



This three-day class has been developed with 16 hours of classroom lecture and 8 hours of hands-on design exercises to teach attendees to apply critical issues such as take rate and density to outside plant design. This course covers FTTH network field configurations, design benchmarks, and installation parameters for active Ethernet and PON systems. Attendees will create their own FTTx network designs in classroom break-out sessions, applying the learned objectives to distributed split, centralized split, home run, and point-to-point systems.

Prerequisites: This class requires knowledge of fiber optic theory and terminology, as well as field experience, equivalent formal training such as the Certified Fiber to the Professional (classroom or online) course, or viewing the Light Brigade Staff Development DVD set.

Certifications and Credits: Fiber Broadband Association FTTx OSP Design

Introduction to FTTx

- FTTx basics
- Fiber optic transmission
- Basic fiber optic terminology
- The three big issues
- Lightwave transmission
- FTTH formats
- POLAN
- PON generations

Optical Fiber

- Fiber specifications
- Single-mode fiber characteristics
- ITU-T G.652 / G.652D single-mode fiber
- ITU-T G.657 single-mode fiber

Optical Cables

- Cable designs
- Optical cable for FTTx
- FTTx distribution and drop cables
- High fiber count cables
- Aerial fiber optic cables
- Distribution cables
- Cable structure and fiber counts
- Fiber and buffer color codes
- Cable handling
- Outside plant cable management
- Fiber distribution hubs
- Pedestals
- Splice closures
- Multiport service terminals

Connectors and Splitters

- Common FTTx connectors
- Small form factor LC connectors
- Multifiber connectors
- Hardened connectors
- Field terminated FTTH connectors
- Splice-on connectors
- Fiber optic connector polishes
- Splitter flexibility
- Splitter management

AE versus PON

- FTTH design options
- AE versus PON cost comparisons
- The fundamental fiber plan

Fundamental Fiber Planning

- Fundamental planning design steps
- Cost considerations
- Fiber and cable management
- The ideal network location
- Central office location strategy
- Ideal hub/node placement
- Density and central office location
- PON systems design
- Configuring fiber routes
- Ideal feeder route configuration
- Cost variance from the ideal
- Typical outside plant fundamental planning

Futureproofing

- Fiber cable sizing
- What speed do we need to the home?
- Full spectrum zero water peak fiber
- FTTx needs stable reliable performance

PON Design Options

- Distributed split designs
- Determining the best solution
- OLT and splitter relationship
- Pseudo cabinet concept
- Fiber cable tapering
- FTTx design efficiency
- Operational issues

Fiber to the Building

- MDUs and MTUs
- Get cabling to each user
- Fiber in the building design goals
- High-rise buildings
- Medium-rise buildings
- MDU existing infrastructure
- Telecommunications room
- MDU cabling systems
- Low rise and campus MDUs
- Typical cabinet design strategy
- Typical distributed split design strategy
- Splitter design for MDUs
- End user locations
- Optical network terminals and access points
- Bend-insensitive fiber for FTTB

Single-family Residential Areas

- PON areas
- Subdivision design strategies
- Typical drop layout
- Fiber drop design

Connectorization Options

- Termination options
- Connectorized versus fusion splicing
- Conventional vs. plug-and-play
- Capital expenditures (CAPEX)
- Administration
- Network performance
- Organizational considerations
- Developing a cost model
- Take rates

Rural Areas

- Network design for rural areas
- Ideal hub/node placement
- Rural area network design
- Splitter placement and distribution
- Splitter field arrangement
- Conceptual example of reusing dead fibers

WDM-PON

- ODN and OSP issues
- The impact of WDM-PON
- NG-PON and NG-PON2
- TWDM-PON
- Point-to-point WDM
- Wavelength allocations
- Fiber implications
- Spectral flexibility
- Multiplexing and demultiplexing
- WDM-PON design basics
- Home run design conversion
- Centralized design conversion
- Distributed split design conversion
- PON to WDM-PON conversion

Design Steps

- PON loss budgets
- Calculating network loss
- Optical loss budget example
- General design steps
- Home run design steps
- Cabinet design steps
- Distributed design steps

Specifications

- Product specification
- Partial fiber specification
- Typical optical cable specification sheet

Miscellaneous

- ITU-T standards
- Splitter specifications
- WDM specifications
- Telcordia requirements
- Physical layer standards
- Outside plant standards
- North American Codes
- Proper aerial route planning and engineering
- Fiber quality