Certified Fiber to the Home Professional

Detailed Course Outline

Description: The Certified Fiber to the Home Professional program (CFHP) is a certification program sponsored and operated by the Fiber-to-the-Home (FTTH) Council. Certification at the CFHP level indicates a professional level of technical competence in Fiber-to-the-Home technologies. Certification consists of study of FTTH architecture and deployment technology necessary to design and administer an FTTH network. It would not be intended to certify competency in a particular vendor's equipment, but, rather, to certify competence in overall FTTH theory, terminology, topology, equipment and system cost estimation.

Recommended Prerequisites: None. Entry level.

Chapter 1 — Applications

- Introduction
- Conversion chart
- Drivers behind FTTP
- Basic FTTP terminology
- Point to point
- Point to multipoint
- Today's applications
- Fiber to the home
- Fiber to the business/building
- Radio frequency over glass
- Business needs
- Why use fiber optics?
- Additional benefits of fiber optics
- Basic fiber optic terminology
- Fiber comparison
- Fiber optic symbol master

Chapter 2 — Bandwidth Issues

- Bandwidth review
- Technology in transition
- Analog to digital video
- SDTV to HDTV
- IP video delivery
- Telecommuting
- Interactive technologies
- High bandwidth users
- Over the top video
- Next Generation 3D HDTV
- Cloud computing and storage
- Cell towers
- Smart grid and energy management
- Future trends
- ODN capabilities
- User density
- Solutions

Chapter 3 — Economics CAPEX/OPEX

- Defining CAPEX and OPEX
- FTTH and FTTB CAPEX items
- Design impacts
- Who's implementing FTTH
- Triple play network characteristics
- Technology introduction
- Cost comparison
- Migration path considerations
- FTTH and FTTB OPEX items
- Power
- Network management systems
- Mean time between failure
- Maintenance issues
- Operations software
- Interface software
- Quality of service
- Costs

Chapter 4 — FTTH Evolution

- The birth of fiber optics
- Fiber technology evolution
- The evolution from POTS to fiber
- FTTP origins
- FTTH PON evolution and development
- Service providers of communications
- FTTP evolution
- Telephony PON (TPON)
- Fiber to the curb
- Cable television
- Full service access networks (FSAN)

Chapter 5 — Theory and Fibers

- Introduction
- The three big issues
  - Reflection
  - Attenuation
  - Dispersion
- Total internal reflection
- Singlemode fiber with laser source
- Mode field diameter
- Optical fiber color coding
- Optical fiber characteristics
- Singlemode optical fiber types
  - ITU-T G.652 singlemode optical fiber
  - ITU-T G.652D singlemode optical fiber
  - ITU-T G.657 singlemode optical fiber
  - ITU-T G.655 singlemode optical fiber

Chapter 6 — Fiber Cable Installation

- Standards committees
- Fiber optics standards organizations
- System standards
  - PON formats
  - ITU-T G.983 B-PON
  - ITU-T G.984 G-PON
  - ITU-T G.987 and G.988 10G-PON
  - IEEE 802.3 EPON
  - Video standards MPEG
  - DOCSIS
- Physical layer standards
  - Telcordia requirements
  - ITU-T G.652
  - ITU-T G.657
  - ITU-T G.655
  - ITU-T G.671
- Physical plant standards
  - NEC/NESC
  - Typical pole clearances
  - TIA-568
  - TIA/EIA-569

Chapter 7 — FTTH Architectures

- Network architecture
- Broadband PON
- Gigabit PON
- Active Ethernet
- Ethernet PON
- Next generation networks
- WDM-PON
- 40 GbE and 100 GbE
- RF video overlay
- Route redundancy

Chapter 8 — FTTH Network Topologies

- Network topology
- The physical topologies
- Point-to-point topology
- Star topology
- Tree topology
- Ring topology
- Mesh topology
- Bus topology
- Physical topologies review
- Fiber to the premises
- Fiber to the curb/cabinet
- Fiber to the home
- Fiber to the building
- FTTB/MDU premises

Chapter 9 — Network Components

- Active devices
- Laser spectral width
- Typical transmitter types
- Optical return loss and the ODN
- Erbium-doped fiber amplifiers
- Working with lasers
- Photodetectors
- Optical line terminal
- ONT, NT and ONU
- User network interface
- Fiber optic passive devices
- WDM and PON systems
- Splitters
- Multiplexing and demultiplexing
- Filters and gratings
- Diplexers, triplexers, and quadplexers
- Optical bands and windows
- Wavelength allocations

Chapter 10 — Cables

- Cable designs
- Optical cable for FTTP
- FTTP distribution and drop cables
- Outside plant cables
- Outdoor ribbon cables
- Aerial fiber optic cables
- FTTP drop cables
- Indoor/outdoor cables
- Distribution cables
- Plenum and riser cables
- Fiber optic cable cordage
- Cable handling
- FTTP installation disciplines
- Standards and regulations
- Proper route planning and engineering
- Installation options

Chapter 11 — Cable Management

- Panels, closures and cabinets
- Fiber optic interconnect hardware
- Outside plant cable management
- Patch panels
- Splice panels
- Optical entrance enclosures
- Distribution panels
- Fiber distribution hubs
- Pedestals
- Vaults and handholes
- Splice closures
- Fiber transition terminals
- FTTB/MDU premises installations
- Backbone hierarchical star topology
- FTTB panels
- Cabinets for Active Ethernet
- Underground cable storage
- Slack storage methods
- Cable storage products
- Hardened connector slack storage
- Panel and closure issues

Chapter 12 — Cable and Fiber Termination Options

- Managing termination costs
- Splicing for the FTTx system
- Good splice requirements
- Fusion splicing
- Ribbon splicing
- Pigtail splicing
- Mechanical splicing
- Splice protection
- Splice scenarios
- What to look for in a connector
- Typical connector roles
- Types of connections
- Main connector components
- Fiber optic connectors polishes
- Common FTTx connectors
- Hardened connectors
- Small form factor singlemode connectors
- Multifiber connectors
- Field terminable FTTH connectors
- IEC 61300-3-35
- Optical terminators
- Attenuators
- Fiber optic cleaning methods
- Termination options
- The physical plant

Chapter 13 — Splitter Placement

- FTTH planning
- Take rate
- Growth strategies
- Migration strategy
- Splitter handling
- Cable management
- PON examples
- Fiber management
- Fiber distribution hubs
- Fiber access terminals
- Pedestal cabling options
- Multiport service terminals
- Splice closures
- FTTB MDU
- Aesthetics
- Rural applications
- Slack storage

Chapter 14 — Network Design and Loss Budgets

- Designing FTTP systems
- Loss budgets for FTTP networks
- Active components
- Fiber specifications
- Splitter specifications
- WDM specifications
- Active Ethernet
- PON classes
- Differential optical path loss
- B-PON specifications
- Active Ethernet specifications
- EPON specifications
- G-PON specifications
- Class B+ and C+ specifications
- XG-PON specifications
- 10GEPON specifications
- “Not to exceed” charts
- System design flow chart
- Exercise worksheets

Chapter 15 — Test Disciplines and Equipment

- Network tests and equipment
- Test equipment and optical tests
- Testing Active Ethernet
- Testing PON systems
- Testing FTTH/PON
- "Not to exceed" charts
- Optical loss test sets
- PON power meter
- Optical loss testing
- Optical power measurements
- Optical loss test record
- OTDR testing
- OTDR requirements
- OTDR testing of splitters
- Splitter signatures
- Reflection testing
- Visual laser testing requirements
- Troubleshooting with a visual fault locator
- Visual inspection
- Documentation issues
- Testing documentation
- System test points
- System related problems
- Eye diagrams
- Singlemode fiber and transmission distance

Chapter 16 — Review Summary

- Introduction
- FTTH planning
- Growth strategies
- Migration
- FTTH design engineering
- The physical topologies
- Point to point
- Centralized architecture
- Distributed architecture
- PON examples
- Fiber cable management
- Cable questions to ask
- Managing termination costs
- Cable management products
- Fiber distribution hubs
- Fiber access terminals
- Multiport service terminals
- FTTB MDU
- FTTB MDU hub locations
- Point to multipoint PON system
- Exercise worksheet
- Construction planning

Chapter 17 — Miscellaneous

Chapter 18 — Glossary and Acronyms

Certification

Earn Certified Fiber to the Home Professional program (CFHP) certification through the FTTH Council.

Following the course the on-line exam for certification will be conducted on the FTTH Council's website, and the database of certified professionals will be maintained by the FTTH Council. Those successfully achieving the CFHP designation would have demonstrated knowledge of the covered subjects through an online examination with a passing percentage of 80% or greater and will receive a certification diploma valid for three years. The CFHP certification will be entered into the CFHP database maintained by the FTTH Council for confirmation for prospective employers and others.

The FTTH Council will administer the Certification exams and collect the certification charge. The certification fee is $150 for the three-year period. At that time, passing an additional exam will be required to maintain certification. One free retest of the exam will be provided if necessary. Additional examinations will require a retest fee.