Basics

- The Carrier – Light
- Light Properties – Wavelength
- Electromagnetic Spectrum
- Lightwave Transmission Bands
- Optical Power and Laser Power Limits of Class I
- Logarithmic Scale
- Coherence, Interference, Reflections, and Polarization
- Poincaré Sphere
- Digital Modulation and Analog Modulation

Standards

- Lightwave Standards Evolution
- Network Model and Key Standards
- PDH Networks and SONET/SDH
- Typical Ring Structures
- DWDM Standards
- Frequency grid from G.692

Fibers, Cables, Splices, and Connectors

- Basic Step-Index (SI) Fiber Design
- Numerical Aperture (NA)
- Attenuation In Silica Fibers
- Step-Index Multimode (MM) Dispersion
- Gradient-Index (GI) Fibers
- Single-Mode Fibers (SMF)
- Chromatic Dispersion (CD)
- Dispersion-Shifted Fiber (DSF)
- Polarization Mode Dispersion (PMD)
- Cable Designs and Issues of Connecting Fibers
- Connector Types, Technology and Brands
- Connector Inspection, Care, and Cleaning
- Splices

Passive Components

- Patchcords
- Wavelength-Independent Couplers
- Wavelength-Dependent Couplers
- Isolators
- Filter Characteristics
- Dielectric Filters and Tunable Fabry-Perot Filters
- Fiber Bragg Gratings (FBG)
- Circulators and Add/Drop Nodes
- Multiplexers (MUX)/Demultiplexers (DEMUX)
- Array Waveguide Grating (AWG)

Transmitters and Receivers

- Light-Emitting Diode (LED)
- Fabry-Perot (FP) Laser
- Distributed Feedback (DFB) Laser
- Vertical Cavity Surface Emitting Lasers (VCSEL)
- Other Light Sources
- Basic Transmitter Design
- Modulation Principles and External Modulators
- Photodiodes
- Material Aspects
- Basic Receiver Design and Receiver Sensitivity
- Regenerator and Conceptual Terminal Diagra

Optical Amplifiers
- Erbium Properties
- Basic EDF Amplifier Design
- Amplified Spontaneous Emission
- Output Spectra and Time-Domain Properties
- Optical Gain (G) and Noise Figure (NF)
- Gain Compression
- Polarization Hole-Burning (PHB)
- Spectral Hole-Burning (SHB)
- EDFA Categories
- Commercial Designs
- Security Features and Other Amplifier Types
- Future Development

Wavelength – Division Multiplexing
- Basic Design
- DWDM Spectrum and DWDM Standards
- EDFAs In DWDM Systems
- Gain Flatness (Gain Tilt) and Gain Competition
- Output Power Limitations
- DWDM Trends
- Add/Drop Points
- Research Topics

For more details on Agilent's optical and electrical solutions for testing communication at the physical layer, visit our website: www.agilent.com/find/lightwave

Ordering Information

To order the *Elements of Lightwave Technology* course (H7214A/B Opt. 100), call:
US (800) 593-6632
Canada (800) 561-3276

The Agilent Technologies Customer Registration Center can provide you with price and enrollment information about scheduled courses or a dedicated course which can be customized to meet your specific needs.

You may also register or request additional information online at: www.agilent.com/find/tmeducation

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