

Hands-On

# CAT 5/6 & Fiber Optic Installer T-T-T

Train-The-Trainer



## Course Description

This Hands-On 5-day (or 4-day 10 hrs. per day) course will train-the-trainer and a group of participants how to become an CAT 5-6 and Fiber Optic Certified Installer.

Train-The-Trainer Will include the following

1. The instructor candidates (CAT 5-6 and fiber experience is required) will attend the first 2 days of the course that consists of two parts
  - A) First 2 days covering the course materials and how to deliver the training.
  - B) 2-3 days of co-teaching. In other words, the instructors will co-teach a live course of students.
2. Instructor Delivery-Course-Agenda Will receive a detailed course description with timelines and benchmarks for the delivery format of this course.
3. Course Manual Will receive a hardcopy and digital .pdf copy of the training course manual with unlimited use license.
4. Lab Documentation Will receive a detailed documented lab guide.
5. A list of required equipment needed and facility layout for a successful training program.

BTS recognizes that installers and or contractors often have a difficult time getting certified and getting the Hands-On experience needed to do the job. To many courses are focused toward test and exam questions, rather than the understanding and Hands-On Skill-Set to do the job inline with today's standards and competencies.

Our Certification Course to become an CAT 5-6 and Fiber Optic Certified Installer is designed to get attendees up to speed quickly on industry standards, provide proper installation, knowledge and get Hands-On training that covers the latest standards, tools, and techniques used today's cable installations, and give them the ability to represent themselves as "CAT 5 - 6 and Fiber Optic Certified Installer."

Attendees will be taught how to properly splice fiber, both fusion and mechanical, test and troubleshoot a fiber system. Also, in today's environments 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 systems used today will also include portions of Cat 5 and 6 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 and 6 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 and 6 cabling. BTS's Certification Course to become an BTS Certified Installer. It is taught by SME certified structured cable specialists with over 25 years of industry experience that includes network installations/upgrades for Telephone Companies, Power & Energy Companies, United States Federal & State Governments, School Districts, and major U.S. Corporations. Our SMEs have the field experience to find the answers to real live scenarios, providing students with a Real-World Experience.

Attendees each get a Certification Certificate, and I.D. Card Benefits

- Maximize system performance and reliability by learning today's installation techniques.
- Be aware of current industry standards, and become a trusted resource for your customer.
- Gain customer confidence by ensuring the integrity of their installations/support.
- Hold a Certification Installer Card that represents your Certification.
- BTS Certificate and I.D. card remains on electronic record and can be confirmed and reissued at any time.
- This Certification is Nationally and Internationally Recognized.

## Students Will Learn

- **Fiber Optics Overview-Refresher.**
- **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**
- **Industry Standards**
- **Project Planning**
- **Architectures and Installations**
- **Tools and Components**
- **Cable Building**
- **Termination**
- **Certified Testing**
- **Troubleshooting**
- **And More...**

## Target Audience

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

## Prerequisites

Instructor candidates must have CAT 5-6 and Fiber Optic experience. Basic electrical concepts. This information can be obtained in our Basic Electricity and Telephony courses. Basic telecommunications 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 and 6 CABLE

- Project planning
- Codes and standards
- Installation DOS and DONTs
- Architectures and Installations
- Tools and Components
- Connector types
- Certified Testing Procedures
- Architectures and Installations
- Tools and Components
- Cable Building
- Termination
- Certified Testing
- Troubleshooting

#### Notes

OTDRs, Power Meter and Light Source  
Visible LASER Light Source  
Fiber Inspection Microscope  
Fusion Splicers  
CAT 5/6 Cable Testers (Certified Throughput)  
Wire Mappers  
3M Hotmelt  
Seicor Unicam  
Termination Kits  
Pentascanner  
110 Punchdown  
Wire Verifier  
Cross-Connects  
Patch Panels  
Wall Outlet/Jacks  
Hand Tools and more...

## **Delivery Method**

Instructor-Led with numerous Hands-On Labs and exercises and can incorporate any type of customer equipment in to the Hands-On lab environment.

## **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**

5 Days