

Hands-On

# Fiber Optic and CAT 5, 6, 7 and 8 Installer Premise Cabling

Certification



## Course Description

This Hands-On course is customized to give Technicians the confidence and skills to maintain Fiber Optic systems and CAT 5, 6, 7 and 8 Installer Premise Cabling Data Networks from port to port.

(ETA Certification is available upon request)

The Technicians will be taught how to properly splice fiber, both fusion and mechanical, test and troubleshoot a fiber system. Also, in today's FTTx and LAN data systems technicians need to be able to properly inspect and repair faulty connectors. A portion of this course is used to cover termination techniques and testing of connectors, patch cords and couplers.



Many of the Data systems used today will also include portions of CAT 5, 6, 7 and 8 cabling. Like the Fiber Optic systems, this bit rate is dramatically increasing giving the importance of proper installation and testing of these systems. This course will cover the transmitting capabilities of CAT 5, 6, 7 and 8 cable, proper termination and testing a data system. Those who complete this

course will be productive and knowledgeable in both Fiber Optic and Category 5, 6, 7 and 8 cabling.

This training is geared for the voice, video and data technician.

## Students Will Learn

- **The History Of Fiber Optics & Evolution Of Fiber Systems.**
- **Fiber Optic Theory And Waveguide Functions.**
- **Singlemode (OSP) And Multimode (ISP) Fiber Types.**
- **The Causes Of Attenuation, Optical Reflection And Refraction.**
- **Optical Dispersion Characteristics And Pulse Spreading Issues.**
- **Loose Tube And Unitube Style Trunk Cables**
- **Distribution And Feeder Cables.**
- **Fusion Splicer Applications And Fiber Alignment Systems**
- **Mechanical Splicing Uses And Applications**

- **Optical Connector Styles And Applications**
- **Back Reflection Issues And Angled Physical Contact Connectors**
- **Patch Panels And Functions For Distribution And Transmission**
- **ISP/OSP Style Splice Closure Styles And Function**
- **Cable Entry Methods And Splitter Configurations**
- **Cable Installation Methods As Direct Bury, Aerial And Ducted**
- **Safety Practices**
- **Intro To Optical Testing And Troubleshooting.**
- **Visible Light Sources, OTDRs And Power Meters**
- **Testing Methods For ISP/OSP Systems**
- **OTDR Test Functions And Trace Interpretation**
- **Optical Loss Testing Methods**
- **Category 5, 6, 7 and 8**
- **Project Planning**
- **Network Architectures**
- **Network Components**
- **Termination**
- **Testing**
- **And More...**

## **Target Audience**

Persons who will be building, installing, terminating, and testing Category 5, 6, 7 and 8 and Fiber Optic cabling.

## **Prerequisites**

Basic electrical concepts. This information can be obtained in our Basic Electricity and Telephony courses. Basic hands-on skills and be able to pass a color-blindness test.

## **Course Outline**

## MODULE I: FIBER OPTIC GENERAL STUDIES

### INTRODUCTION

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

### THEORY TOPICS

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

### FIBER TOPICS

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

### 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 II: FIBER OPTIC SAFETY ISSUES

### 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 III: FIBER OPTIC CABLE INSTALLATION 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  
And More...

#### MODULE IV: FIBER OPTIC CONNECTORS

Connector Types  
Use of connectors  
ST Style Connector Assembly; Hand and/or Machine Polishing and Inspection  
SC Style Connector Assembly; Hand and/or Machine Polishing and Inspection  
\* Proper termination and testing of connectors

#### TESTING CONNECTORS AND JUMPER LOSS

Measure loss of previously installed connectors  
Test loss of jumpers  
Fiber Testing Parameters  
Continuity Testing

#### MODULE V: FIBER OPTIC SPLICING

Mechanical and Fusion Splicing  
Fusion Splicer Types and Operations  
Precision Cleaver Operation  
Set-up Fusion Splicer and Cleaver Work Stations  
Practice Fiber Stripping, Cleaning and Cleaving  
Practice In-Line Fusion Splicing  
Practice Pigtail Fusion Splicing  
Qualify Acceptable Splices

#### MODULE VI: FIBER OPTIC ENCLOSURES

Closures used if Fiber Optics Splicing  
How to properly open and install cables  
How to dress fibers in a splicing tray

#### MODULE VII: FIBER OPTIC TESTING

- \* 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

#### MODULE VIII: CATEGORY 5, 6, 7 and 8 CABLE

- Project Planning
- Codes and Standards
- Installation DOS and DONTs
- Network Components
- Connector Types
- Cable Types
- Testing Procedures
- Test Results and Reporting
- Documentation
- And More...

### Notes

We always welcome and encourage attendees to bring their Test Meters, OTDRs and Fusion Splicers and any Tools to the course. Our instructor will be customizing the Hands-on portions of the course to their specific equipment, which will enhance the overall training and increase the Hands-On time experience on the actual equipment they will be using in the field.

### Delivery Method

Instructor-led with Hands-On labs and exercises throughout the course.

### **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**

4 Days