OSP for Installers and Technicians

Foundational

This four-day instructor-led course is designed to provide useful technical knowledge of fiber optics relating to outside plant (OSP) and FTTx applications, as well as the skills needed to install and test the physical layer for active Ethernet and passive optical networks (PON). Students will gain practical knowledge and hands-on skill in all aspects of FTTx deployments including specific issues—such as testing splitters, WDM devices, measuring reflectance, and bidirectional testing—that are unique to FTTx networks.

Audience: Beginner and experienced technicians, or supervisors

Prerequisite: Fiber Foundations is recommended, but not required.

Click or scan for detailed course information and upcoming training locations.

Credentialing

ETA® International Fiber Optics Technician—Outside Plant (FOT-OSP)
Valid for four years.

Light Brigade Digital Badge
Complete this course and receive a Credly digital badge.

Continuing Education Credits (CECs)
28 BICSI CECs

"The most knowledgeable instructor I've ever had in the 17 years I've been in the industry. I don't think there is a question he could not answer. Awesome instructor."

—Brandon Martinez, Webpass

Light Brigade®

For training, tools, or equipment:
1 (206) 575-0404 • 1 (800) 451-7128 • lightbrigade.com

FTTx for Installers & Technicians

Detailed Course Outline

Light Brigade®
FIBER OPTIC TRAINING

This four-day class has been developed with 16 hours of classroom lecture and 16 hours of hands on skills labs to provide practical understanding and skills required to install, test, and troubleshoot PON and active Ethernet FTTx systems according to ITU, IEEE, and SCTE standards. Students will perform bidirectional testing, WDM testing, and splitter testing with the latest FTTx test equipment such as PON power meters and optical time-domain reflectometers.

Prerequisites: None. Entry level.

Certifications and Credits: ETA Fiber Optic Technician—Outside Plant (FOT-OSP) Certification
BICSI Continuing Education Credits
Light Brigade Digital Credentialing

Theory and Applications Review

Safety
- Working with lasers
- Visual safety using fiber optic sources
- Working with optical fibers
- Chemicals

Introduction
- Basic fiber optic terminology
- FTTx optical fiber transmission systems
- Typical transmission rates
- Fiber optic symbols
- Why use fiber optics?
- Fiber optic standards
- Brief history of fiber optics

FTTx PON Methodology
- Basic FTTx terminology
- Passive optical networks (PON)
- Fiber to the home
- Fiber to the business/building
- POLAN
- Fiber to the curb
- IP video delivery
- Active Ethernet
- TDM and TDMA
- Broadband PON (B-PON)
- Asynchronous transfer mode (ATM)
- Ethernet PON
- Gigabit PON (G-PON)
- 10G-PON
- 10 Gigabit EPON
- RF video overlay
- Radio frequency over glass
- WDM-PON

Topologies
- Network topologies
- Physical topologies
- Point-to-point topology
- Star topology
- Reach extender
- Route redundancy
- Ring topology
- Mesh topology
- Bus topology

ODN and OSP
- ODN capabilities
- Outside plant cable management
- Drop terminators
- Cable and fiber management

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Fiber Theory

- Attenuation
- Fresnel reflection
- Refraction
- Numerical aperture
- Intrinsic and extrinsic losses
- The electromagnetic spectrum
- Lightwave transmission
- Mode field diameter
- Dispersion (pulse spreading)

Fiber

- FTTx fiber optic specifications
- Single-mode optical fiber types
- Fiber optic color coding
- Ribbon fibers

Cable

- Optical cable for FTTx
- Outside plant cables
- High fiber count cables
- Aerial fiber optic cables
- Indoor/outdoor cables
- Plenum and riser cables
- Low smoke zero halogen
- Distribution cables
- Fiber optic cable cordage
- Fiber and buffer color codes

Connectors

- Extrinsic splice and connection attenuation
- Fiber optic connector polishes
- Common FTTx connectors
- Small form factor LC connectors
- Multifiber connectors
- Field terminable FTTH connectors
- Hardened connectors
- Connector inspection and cleaning
- Terminators and attenuators
- Single-mode field connectorization issues

Splicing

- Traditional splice scenarios
- Drop cable splicing
- Good splice requirements
- Fiber cleaving
- Fusion, ribbon, and pigtail splicing
- Splice protection
- Mechanical splices

Fiber and Cable Management

- Panels, closures and cabinets
- Fiber optic interconnect hardware
- Splice tray recommendations
- FTTx OSP cable management products
- Cabinets for active Ethernet
- Network access points
- Slack storage
- Vaults and handholes
- Indoor slack storage methods
- Underground cable storage
- Aerial cable storage products
- Hardened connector slack storage

Passive Devices

- Fiber transition to the network
- Planar lightwave circuits
- Fused biconical taper splitters
- Splitter challenges and scenarios
- Tap splitters
- WDMs and PON systems
- Optical bands and windows
- Wavelength allocations
- Multiplexing and demultiplexing
- Filters and gratings
- Types of WDMs
- PON configurations for WDM
- RF video overlay
- Diplexers, triplexers, and quadplexers
- Coarse, dense, and wide WDM

Active Devices

- Fiber optic transmitters
- Distributed feedback lasers
- Fabry-Perot lasers
- Fiber optic receivers and photo diodes
- Erbium-doped fiber amplifiers
- Reflection issues
- Optical return loss and the ODN

OLTs and ONTs

- Optical line terminals
- ONT, NT and ONU
- UPS and battery backup systems

Loss Budgets

- Designing FTTx systems
- Writing OSP specifications
- Loss budgets for FTTx networks
- Safety margins
- “Not to exceed” charts for single-mode
- Active Ethernet specifications
- PON loss budgets
- G-PON specifications
- G-PON power levels
- Ethernet specifications
- RFoG and tapered loss budgets

Installation

- FTTx cable installation
- Cable handling
- Standards and regulations
- Underground installation techniques
- Direct buried
- Conduit and duct installation
- Cable pulling methods
- Tension monitoring
- High air speed blown
- Air blown fiber
- Aerial installation techniques
- Mid-span (express) entries
- Cable installation products
- FTTB installation techniques
- MDUs and MTUs
- FTTB design goals
- Telecommunications rooms
- Get cabling to each user
- Termination techniques
- Aesthetics
- ONTs and access points
- Installation inspection reports

Testing

- Testing active Ethernet
- Testing PON systems
- Initial installation testing
- Testing equipment for different scenarios
- “Not to exceed” values
- OTDR testing
- Dynamic range
- Deadzone
- OTDR signatures
- Key points to understanding IOR
- Post-installation testing with the OTDR
- Testing drop cables
- Reflection testing
- Measuring reflectance with a deadzone box
- Optical loss testing
- Insertion loss method
- Visual laser testing requirements
- Visual inspection

Maintenance

- Identify, locate, and resolve
- Typical causes of failure
- System related problems
- Eye diagrams
- Types of fiber optic damage
- Typical cable system faults
- Equipment used in the restoration role
- Emergency restoration kit requirements
- Aerial restoration
- Outside plant restorations
- The need for slack cable
- Effective maintenance postures
- Post-restoration recommendations

Safety Best Practices

- Fiber optic safety concerns
- Visual safety using fiber optic sources
- Wavelength of the eye
- Laser classifications
- Working with lasers and optical fibers
- Personal protective equipment
- Chemicals
- Material safety data sheets (MSDS)
- Work area safety
- Installation practices

Wrap-up and Review

Hands-on Skills Learning

Cable Management

- Cable preparation
- Mid-entry practices
- Closure preparation
- Panel dressing
- Splitter installation
- Splice tray fiber routing

Splicing

- Strip and cleave processes
- Inline and pigtail splicing
- FTTx splicing
- Fixed V-groove splicers
- Core alignment splicers

OTDR Testing

- OTDR use in FTTx installations
- FTTx OTDR signatures
- Measuring reflectance
- Testing splitters

Optical Loss Testing

- FTTx test equipment
- Testing OLT/ONT power levels
- Test points in FTTx installations
- Upstream/downstream testing
- Troubleshooting
- FTTx documentation