

Hands-On

Fiber Optic - ISP/LANs

Inside Plant/Local Area Cable Networks



Course Description

This Hands-On 3-day course is designed to provide technicians with a practical understanding of fiber optic theory and fiber applications in Local Area Network, Security and Closed Circuit TV systems. This course provides the knowledge and skills to help students design, install, terminate, test, troubleshoot and maintain cables in an intra-building and inter-building environment.

Certification(s)

ETA FOI (Fiber Optic Installer) Certification can be administered during this course, and will add an additional day with applicable charges, upon request.



Students Will Learn

- Discuss the history of fiber optics & evolution of fiber.
- Discuss fiber types and manufacturing methods.
- Discuss fiber optic theory and waveguide functions.
- Describe the causes of attenuation, optical reflection and refraction.
- Understand Optical Dispersion and Pulse Spreading Issues.
- List the three basic elements of fiber optic systems and discuss their uses.
- Describe various cables types and proper installation methods.
- Describe Safe Optical and Physical Work Practices.
- Understand the design of various Indoor Network Topologies.
- Discuss LAN specifications and standards.
- Recognize challenges for the Designer and Installer.
- Demonstrate safe hand tool use.
- Perform cable and fiber preparation techniques.
- Perform ST & SC style connector assemblies.
- Demonstrate connectorized Jumper and Cable Assembly skills.
- Recognize other types of connectors currently available.
- Perform optical loss testing on jumpers and cable assemblies.
- Perform Visual Fault Locator techniques.
- Demonstrate troubleshooting techniques.
- Understand OTDR basic operation and testing methods.
- And More

Target Audience

Contractors, union craftsman, electricians, technicians, installers, splicers, LAN managers/administrators, end-users, engineers, MIS managers, facilities managers, architects and developers, systems engineers, telecom managers and anyone involved in repairing, installing, maintaining, designing, evaluating, or provisioning Cable, Fiber Optic Cables and Optical Networks.

Prerequisites

A basic understanding of various telecommunications systems is highly recommended. We offer these topics in several of our courses, please visit www.BTStraining.com for additional course descriptions.

Course Outline

MODULE: 1 FIBER OPTIC GENERAL STUDIES

I. INTRODUCTION

- Common Industry Terminology
- History of Fiber Optics
- Advantages/Disadvantages of Fiber Optics
- Basics of a Fiber Optic Communications System
- Fiber Types and Manufacturing Processes (VIDEO)
- Typical Transmission Rates for Voice, Video & Data Applications
- System Topologies
- Fiber Optic Standards

II. THEORY TOPICS

- Theory of Light
- Electromagnetic Spectrum
- Total Internal Reflection (Singlemode)
- Refraction (Multimode)
- Index of Refraction (Refractive Index)
- Light Sources (LEDs & LASERS)
- Wave Division Multiplexing (WDM)
- Optical Switching Fundamentals

III. FIBER TOPICS

- Optical Fiber Types
- Typical Fiber Specifications
- Multimode Optical Fibers
- Singlemode Optical Fibers
- Dispersion Characteristics
- Modal Dispersion
- Chromatic Dispersion

IV. FIBER CABLE TYPES

- Outside Plant
- Inside Plant
- Loose tube Gel Filled (OSP)
- Tight Buffered Distribution (ISP)
- Tight Buffered Breakout (ISP)
- Jumper Cables and Hybrids styles
- Reverse Oscillation Locator (OSP)
- Fiber Color Code

MODULE: 2 FIBER OPTIC SAFETY ISSUES

V. SAFETY FIRST

- LASER Safety and Warning labels
- Types of LASERS
- LASER Output Power Levels
- Eye Safety Precautions
- Safe Glass Disposal Practices

Food and Drinks Not Safe
Proper Person Cleanliness
Safe Work Surroundings
Confined Spaces Issues

MODULE: 3 FIBER OPTIC CABLE INSTALLATION

VI. PROPER PLANNING

Project Considerations
Cable Pre-testing
Cable Reels Identification and Handling
Proper Cable Pulling Techniques
Outdoor Cable Design Characteristics
Direct Bury Cable Installation
Directional Boring Methods
Buried Cable Depths
Man Holes and Vaults
Cable Pulling Specifications
Tensile Strength and Bend Radius
Avoiding Installation Obstacles
Grounding and Bonding Fiber Cables
Identifying Cable Types
Work Area Protection Issues

MODULE: 4 FIBER OPTIC TESTING

VII. BASIC TESTING INFORMATION

The dB Scale and Units of Loss
OTDR Functions for Testing
OTDR Testing for Splices, Distances and Back Reflection
OTDR Trace Guidelines
The Dead Zone
Trace Events and Interpretation
Testing at Various Wavelengths
System Loss Parameters
Calculating System Loss
Total System OTDR Testing
Optical Loss Test Sets (OLTS)
Referencing the Test Set First
Measuring Cable System Loss
Documenting Test results

Hands-On Labs:

Safety Meeting

1 Cable Preparation Tools and Techniques

- A. Show the correct and safe usage of cable preparation tools

Cable Knife
Kevlar shears/snips
Tube Ring Tool
T strippers

- B. Tight Buffer Cables - Preparations for termination of jumpers and system cables

Measure and then Ring the cable jacket accordingly
Remove the out jacket to expose fibers and inner materials
Cut the Kevlar, nylon tape and any strength members
If necessary, ground the cable using recommended cable manufactures procedures.

- C. Breakout & Fan Out Kits

Determine the type of kit if necessary
Prepare and clean the cable to match
Install fibers to kit
Label as necessary

- D. Connector Assembly

Determine connector type to be installed
Slide the connector boot onto each fiber
Remove the fiber coating with proper stripping tools
Clean the exposed fiber with alcohol pad
Apply epoxy to fiber and connector body
Insert fiber through connector & ferrule and let epoxy cure
Cleave fiber from ferrule end with hand scribe tool
Perform hand polishing techniques until fiber is flush with ferrule
Inspect polished fiber end with connector view scope
Determine polish quality for acceptance

2 Testing Equipment and Methods

- E. Optical Loss Testing

Reference the Light Source and Power Meter
Perform End to End and Link Loss Measurements
Measuring your equipments transmit power
Measuring your equipments receive power
Coupling Errors

Optic Attenuators
Documentation

F. OTDR Testing

Operating an OTDR
Setup the OTDR for Testing
OTDR Test Functions:

- a) Acceptance Testing (Reel)
- b) Span Loss and Distance Testing
- c) Connector loss testing
- d) Back Reflection Testing
- e) Using the OTDR for Troubleshooting and Restoration

G. Troubleshooting a Local Area Network

Power Meters
Visual Fault Finders
Fiber Identifiers
OTDRs

Delivery Method

Instructor led with numerous Hands-On labs and exercises.

Equipment Requirements

(This apply's to our hands-on courses only)

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

Course Length

3 Days