Broadband Fiber Optic Technician
Level 2

Intermediate

This intermediate level course is comprised of four days of blended advanced broadband theory topics and practical hands-on skills to apply the theoretical principles into real-world field practices. It is aimed at those that have completed BFOT Level 1 and are ready to build upon that knowledge to gain a deeper and expanded mastery of FTTH broadband theory and skills.

Areas of focus are standards and codes, advanced topologies and methodologies, active and passive devices, ODN and FTTB installation, testing and troubleshooting, as well as expanding upon the fiber theory areas covered in BFOT Level 1.

Learners that complete this course will earn digital credentialing through Credly and will be eligible to sit for the ETA Broadband Technician (BFT) credential exam.

Credentialing

ETA® International Broadband Technician (BFT)

Valid for four years.

Light Brigade Digital Badge

Complete this course and receive a Credly digital badge.

Click or scan for detailed course information and upcoming locations.

"[The instructor]'s engagement and vast knowledge of fiber optic systems is unmatched and even taught someone with 10+ years experience multiple different things."

—Greg Abbott, Gibson Technical Services

Light Brigade®

For training, tools, or equipment:

1 (206) 575-0404 • 1 (800) 451-7128 • lightbrigade.com

Broadband Fiber Optic Technician - Level 2

Light Brigade® FIBER OPTIC TRAINING

Detailed Course Outline

This intermediate level course is comprised of four days of blended advanced broadband theory topics and practical hands-on skills to apply the theoretical principles into real-world field practices. It is aimed at those that have completed BFOT Level 1 and are ready to build upon that knowledge to gain a deeper and expanded mastery of FTTH broadband theory and skills.

Areas of focus are standards and codes, advanced topologies and methodologies, active and passive devices, ODN and FTTB installation, testing and troubleshooting, as well as expanding upon the fiber theory areas covered in BFOT Level 1.

Prerequisites: Broadband Fiber Optic Technician Level 1

Certifications and Credits: ETA Broadband Fiber Technician (BFT)
Light Brigade Digital Credential

Theory and Applications Review

Introduction

- Fiber optic symbols
- Standards and regulations
- Code setting organizations
- Standards organizations
- System standards
- iconectiv generic requirements

FTTx/PON Methodology

- Network architecture
- Broadband FTTx terminology
- Passive optical networks
- FTTH formats
- Wavelength allocations
- ITU-T PON wavelengths
- IEEE PON wavelengths
- XG/XGS-PON/10G EPON architectures
- XG-PON coexistence
- NG-PON2 (TWDM) architecture
- Time wave division multiplexing (TWDM)
- Radio frequency over glass (RFoG)
- Hybrid fiber coax
- Active Ethernet
- 10G-PON
- 10 Gigabit EPON
- RF video overlay
- IP video
- NG-PON2 network options (TWDM)

Topologies

- FTTx architectures
- Centralized splits
- B-PON, G-PON, and EPON architectures
- Time division multiplexing
- Network topologies
- Point-to-point topology
- Star topology
- Reach extension
- Route redundancy
- Mesh topology
- Ring topology
- Bus/tapered topology

ODN and OSP

- ODN capabilities
- OSP fiber and cable management
- Drop terminations

Ribbon Cable, Fiber, and Theory

- Fiber theory
- The electromagnetic spectrum
- Single-mode optical fibers
- Optical reflection
- Mode field diameter (MFD)
- Optical dispersion
- Chromatic dispersion testing
- Polarization mode dispersion testing
- 200-µm coated fibers
- Optical fiber color coding
- High fiber count cables
- Ribbon fibers
- Collapsible ribbons and cables

Splicing

- Splicing specific considerations
- Fusion splicing technology
- Good splice requirements
- Causes of splice errors and loss
- Ribbon splicing technology
- Splicing 200-µm coated fiber
- Splicing operations
- Pitch conversion options
- Ribbonizing
- Pigtail splicing and splice-on connectors
- Termination techniques
- Protecting the splice
- Splice closures and transition tubes
- How to route a splice tray
- Mechanical splicing

Passive Devices

- Optical splitters
- Planar lightwave circuits
- Fused biconical taper splitters
- Tap splitters
- WDMs and PON systems
- Optical bands and windows
- Wavelength allocations
- Multiplexing and demultiplexing
- TDM and TDMA
- Filters and gratings
- Wavelength division multiplexing

Active Devices

- Active device design and packaging
- Fiber optic transmitters
- Fabry-Perot lasers
- Distributed feedback lasers
- Laser spectral width
- Fiber optic receivers
- Photodiodes
- Erbium-doped fiber amplifiers
- Reflection issues
- Optical return loss and the ODN
- PON transmitter and receiver examples
- Active Ethernet OLT transmitters
- Active Ethernet ONT receivers

Loss Budgets

- Designing FTTx systems
- Fiber optic system design
- Writing OSP specifications
- Loss budgets for FTTx networks
- Safety margin
- P2P exercises
- “Not to exceed” charts
- Active Ethernet specifications
- G-PON loss budgets
- P2MP exercises
- G-PON specifications
- G-PON power levels
- Ethernet specifications
- RFoG loss budgets
- Tapered loss budgets

ODN Installation

- FTTx cable installation
- FTTx installation disciplines
- General guidelines
- Project chronology and planning
- Cable plant installation options
- Plan vault and handhole locations
- Underground installation techniques
- Direct buried
- Conduit and duct installation
- Cable pulling methods
- Tension monitoring
- Cable pulling lubricants
- Air blown fiber
- Elements of an ABF network
- Aerial installation
- Typical pole clearances
- Aerial installation
- NESC considerations
- Comparison of aerial installation techniques
- Mid-span (express) entries
- Network access points
- Rights-of-way
- Buried versus conduit
- Field connectorization
- Factory connectorization
- ONT collection methods
- Cable installation products

ADSS Installation

- Aerial restoration issues
- Utility applications of fiber optics
- ADSS fiber cable
- ADSS installation
- Traveler dimensions
- Cable support hardware
- Dead-end assemblies
- Suspension assemblies
- Tangent or trunion support assemblies
- Sagging of ADSS
- Installation of downleads
- Splice enclosures, trays, and bulletproof containers
- ADSS cable maintenance
- ADSS installation equipment
- What not to do during ADSS installation

FTTB Installation

- FTTB/MDU premises installations
- FTTB hierarchical star topology
- FTTB design goals
- Telecommunications rooms
- Get cabling to each user
- Aesthetics
- ONTs and access points

Testing

- Testing drop cables
- Reflection testing
- Measuring reflectance with deadzone boxes
- Other optical devices
- Terminators
- FTTx testing
- OTDR testing OLT to ONT

Safety Best Practices

- Fiber optic safety concerns
- Visual safety using magnification
- Wavelength and the eye
- Laser classifications
- Working with lasers
- Safety eyewear
- Working with optical fibers
- Personal protective equipment
- Chemical safety
- Safe cable handling
- The work area
- Installation safety
- Aerial safety

Wrap-up and Review

Hands-on Skills Learning

Participants will build and troubleshoot a fiber optic link from patch panel to patch panel through various splice closures and with multiple drops. During this "network build", students will learn the following:

Lab Safety
- Practice safety during the labs for yourself and your fellow participants.

Cable Preparation
- Prepare a stranded cable for butt-entry installation into a fiber closure/panel.

Prep Panel/Closure
- Secure cables to closure/panel and route blue tube to splice tray.

Fanout Kit
- What is a fanout kit and how do I use it?

Splice Closures
- Splice the blue tube fibers in the splice trays of the closures.

Pigtails for Panel 1
- Splice the blue tube fibers to pigtails in Panel 1.

Fuse-on Connectors for Panel 2
- Use fuse-on connectors to terminate the blue tube fibers in Panel 2.

Splicer Menu Options
- Review key splicer menu options.

Mid-entry Cable Preparation
- Prepare a stranded cable for mid-entry installation into a fiber closure/panel.

Mid-entry Closure Preparation
- Secure cables to closure and route blue tube to splice tray.

OTDR Overview
- Discuss functions, features, limitations, and accessories for effective OTDR usage.

OTDR Testing
- Use an OTDR to test and identify issues with the class-built fiber span.

Optical Loss Budgets
- Create a loss budget for the classroom assembled link.

Optical Loss Testing
- Determine optical loss for the classroom assembled link and compare to the calculated loss budget.

Fiber Identifier
- Use a fiber identifier to prevent cutting a live fiber.

VFL
- Use a visual fault locator to find failures in the classroom assembled link.

Documentation
- Discuss documentation that may be required on the job.

Ribbon Splicing
- Fusion splice ribbon fiber.