

Course ID
DWDM101
Course Duration
2 days

Course Title
DWDM: An Introductory Tutorial

Related Courses

- SONET/SDH: Principles and Design (SONET-SDH, 2 days)
- DWDM Principles and Design: An Advanced Tutorial (DWDM, 2 days)

Aimed At

Telecommunications transport, systems, and network engineers, capacity managers, and others responsible for the planning, design, or day-to-day operation and management of large telephony systems.

Group Size

5-25

Prerequisites

While there are no particular prerequisites for this course, some comfort with Physics and Mathematics will be helpful. However, all necessary Mathematics/Physics concepts will be reviewed within the course as needed.

Course in a Nutshell

Dense Wavelength Division Multiplexing (DWDM) is a key part of the world's communications infrastructure. The revolution in optical transmission technologies that has occurred in this decade has allowed operators to dramatically increase their transmission capabilities at a fraction of the costs of legacy technologies. For anyone involved with telecommunication and information technology, understanding this technology is of vital importance.

In this introductory course, you will learn the essentials of the T-carrier system, review the SONET/SDH basics, and study the technology and applications of dense wavelength division multiplexing. Toward the end of the course, we will also touch upon coarse wavelength division multiplexing.

Customize It!

We can customize the course to address the concerns unique to the various audience groups including transmission, network, or systems engineers, chipset manufacturers, R&D specialists, optical system installers, managers and executives, marketing and sales personnel, operations and support personnel, and others. Most customization is performed at little to no added cost.

Learn How To Describe the key concepts and techniques of transport/optical transmission technologies including:

- T-carrier system
- SONET/SDH
- DWDM
- Coarse WDM

**Course
Outline**

- Introduction to Optical Technologies
 - An overview of the transport technologies
 - Optical technologies: Their advantages and disadvantages
- The T-Carrier System
 - Framing
 - Synchronization
 - Extended super frame
 - Capacity overview
- Review of SONET/SDH
 - Framing
 - Overhead
 - SONET structures
 - SONET carrier system
 - SONET synchronization
 - Concatenation
 - BLSR
- WDM Technologies
 - History of WDM
 - Evolution of DWDM
 - Drivers of DWDM
 - Drivers of CWDM
 - Overview and comparison of DWDM and CWDM
 - Overview of a functioning DWDM system
 - Signal generation
 - Combiners/Mixers
 - Transmitters
 - Receivers
 - How optical fiber works
 - Refraction
 - Reflection
 - Cladding
 - Core
 - Overview of multimode fiber
 - Overview of single-mode fiber
 - Step index
- Functional Descriptors: DWDM

- Standards and definitions
- Channel spacing
- Multiplexers
- Optical multiplexers
- Add/drop multiplexers
- Wave division multiplexing
- Signal regeneration
- Functional Descriptors: CWDM
 - ITU standard definition
 - Channel spacing
 - Applicability and use
- Dense WDM
 - ITU standard definition
 - Channel spacing
 - Wavelengths
 - EDFA
 - DWDM terminal multiplexer
 - Add drop multiplexer in DWDM
 - DWDM terminal duplexer
 - Optical supervisory channel
- DWDM Systems
 - Typical laser design: An overview
 - ITU Grid G.692
 - Transponders
 - Re-transmission – 1R
 - Re-time and re-transmit – 2R
 - Re-time, re-transmit and re-clock – 3R
 - Multiplexed transponders
 - Transmitters
 - Attenuation
 - Chromatic dispersion
 - Nonlinearities
 - Optical amplifiers
 - Optical receivers
 - OADMs
 - Roadm (reconfigurable add/drop multiplexer) technology
 - DWDM in single-mode fiber systems
 - DWDM in multimode fiber systems
- DWDM Applications
 - Long distance
 - Long haul
 - Self healing rings
 - Diversity
 - Network expansion
- Course Wrap-up
 - Future evolution of optical technologies

- Directions for advanced study
- Course recap, Q/A, and evaluations

How You Will Learn

- An instructor well versed with optical technologies will present this course onsite at your offices.
- The course will be taught tutorial style, with plenty of opportunity for questions/answers and group discussion. Exercises specific to your work can be included if desired to make the course more job relevant.
- If you already know something about optical or other transmission technologies, we will leverage what you know to make the new concepts easier to master.
- If you are rusty on Physics or Mathematics, we will review the critical Mathematics/Physics background as needed as well as employ examples and analogies to communicate difficult concepts.
- You will receive a printed student handbook which will help you recall and retain what you learned in class and apply it on your job.

Revised

April 10, 2007