

OTDR Testing Deep Dive

Detailed Course Outline

In this two-day course, students will learn best practices associated with the preparation and testing of installed fiber links. Students will develop expertise using optical time-domain reflectometers (OTDRs) and gain understanding of proper cleaning, inspection, and troubleshooting techniques and tools.

This course will have a maximum ratio of six students per instructor. Although the class is fully equipped, students are encouraged to bring their own test equipment to class as well.

Prerequisites: Any Light Brigade foundational level course such as Fiber Optics 1-2-3, Broadband Fiber Optic Technician Level 1, Fiber Optics for Utilities Level 1, or equivalent field experience.

Certifications and Credits: BICSI Continuing Education Credits
Light Brigade Digital Credentialing

Course Content

Light and Fiber Basics

- Basic signal communication
- Digital communications
- The binary system
- The electromagnetic spectrum
- What is an optical fiber?
- Multimode fiber
- Single-mode fiber
- Fiber comparison
- Total internal reflection
- What is a mode?
- Lightwave transmission
- The dBm and dB scales
- Typical power levels
- Intrinsic and extrinsic attenuation
- ITU-T G.657 bend-insensitive fibers
- Fresnel reflection
- Advanced single-mode impairments
- Typical fiber specifications
- Subscriber connectors
- LC connectors
- Connector color identifiers
- Fiber profile versus reflection
- Optical connector performance
- ORL/reflectance performance guidelines

Connector Endface Cleaning and Inspection

- Connector inspection criteria
- Dust dimensions
- Reflection issues
- Fiber optic connector polishes
- Connector cleaning kits

Instructor Demonstration

- Connector endface inspection and cleaning

Basic Fiber Test Tools

- Connector endface inspection tools
- Optical power meters
- Optical light sources
- Optical loss test sets
- Certification test sets
- Fiber identifiers
- Optical talk sets
- Visual fault locators
- Visual tracers

Power, Loss Budgets, and Testing Basics

- Optical power and link loss budgets
- Testing link loss
- One, two, and three-jumper methods for spans
- ORL versus reflectance
- OTDRs versus dedicated testers



OTDR Introduction

- How an OTDR works
- OTDR traces
- Trace versus schematic displays
- Icon-based reporting
- Choosing the proper OTDR
- Dynamic range
- OTDR dead zones

OTDR Configurations and Uses

- Compact or handheld OTDRs
- OTDR modules
- Fiber monitoring systems
- Portable OTDRs
- Reel acceptance testing
- Checking splices
- Fiber link characterization
- Proactive maintenance
- Fault location
- Emergency restoration
- Specialty OTDRs
- System OTDRs for monitoring
- Key issues for OTDRs

Key Setup Parameters

- Auto versus manual operation
- Schematic display/test options
- Wavelength
- Display range
- Pulse width
- Real time
- Averaging
- Index of refraction
- Backscatter coefficient

Instructor Demonstration

- OTDR launch levels

OTDR Challenges

- Launch levels
- Ghosts (echoes)
- Managing OTDR dead zones
- Attenuation vs. event dead zone
- Resolution – pulse width selection
- Launch and receive fibers
- Gainers

Proper OTDR Setup

- Pre-testing setup
- Date, time, and file directories
- Establish good connectivity
- Optimizing test settings
- Matching settings
- Validation and testing
- Backing up test results

OTDR Trace Analysis

- Event signatures
- Fiber tolerances
- Fiber mismatches and gainers
- Micro- and macrobending
- Link ORL and reflectance data
- Proper manual cursor settings
- Connector pass/fail
- Event tables
- OTDR loss summary acceptance reports

Hands-on: Trace Analysis

- Analysis and discussion of multiple OTDR traces

Hands-on: OTDR Lab Exercises

- Test a fiber route through all steps:
 - Admin/file setup
 - File naming
 - OTDR settings
 - Preliminary shots
 - Testing
 - Saving results
 - Recording and analyzing results
- Teams to rotate through various setups
 - Front haul antenna scenario
 - FTTx feeder/distribution scenario
 - Metro or data center scenario
- Complete simulations and report findings to group

Post-test Analysis

- Trace post-processing software
- Viavi FiberCable 2
- EXFO FastReporter 3

Instructor Demonstration

- FiberCable software

Wrap-up and Review