Get Trained... GET CERTIFIED!

Course Catalog

Fiber Optic Courses
Premise Wiring
Wireless & Security
Custom Training Courses
Juniper Networks Courses
System Design
Network Management
Ethernet Training
Optical Networking
Radio Frequency (RF)

The Fiber School
Professional Technical Training
FiberOptic.com will train you on the latest equipment from the best manufacturers. This provides you with valuable experience on what equipment is available and how it can be effective. FiberOptic.com offers a full line of courses designed for the beginner, intermediate and advanced student.

Our instructors have years of experience including field work and in a classroom environment. Our courses can be taught in our state of the art facility, at your location or in numerous cities around the country.

Get Certified With
THE FIBER SCHOOL
- Top Instructors
- Enhance your skills
- Convenient class schedules
- Training on the latest equipment from the top manufacturers
- Fair and competitive pricing
- State-of-the-art training facility
- Custom on-site training available
- Vendor neutral equipment
- 24/7 Online classes

How To
REGISTER FOR A COURSE
- Fax or Mail: fill out the registration form included with this catalog and
  fax to: (215) 689-1464 or
  mail to: Corporate Headquarters
  email to: training@fiberoptic.com
- Web: www.thefiberschool.com
- Phone: 1-877-529-9114

PROFILE
Since our inception The Fiber Optic Marketplace LLC (FOM) has trained thousands of students and coordinated specialized training throughout the United States and the world: Fortune 500, government, military and internationally in IRAQ, Suriname, Nigeria, Columbia and many other locations.

Our courses have been developed and refined over the years to ensure that the material presented is current, relevant and does not waste your training dollars. Our courses consist of lecture, video and ample time for “hands-on” labs and one-on-one time with the instructor. For your convenience we’ve added a full line-up of online courses which are accessible anytime anywhere.
Meet Us ANYWHERE!

With a growing number of regularly scheduled courses around the world and on-site training available to most areas, we can meet you just about anywhere! Have a class of six students or more? We’ll come to you! We take pride in what we do and strive to be the #1 leader in fiber optic training by providing you with the best knowledge, skills and hands-on training.
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**Legal Notice:** Catalog prices and are subject to change without notice.

**Cancellation Policy:** FiberOptic.com/The Fiber School may cancel a course that lacks sufficient enrollment a week before it is scheduled to begin. When a course is canceled, we make every effort to notify all registered students promptly. A full refund is processed unless the student elects to transfer to another course or time. You can help avoid cancellation by registering early. **Student Cancellation:** No refunds are permitted for student cancellation. Substitutions are permitted.
FiberOptic.com, is a leader in providing online fiber optic products and services, and is pleased to announce the release of Online Fiber Optic Training and Certification with certification from The Fiber School. FiberOptic.com’s award-winning courses are now available to any student, anywhere, at any time. Hands-on work is important for advanced courses, so we are proud to offer a course jump start package allowing students to complete their review and lectures online prior to classroom instruction.

The advantages of online training include:
- Learning at your own pace
- Working around your busy schedule
- Keeping the lecture at your fingertips
- Minimize expenses
- Completing the hands-on portion of any course at any of our world-wide training locations
- Earning a FiberOptic.com Certificate or one of many other industry standard certificates

The internet is one of the best ways to deliver high quality courses at affordable prices. We strive to provide the highest level of service both in and out of the classroom; even if you take a course online we still have one of the best student-to-teacher ratios in the business and we are happy to answer any student’s questions.

Learning at your own pace
Any time of the day, any day of the week - you can log on to the online courses. There is no set amount of time that you need to spend during a session. Students may then complete the hands-on portions of the class at any of our scheduled sessions around the world (and can review the material within one year of registering for the course.)

Minimize expenses
Online training allows you to minimize travel expenses and materials. Online courses can be taken from anywhere at any time. We understand what it’s like to work with a busy schedule so we are proud to be able to offer you this new feature for training courses.
TR-FOF Fiber Optic Fundamentals

Fiber Optic Fundamentals training is designed for new or experienced workers who desire a fundamental knowledge of fiber optic theory, codes, standards and practices widely accepted in the telecommunications industry today. This course is an excellent starting point for those who install, design, or supervise the installation of fiber optic systems.

This online approach to fiber optic training and certification allows students to minimize expense, time and travel while learning at their own pace on their own schedule. If you wish to take this course on-site, please contact us about scheduling custom training.

Target Audience
Fiber Optic Fundamentals is designed for new or experienced telecom workers seeking a deeper understanding of fiber optic theory and cabling systems. This course is excellent for anyone involved in:

Construction or Project Management
- Electrical, Voice/Data, OSP including Customer-Owned OSP, Site or Utility Contractors

End User Markets
- Education, Commercial, Industrial, Utility (including Telephone, CATV, FTTx, Security)

COURSE PREREQUISITES
No prior experience is necessary for the Fiber Optic Fundamentals Course.

COURSE OUTLINE TOPICS INCLUDE
- Cables: Cable Types, Construction and Specifications, Cable Marking, Selection Criteria
- Connectors & Terminations: Connections, Connector Types, Mechanical and Environmental Considerations, Performance Specifications, Connector Loss Issues, Splicing Applications
- Enclosures & Panels: Panels, Distribution, Patch and Splice Types, Aerial and Burial Enclosures, Re-Entry and Expansion Capabilities, Routing and Preparation
- Test Equipment: Loss Testing Tools and Equipment, Standards and Methods, Return Loss, Bandwidth and Dispersion, OTDR Theory and Applications, Loss and System Budget Calculations

PRICING COURSES & CERTIFICATIONS

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TR-TAM OTDR Trace Analysis for Managers

OTDR Trace Analysis for Managers is a one-day online class with live instructor-led lecture and exercise to train managers in evaluating the traces they receive and see potential issues that may create problems down the road.

Objectives
This class is designed to assist managers in understanding the complexities of understanding an OTDR trace. OTDRs can provide valuable information about loss and location of faults, but only if the person interpreting the results understands how to read the data. The trace can show you the power loss but does not provide the source of such loss. Analysis of the trace is complicated since there are multiple causes to a loss. It’s important to realize that the OTDR can only provide accurate measurements and proper interpretations if the OTDR is setup correctly.

Target Audience
This class will help managers to better assess the reports and ask the proper questions.

COURSE PREREQUISITES
This course requires a basic understanding of fiber technology and terminology.

COURSE OUTLINE TOPICS INCLUDE
- What does an OTDR do?
- OTDR basics: What does an OTDR measure?
- How does an OTDR create a trace?
- Setting parameters and their effects on a trace
- Understanding events: Non-reflective, Reflective, Gainers, Ghosts
- Optical return loss
- Effects of a launch and/or Landing box

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<td>TFS Certification TAM</td>
<td>$150</td>
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TR-FOB Fiber Optic Basic Theory

Fiber Optic Basic Theory training is designed for new or experienced workers who desire a fundamental knowledge of fiber optic theory and performance issues pertaining to today's telecommunications industry. This course consists of basic knowledge and hands-on practice that will give students an essential understanding of fiber optics and the principles and tools used. This course is perfect for those students interested in learning about fiber optic communications.

Course lectures must be taken online. Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-FOB Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber Optic Basic Theory Certification.

Target Audience
Fiber Optic Basic Theory is designed for new or experienced telecom workers seeking a deeper understanding of fiber optic theory and performance issues.

COURSE LECTURES ONLINE
- Introduction to Fiber Optics
- Cables: Types, Construction and Specifications
- Connectors & Terminations
- Enclosures & Panels
- Test Equipment

COURSE LABS HANDS-ON
- Strip and Prepare cables for Termination
- Install a Buffer Tube fanout kit on an outside plant cable
- Install Connectors on indoor simplex cable
- Mechanical Splice

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<td>TC-FOB</td>
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COURSE PREREQUISITES
No prior experience is necessary for the Fiber Optic Basics Theory Course.
TR-CFI Certified Fiber Optic Installer

This course is designed for those who layout, install or maintain fiber optic cabling systems. It identifies you as an installer able to demonstrate a practical knowledge of fiber optic theory, codes, standards and practices widely accepted in the industry. This training incorporates validating installer skills, including fiber terminations, cable preparations, fusion splicing, OTDR and optical loss testing. These skills are applicable to all the requirements to safely and competently install, maintain, and test fiber optic cabling systems.

This fiber optic installation course is currently offered with a self-paced, online lecture and a hands-on workshop. Course lectures must be taken online before attending hands on training. This innovative approach to Fiber Optic Training and certification allows students to minimize expense, time and travel by learning at their own pace, on their own schedule. Students may then complete the hands-on portions of the class at any of our scheduled sessions around the world (and can review the material within one year of registering for the course.) If online training is not ideal for your learning style, a more traditional instructor-led lecture or question and answer section is available upon request depending on the location and the size of the class.

Hands-on Labs

Experienced Instructors

Real World Exercises

BICSI Continuing Education Credits

19 BICSI CECs — BICSI recognizes Certified Fiber Optic Installer training for 19 BICSI Continuing Education Credits (CECs) to BICSI credential holders. If you are a current BICSI credential holder, request a free BICSI completion certificate in order to redeem your CECs.

COURSE PREREQUISITES

Knowledge and experience in these areas are desirable but not required prior to taking this course: Fiber optic advantages and applications, Cables, Connectors and Terminations, Enclosures and Panels, Test Equipment

COURSE LECTURES ONLINE

Approximate time needed to complete lectures: 16 hours

- **Introduction**: Advantages & Applications; Terminology and History; The Fundamentals of Light Propagation; Scales of Measurement and the Spectrum; Singlemode and Multimode; Manufacturing, Bandwidth and Linear Effects
- **Cables**: Cable Types, Construction and Specifications; Cable Marking; Selection Criteria
- **Connectors & Terminations**: Connections; Connector Types; Mechanical and Environmental Considerations; Performance Specifications; Connector Loss Issues; Splicing Applications
- **Splicing**: Fusion and Mechanical; Fusion Splicing; Cable Marking; Mechanical Splicing
- **Enclosures & Panels**: Panels; Distribution, Patch and Splice Types; Application Issues and Selection Criteria; Aerial and Burial Enclosures; Re-Entry and Expansion Capabilities; Routing and Preparation
- **Installation**: Planning and Standards; Premise/LAN Methods; Outside Plant Methods; Aerial and Burial Techniques; Installation Tools and Equipment
- **Test Equipment**: Loss Testing Tools and Equipment; Standards and Methods; Return Loss, Bandwidth and Dispersion; OTDR Theory and Applications; Loss and System Budget Calculations
- **Restoration & Maintenance**: Tools and Equipment; Practical Applications; Time Saving Techniques; Record Keeping and Documentation
- **System Components**: Transmitters and Receivers; Passive Optical Components; Couplers and Splitters; WDM and DWDM Issues
- **System Design**: Equipment; Applications; Time Saving Techniques

COURSE LABS HANDS-ON

- Cable Preparation, Cleaning and Cleaving
- Splice Closure: Prepare, Splice and Assemble
- Multimode Fiber LAN Link: Prepare, Splice and Assemble
- Fusion and Mechanical Splicing
- Perform Optical Loss Testing Using an OTDR
- Perform Loss and System Budget Calculations

PRICING COURSES & CERTIFICATIONS

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<td>TC-BICSI-CFI</td>
<td>Certificate: BICSI 19 CECs Issued ONLY to BICSI credential holders</td>
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*Prices subject to change without notice. BICSI® Continuing Education Credits (CECs) are approved by BICSI and BICSI recognizes these CECs for the purposes of national recertification.®

877-529-9114
training@fiberoptic.com

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www.thefiberschool.com
Further your training by choosing a specialized installer course that fits your industry needs.
SPECIALIZED INSTALLER COURSES

TR-FTTX  FTTx Specialized Installer

“Fiber to the X” (FTTx) is the hottest network topic since TCP/IP. In this course, we will discuss various network designs, installations, maintenance and troubleshooting. This is a three-day hands-on course designed to provide students with a practical understanding of FTTx networks. Students will learn the difference between an Active and a Passive Optical Network (PON). The advantages and disadvantages of each system and how they are currently being implemented in the field are featured in this course. Students will learn splicing, testing and installing techniques for an FTTx network. Course lectures must be taken on line before attending hands on training. Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-FTTX Hands-on training sessions scheduled. The hands-on training session is required to complete the FTTx Installer Certification.

COURSE LECTURES ONLINE

• Introduction to Fiber Optics: Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
• Fiber optic Installation Practices: Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
• Fiber to the X (FTTx): FTTx Architecture; OLT Efficiency; PON Systems; Splitters in PONS; Splitter Signal Loss; WDM; Cable Management; Splicing verses Connectorization; OSP Concerns; Connectors in OSP; ITU Specifications; Ribbon Considerations; Hardened Connectors vs Field Splicing; FTTx Delivery Options

COURSE PREREQUISITES

Knowledge and experience in these areas are desirable but not required prior to taking this course:
• Fiber optic advantages and applications
• Cables
• Connectors and Terminations
• Enclosures and Panels
• Test Equipment

COURSE LABS HANDS-ON

• Cable Preparation, Cleaning and Cleaving
• Splice Closure: Prepare, Splice and Assemble
• Fuse-on Connectors
• No-Epoxy No-Polish Connectors
• Fusion and Mechanical Splicing
• FTTx Optical Loss Testing Using an OTDR
• FTTx Loss and System Budget Calculations

PRICING COURSES & AVAILABLE CERTIFICATIONS

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TR-FTTD  Fiber to the Desktop Specialized Installer

This course will give students a deeper understanding of how to assemble, cable, and test various commercial building systems utilizing, FTTD, a high-bandwidth solution that expands the traditional fiber backbone system directly to desktops and pushes the available bandwidth beyond 10G. This course also explores passive optical networks (PON), commonly utilized in FTTH applications, and its use in commercial buildings. Course lectures must be taken on line before attending hands on training. Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-FTTD Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber to the Desktop Installer Certification.

COURSE LECTURES ONLINE

• Introduction to Fiber Optics: Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
• Fiber optic Installation Practices: Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
• FTTD – Bringing Fiber to the Desktop: Hierarchical Star; Centralized Optical Fiber, Fiber to the Enclosure, PONS, Testing Considerations

COURSE PREREQUISITES

Knowledge and experience in these areas are desirable but not required prior to taking this course: Fiber optic advantages and applications, Cables, Connectors and Terminations, Enclosures and Panels, Test Equipment

COURSE LABS HANDS-ON

• Cable Preparation, Cleaning and Cleaving
• Splice Closure: Prepare, Splice and Assemble
• Fuse-on Connectors
• No-Epoxy No-Polish Connectors
• Testing PONS Splitters
• Fusion and Mechanical Splicing
• FTTD Optical Loss Testing Using an OTDR
• FTTD Loss and System Budget Calculations

PRICING COURSES & AVAILABLE CERTIFICATIONS

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**TR-FTAI Fiber to the Antenna Specialized Installer**

This certified fiber to the antenna / tower installer training course is designed for those who install and test fiber optic cables installed within antenna towers. It identifies you as a tower installer with practical knowledge of fiber optic theory, codes, standards and practices widely accepted in the wireless telecommunications industry. In addition, this training incorporates a three-day hands-on lab, validating installer skills, including fiber cable installation, OTDR testing, connector cleaning and loss prevention. These skills are applicable to all the requirements to safely and competently install, maintain, and test fiber optic antenna systems. **Course lectures must be taken on line before attending hands on training.** Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-FTAI Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber to the Antenna Installer Certification.

**COURSE LECTURES ONLINE**

- Introduction to Fiber Optics: Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- Fiber Optic Installation Practices: Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- Fiber to the AntennaTower: About NATE & OSHA; How Cell Towers Work; FTAI Tower Architectures; Cabling Practices; Connector & Splicing Practices; Testing Tier 1 & 2 (OTDR)

**COURSE LABS HANDS-ON**

- Cable Preparation, Cleaning and Cleaving
- Splice Closure: Prepare, Splice and Assemble
- Fusion and Mechanical Splicing
- No-Epoxy No-Polish Connectors
- Harsh environment LC Connectors
- FTAI Optical Loss Testing Using an OTDR
- FTAI Loss and System Budget Calculations

**PRICING COURSES & AVAILABLE CERTIFICATIONS**

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**TR-FWTI Fiber to the Wind Turbine Specialized Installer**

This fiber optic installation training course is designed for those who layout, install or maintain fiber optic cabling systems to wind turbines. It identifies you as an installer who is able to demonstrate a practical knowledge of fiber optic theory, codes, standards and practices widely accepted in the fiber optics industry. This training focuses on the supervisory control and data acquisition (SCADA) systems common to wind turbines utilizing fiber optics. **Course lectures must be taken on line before attending hands on training.** Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-FWTI Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber to the Wind Turbine Installer Certification.

**COURSE LECTURES ONLINE**

- Introduction to Fiber Optics: Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- Fiber Optic Installation Practices: Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- Fiber to the Wind Turbine: Network Topologies; Key Applications; Condition Monitoring; Nomenclature; Wireless Introduction; WT Optical Applications; Condition Monitoring; Wind Turbine Networking; Harsh Environment Fiber Coatings; SCADA Basics; SCADA Architecture; Wind Turbine & Wind Farm SCADA

**COURSE LABS HANDS-ON**

- Cable Preparation, Cleaning and Cleaving
- Splice Closure: Prepare, Splice and Assemble
- Multimode Fiber LAN Link: Prepare, Splice and Assemble
- Fusion and Mechanical Splicing
- FWTI Optical Loss Testing Using an OTDR
- FWTI Loss and System Budget Calculations

**PRICING COURSES & AVAILABLE CERTIFICATIONS**

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TR-CCTV Closed Circuit TV Specialized Installer

This specialty fiber installer course focuses on today’s CCTV systems which are IP addressable and considered to provide interactive and intelligent video surveillance. Students will learn about the concepts of video surveillance, the selection of components and how they are deployed within home and business. Also included are options for implementation over Local and Wide Area Networks (LANs & WANs) and various cabling infrastructures. **Course lectures must be taken on line before attending hands on training.** Upon successful completion of the required on-line lectures and exams, the student will then attend the 3-day TR-CCTV Hands-on training sessions scheduled. The hands-on training session is required to complete the Closed Circuit TV Specialized Installer Certification.

**COURSE LECTURES ONLINE**

- **Introduction to Fiber Optics:** Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- **Fiber Optic Installation Practices:** Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- **CCTV Specialized Installer:** Intelligent Video Surveillance - Overview; Camera & Surveillance Basics; DVS – (Digital Video Security); Camera Basics; Protocols; Digital And Analog Video; Environmental Considerations; Easy setup procedures; PoE (Power over Ethernet); Media Converters to Optical Fiber;

**COURSE PREREQUISITES**

Knowledge and experience in these areas are desirable but not required prior to taking this course: Fiber optic advantages and applications, Cables, Connectors and Terminations, Enclosures and Panels, Test Equipment

**COURSE LABS HANDS-ON**

- Cable Preparation, Cleaning and Cleaving
- Cable Connectors: Epoxy, AE, Quick Term, Fuse-on
- Prepare a Splice Tray: Splice and Assemble
- Singlemode Fiber Link: Prepare, Splice and Assemble
- Fusion and Mechanical Splicing
- Perform Optical Loss Testing Using an OTLS and an OTDR
- Perform Loss and System Budget Calculation
- Configure and Set Up a CCTV System (Cameras, DVR, Switches):
  - Assemble a CCTV System Category 5e Cable Implementing Power Over Ethernet (PoE)
  - Assemble a CCTV Camera Link Using Coax to PoE Media Converters; Using Fiber Optic Media Converters

**PRICING COURSES & CERTIFICATIONS**

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<td>TC-CFI</td>
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TR-DAS Distributed Antenna Specialized Installer

This course is designed for those who design, install or maintain fiber optic systems in commercial buildings and other facilities. It identifies you as an installer who demonstrates a practical knowledge of fiber optic theory, codes, standards and practices widely accepted in commercial buildings and customer-owned outside environments (campus). In addition, this training incorporates a three-day hands-on lab, validating installer skills, including fiber terminations, cable preparations, installation practices and certification testing procedures. Students will learn skills applicable to all the functions required to safely and competently install advanced fiber communications including DAS cabling deployments. **Course lectures must be taken on line before attending hands on training.** Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-DAS Hands-on training sessions scheduled. The hands-on training session is required to complete the Distributed Antenna Specialized Installer Certification.

**COURSE LECTURES ONLINE**

- **Introduction to Fiber Optics:** Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- **Fiber Optic Installation Practices:** Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- **DAS – Delivering Mobile Services:** DAS Overview; Public Safety; Survey & Design; In-Building Considerations; Antennas; Distribution Equipment; Coverage; Needs Analysis; Installation; System Acceptance; Testing DAS

**COURSE PREREQUISITES**

Knowledge and experience in these areas are desirable but not required prior to taking this course: Fiber optic advantages and applications, Cables, Connectors and Terminations, Enclosures and Panels, Test Equipment

**COURSE LABS HANDS-ON**

- Cable Preparation, Cleaning and Cleaving
- Splice Closure: Prepare, Splice and Assemble
- Multimode Fiber LAN Link: Prepare, Splice and Assemble
- Fuse-on Connectors
- No-Epoxy No-Polish Connectors
- Fusion and Mechanical Splicing
- DAS Optical Loss Testing Using an OTDR
- DAS Loss and System Budget Calculations

**PRICING COURSES & AVAILABLE CERTIFICATIONS**

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<td>TC-CFI</td>
<td>TFS Certification CFI</td>
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## TR-OGP Oil, Gas, Petrochem Specialized Installer

This course provides the practical understanding and skills required to properly design, install, and maintain fiber optics systems in petrochemical environments such as offshore drilling, pipeline, refineries, and process plants and other industrial plant processes. Students will use the latest fiber optic technology and equipment to learn how to splice, connectorize, test, and troubleshoot petrochemical-based harsh environment optical fiber networks in order to increase efficiency, reliability, and on-the-job safety requirements as well as reduce overall production cost and facilities downtime. **Course lectures must be taken online before attending hands on training.** Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-OGP Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber Optics for Petrochem Certification.

### COURSE LECTURES ONLINE

- **Introduction to Fiber Optics**: Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- **Fiber Optic Installation Practices**: Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- **Fiber Optics for the Petrochemical Industry**: Harsh Environments Cables & Connectors; Fiber Optic Sensing Cables and Sensors; Fiber Coatings for Harsh Environments; Splicing in a Harsh Environment; Tethers & Umbilicals; SCADA Systems

### COURSE LABS HANDS-ON

- **Cable Prep**: OSP Harsh environment, Cleaning & Cleaving
- **Prepare a Splice Closure**: Splice and Assemble
- **Install Cable Connectors**: Quick Term, Fuse-on, Harsh environment
- **Multimode and Singlemode Fiber Links**: Prepare, Splice and Assemble
- **Fuse-on Connectors**: LC, Commercial Style TFOCA II
- **Fusion and Mechanical Splicing**:
- **Perform Optical Loss Testing using an OLTS & an OTDR**:
- **Perform Loss and System Budget Calculations**

### PRICING COURSES & AVAILABLE CERTIFICATIONS

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## TR-MIL Military Specialized Installer

Military intuitions have trusted FiberOptic.com to provide their students with the best training in fiber optics. Our courses feature real world hands on exercises that ensure that students leave the course prepared to tackle new installations, maintenance and repairs of fiber optic networks. Certification from TFS ensures that students have passed the most rigorous exams and understand the course material. **Course lectures must be taken online before attending hands on training.** Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-MIL Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber Optics for Military Certification.

### COURSE LECTURES ONLINE

- **Introduction to Fiber Optics**: Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- **Fiber Optic Installation Practices**: Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- **Fiber Optics for the Military**: Tactical Fiber Optic Connectors; Tactical Fiber Optic Assemblies; About Tactical Fiber Optic Cable

### COURSE LABS HANDS-ON

- **Cable Preparation**, Cleaning and Cleaving
- **Install Cable Connectors**: Quick Term, Quick Term, Fuse-on, TFOCA
- **Prepare a Splice Closure**: Splice and Assemble
- **Multimode & Singlemode Fiber Link**: Prepare, Splice and Assemble
- **Fusion and Mechanical Splicing**, Fuse-on Connectors
- **No-Epoxy No-Polish Connectors**: TFOCA I & TFOCA II Connectors
- **Testing TFOCA Assemblies**:
- **Perform Optical Loss Testing using an OLTS & an OTDR**:
- **Perform Loss and System Budget Calculations**

### PRICING COURSES & AVAILABLE CERTIFICATIONS

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<td>TC-CFI</td>
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<td>$150</td>
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**TR-MIN** Mining Specialized Installer

This course addresses the challenges of deploying and maintaining fiber optic networks in harsh mine environments in order to improve employee safety, provide reliable communications, improve and measure process efficiency, and provide continuous monitoring and analysis of the hazardous environments. This course is tailored to the unique environment and applications of underground, open pit, and strip mines, and will provide the knowledge and skill sets required to design, install, and maintain fiber optics in harsh mine environments. **Course lectures must be taken online before attending hands-on training.** Upon successful completion of the required online lectures and exams, the student will then attend the TR-MIN Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber Optics for Mining Certification.

**COURSE LECTURES ONLINE**

- **Introduction to Fiber Optics:** Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- **Fiber Optic Installation Practices:** Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- **Fiber Optics for Mining:** MSHA approved cables and connectivity, Mining Cables; NEMA 4X Enclosures; Harsh Environment Connectivity, Deployable Systems; About MSHA & OSHA; Splicing Practices; Testing Tier 1 & 2 (OTDR)

**COURSE LABS HANDS-ON**

- Perform Loss and System Budget Calculations
- Perform Optical Loss Testing Using an OTDR & an OTDR
- Fusion and Mechanical Splicing
- No-Epoxy No-Polish Connectors
- Fuse-on Connectors
- Prepare, Splice and Assemble
- Multimode & Singlemode Fiber Links: Prepare, Splice and Assemble
- Harsh environment Connectors
- Cable Preparation, Cleaning and Cleaving
- Cables
- Connectors and Terminations
- Enclosures and Panels
- Test Equipment

**PRICING COURSES & AVAILABLE CERTIFICATIONS**

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**TR-PAV** Pro Audio/Video Specialized Installer

This three-day course will provide an overview of fiber optic transmission theory, system design parameters, installation guidelines, fiber optic connector and splice termination options, test equipment, testing, documentation, and troubleshooting tailored for Pro A/V applications and installations.

The course includes extensive hands-on exposure to fiber optic cable preparation, terminations, testing, and troubleshooting.

**COURSE LECTURES ONLINE**

- **Introduction to Fiber Optics:** Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- **Fiber Optic Installation Practices:** Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- **Fiber Optics for PRO Audio/Video:** AV connector fundamentals; Internet Video; 10 Gigabit Networking; CATV over Twisted Pair; Digital Signage; Multiple Matrix Multiple Display; Fiber Optic AV Signal distribution; Fiber Optic AV System Design; Digital Signage; Extenders; Audio and Control Products; Distribution Amplifiers; Switchers; Signal Processors; Matrix Switchers; Cables, Connectors

**COURSE PREREQUISITES**

Knowledge and experience in these areas are desirable but not required prior to taking this course:

- Fiber optic advantages and applications
- Cables
- Connectors and Terminations
- Enclosures and Panels
- Test Equipment

**COURSE LABS HANDS-ON**

- Cable Preparation, Cleaning and Cleaving
- Cable Connectors: Quick Term, Coax, UTP
- Multimode Fiber LAN Link: Prepare, Splice and Assemble
- Fuse-on Connectors
- No-Epoxy No-Polish Connectors
- Fusion and Mechanical Splicing
- Perform Optical Loss Testing
- Perform Loss and System Budget Calculations

**PRICING COURSES & AVAILABLE CERTIFICATIONS**

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<td>TC-CFI</td>
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TR-PWSI Premise Wiring Systems Specialized Installer

This course is designed for those who design, install or maintain copper and fiber optic systems in commercial buildings and outer facilities. It identifies you as an installer who demonstrates a practical knowledge of copper and fiber optic theory, codes, standards and practices widely accepted in commercial buildings and customer-owned outside environments (campus).

This course incorporates hands-on training of copper and fiber terminations, cable preparations, installation practices and certification testing procedures. Students will learn skills applicable to all the functions required to safely and competently install advanced copper and fiber communications cabling. This course is designed for those who design, install or maintain copper and fiber optic systems in commercial buildings and outer facilities. It identifies you as an installer who demonstrates a practical knowledge of copper and fiber optic theory, codes, standards and practices widely accepted in commercial buildings and customer-owned outside environments (campus).

The following knowledge or experience level is desirable but not required: 0-1 year electrical or telecommunications voice/data experience, basic knowledge of fiber optic cable types, basic knowledge of cable pulling, basic knowledge of cable installation, basic knowledge of cable testing, basic knowledge fiber optic connector types.

COURSE LABS HANDS-ON

- Copper Termination Labs & Copper Testing
- Fiber Termination Labs & Fiber Testing
- Media Terminations and Components
- Connections, Patch Panels, Cable Management
- Installation Practice
- Testing and Equipment
- Specification Process

COURSES & CERTIFICATIONS

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TR-TEL Telecommunication Specialized Installer

Optical fibers can be used to transmit light and thus information over long distances. Fiber-based systems have largely replaced radio transmitter systems for long-haul optical data transmission. They are widely used for telephony, but also for Internet traffic, long high-speed local area networks (LANs), cable TV (CATV), and increasingly also for shorter distances within buildings. In most cases, silica fibers are used, except for very short distances, where plastic optical fibers can be advantageous. Course lectures must be taken online before attending the hands on training. Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-TEL Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber Optics for Telecommunications Certification.

COURSE LABS HANDS-ON

- Cable Preparation, Cleaning and Cleaving
- Cable Connectors: Epoxy, AE, Quick Term, Fuse-on, Harsh environment
- Prepare a Splice Closure: Splice and Assemble
- Singlemode Fiber Link: Prepare, Splice and Assemble
- Fusion and Mechanical Splicing
- No-Epoxy No-Polish Connectors
- Perform Optical Loss Testing Using an OLTS & an OTDR
- Perform Loss and System Budget Calculations

COURSES & AVAILABLE CERTIFICATIONS

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<tr>
<th>COURSE</th>
<th>DESCRIPTION</th>
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<td>TC-TEL</td>
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<tr>
<td>TC-CFI</td>
<td>TFS Certification CFI</td>
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Specialized Installer Courses

TR-ITS Traffic Systems Specialized Installer

As the number of cars on the road increases, the need for traffic control grows exponentially. Fiber Optics are increasingly being used to tie together the enormously complex networks that control the traffic lights, message signs, cameras and other traffic systems technology. This course teaches the essentials of splicing, testing and troubleshooting fiber optics systems, as well as the specialized Outside Plant knowledge required to work with Intelligent Transportation Systems (ITS) traffic systems. 

*Course lectures must be taken online before attending the hands on training.* Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-ITS Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber Optics for Traffic Systems Certification.

**COURSE LECTURES ONLINE**

- **Introduction to Fiber Optics:** Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- **Fiber Optic Installation Practices:** Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- **Fiber Optics for Traffic Systems:** Traffic Management Overview; Dedicated-Short Range Wireless Networks; Mobile Telephony; Camera Recognition; Standards; Ethernet in ITS; Fiber Optic Cables in ITS; Radio Frequency (RF); Fiber optic Design; Factory Terminated Fiber Links; Fusion Splicing Options; CCTV Introduction; Dynamic Messaging; SCADA Basics; SCADA Architecture; SCADA Applications

**COURSE PREREQUISITES**

Knowledge and experience in these areas are desirable but not required prior to taking this course: Fiber optic advantages and applications, Cables, Connectors and Terminations, Enclosures and Panels, Test Equipment

**COURSE LABS HANDS-ON**

- Cable Preparation, Cleaning and Cleaving
- Install Cable Connectors: Quick Term, Fuse-on, Harsh environment
- Prepare a Splice Closure: Splice and Assemble
- Set up and install a basic CCTV System
- Multimode and Singlemode Fiber Link: Prepare, Splice and Assemble
- Fuse-on Connectors
- No-Epoxy No-Polish Connectors
- Fusion and Mechanical Splicing
- Perform Optical Loss Testing Using an OLTS & an OTDR
- Perform Loss and System Budget Calculations

**PRICING COURSES & AVAILABLE CERTIFICATIONS**

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TR-UTL Utilities Specialized Installer

This fiber optics training course is designed for those who specify, design, install, or maintain aerial and underground fiber optics systems in investor owned, REA, Co-operatives, and municipal power networks. Students will learn about latest fiber optic technology and equipment, as well as how to splicing, termination, testing, and troubleshooting impact fiber optic based utility networks. 

*Course lectures must be taken online before attending the hands on training.* Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-UTL Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber Optics for Utilities Certification.

**COURSE LECTURES ONLINE**

- **Introduction to Fiber Optics:** Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- **Fiber Optic Installation Practices:** Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- **Fiber Optics for Utilities:** Telephone & CATV; Power Utilities; OSP Safety & Codes; OSP Installation Practices, Cabling Handling; Tension & Bend Radius; Span, Sag, and Tension; Figure-eighting Cables Splice Locations; Manholes and Vaults; Conduit and Ducts; ADSS (All Dielectric Self Supporting) & Optical Power Ground Wire (OPGW)

**COURSE PREREQUISITES**

Knowledge and experience in these areas are desirable but not required prior to taking this course: Fiber optic advantages and applications, Cables, Connectors and Terminations, Enclosures and Panels, Test Equipment

**COURSE LABS HANDS-ON**

- Cable Preparation, Cleaning and Cleaving
- Cable Connectization: Fuse-on, Harsh environment
- Prepare a Splice Closure: Splice and Assemble
- Single Fiber Links: Prepare, Splice and Assemble
- Fusion and Mechanical Splicing
- Fuse-on Connectors
- No-Epoxy No-Polish Connectors
- Perform Optical Loss Testing Using an OTDR
- Perform Loss and System Budget Calculations

**PRICING COURSES & AVAILABLE CERTIFICATIONS**

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TR-TSI Fiber Optic Transit Systems Specialized Installer

This course is designed for those who design, install or maintain fiber optic systems in commercial buildings and other facilities. It identifies you as an installer who demonstrates a practical knowledge of fiber optic theory, codes, standards and practices widely accepted in commercial buildings and customer-owned outside environments. This course incorporates hands-on training of fiber terminations, cable preparations, installation practices and certification testing procedures. Students will learn skills applicable to all the functions required to safely and competently install advanced fiber communications in transit cabling deployments. 

Course lectures must be taken online before attending the hands on training. Upon successful completion of the required on-line lectures and exams, the student will then attend the TR-TSI Hands-on training sessions scheduled. The hands-on training session is required to complete the Fiber Optics for Traffic Systems Certification.

COURSE LECTURES ONLINE
- Introduction to Fiber Optics: Fundamentals; Theory; History; Performance Characteristics; System Components including Transmitters, Receivers
- Fiber Optic Installation Practices: Optical Networks; Techniques, Standards & Codes; Cable Types; Connectors; Splicing; Enclosures & Panels; Tools & Test Equipment; System Design & Loss Budgets: Equipment, Techniques & Applications
- Fiber Optic Transit: Video surveillance; SCADA Systems, Transit control applications; WiFi; CCTV

COURSE LABS HANDS-ON
- Cable Preparation, Cleaning and Cleaving
- Install Cable Connectors: Quick Term, Fuse-on, Harsh environment
- Prepare a Splice Closure: Splice and Assemble
- Set up and install a basic CCTV System
- Multimode and Singlemode Fiber Link: Prepare, Splice and Assemble
- Fusion and Mechanical Splicing
- Fuse-on Connectors
- No-Epoxy No-Polish Connectors
- Perform Optical Loss Testing Using an OLTS & an OTDR
- Perform Loss and System Budget Calculations

COURSE PREREQUISITES
Knowledge and experience in these areas are desirable but not required prior to taking this course: Fiber optic advantages and applications, Cables, Connectors and Terminations, Enclosures and Panels, Test Equipment

PRICING COURSES & AVAILABLE CERTIFICATIONS

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TR-OSP Outside Plant Technician

The fiber optic Outside Plant Technician course is similar to the Fiber Optic Technician (TR-FOT) course. It is designed for workers with fundamental fiber optic knowledge or installer certification. It focuses specifically on outside plant installations (OSP). OSP includes communications such as building to building or long haul telecommunications (including customer-owned OSP).

**COURSE OUTLINE**

**TOPICS INCLUDE**

- **Fiber Theory:** Characteristics of Singlemode and Multimode, Manufacturing, Bandwidth and Linear effects
- **Cables:** Cable Types, Construction and Specifications, Cable Marking
- **Selection Criteria**
- **Connectors and Terminations:** Temporary and Permanent Connections, Connector Types, Mechanical and Environmental Considerations, Performance Specifications, Connector Loss Issues, Splicing Applications
- **Splicing and Fusion and Mechanical:** Fusion Splicing, Mechanical Splicing
- **Enclosures and Panels:** Panels, Distribution, Patch and Splice Types, Application Issues and Selection Criteria, Aerial and Burial Enclosures, Re-Entry and Expansion capabilities, Routing and Preparation
- **Installation:** Planning and Standards, Premise/LAN and Methods, Outside Plant and Methods, Aerial and Burial Techniques, Installation Tools and Equipment
- **Test Equipment:** Loss Testing Tools and Equipment, Standards and Methods, Return Loss, Bandwidth and Dispersion, OTDR Theory and Applications, Loss and System Budget Calculations
- **Restoration and Maintenance:** Tools and Equipment, Practical applications, Time Saving Techniques, Record Keeping and Documentation
- **System Components and Design Issues:** Transmitters and Receivers, Passive Optical Components, Couplers and Splitters, WDM and DWDM Issues
- **System Design Exercise:** Tools and Equipment, Practical Applications, Time Saving Techniques

**COURSE PREREQUISITES**

The following knowledge or experience level is recommended:

- 3 years fiber optic installation experience
- Basic knowledge of splicing equipment and procedures
- Basic knowledge of testing equipment and procedures
- Be a TFS Certified Installer or equivalent (desired)
- Be an ETA Fiber Installer or other Industry equivalent (desired)

**COURSE OUTLINE**

**HANDS-ON LABS**

- Fusion Splicing
- Termination / Connectorization
- Cable Preparation
- OTDR Operation
- Optical Loss Testing

**PRICING**

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<td>TC-ETA-OSP</td>
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TR-FOT Fiber Optic Technician

The Fiber Optic Technician (TR-FOT) training is the next advanced level of our Fiber Optic Installer certification training. It builds upon the installer training and is designed to provide a real-life experience with solid classroom instruction using various labs and practical exercises designed around advanced installation, and testing techniques and procedures.

The Fiber Optic Technician training is a perfect complement for experienced fiber optic installers. Featured are technician level hands-on splicing and testing labs demonstrating advanced procedures and techniques. Students work with test equipment from several different manufacturers.

The Fiber Optic Technician certification is for professionals who are involved with designing, configuring, installing, testing, and maintaining fiber optic systems.

COURSE OUTLINE TOPICS INCLUDE


• Cables: Cable Types, Construction and Specifications, Cable Marking, Selection Criteria

• Connectors and Terminations: Temporary and Permanent Connections, Connector Types, Mechanical and Environmental considerations, Performance Specifications, Connector Loss Issues, Splicing Applications

• Splicing – Fusion and Mechanical: Fusion Splicing, Cable Marking, Mechanical Splicing

• Enclosures and Panels: Panels, Distribution, Patch and Splice Types, Application Issues and Selection Criteria, Aerial and Burial Enclosures, Re-Entry and Expansion capabilities, Routing and Prep

• Installation: Planning and Standards, Premise/LAN Methods, Outside Plant Methods, Aerial and Burial Techniques, Installation Tools and Equipment

• Test Equipment: Loss Testing Tools and Equipment, Standards and Methods, Return Loss, Bandwidth and Dispersion, OTDR Theory and Applications, Loss and System Budget Calculations

• Restoration and Maintenance: Tools and Equipment, Practical Applications, Time Saving Techniques, Record Keeping and Documentation

• System Components and Design Issues: Transmitters and Receivers, Passive Optical Components, Couplers and Splitters, WDM and DWDM Issues

• Hands-on task required include: Building a complete fiber optic segment utilizing wall mount enclosures with fusion pigtails, quick connectors and mechanical splicing, Test the completed Fiber optic segment using an OLTS and OTDR, Review and Evaluate test results according to ETA and FiberOptic.com certification requirements

See page 75 for products used in training courses.
TR-ERC Emergency Restoration

It is not a matter of if an outage will occur – It is a matter of when an outage will occur! Network outages can cost a company thousands of dollars for every minute that your network is down.

Having a recovery program in place is critical. As so is having a staff that has been trained and prepared to deal with the emergency when it occurs. The Fiber School has worked over the years with a number of network providers and with Adtell Integration, a leading contractor for emergency restoration services, to offer our Emergency Restoration training course. This two-day course emphasizes real-world hands-on troubleshooting techniques to quickly find the fault locations and then allows technicians to get hands-on experience in field restoration.

Objectives
Emergency Restoration training emphasizes real-world, hands-on troubleshooting techniques to quickly find the fault locations and then allows technicians to get hands-on experience in field restoration.

Target Audience
This course is designed for fiber optic plant managers, technicians and contractors who desire an efficient fiber optic communication network.

See page 75 for products used in training courses.
TR-MFS Master in Splicing

The Master in Splicing program is the first of its kind in the telecommunications field. It is designed to provide an unmatched, real-life experience with solid classroom instruction using various labs designed around specific techniques. The Master in Splicing training is a perfect complement for experienced installers and technicians. Advanced hands-on design labs along with advanced fusing splicing techniques are featured in this course.

Students work with several types of fusion splicers from at least two different manufacturers.

As a master level course, it is recommended that students have had several years of field experience or have taken our CFI or OSP course prior to enrolling.

COURSE PREREQUISITES
The following knowledge or experience level is recommended:
- 3-5 years of fiber optic installation experience or TFS Technician or equivalent certification
- Prior Knowledge of fiber optic cable system fundamentals
- Prior Knowledge of cable installation techniques

COURSE OUTLINE TOPICS INCLUDE
- Introduction to “Master in Splicing”: Fiber Optic Advantages and Applications, Terminology, Methodology
- Designs: Infrastructure, Topologies, Survey, Checklist, Loss Budget – LAN Environments (Lab Exercise), Loss Budget – OSP Environments (Lab Exercise)
- Cable Preparations: Mid Span Access (Hands-on), Spider Fan out Kits (Hands-on), Splice Trays (Hands-on), Sheath Removal (Hands-on), Accessing Ribbon Cables (Hands-on), Sheath Removal Interlocked Armor (Hands-on)
- Optical Fiber Splicing Overview: Mechanical Splicing, Fusion Splicing, Mass splicing
- Cabling Hardware Overview: Optical Fiber Closures, Splice Closures, Distribution Center, Splice Trays, Hardware Labeling, Splice Configurations
- Splicing – Mechanical (Hands-On): Types of Mechanical Splices, Fiber Preparation, Perform Mechanical Splicing
- Splicers – Fusion (Hands-On): Core Alignment versus Profile Alignment, Fiber Preparation, Cleaving Techniques, Operations, Maintenance, Splicing Tips
- Hands-On Exercises: Prepare, Splice and Assemble a Splice Closure, Prepare, Splice and Assemble a Multimode Fiber LAN Link, Perform Optical Loss Testing

EQUIPMENT USED & BRAND VARIETY
FiberOptic.com MASTER courses will expose you to the following equipment:
- Core alignment fusion splicers
- V-groove fusion splicers
- Mass/Ribbon fusion splicers
- Mechanical splices

PRICING COURSES & CERTIFICATIONS

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<th>COURSE</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
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<td>TR-MFS</td>
<td>Master In Splicing (Includes course materials)</td>
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<tr>
<td>TC-MFS</td>
<td>TFS Certification MFS</td>
<td>$150</td>
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</table>

See page 75 for products used in training courses.
TR-MFT Master in Testing

FiberOptic.com’s Master in Testing program is the first of its kind in the telecommunications field. It is designed to provide an unmatched, real-life experience with solid classroom instruction. Using various labs designed around specific testing scenarios, the Master in Testing training is a perfect complement for experienced fiber optic installers and technicians. This course features advanced hands-on testing labs demonstrating advanced testing procedures and techniques. Students work with test equipment from several different manufacturers.

COURSE PREREQUISITES

The following knowledge or experience level is recommended:

- 3-5 years fiber optic installation experience or equivalent
- Prior knowledge of basic testing equipment/procedures
- Be a TFS professional certified Technician or Master in Splicing (desired)
- Be a TFS fiber technician, or equivalent industry certification

COURSE OUTLINE TOPICS INCLUDE

- Introduction to “Master in Testing”: Fiber Optic Testing Overview, Testing Equipment Overview
- Power Meter and Light Sources: Attenuation Test Procedures: One, Two and Three Jumper References
- Fiber Optic Certification Test Sets
- Optical Fiber Identifiers and Detectors: FTTx Active ONT Detector, Visual Fault Identifiers, Visual Fault Tracers
- The OTDR: Use and Operation of the Optical Time Domain Reflectometer (OTDR), Telco/Broadband OTDR, Handheld OTDR, Fiber Rings and Boxes, Trace Software
- Miscellaneous Equipment: Fiber Optic Attenuator, Fiber Optic Talk Sets, Video Scopes
- Testing in the LAN Environment (Presentation and Lab): Loss Budgets, Test Methods and Procedures, Documentation, Troubleshooting and Fault Locating Procedures
- Testing in the Telco Environment (Presentation and Lab): Loss Budgets, Test Methods and Procedures, Documentation, Troubleshooting and Fault Locating Procedures
- Testing in the CATV Environment (Presentation and Lab): Loss Budgets, Test Methods and Procedures, Documentation, Troubleshooting and Fault Locating Procedures
- Testing in the CCTV Environment (Presentation and Lab): Loss Budgets, Test Methods and Procedures, Documentation, Troubleshooting and Fault Locating Procedures
- Testing in the FTTx Environment (Presentation and Lab): Loss Budgets, Test Methods and Procedures, Documentation, Troubleshooting and Fault Locating Procedures, Perform Optical Loss Testing

PRICING COURSES & CERTIFICATIONS

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<td>TC-MFT</td>
<td>TFS Certification MFT</td>
<td>$150</td>
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</table>

See page 75 for products used in training courses.
TR-MFOT Master Technician

The Master Fiber Optic Technician (TR-MFOT) training is the most comprehensive certification training available. It is our complete Fiber Optic Training; encompassing all aspects of our master splicing and testing programs into an intensive five-day certification experience that qualifies a Technician as a truly unique "Craftsman". It is designed to provide an unmatched, real-life experience with solid classroom instruction using various labs designed around splicing, and testing scenarios.

The Master Fiber Optic Technician training is a perfect complement for experienced fiber optic installers and technicians. Featured are advanced hands-on splicing, testing labs and documentation exercises demonstrating advanced procedures and techniques. As outlined in the Master Splicing and Master Testing course agendas culminating in the extensive 5th day of OTLS and OTDR testing and documentation certification exercises.

The Master Fiber Optic Technician certification is for professionals who are involved with configuring, installing, testing, and maintaining fiber optic systems.

COURSE PREREQUISITES

The following knowledge or experience level is recommended:

- 5 years fiber optic installation experience
- Knowledge of splicing equipment and procedures
- Knowledge of testing equipment and procedures
- Be a TFS Certified Technician or OSP Installer or other equivalent (desired)
- Be an ETA Fiber Optic Technician or OSP Installer or other Industry equivalent (desired)

COURSE OUTLINE TOPICS INCLUDE

- Introduction to “Master in Splicing”: Fiber Optic Advantages and Applications, Terminology, Methodology
- Designs: Infrastructure, Topologies, Survey, Checklist, Loss Budget – LAN Environments (Lab Exercise), Loss Budget – OSP Environments (Lab Exercise)
- Cable Preparations: Mid Span Access (Hands-on), Spider Fan out Kits (Hands-on), Splice Trays (Hands-on), Sheath Removal (Hands-on), Accessing Ribbon Cables (Hands-on), Sheath Removal Interlocked Armor (Hands-on)
- Optical Fiber Splicing Overview: Mechanical Splicing, Fusion Splicing, Mass splicing
- Cabling Hardware Overview: Optical Fiber Closures, Splice Closures, Distribution Center, Splice Trays, Hardware Labeling, Splice Configurations
- Splicing – Mechanical: Types of Mechanical Splices, Fiber Preparation (Hands-on), Perform Mechanical Splicing (Hands-on)
- Splicers – Fusion: Core Alignment versus Profile Alignment, Fiber Preparation (Hands-on), Cleaving Techniques (Hands-on), Operations (Hands-on), Maintenance (Hands-on), Splicing Tips (Hands-on)
- Hands-On Exercises: Prepare, Splice and Assemble a Splice Closure, Prepare, Splice and Assemble a Multimode Fiber LAN Link, Fusion and Mechanical Splicing, Perform Optical Loss Testing
- Introduction to “Master in Testing”: Fiber Optic Testing Overview, Testing Equipment Overview
- Power Meter and Light Sources: Attenuation Test Procedures: One, Two and Three Jumper References
- Fiber Optic Certification Test Sets
- Optical Fiber Identifiers and Detectors: FTTx Active ONT Detector, Visual Fault Identifiers, Visual Fault Tracers
- The OTDR: Use and Operation of the Optical Time Domain Reflectometer (OTDR), Telco/Broadband OTDR, Handheld OTDR, Fiber Rings and Boxes, Trace Software
- Miscellaneous Equipment: Fiber Optic Attenuator, Fiber Optic Talk Sets, Video Scopes
- Testing in the LAN, Telco, CATCV, CCTV and FTTX Environments (Presentations and Labs): Loss Budgets, Test Methods and Procedures, Documentation, Troubleshooting and Fault Locating Procedures, Perform Optical Loss Testing

See page 75 for products used in training courses.
The fiber optics industry will keep expanding and so should you! Our professional tracks are the perfect money-saving formula for your continuing education. Whether you decide to take a “distance learning” online course, attend our main campus, take a regularly scheduled course in a city near you or even invite us to your town for on-site training... we’ll be there for you.

Objectives

Our professional level programs certify that a student has passed at least two courses in a sequence and received instruction on techniques from the installer level up through the masters level.

FiberOptic.com certified professionals will have received a much more rigorous technical education than the minimum industry standard. Professional courses allow a student to become a master technician starting with little-to-no knowledge. Companies wishing to certify new personnel may wish to take advantage of these sequenced packages.

Course Offerings

FiberOptic.com proudly offers comprehensive professional tracks in fiber optic splicing, fiber optic testing, outside plant splicing and outside plant testing.

The Professional Advantage

The future of the fiber optic industry relies on highly-trained professionals to provide excellence in skills and services. The professional course pathway equips students with the everything from the very basics to advanced testing procedures, techniques and troubleshooting to prepare students for real-life situations.

START HERE

FUNDAMENTALS

INSTALLER

CERTIFIED FIBER OPTIC INSTALLER (TR-CFI)

FIBER OPTIC TECHNICIAN (TR-FOT)

HANDS-ON LABS

PROFESSIONAL

PROFESSIONAL TRACKS

The Fiber Optic Marketplace LLC® — Part of the Adtell Group

www.thefiberschool.com
Following the completion of remaining field experience credits, the student may apply for the one-week extensive training. As a fiber splicer working in the indoor environment, the student will be required to perform a variety of splicing and cable entry tasks. Successful completion of these exercises will demonstrate to the evaluators that the student meets the criteria for the award of the Professional Fiber Optic Splicer Certification.

This specialty track is designed for the fiber optics professional who wishes to specialize in the splicing of fiber optic cable, with an emphasis on the indoor environment. The person who completes this track will demonstrate a high proficiency in splicing fiber, proper slack management in confined spaces, and the entry of both wall-mounted and rack mounted enclosures. This track begins with the Certified Fiber Installer (TR-CFI) course. This is the core curriculum for all of our training. After the CFI, the next step is the Fiber Optic Technician (TR-FOT) course.

After the required field experience credits have been completed, the student may then apply to enter the Master in Splicing (TR-MFS) course, where the student will receive track specific instruction, geared toward their current work needs.

### COURSE OUTLINE

**TOPICS INCLUDE**

**TR-FOF Fiber Optic Fundamentals:** This course provides students with a practical knowledge and understanding of the latest installation, splicing, termination, and testing techniques, achieving the knowledge and competency to design, oversee, direct and maintain fiber optic cabling systems.

**TR-CFI Certified Fiber Optic Installer:** This course teaches students to lay out, install or maintain fiber optic cabling systems. Certification identifies you as an installer who can demonstrate a practical knowledge of the fiber optic theory, codes standards and practices.

**TR-FOT Certified Fiber Optic Technician:** This course utilizes technician-level, hands-on splicing and testing labs to demonstrate advanced procedures and techniques. TR-FOT is perfect for professionals who are involved with designing, configuring, installing, testing and maintaining fiber optic systems.

**TR-MFS Master in Splicing:** This course features advanced hands-on testing labs demonstrating advanced splicing procedures and techniques. Students will also learn industry-standard splicing techniques and industry “best practices”, becoming a splicing specialist.

**TR-PFOS-LAB 4 Day Lab and Examination:** The 4-day Professional Fiber Optic Splicer “practicum” has proven to be immensely popular with our students. It’s an excellent chance for students to discover any gaps in their knowledge before taking the certification exam, while also providing a unique opportunity for students to ask the instructor questions while receiving hands-on, “real-world” experience.

### PRICING

**INDIVIDUAL COURSES & CERTIFICATIONS**

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TR-PFOT Professional Fiber Optic Tester

This specialty track is designed for the fiber optics professional who wishes to specialize in the testing of fiber optic cable, with an emphasis on the indoor environment. The person who completes this track will demonstrate a high proficiency in fiber testing procedures and techniques as it applies to multi-mode fiber within confined spaces, as well as wall-mounted and rack mounted enclosures.

This track begins with the Certified Fiber Installer (TR-CFI) course. This is the core curriculum for all of our training. After the CFI, the next step is the Fiber Optic Technician (TR-FOT) course.

After the required field experience credits have been completed, the student may then apply to enter the Master in Testing (TR-MFT) course, where the student will receive track specific instruction, geared toward their current work needs.

Following the completion of remaining field experience credits, the student may apply for the one-week extensive training. As a fiber tester working in the indoor environment, the student will be required to perform a variety of testing and troubleshooting tasks. Successful completion of these exercises will demonstrate to the evaluators that the student meets the criteria for the award of the Professional Fiber Optic Tester Certification.

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**PRICING** **INDIVIDUAL COURSES & CERTIFICATIONS**

<table>
<thead>
<tr>
<th>Course Title</th>
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<td>TR-FOT Certified Fiber Optic Technician</td>
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<td>TR-MFT Masters in Testing</td>
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<td>TR-PFOT-LAB 4 Day Lab and Exam</td>
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**PRICING** **PACKAGE COURSES & CERTIFICATIONS**

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<td><strong>Savings</strong></td>
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TR-POPS Professional Outside Plant Splicer

This specialty track is designed for the fiber optics professional who wishes to specialize in the splicing of fiber optic cable, with an emphasis on the outside environment. The person who completes this track will demonstrate a high proficiency in splicing fiber, proper slack management in aerial and underground location, and the entry of a variety of outside rated fiber splice enclosures.

This track begins with the Certified Fiber Installer (TR-CFI) course. This is the core curriculum for all of our training. After the CFI, the next step is the Fiber Optic Technician (TR-FOT) course.

After the required field experience credits have been completed, the student may then apply to enter the Master in Splicing (TR-MFS) course, where the student will receive track specific instruction, geared toward their current work needs.

Following the completion of remaining field experience credits, the student may apply for the one-week extensive training. As a splicer working in the outside plant, the student will be required to perform a variety of splicing and enclosure preparation and entry tasks. Successful completion of these exercises will demonstrate to the evaluators that the student meets the criteria for the award of the Professional Outside Plant Splicer Certification.

COURSE OUTLINE TOPICS INCLUDE

TR-FOF Fiber Optic Fundamentals: This course provides students with a practical knowledge and understanding of the latest installation, splicing, termination, and testing techniques, achieving the knowledge and competency to design, oversee, direct and maintain fiber optic cabling systems.

TR-CFI Certified Fiber Optic Installer: This course teaches students to lay out, install or maintain fiber optic cabling systems. Certification identifies you as an installer who can demonstrate a practical knowledge of the fiber optic theory, codes standards and practices.

TR-OSP Certified Outside Plant Technician: TR-OSP focuses extensively on Outside Plant installations (OSP). Outside Plant often includes communication infrastructure between buildings, as well as long haul telecommunications (including customer-owned OSP). This course also includes an overview of FTTx (Fiber To The “X”) applications.

TR-MFS Master in Splicing: This course features advanced hands-on testing labs demonstrating advanced splicing procedures and techniques. Students will also learn industry-standard splicing techniques and industry "best practices", becoming a splicing specialist.

TR-POPS-LAB 4 Day Lab and Examination: The 4-day Professional Outside Plant Splicer “practicum” has proven to be immensely popular with our students. It’s an excellent chance for students to discover any gaps in their knowledge before taking the certification exam, while also providing a unique opportunity for students to ask the instructor questions while receiving hands-on, “real-world” experience.

PRICING INDIVIDUAL COURSES & CERTIFICATIONS

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PRICING PACKAGE COURSES & CERTIFICATIONS

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<td>$7,000</td>
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<tr>
<td>Savings</td>
<td></td>
<td>$1,600</td>
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</table>
TR-POPT Professional Outside Plant Tester

This specialty track is designed for the fiber optics professional who wishes to specialize in the testing of fiber optic cable, with an emphasis on the outside environment. The person who completes this track will demonstrate a high proficiency in fiber testing procedures and techniques as it applies to single-mode fiber over long-haul links, wide area networks, and point-to-point applications.

This track begins with the Certified Fiber Installer (TR-CFI) course. This is the core curriculum for all of our training. After the CFI, the next step is the Fiber Optic Technician (TR-FOF) course.

After the required field experience credits have been completed, the student may then apply to enter the Master in Testing (TR-MFT) course, where the student will receive track specific instruction, geared toward their current work needs.

Following the completion of remaining field experience credits, the student may apply for the one-week extensive training. As a tester working in the outside plant, the student will be required to perform a variety of testing, evaluation, and troubleshooting tasks. Successful completion of these exercises will demonstrate to the evaluators that the student meets the criteria for the award of the Professional Outside Plant Tester Certification.

COURSE OUTLINE TOPICS INCLUDE

TR-FOF Fiber Optic Fundamentals: This course provides students with a practical knowledge and understanding of the latest installation, splicing, termination, and testing techniques, achieving the knowledge and competency to design, oversee, direct and maintain fiber optic cabling systems.

TR-CFI Certified Fiber Optic Installer: This course teaches students to lay out, install or maintain fiber optic cabling systems. Certification identifies you as an installer who can demonstrate a practical knowledge of the fiber optic theory, codes standards and practices.

TR-OSP Certified Outside Plant Technician: TR-OSP focuses extensively on Outside Plant installations (OSP). Outside Plant often includes communication infrastructure between buildings, as well as long haul telecommunications (including customer-owned OSP). This course also includes an overview of FTTx (Fiber To The “X”) applications.

TR-MFT Master in Testing: This course features hands-on testing labs demonstrating advanced testing procedures and industry-standard fiber characterization techniques. Students will become testing specialists who are better able to troubleshoot network problems, analyze traces, and calibrate different types of OTDRs.

TR-POPT-LAB 4 Day Lab and Examination: The 4-day Professional Outside Plant Tester “practicum” has proven to be immensely popular with our students. It’s an excellent chance for students to discover any gaps in their knowledge before taking the certification exam, while also providing a unique opportunity for students to ask the instructor questions while receiving hands-on, “real-world” experience.

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<tr>
<td>TR-POPT</td>
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Savings: $1,600
TR-FCB Fiber Characterization Basics

This fundamental online course will provide students with an introduction to fiber characterization and allow students to effectively communicate and interpret issues found during testing of optical infrastructure. Students will learn about the theory behind PMD, CD and attenuation profiling, and how to interpret the results obtained during testing.

Target Audience
This course is designed for network engineers, system managers, application engineers, designers, and supervisors.

This course Includes:
- Examine tests that are required for fiber characterization
- Transmission limits as a function of bit rate and application
- The effects of chromatic dispersion and polarization mode dispersion on high speed signals such as 10G, 40G, & 100G
- OTDR theory and bi-directional splice characterization
- Learn about ORL and the consequences of high ORL

Understanding issues AND OPTIMIZE PERFORMANCE
Dust, dirt and impurities can cause "speed-bumps" on your fiber. Be proactive and avoid total network road blocks by testing your fiber routinely.

COURSE PREREQUISITES
A basic knowledge of OTDR and fiber networks is recommended for this course.

COURSE OUTLINE TOPICS INCLUDE
- Introduction to Fiber Optics: What is Fiber Characterization?, Why is it needed?, Legacy Networks and Today's Networks
- Fiber Optic Basic Review: Transmission Basics, Light Propagation, Causes of Optical Loss, Types of Fiber
- Inspection and Cleaning of Fibers: Inspection Tools, Proper Cleaning Practices, Inspection Assessment
- End to End Loss: Connector Loss, Splice Loss, Power Budget Calculations, Test Methodologies, OTLS Functionality
- Optical Return Loss: Consequences of High ORL, ORL Limits, ORL Test Tools, ORL Testing
- OTDR: How an OTDR Works, Reflectance, Dead Zones, Setting up an OTDR, Manual Measurements
- Chromatic Dispersion: Causes of Chromatic Dispersion, Limits of Chromatic Dispersion, Chromatic Dispersion Testing, Compensation
- Polarization Mode Dispersion: Causes of PMD, Mode Coupling, PMD Limits, PMD Testing

PRICING COURSES & CERTIFICATIONS

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<tr>
<td>TC-FCB</td>
<td>TFS Certification FCB</td>
<td>$150</td>
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To register call: 877-529-9114
TR-FCT Fiber Characterization Technician

Stay out of the dark
DON’T LIMIT YOUR

FIBER OPTIC NETWORK

Learn how to test the integrity of your fiber optic cables and read OTDR traces in order to limit dispersion and optical fiber loss.

This three-day course will provide you with all the knowledge and requirements that are needed to effectively characterize your optical infrastructure. You will learn about all the requirements for engineering and for qualifying the optical fiber links that utilize specific bit rates in regards to both metro and long haul spans.

After taking this course, students will have a detailed understanding of advanced OTDR configuration, cause and effect of trace events, and other advanced trace analysis techniques including bi-directional splice characterization and optical return loss testing.

Students Will Learn
- Tests and equipment that are required for fiber characterization
- Transmission limits as a function of bit rate and application
- The effects of Chromatic Dispersion (CD) and Polarization Mode Dispersion (PMD) on high speed signals such as 10G, 40G, and 100G
- OTDR theory and bi-directional splice characterization and splice reports
- Optical return loss (ORL) testing & the effects of high ORL
- How to measure CD and PMD
- Conduct all tests required for fiber characterization
- Test one complete span and compile all test data into a comprehensive report
- Use an OLTS, OTDR, CD, and PMD tester

COURSE OUTLINE TOPICS INCLUDE
- Intro to Fiber Characterization: Fiber Characterization and why it’s needed, Legacy Networks and Today’s Networks
- Fiber Optic Basic Review: Transmission Basics, Light Propagation, Causes of Optical Loss, Types of Fiber
- Inspection and Cleaning of Fibers: Inspection Tools, Proper Cleaning Practices, Inspection Assessment
- End to End Loss: Connector Loss, Splice Loss, Power Budget Calculations, Test Methodologies, OTLS Functionality
- Optical Return Loss: Consequences of High ORL, ORL Limits, ORL Test Tools, ORL Testing
- OTDR: How an OTDR Works, Reflectance, Dead Zones, Setting up the OTDR, Manual Measurements
- Chromatic Dispersion: Causes and limits of Chromatic Dispersion, Chromatic Dispersion Testing, Compensation
- Polarization Mode Dispersion: Causes of PMD, Mode Coupling, PMD Limits, PMD Testing, Isolating High PMD Areas
- Bi-directional Trace Analysis: Post Analysis Software, Creating Templates, Applying Templates, Generating Splice Reports
- Reports: Transferring Data, Compiling Data, Generate Report

COURSE PREREQUISITES
Although not required, Fiber Characterization Basics (TR-FCB) is the recommended online prerequisite for this course.

PRICING COURSES & CERTIFICATIONS

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<td>TR-FCT</td>
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<tr>
<td>TC-FCT</td>
<td>TFS Certification FCT</td>
<td>$150</td>
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</table>

877-529-9114
training@fiberoptic.com

The Fiber Optic Marketplace LLC® — Part of the Adtell Group
www.thefiberschool.com
Premise Wiring Systems Fundamentals is an online course, designed for new or experienced personnel who desire a fundamental knowledge of copper and fiber optic theory, codes, standards and practices widely accepted in commercial buildings and customer-owned outside plant facilities.

**Target Audience**
This online course is excellent for those who install, supervise, design and/or oversee the installation of copper and fiber premise wiring systems in commercial buildings. This course is also recommended for IT professionals or facility managers who have a need to oversee telecommunication projects.

**This course will allow students to:**
- Understand the telecommunication-wiring standards for high performance category rated copper cabling.
- Understand a basic building physical topology (permanent link and channel).
- Know how to analyze the performance parameters for copper and fiber optic cabling systems.
- Know the performance specifications for the high-performance Twisted Pair Media.
- Understand Premise Wiring Test Equipment.
- Understand distance limitations, attenuation, near-end cross talk, wire mapping and how to test these measurable electrical properties of copper and fiber media.
- Understand the current Telecommunication Commercial Building Wiring Standards (EIA/TIA).

**COURSE OUTLINE TOPICS INCLUDE**

- The Topologies: Topologies (Physical), Topologies (LAN Basics), The Premise Wiring System
- Unshielded Twisted Pair (UTP)
- Screened Twisted Pair (ScTP)
- Shielded Twisted Pair (STP)
- Coaxial Cable
- Fiber Optic Fundamentals
- Cable Applications: Backbone, Horizontal, Work Area, Media Types (Cables), Distance Limitations
- Media Terminations and Components: Copper and Fiber Optic
- Connections
- Patch Panels: Cable Management
- Installation Practice: Horizontal Pathways, Backbone Pathways, Work Area, Fiber Optic Practices, Miscellaneous Practices, Grounding Basics
- Testing and Equipment: Test Equipment, Electrical Parameters, Optical Parameters, Permanent Link Testing
- Specification Process: Reading Plans and Specs

**COURSE PREREQUISITES**
No prior experience necessary to take Premise Wiring Systems Fundamentals.

**SCHEDULE QUAKERTOWN, PA (+$150 Logistics fee)**

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<td>TR-PWSF</td>
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<tr>
<td>TC-PWSF</td>
<td>TFS Certification PWSF</td>
<td>$150</td>
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To register call: 877-529-9114

Learning is as easy as logging in to your computer. Expand your knowledge and maximize your productivity at your own pace.

- Self-paced for individuals who prefer to learn from work or home
- Reduce your time/cost
- Enjoy access to online material for a full year

The Fiber Optic Marketplace LLC® — Part of the Adtell Group
www.thefiberschool.com

877-529-9114
training@fiberoptic.com
The Premise Wiring Systems Technician training expands a student’s installer training and encompasses a higher knowledge level of copper and fiber optic cabling used in commercial buildings and customer-owned outside plant environments (Campus).

This course incorporates hands-on labs including multi-vendor copper and fiber terminations, and expanded fiber optic splicing and testing labs. Students will learn skills applicable to all functions required to safely and competently install advanced copper and fiber communications cabling in the premise environment.

As the follow-up course to Premise Wiring Installer (TR-PWSI), this course will give an advanced level of understanding of how to assemble, wire, and test various commercial building cabling systems.

This course will allow students to:

- Understand the EIA/TIA standards for category 5e, 6, 6A & 7
- Understand the EIA/TIA standards for laser optimized fiber optic cabling
- Know the performance specifications for the high performance Twisted Pair Media
- Understand Premise Wiring Test Equipment
- Understand distance limitations, attenuation, near-end crosstalk, wire mapping and how to test the performance of copper and fiber media
- Understand the logical and physical organization of premise systems, the products and test equipment needed to install and maintain them
- Demonstrate basic skills needed to assemble, wire, and test various cabling systems including new advanced cabling systems by participating in hands-on lab exercises including fusion splicing and OTDR testing.

COURSE PREREQUISITES
The following knowledge or experience is desirable but not required:
- 2 year electrical or telecommunications voice/data experience
- Basic knowledge of fiber optic cable types
- Basic Knowledge of cabling pulling
- Basic knowledge of cable installation
- Basic knowledge of cable testing
- Basic knowledge fiber connector types
- 2 years of Commercial Building installation experience or equivalent.
- Prior knowledge of basic testing equipment and procedures. Be a FiberOptic.com certified installer or technician or other industry certification (equivalent)

COURSE OUTLINE LECTURES
- Introduction: Course Objectives
- Ethernet Fundamentals
- Wireless Networking
- Power over Ethernet
- Testing Copper Cables
- Testing Optical Fiber
- Voice over IP
- CCTV Fundamentals
- Cable Specifications: Media, Unshielded Twisted Pair, Screened Twisted Pair (ScTP), Shielded Twisted Pair (STP), Category 5e, 6, 7 and laser optimized fiber
- Cable Applications: Backbone, Horizontal, Work Area, Media Types (Cables), Distance Limitations
- Review: Media Terminations and Components, Copper and Fiber optic, Connections, Patch Panels, Cable Management
- Installation Practice: Horizontal Pathways, Backbone Pathways, Work Area, Fiber optic Practices, Grounding Basics
- Testing and Equipment: Test Equipment, Electrical Parameters, Optical Parameters, Permanent Link Testing, Channel Testing

COURSE OUTLINE HANDS-ON LABS
- Set up and install: A basic CCTV system
- Build: Copper, fiber and coax links using Power Over Ethernet
- Copper Testing: Certification Testing, Permanent Link Testing, Channel Testing
- Labs: Pre-polished no epoxy terminations & pigtail splicing
- Fiber Testing: OLS Optical Loss Test Set, Test a Fiber Optic Link
- Fiber Testing: Tier 1 & Tier Link testing

See page 75 for products used in training courses.
TR-WNF Wireless Network Fundamentals

Faster. Effective. Secure.
MOVING YOUR NETWORK TO BUSINESS CLASS

While the router at your home may be perfect for wireless networking for a few computers, as your business grows, so does your need for proper wireless network methods and devices.

This online course is designed to give students a firm understanding of radio frequency theory, 802.11 standards, WLAN topologies, basic antenna theory and an introduction to WLAN security. Presentation material will explore WLAN applications in specific markets, WLAN topologies and design concerns, essential equipment, AP configuration, & site survey techniques.

Objectives

Wireless Network Fundamentals training will give students a good foundation in both wireless networking techniques and equipment.

This course will allow students to:
- Understand when to use wireless networks
- Know how to secure wireless networks
- Understand the differences between enterprise grade and consumer grade wireless equipment
- Know how to properly troubleshoot and test wireless networks

Target Audience

This course is designed for network installers, building managers, small campus technology staff, IT personnel and anyone else with an interest in enterprise level wireless networking. No prior experience is necessary.

COURSE PREREQUISITES

No prior experience required for Wireless Network Fundamentals.

COURSE OUTLINE

- Introduction to Wireless Networking
- Understanding Enterprise Grade Wi-Fi Networks
- Designing and Deploying Wireless: Antennas, Devices, Security
- Basic Wireless Router and Client Setup
- Common Administrative Tasks
- 802.11 Troubleshooting
- Site Surveys and RF Signal Measurements

PRICING

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<td>TC-WNF</td>
<td>TFS Certification WNF</td>
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To register call: 877-529-9114
TR-WIT Wireless Network Installation & Testing

This course is designed to give students a firm understanding of WLAN security. Hands-on access point and client adaptor labs provide attendees with experience setting up and securing a wireless LAN. Presentation material will explore WLAN design concerns, essential equipment, AP configuration, and site survey techniques.

Objectives
As the follow-up course to Wireless Network Fundamentals (TR-WNF), this course assumes the student already knows how to set up a basic enterprise level wireless network. This course will teach students how to properly configure and secure a network against intrusion, vandalism, and abuse.

This course includes:
- Understanding Advanced Wireless Network Settings
- Address Translation, Firewalling and MAC Filtering
- Configuring WPA
- Intrusion Detection
- Physical Security of Wireless Assets
- Planning for Infrastructure Improvements
- IPv4 Migration
- Public Wireless Hotspot Setup
- Using DNS for a “For-pay” Wireless Connection
- Antenna Placement

Target Audience
This course is designed for network installers, building managers, small campus technology staff, IT personnel and anyone else with an interest in enterprise level wireless networking. Students should be familiar with enterprise level network hardware and the installation of wireless networks prior to taking this course. The Wireless Network Fundamentals course is a recommended prerequisite.

COURSE OUTLINE LECTURES
- Advanced Wireless Networking
- Planning for Network Security
- Securing Wireless Router and Clients
- Advanced Administrative Tasks
- Intrusion Detection Techniques

COURSE OUTLINE HANDS-ON LABS
- Create a wireless network
- Test a Wireless LAN (WLAN) by sharing Windows files
- Install and configure wireless network adapters, access points and wireless LAN antennas
- Connect to an Integrated Wireless Router
- Perform management, security and custom configurations
- Perform basic site survey
- Use diagnostic tools
- Perform internet and wireless connectivity troubleshooting
- Create Firewall Filter Rules to restrict access to undesirable websites
- Restrict access to certain MAC addresses

PRICING COURSES & CERTIFICATIONS

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<td>TC-WIT</td>
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For current locations and dates go to http://www.thefiberschool.com/schedule
TR-LTEBT Long Term Evolution (LTE) Basics

LTE Basics, delivers true mobile broadband for the masses with a superior user experience. LTE provides improved performance, lower total cost of ownership and enables a new era of personalized services and covers the technical details of the next-generation network beyond 3G. This two day course provides an overview of LTE from both application and technical aspects. It gives an overview of the LTE/E-UTRAN network architecture, the underlying technologies, and call setup procedures.

Objectives
LTE (Long Term Evolution) covers the technical details of the next-generation network beyond 3G.

This course includes:
• List LTE System architecture
• Radio access network
• LTE air interface details
• Underlying technologies of LTE: OFDMA/SC-FDMA and MIMO
• LTE applications, security, SLA and QoS
• Mobility in LTE
• LTE RF and backhaul planning

COURSE PREREQUISITES
Although this course requires no previous knowledge or understanding of LTE, a good understanding of telecommunication network and UMTS technology would be beneficial.

Target Audience
This course is designed for network installers, building managers, small campus technology staff, IT personnel and anyone else with an interest in the technical overview of the LTE access network.

COURSE OUTLINE TOPICS INCLUDE
• Overview of LTE, HSDPA and HSUPA
• UMTS LTE Networks
• HSPA Evolution in Release 7/8 (HSPA+)
• Mobile, fixed and portable wireless broadband access
• Evolution of mobile technology
• Optimized for IP-based traffic
• Increasing capacity
• Evolved Packet Core (EPC)
• Evolved Packet System (EPS)
• LTE Interfaces and protocols
• Service-Oriented Architecture of LTE: Content-based charging, End-to-end QoS, All-IP flat networks, Optimal routing of traffic, Seamless mobility
• LTE System Architecture Evolution: Control-pane latency and capacity, Coverage and Capacity, Spectrum flexibility, Radio Admission Control
• LTE/SAE/EPC/EPS Network Architecture: New enhanced base station, “Evolved NodeB (eNodeB), Access Gateway, Key logical functions
• LTE Operations and Procedures: System acquisition, Idle mode operations, Synchronization
• LTE Planning and Optimization: Traffic and QoS considerations, Capacity planning considerations, Antenna selections, Site location and integration

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TR-LTENE LTE Training for Non-Engineers

LTE Training for Non-Engineers training course provides a high level view of LTE (Long Term Evolution) and its related technologies. This course is intended for managers, business professional and non-engineers who need to understand LTE and evolution of the mobile broadband to 4G. You’ll gain a clear, cohesive understanding of LTE, SAE/EPC, OFDM, MIMO, VoLTE, IMS and from LTE fundamentals to the latest LTE technologies and services and how everything fits together.

Objectives

Upon completion of this fundamentals course, the attendees will have a basic understanding of the key concepts and requirements of LTE and understand the network architecture of LTE/E-UTRAN and EPC.

This course includes:
- The Mobile Broadband Evolution
- Goals and Objectives of LTE
- Interworking with other wireless technologies
- Services and Applications
- Migration to LTE and LTE-Advanced
- Global LTE Radio Spectrum
- Handover
- Roaming
- Security and Fraud
- Charging and Billing
- Location-based Services
- MBMS
- Voice over LTE (VoLTE) and SMS over LTE

Target Audience

Project managers, non-engineers and anyone else who needs to understand what LTE is.

COURSE OUTLINE TOPICS INCLUDE
- Overview of LTE
- Key LTE technologies
- Concepts behind LTE/EPC Networks
- Key interfaces & protocols
- LTE Air Interface
- Concepts of OFDMA and SC-FDMA
- MIMO in LTE: MIMO (SU-MIMO, MU-MIMO)
- Security in LTE
- Frequency Planning
- Capacity Planning
- Roaming, Security and Fraud
- Charging and Billing
- Location-based Services

COURSE PREREQUISITES

Although this course requires no previous knowledge or understanding of LTE, a good understanding of telecommunication network and UMTS technology would be beneficial.

PRICING COURSES & CERTIFICATIONS

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<td>TC-LTENE</td>
<td>TFS Certification LTENE</td>
<td>$150</td>
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For current locations and dates go to http://www.thefiberschool.com/schedule
TR-LTEBC LTE Training Boot Camp

LTE Training is an intensive learning experience that covers the essential elements of Long Term Evolution (LTE). LTE Training Crash Course covers the foundation of LTE, LTE RAN, concepts behind OFDMA/SC-FDMA, Overview of MIMO, LTE Cell Planning, LTE Capacity Planning, EPC, IMS, Diameter, EPC Signaling, Security, Voice over LTE, LTE-Advanced, LTE Backhaul (both Microwave and Metro Ethernet), PPE-TE, MPLS-TP and more.

Long Term Evolution (LTE) training crash course – Boot Camp introduces LTE and related technologies required to plan, design, implement and manage the evolution route for wireless and cellular network operators towards 4G broadband mobile networks. These courses range from basics technological overview programs to detailed engineering and design LTE courses.

LTE Training Boot Camp is the answer to your LTE-EPC/EPS technology needs. This innovative and intensive learning experience covers the essential elements of LTE and SAE/EPC/EPS in a nutshell by the industry experts.

Objectives
LTE Training Boot Camp is the answer to your LTE-EPC/EPS technology needs. This innovative and intensive learning experience covers the essential elements of LTE and SAE/EPC/EPS in a nutshell by the industry experts. LTE Training Modules are customizable based on attendee’s background, needs and objectives.

This course includes:
• Comprehension of the basics of LTE/EPC/EPS
• LTE Architecture, Protocols and Signaling
• LTE Multiple Access Methods
• Evolved Packet Core (EPC), SAE (System Architecture Evolution) and Evolved Packet System (EPS)
• LTE Radio and Core Network Planning and Design Procedures
• LTE Backhaul Requirements
• Quality of Service (QoS), Call setup procedures, Mobility support, LTE and EPC Security Architecture

Target Audience
Engineers and Non-Engineers professionals who need a thorough understanding of LTE, EPC, Services, Protocols, RF and Core Planning and Design, Backhaul, Capacity Planning, QoS, Security, VoLTE and LTE-Advanced.

COURSE PREREQUISITES
Although this course requires no previous knowledge or understanding of LTE, a good understanding of telecommunication network and UMTS technology would be beneficial.

PRICING COURSES & CERTIFICATIONS

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<tr>
<td>TC-LTEBC</td>
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<td>$150</td>
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COURSE OUTLINE TOPICS INCLUDE

- Overview of LTE: Evolution from GSM/GPRS and UMTS/HSPA to LTE and LTE Advanced, GSM (Global System for Mobile Communications), GPRS (General Packet Radio Service), EDGE and EDGE II, UMTS (Universal Mobile Telecommunication System), HSPA/HSPA+, LTE and LTE Advanced
- Overview of IP Convergence in the mobile networks: Wireless Internet Basics, GSM/EGPRS/UMTS/HSPA/HSPA+, Ethernet Backhaul for LTE, LTE Protocols and Signaling
- Overview of LTE SAE, Evolved Packet Core (EPC) and EPS
- Overview of LTE-EPC Networks and Signaling
- LTE and 1x/1xEV-DO (eHRPD) Interworking
- LTE and GSM/UMTS Interworking
- IMS Architecture and Protocols Applied to LTE
- LTE and EPC Security
- QoS Applied to LTE-EPC
- Introduction to LTE (Long Term Evolution) & EPC/EPS: Long Term Evolution (LTE) as a new radio platform technology, Support to achieve higher peak throughputs than HSPA+ in higher spectrum bandwidth, LTE for mobile, fixed and portable wireless broadband access, Optimized for IP-based traffic
- LTE Network Architecture: LTE Interfaces and protocols, Introduction to E-UTRAN, E-UTRAN network architecture, E-UTRAN protocols, Orthogonal Frequency Division Multiplexing (OFDM), Architecture and node functions
- Key interfaces: S1, S5, S6, S10 and S11
- Key features and services
- LTE/SAE/EPC Network Architecture
- Evolved UTRAN and Evolved Packet Core
- LTE/EPC Interworking
- Overview of LTE and EPC Protocol Stacks
- Overview of LTE and EPC Interfaces
- LTE-EPC Signaling Principals
- IMS (IP Multimedia Subsystem) in LTE
- Overview of Diameter Protocol
- Diameter Applications in IMS
- LTE Operations and Procedures
- LTE Planning and Optimization
- Ethernet Backhaul for LTE
- QoS Applied to LTE-EPC
- PCC (Policy and Charging Control)
- LTE and EPC Security
- Overview: LTE Air Interface, OFDM and MIMO
- LTE RF Planning and Design
- LTE Backhaul Requirements
- LTE Backhaul Aggregation Network Technology
- Overview of LTE-Advanced
TR-UBWA Ubiquiti Wireless Admin

The Broadband Wireless Admin course is a two-day instructor-led training that features the Ubiquiti product line. The course focuses on the concepts of outdoor wireless networking. This course provides an emphasis on how to design, build and manage a successful wireless ISP.

Objectives
This intermediate-level course teaches professionals in the service provider industry how to design, manage, and troubleshoot the wireless infrastructure of an ISP network, specifically using Ubiquiti equipment.

This course includes:
- RF Theory & Link Planning
- Radio Operation & Modulation
- Antenna Design & Gain
- Specific Ubiquiti Features
- WISP Network Topologies

Target Audience
The UBWA course targets students who have some experience in wireless networking, independent of vendor. Both courses are fast-paced and feature plenty of lab activities to reinforce theory and practice technical concepts.

COURSE PREREQUISITES
While not a prerequisite to the UBWA course, the UBWS (Specialist) course teaches you basic, foundational wireless concepts, regardless of your technical background. It also introduces you to the vast potential of Ubiquiti's outdoor wireless products while familiarizing you with the radio web management platform, airOS.

COURSE OUTLINE TOPICS INCLUDE
- RF Theory: Frequency vs. Propagation, Unlicensed Bands, OFDM Spectral Masks, Licensed Frequencies, Decibels in RF Systems, Free Space Path Loss, EIRP, Line of Sight & Fresnel Zones, Link Power Budgets, Fade Margin

For current locations and dates go to http://www.thefiberschool.com/schedule

PRICING COURSES & CERTIFICATIONS

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<tr>
<td>TC-UBWA</td>
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<td>$150</td>
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The Ubiquiti Enterprise Wireless Admin course is a two-day instructor-led training that features the Ubiquiti product line. This course provides an emphasis on designing/managing UniFi WLANs. Course includes hands-on labs using the latest generation of UniFi APs as well as UniFi controller platform.

**Objectives**

This two-day, in-class training course teaches the most important concepts in Enterprise Networks, focusing especially on Wireless Networks. The course has been completely redesigned with new course materials and lab activities using UAP-AC-LITE and other UniFi hardware to emphasize on how to design, build, and manage the latest, top-performing WLANs.

**This course includes:**
- WLAN Fundamentals
- WLAN Planning
- Deployment
- Basic Adoption & Setup
- Advanced Management
- Guest Portal & Hotspot Specific Ubiquiti Features
- WISP Network Topologies

**Target Audience**

The UEWA course targets students who have some experience in wireless networking, independent of vendor. Both courses are fast-paced and feature plenty of lab activities to reinforce theory and practice technical concepts. At the conclusion of the course, you can take an exam to certify at the level of Ubiquiti Enterprise Wireless Admin. If you pass at 65% or higher, you will receive a student certificate.

For current locations and dates go to: [http://www.thefiberschool.com/schedule](http://www.thefiberschool.com/schedule)

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**COURSE PREREQUISITES**

While not a prerequisite to the UEWA course, the UBRSS (Ubiquiti Broadband Routing & Switching Specialist) course teaches you basic, foundational networking concepts, regardless of your technical background. It also explains how different Ubiquiti products, such as routers, switches, and access points are configured and deployed in broadband & enterprise networks.

**COURSE OUTLINE TOPICS INCLUDE**

- **WLAN Fundamentals:** Unlicensed Radio Spectrum, Channel Operation, Regulatory Domains, WLAN Standards, Wireless Access Methods, Network Equipment
- **WLAN Planning:** Wireless Technology, Coverage & Channels, TX Power, Antenna Gain, Channel Availability, Signals vs. Noise, Airtime, Capacity & Density, Mixed Networks
- **Deployment:** Site Surveys, Overlap, Wiring & PoE, Benchmarking
- **Basic Adoption & Configuration:** Multi-Site, Layer-2 Adoption, WLAN Groups, SSID, Security & VLANs
- **Analytics:** Advanced Adoption & Guests, Cloud Hosting, Layer-3 Adoption, Discovery, SSH, DNS & DHCP, Minimum RSSI, Zero-Handoff Roaming, Guest Portal, Access Controls, Customization

**PRICING COURSES & CERTIFICATIONS**

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<td>Ubiquiti Enterprise Wireless Admin</td>
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<tr>
<td>TC-UEWA</td>
<td>TFS Certification UEWA</td>
<td>$150</td>
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The Ubiquiti Broadband Routing & Switching Specialist course is a three-day instructor-led training that features the Ubiquiti product line. This course provides information on core protocols and technologies used in today’s Internet Service Provider Networks. The course includes practical, real-world WISP examples as well as hands-on lab activities using EdgeMAX hardware.

Objectives
This is an entry-level course specially designed for networking professionals in the service provider background.

This course includes:
- First-time use, setup & management of network equipment
- Basic network design, protocol stacks and data models
- Addressing and subnetting for IPv4 networks
- Anatomy of a router and essential routing protocols
- Standard network services and security across different OSI layers

Target Audience
The UBRSS course is designed for students with virtually no prior knowledge of network theory. Mastery of the UBRSS course concepts is crucial to your success in the networking world and advancement through the Ubiquiti Academy.

For current locations and dates go to http://www.thefiberschool.com/schedule

COURSE PREREQUISITES
The UBRSS course is designed for students with virtually no prior knowledge of network theory.

COURSE OUTLINE TOPICS INCLUDE
- Device Management: Configure Lab Equipment, EdgeMAX Product Family
- IPv4 Subnetting: Addressing Basics, Subnetting, VLSM for Providers, Summarization
- Routing: Routing Tables, Static Routing Protocols, Dynamic Routing Protocols
- Services & Security: DHCP, DNS, NAT, Firewalls, Tunnel & VPN
- Appendices: IPv6 Intro, EdgeOS Commands, Addressing & Routing Tables

PRICING COURSES & CERTIFICATIONS
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<td>TR-UBRSS</td>
<td>Ubiquiti Broadband Routing &amp; Switching Specialist</td>
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<tr>
<td>TC-UBRSS</td>
<td>TFS Certification UBRSS</td>
<td>$150</td>
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The Ubiquiti Broadband Routing & Switching Admin (UBRSA) is Ubiquiti’s second, two-day course designed for professionals in the Service Provider market that desire greater knowledge about how EdgeMAX products are used in today’s carrier networks.

Objectives
The lab activities in this course are designed to mimic real-world scenarios involving STP, VLANs, OSPF/BGP/policy-based routing, as well as firewall applications.

Target Audience
The Ubiquiti Broadband Routing & Switching Admin (UBRSA) course is designed for students to learn the core protocols and technologies used in today’s service provider networks. The curriculum contains practical, real-world examples as well as hands-on lab activities with EdgeMAX equipment to enhance student learning.

COURSE OUTLINE TOPICS INCLUDE
- Virtual LANs
- Advanced L2 Studies
- Policy-Based Routing
- BGP Operation
- Multi-Area OSPF

For current locations and dates go to http://www.thefiberschool.com/schedule

COURSE PREREQUISITES
While not a prerequisite to the UBRSA course, UBRSS lays the foundations for the fundamental routing and switching concepts that surround service provider networks, including VLANs, Policy-Based Routing, multi-area OSPF, as well as intro-to-BGP.

PRICING COURSES & CERTIFICATIONS
TR-UBRSA Ubiquiti Broadband Routing and Switching Admin $1,995
TC-UBRSA TFS Certification UBRSA $150
TR-IJOS Introduction to the Junos Operating System

This three-day course provides students with the foundational knowledge required to work with the Junos operating system and to configure Junos devices. The course provides a brief overview of the Junos device families and discusses the key architectural components of the software. Key topics include user interface options with a heavy focus on the command-line interface (CLI), configuration tasks typically associated with the initial setup of devices, interface configuration basics with configuration examples, secondary system configuration, and the basics of operational monitoring and maintenance of Junos devices.

The course then delves into foundational routing knowledge and configuration examples including general routing concepts, routing policy, and firewall filters.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos OS and monitoring basic device operations.

Target Audience

This course benefits individuals responsible for configuring and monitoring devices running the Junos OS.

COURSE OUTLINE

- Introduction - Course Objectives
- Junos Operating System Fundamentals
- User Interface Options
- Initial Configuration
- Secondary System Configuration
- Operational Monitoring and Maintenance
- Interface Configuration Examples
- The J-Web Interface
- Routing Fundamentals
- Routing Policy
- Firewall Filters
- Class of Services (CoS)

COURSE OUTLINE TOPICS INCLUDE

- Introduction - Course Objectives
- Junos Operating System Fundamentals
- User Interface Options
- Initial Configuration
- Secondary System Configuration
- Operational Monitoring and Maintenance
- Interface Configuration Examples
- The J-Web Interface
- Routing Fundamentals, Routing Policy
- Firewall Filters
- Class of Services (CoS)

COURSE PREREQUISITES

Students should have basic networking knowledge and an understanding of the Open Systems Interconnection (OSI) reference model and the TCP/IP protocol suite.

Call 877-529-9114 for course dates and locations.


For current locations and dates go to http://www.thefiberschool.com/schedule

PRICING COURSES & CERTIFICATIONS

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<td>TR-IJOS</td>
<td>Intro to the Junos OS</td>
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<tr>
<td>TC-IJOS</td>
<td>TFS Certification</td>
<td>$150</td>
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The Fiber Optic Marketplace LLC® — Part of the Adtell Group
www.thefiberschool.com
TR-JIR Junos Intermediate Routing

This two-day course provides students with intermediate routing knowledge and configuration examples. The course includes an overview of protocol independent routing features, load balancing and filter-based forwarding, OSPF, BGP, IP tunneling, and high-availability (HA) features.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos OS and monitoring device operations. This course uses Juniper Networks SRX Series Services Gateways for the hands-on component, but the lab environment does not preclude the course from being applicable to other Juniper hardware platforms running the Junos OS. This course is based on Junos OS Release 12.1R1.9.

Target Audience

Network engineers, technical support personnel, reseller support engineers, and others responsible for implementing and/or maintaining the Juniper Networks products covered in this course.

Call 877-529-9114 for course dates and locations.


PRICING COURSES & CERTIFICATIONS

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<td>TR-JIR</td>
<td>Junos Intermediate Routing</td>
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<td>TC-JIR</td>
<td>TFS Certification</td>
<td>$150</td>
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COURSE PREREQUISITES

Students should have basic networking knowledge and an understanding of the OSI model and the TCP/IP protocol suite.

Students should also have attended the Introduction to Junos Operating Systems (TR-IJOS) and Junos Routing Essentials (TR-JRE) courses prior to attending this class.

COURSE OUTLINE LECTURES

- Introduction to Intermediate Routing
- Protocol-Independent Routing
- Load Balancing and Filter-Based Forwarding
- Open Shortest Path First (OSPF)
- Border Gateway Protocol
- IP Tunneling
- High Availability

COURSE OUTLINE HANDS-ON LABS

- Introduction - Course Objectives
- Configure and Monitor: Static/aggregate/generated routes
- Configure and Share: Routes between routing instances
- Describe: Load-balancing concepts and operations
- Implement and Monitor Filter-based Forwarding
- OSPF: Configure, monitor and troubleshoot
- IP Tunneling: Concepts and Applications
- IPv4 versus IPv6
- IS-IS: Operations, configure, monitor and troubleshoot
TR-AJER Advanced Juniper Enterprise Routing

This four-day course is designed to provide students with the tools required for implementing, monitoring, and troubleshooting Layer 3 components in an enterprise network. Detailed coverage of OSPF, BGP, class of service (CoS), and multicast is strongly emphasized. The course also exposes students to common troubleshooting commands and tools used to troubleshoot various intermediate to advanced issues.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos operating system and in monitoring device and protocol operations.

This course uses Juniper Networks vSRX virtual firewall for the hands-on component, but the lab environment does not preclude the course from being applicable to other Juniper hardware platforms running the Junos OS. This course is based on Junos OS Release 15.1X49-D70.

Target Audience

This course benefits individuals responsible for configuring and monitoring devices running the Junos OS.

COURSE OUTLINE

HANDS-ON LABS

- Configuring and Monitoring OSPF
- Configuring and Monitoring OSPF Areas and Route Summarization
- Configuring and Monitoring Routing Policy and Advanced OSPF Policy
- Implementing BGP
- BGP Attributes
- Implementing Enterprise Routing Policies
- Implementing PIM-SM
- Implementing SSM
- Implementing CoS Features in the Enterprise
- BGP Route Reflection (Optional)

COURSE PREREQUISITES

Students should have basic networking knowledge and an understanding of the Open Systems Interconnection (OSI) model and the TCP/IP protocol suite. Students should also have working experience with basic routing principles.

Students should also have attended the Introduction to the Junos Operating System (TR-IJOS), Junos Routing Essentials (TR-JRE), and Junos Intermediate Routing (TR-JIR) courses prior to attending this class.

COURSE OUTLINE

TOPICS INCLUDE

- Introduction - Course Objectives
- OSPF Area Types: Describe types and operations, configure various types
- BGP: Describe basic operation, explain the route selection process, configure advanced options for BGP peers, manipulation BGP attributes using routing policy
- Routing Policy: Describe common policies used in the enterprise environment, implement a routing policy for inbound and outbound traffic using BGP
- CoS: Describe various components and their functions, explain processing along with CoS defaults, implement CoS features in an enterprise environment
- Configure and monitor Internet Group Management Protocol (IGMP)
- Identify common multicast routing protocols

Call 877-529-9114 for course dates and locations.


PRICING COURSES & CERTIFICATIONS

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<tr>
<td>TC-AJER</td>
<td>TFS Certification</td>
<td>$150</td>
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TR-AJSPR Advanced Junos Service Provider Routing

This five-day course is designed to provide students with detailed coverage of OSPF, IS-IS, BGP, and routing policy.

This course uses Juniper Networks vMX Series Routers for the hands-on component, but the lab environment does not preclude the course from being applicable to other Juniper hardware platforms running the Junos OS. This course is based on the Junos OS Release 17.1.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring, monitoring, and troubleshooting the Junos operating system and in monitoring device and protocol operations. After successfully completing this course, you should be able to:

- Describe the various OSPF link-state advertisement (LSA) types.
- Explain the flooding of LSAs in an OSPF network.
- Describe the shortest-path-first (SPF) algorithm.
- List key differences between OSPFv2 and OSPFv3.
- Describe OSPF area types and operations.
- Configure various OSPF area types.
- Summarize and restrict routes.
- Identify some scenarios in a service provider network that can be solved using routing policy or specific configuration options.
- Use routing policy and specific configuration options to implement solutions for various scenarios.
- Describe how to troubleshoot OSPF.
- Explain the concepts and operation of IS-IS.
- Describe various IS-IS link-state protocol data unit (LSP) types.
- List IS-IS adjacency rules and troubleshoot common adjacency issues.
- Configure and monitor IS-IS.

Target Audience

This course benefits individuals responsible for implementing, monitoring, and troubleshooting Layer 3 components of a service provider's network.

Call 877-529-9114 for course dates and locations.


Pricing Courses & Certifications

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<tr>
<td>TC-AJSPR</td>
<td>TFS Certification</td>
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COURSE PREREQUISITES

Students should have intermediate-level networking knowledge and an understanding of the Open Systems Interconnection (OSI) model and the TCP/IP protocol suite. Students should also attend the Introduction to the Junos Operating System (IJOS) and Junos Intermediate Routing (JIR) courses prior to attending this class.

COURSE OUTLINE TOPICS INCLUDE

- Introduction to Advanced Junos Service Provider Routing
- OSPF Areas: Review of areas, Stub Area Operation and Configuration, NSSA Operation and Configuration, Route Summarization
- OSPF Case Studies and Solutions: Virtual Links, OSPF Multi-area Adjacencies, External Reachability
- Troubleshooting OSPF
- IS-IS: Overview, PDUs, Neighbors and Adjacencies, Configuring and Monitoring
- Advanced IS-IS Operations and Configuration Options: Operations, Configuration, Routing Policy
- Multilevel IS-IS Networks: Level 1 and Level 2 Operations, Multilevel Configuration
- Troubleshooting IS-IS
- BGP: Review, Operations, Path Selection, Configuration
- BGP Attributes and Policy
- Route Reflection and Confederations
- BGP Route Damping
- Troubleshooting BGP
- Troubleshooting Policy
**TR-JSEC Junos for Security Platforms**

This five-day course covers the configuration, operation, and implementation of SRX Series Services Gateways in a typical network environment. Key topics within this course include security technologies such as security zones, security policies, Network Address Translation (NAT), IP Security (IPsec), and high availability clusters, as well as details pertaining to basic implementation, configuration, management, and troubleshooting.

**Objectives**

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos OS and monitoring device operations. This course uses Juniper Networks SRX Series Services Gateways and Security Director for the hands-on component. This course is based on Junos OS Release 15.1X49-D70.3 and Junos Space Security Director 16.1.

After successfully completing this course, you should be able to perform the following:
- Describe traditional routing and security and the current trends in internetworking.
- Provide an overview of SRX Series devices and software architecture.
- Describe the logical packet flow and session creation performed by SRX Series devices.
- Describe, configure, and monitor zones.
- Describe, configure, and monitor security policies.
- Describe, configure, and monitor user firewall authentication
- Describe various types of network attacks.
- Configure and monitor Screen options to prevent network attacks.
- Explain, implement, and monitor NAT, as implemented on Junos security platforms.

**Target Audience**

The course benefits operators of SRX Series devices. These operators include network engineers, administrators, support personnel, and reseller support personnel.

Call 877-529-9114 for course dates and locations.


**PRICING COURSES & CERTIFICATIONS**

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<td>TC-JSEC</td>
<td>TFS Certification</td>
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**COURSE PREREQUISITES**

Students should have basic networking knowledge and an understanding of the OSI model and the TCP/IP protocol suite.

Students should also either have attended the **Introduction to the Junos Operating System (TR-IJOS)** and **Junos Routing Essentials (TR-JRE)** courses prior to attending this class, or have equivalent experience with Junos Software.

**COURSE OUTLINE HANDS-ON LABS**

- Introduction - Course Objectives
- Overview of Junos security platforms and software
- Zones: Describe, configure and monitor
- Security Policies: Describe, configure and monitor
- Firewall User Authentication: Describe, configure and monitor
- Screen Options
- NAT: Explain, implement and monitor
- IPsec VPNs: Explain the purpose and mechanics
- IDP Signature Database: Utilize and update on Junos security platforms

**COURSE OUTLINE TOPICS INCLUDE**

- Introduction to Junos for Security Platforms
- Zones: Definition, Configuration, Monitoring
- Security Policies: Overview, Components, Scheduling
- Firewall User Authentication
- Common Administrative Tasks
- Screen Options
- Network Address Translation (NAT)
- IPsec VPNs: Types, Requirements, Details, Monitoring
- Intro to Intrusion Detection and Prevention (IDP)
- High Availability Clustering Overview and Implementation
TR-AJSEC Advanced Junos Security

This five-day course, which is designed to build off of the current Junos Security (JSEC) offering, delves deeper into Junos security.

This course is based on Junos OS Release 15.1X49-D70.3 and Junos Space Security Director 16.1.

Target Audience
This course benefits individuals responsible for implementing, monitoring, and troubleshooting Junos security components.

Objectives
Through demonstrations and hands-on labs, you will gain experience in configuring and monitoring the advanced Junos OS security features with advanced coverage of virtualization, AppSecure, advanced Network Address Translation (NAT) deployments, Layer 2 security, and Sky ATP. This course uses Juniper Networks SRX Series Services Gateways for the hands-on component. After successfully completing this course, you should be able to:

- Demonstrate understanding of concepts covered in the prerequisite Junos Security course.
- Describe the various forms of security supported by the Junos OS.
- Configure custom application signatures.
- Describe Junos security handling at Layer 2 versus Layer 3.
- Implement next generation Layer 2 security features.
- Demonstrate understanding of Logical Systems (LSYS).
- Use Junos debugging tools to analyze traffic flows and identify traffic processing patterns and problems.
- Describe Junos routing instance types used for virtualization.

COURSE PREREQUISITES
Students should have a strong level of TCP/IP networking and security knowledge.

Students should also have attended the Introduction to the Junos Operating System (TR-IJOS), Junos Routing Essentials (TR-JRE), and Junos Security (TR-JSEC) courses prior to attending this class.

COURSE OUTLINE TOPICS INCLUDE

- Introduction - Course Objectives
- Junos Layer 2 Packet Handling and Security Features
- Virtualization: Routing instances, Logical Systems (LSYS)
- Working with Log Director: Overview, components, install, setup, administration
- Sky ATP Theory and Implementation
- IPS Policy & Configuration
- SDSN: Overview, components, troubleshooting
- Enforcement, Monitoring and Reporting: User role firewall and integrated user firewall overview
- Troubleshooting Junos Security: Methodology, Tools, Identifying IPsec issues

Call 877-529-9114 for course dates and locations.


PRICING COURSES & CERTIFICATIONS

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<td>TC-AJSEC</td>
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<td>$150</td>
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Call 877-529-9114 for course dates and locations.

TR-CJFV Configuring Juniper Firewall/VPNs

The Configuring Juniper Firewall/VPNs course is a three-day course and is the first course in the Screen OS curriculum. The instructor-led course focuses on configuration of the Juniper Firewall/VPN products in a variety of situations, including basic administrative access, routing, firewall policies and policy options, attack prevention features, address translation, and VPN implementations.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring Juniper Firewall/VPN devices.

This course covers:
- ScreenOS security architecture
- Configuration of administrative access and options
- Backing up and restoring configuration and ScreenOS files
- Configuring a ScreenOS device in transparent, route, Network Address Translation (NAT), and IPv6 modes
- The applications of multiple virtual routers
- Configuration of the ScreenOS firewall to permit and deny traffic based on user-defined policies
- Configuration of advanced policy options
- Identifying and configuring network designs for various types of network address translation.
- Configuring policy-based and route-based VPN tunnels.

Target Audience

This course is intended for network engineers, support personnel, reseller support and others responsible for implementing Juniper Security products using the advanced features covered in this class.

COURSE PREREQUISITES

This course assumes that students have basic networking knowledge and experience in the following areas:
- Ethernet
- Transparent Bridging
- TCP/IP Operations
- IP Addressing
- Routing

COURSE OUTLINE

TOPICS INCLUDE
- Introduction - Course Objectives
- Juniper Networks Security Concepts
- Security Architecture
- Transparent Mode and Layer 2 Operations
- Layer 3 Operations/Configuration
- Policy Options and Configuration
- Attack Prevention
- Address Translation Options
- VPN Concepts
- Route-Based VPNs
- Policy-Based VPNs
- Netscreen Remote Client

PRICING COURSES & CERTIFICATIONS

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<tr>
<td>TC-CJFV</td>
<td>TFS Certification</td>
<td>$150</td>
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Call 877-529-9114 for course dates and locations.

TR-JEX Junos Enterprise Switching

The Junos Enterprise Switching Course (TR-JEX) is a two-day course that provides students with introductory switching knowledge and configuration examples. This course includes an overview of switching concepts and operations, virtual LANs, spanning tree protocol, port and device security features, and high-availability features.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos OS and monitoring device operations.

Target Audience

This course is intended for network engineers, support personnel, reseller support and others responsible for implementing Juniper Security products using the advanced features covered in this class.

Call 877-529-9114 for course dates and locations.


COURSE PREREQUISITES

Students should have intermediate-level networking knowledge and an understanding of the OSI model and the TCP/IP protocol suite. Students should also have familiarity with the Protocol Independent Multicast-Sparse Mode (PIM-SM) protocol.

Students should have attended Introduction to Junos Operating Systems (TR-IJOS) and Junos Routing Essentials (JRE) courses prior to attending this class.

COURSE OUTLINE TOPICS INCLUDE

- Introduction - Course Objectives
- Layer 2 Switching
- Ethernet Bridging Basics
- Terminology and Design Considerations
- Layer 2 Switching Operations: Enabling and Monitoring
- Configuring and Monitoring VLANs
- Spanning Tree Protocol (STP): Overview, Configuring
- Rapid Spanning Tree Protocol (RSTP): Overview, Configuring and Monitoring
- Protection Features
- Port Security
- MAC Limiting
- Dynamic ARP Inspection (DAI)
- DHCP Snooping
- Device Security
- Firewall Filters
- High Availability
- Link Aggregation Groups (LAGs)
- Redundant Trunk Groups (RTGs)
- Virtual Chassis

Call 877-529-9114 for course dates and locations.


Call 877-529-9114 for course dates and locations.

Call 877-529-9114 for course dates and locations.
TR-AJEX Advanced Junos Enterprise Switching

This two-day course provides detailed coverage of virtual LAN (VLAN) operations, Multiple Spanning Tree Protocol (MSTP) and VLAN Spanning Tree Protocol (VSTP), authentication and access control for Layer 2 networks, IP telephony features, class of service (CoS), and monitoring and troubleshooting tools and features supported on the EX Series Ethernet Switches.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos operating system and in monitoring device and protocol operations. This course uses Juniper Networks EX-4200 Series Ethernet Switches for the hands-on component. After successfully completing this course, students should be able to:

- Implement filter-based VLAN assignments
- Restrict traffic flow within a VLAN
- Manage dynamic VLAN registration
- Tunnel Layer 2 traffic through Ethernet networks
- Review the purpose and operations of a spanning tree
- Implement multiple spanning-tree instances in a network
- Implement one or more spanning-tree instances for a VLAN
- List the benefits of implementing end-user authentication
- Explain the operations of various access control features
- Configure and monitor various access control features
- Describe processing considerations when multiple authentication and access control features are enabled
- Describe some common IP telephony deployment scenarios
- Describe features that facilitate IP telephony deployments
- Configure and monitor features used in IP telephony deployments
- Explain the purpose and basic operations of CoS
- Describe CoS features used in Layer 2 networks
- Configure and monitor CoS in a Layer 2 network

Target Audience

Network engineers, technical support personnel, reseller support engineers, and others responsible for implementing and/or maintaining the Juniper Networks products covered in this course. AJEX is an advanced-level course and benefits individuals responsible for configuring and monitoring EX Series switches.

COURSE PREREQUISITES

Students should have basic networking knowledge and an understanding of the Open Systems Interconnection (OSI) reference model and the TCP/IP protocol suite. Students should also attend the Introduction to the Junos Software Operating System (IJOS), the Junos Routing Essentials (JRE), and the Junos Enterprise Switching (JEX) courses prior to attending this class.

COURSE OUTLINE

TOPICS INCLUDE

- Introduction to Advanced Junos Enterprise Switching
- Advanced Ethernet Switching: Virtual Local, Automating VLAN Administration, Tunneling Layer 2 Traffic
- Advanced Spanning Tree: Spanning Tree Review, MSTP, VSTP
- Authentication and Access Control: Overview, Features, Processing
- Deploying IP Telephony Features: Deployment Scenarios, IP Telephony Features
- Class of Service (Cos)
- Monitoring and Troubleshooting Layer 2 Networks

PRICING

COURSES & CERTIFICATIONS

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<td>TC-AJEX</td>
<td>TFS Certification</td>
<td>$150</td>
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Call 877-529-9114 for course dates and locations.

TR-JNCIS-ENT Junos Certification Boot Camp

Everything’s better in a BUNDLE

Junos Certification Boot Camp provides you with all the aspects that meet that Junos Specialist Certification tier for the Enterprise Network Engineer... all in one easy package!

This four-day program includes an overview of protocol independent routing features, load balancing and filter-based forwarding, OSPF, BGP, IP tunneling, switching concepts and operations, virtual LANs (VLANs), the Spanning Tree Protocol (STP), port and device security features, and high-availability (HA) features.

JNCIS-ENT exam topics are based on the content of the recommended instructor led training courses, as well as the additional resources. The JNCIS-ENT certification is valid for three years. Recertification is achieved by passing the JN0-343 exam.

Objectives

Students will learn Layer 2 and Layer 3 principles, configuration standard practices, and design and implementation design requirements.

This bundle course includes course information from:
• TR-JEX
• TR-JIR

Target Audience

Designed for experienced networking professionals with beginner to intermediate knowledge of routing and switching implementations in Junos.

Call 877-529-9114 for course dates and locations.


For current locations and dates go to http://www.thefiberschool.com/schedule

COURSE PREREQUISITES

Students should have basic networking knowledge and an understanding of the OSI model and the TCP/IP protocol suite. Students should also have attended the Introduction to the Junos Operating System (IJOS) and the Junos Routing Essentials (JRE) courses prior to attending this class.

COURSE OUTLINE TOPICS INCLUDE

• Introduction - Course Objectives
• Protocol-Independent Routing
• Load Balancing and Filter-Based Forwarding
• Open Shortest Path *First
• Border Gateway Protocol
• IP Tunneling
• High Availability
• Layer 2 Switching
• Virtual Networks
• Spanning Tree
• Port Security
• Device Security and Firewall Filters
• Virtual Chassis
• High Availability Features

PRICING COURSES & CERTIFICATIONS

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<td>TC-JNCIS</td>
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To register call: 877-529-9114
TR-JMF Junos MPLS Fundamentals

This two-day course is designed to provide students with a solid foundation on Multiprotocol Label Switching (MPLS). After introducing concepts such as MPLS forwarding and the structure of the MPLS header, the course will delve into the configuration and operation of the two main label distribution protocols, RSVP and LDP. Special emphasis is given to the central topics of traffic engineering and MPLS traffic protection, including fast reroute, link/node protection, and LDP Loop-Free Alternate. The concepts are put into practice with a series of in-depth hands-on labs, which will allow participants to gain experience in configuring and monitoring MPLS on Junos OS devices.

Objectives

After successfully completing this course, you should be able to:

- Describe the history & rationale for MPLS & basic terminology.
- Explain the MPLS label operations (push, pop, swap) and the concept of label-switched path (LSP).
- Describe the configuration & verification of MPLS forwarding.
- Describe the functionalities and operation of RSVP and LDP.
- Configure and verify RSVP-signaled and LDP-signaled LSPs.
- Select and configure the appropriate label distribution protocol for a given set of requirements.
- Describe default Junos OS MPLS traffic engineering behavior.
- Explain the Interior Gateway Protocol (IGP) extensions used to build the Traffic Engineering Database (TED).
- Describe the Constrained Shortest Path First (CSPF) algorithm, its uses, and its path selection process.
- Describe administrative groups and how they can be used to influence path selection.
- Describe the default traffic protection behavior of RSVP-signaled LSPs.
- Explain the use of primary and secondary LSPs.
- Describe the operation and configuration of: fast reroute, link and node protection, LDP loop-free alternate.
- Describe the LSP optimization options.
- Explain LSP priority and preemption.
- Describe the behavior of fate sharing.
- Describe how SRLG changes the CSPF algorithm when computing the path of a secondary LSP.
- Explain how extended admin groups can be used to influence path selection.
- Explain the purpose of several miscellaneous MPLS features.

Target Audience

This course benefits individuals responsible for configuring and monitoring devices running the Junos OS.

Call 877-529-9114 for course dates and locations.


COURSE PREREQUISITES

Students should have intermediate-level networking knowledge and should be familiar with the Junos OS command-line interface (CLI). Students should also attend the Introduction to the Junos Operating System (IJOS), Junos Routing Essentials (JRE), and Junos Intermediate Routing (JIR) courses prior to attending this class.

COURSE OUTLINE TOPICS INCLUDE

- Introduction to Junos MPLS Fundamentals
- MPLS Foundation, Terminology, Configuration, Packet Forwarding
- Label Distribution Protocols: Protocols, RSVP, LDP
- Routing Table Integration: Mapping Next-Hops to LSPs, Route Resolution Example, Route Resolution Summary, IGP Passive Versus Next-Hop Self for BGP Destinations
- Constrained Shortest Path First: RSVP Behavior Without CSPF, CSPF Algorithm, CSPF Tie Breaking, Administrative Groups, Inter-area Traffic Engineered LSPs
- Fate Sharing: Junos OS Fate Sharing, SRLG, Extended Admin Groups
- MPLS Features: Forwarding Adjacencies, Policy Control over LSP Selection, LSP Metrics, Automatic Bandwidth, Container LSPs, TTL Handling, Explicit Null Configuration, MPLS Pings

PRICING COURSES & CERTIFICATIONS

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<td>Junos MPLS Fundamentals</td>
<td>$1,595</td>
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<tr>
<td>TC-JMF</td>
<td>TFS Certification</td>
<td>$150</td>
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Call 877-529-9114 for course dates and locations.
TR-JL2V Junos Layer 2 VPNs

This two-day course is designed to provide students with MPLS-based Layer 2 virtual private network (VPN) knowledge and configuration examples. The course includes an overview of MPLS Layer 2 VPN concepts, such as BGP Layer 2 VPNs, LDP Layer 2 circuits, FEC 129 BGP autodiscovery, virtual private LAN service (VPLS), Ethernet VPN (EVPN), and Inter-AS Layer 2 VPNs. This course also covers Junos operating system-specific implementations of Layer 2 VPN instances, VPLS, and EVPNs. This course is based on the Junos OS Release 15.1R2.9.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos OS and in device operations.

After successfully completing this course, you should be able to:

- Define the term virtual private network.
- Describe the business drivers for MPLS VPNs.
- Describe the differences between Layer 2 VPNs and Layer 3 VPNs.
- List advantages for the use of MPLS Layer 3 VPNs and Layer 2 VPNs.
- Describe the roles of a CE device, PE router, and P router in a BGP Layer 2 VPN.
- Explain the flow of control traffic and data traffic for a BGP Layer 2 VPN.
- Configure a BGP Layer 2 VPN and describe the benefits and requirements of over-provisioning.
- Monitor and troubleshoot a BGP Layer 2 VPN.
- Explain the BGP Layer 2 VPN scaling mechanisms and route reflection.
- Describe the Junos OS BGP Layer 2 VPN CoS support.
- Describe the flow of control and data traffic for an LDP Layer 2 circuit.
- Configure an LDP Layer 2 circuit.
- Monitor and troubleshoot an LDP Layer 2 circuit.
- Describe the operation of FEC 129 BGP autodiscovery for Layer 2 VPNs.
- Configure a FEC 129 BGP autodiscovery Layer 2 VPN.
- Monitor and troubleshoot a FEC 129 BGP autodiscovery for Layer 2 VPNs.

Target Audience

This course benefits individuals responsible for configuring and monitoring devices running the Junos OS.

Call 877-529-9114 for course dates and locations.


COURSE PREREQUISITES

Students should have intermediate-level networking knowledge and an understanding of OSPF, IS-IS, BGP, and Junos policy. Students should have experience configuring MPLS label-switched paths using Junos. Students should also attend Introduction to the Junos Operating System (IJOS), Junos Routing Essentials (JRE), Junos Service Provider Switching (JSPX), Junos Intermediate Routing (JIR) and Junos MPLS Fundamentals (JMF) courses prior to attending this class.

COURSE OUTLINE TOPICS INCLUDE

- Introduction to Junos Layer 2 VPNs
- MPLS VPNs, Provider-Provisioned VPNs
- BGP Layer 2 VPNs: Overview of Layer 2 Provider-Provisioned VPNs, BGP Layer 2 VPN Operational Model: Control Plane, BGP Layer 2 VPN Operational Model: Data Plane, Preliminary BGP Layer 2 VPN Configuration, BGP Layer 2 Configuration, Monitoring and Troubleshooting BGP Layer 2 VPNs
- Virtual Private LAN Services: Layer 2 MPLS VPNs Versus VPLS, BGP VPLS Control Plane, BGP VPLS Data Plane, Learning and Forwarding Process, Loops
- VPLS Configuration & Troubleshooting
- Ethernet VPN (EVPN): Overview, EVPN Control Plane, EVPN Operation, EVPN Configuration, EVPN Troubleshooting

PRICING COURSES & CERTIFICATIONS

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<td>Junos Layer 2 VPNs</td>
<td>$1,900</td>
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<tr>
<td>TC-JL2V</td>
<td>TFS Certification</td>
<td>$150</td>
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TR-JL3V Junos Layer 3 VPNs

This three-day course is designed to provide students with MPLS-based Layer 3 virtual private network (VPN) knowledge and configuration examples. The course includes an overview of MPLS Layer 3 VPN concepts, scaling Layer 3 VPNs, Internet access, Interprovider L3VPNs, and Multicast for Layer 3 VPNs. This course also covers Junos operating system-specific implementations of Layer 3 VPNs. This course is based on the Junos OS Release 15.1R2.9.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos OS and in device operations.

After successfully completing this course, you should be able to:

- Describe the value of MPLS VPNs.
- Describe the differences between provider-provisioned VPNs and customer-provisioned VPNs.
- Describe the differences between Layer 2 VPNs and Layer 3 VPNs.
- List the provider-provisioned MPLS VPN features supported by the JUNOS software.
- Describe the roles of a CE device, PE router, and P router in a BGP Layer 3 VPN.
- Describe the format of the BGP routing information, including VPN-IPv4 addresses and route distinguishers.
- Describe the propagation of VPN routing information within an AS.
- List the BGP design constraints to enable Layer 3 VPNs within a provider network.
- Explain the operation of the Layer 3 VPN data plane within a provider network.
- Create a routing instance, assign interfaces to a routing instance, create routes in a routing instance, and import/export routes from a routing instance using route distinguishers/route targets.

Target Audience

This course benefits individuals responsible for configuring and monitoring devices running the Junos OS.

Call 877-529-9114 for course dates and locations.


PRICING COURSES & CERTIFICATIONS

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<td>TC-JL3V</td>
<td>TFS Certification</td>
<td>$150</td>
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COURSE PREREQUISITES

Students should have intermediate-level networking knowledge and an understanding of OSPF, ISIS, BGP, and Junos policy. Students should have experience configuring MPLS label-switched paths using Junos. Students should also attend the Introduction to the Junos Operating System (IJOSS), Junos Intermediate Routing (JIR), and the Junos MPLS Fundamentals (JMF) courses prior to attending this class.

COURSE OUTLINE TOPICS INCLUDE

- Introduction to Junos Layer 3 VPNs
- MPLS VPNs, Provider- Provisioned VPNs
- Layer 3 VPNs: Layer 3 VPN Terminology, VPN-IPv4 Address Structure, Operational Characteristics
- Basic Layer 3 VPN Configuration: Preliminary Steps, PE Router Configuration
- Layer 3 VPN Scaling and Internet Access: Scaling Layer 3 VPNs, Public Internet Access Options
- Layer 3 VPNs – Advanced Topics: Exchanging Routes between Routing Instances, Hub-and-Spoke Topologies, Layer 3 VPN CoS Options, Layer 3 VPN and GRE Tunneling Integration, Layer 3 VPN and IPSec Integration, Layer 3 VPN Egress Protection, BGP prefix-independent convergence (PIC) edge for MPLS VPNS, VRF Localization, Provider Edge Link Protection, Support for configuring more than 3 million L3VPN Labels
- Interprovider Backbones for Layer 3 VPNs: Hierarchical VPN Models, Carrier-of-Carriers Model, Option C Configuration
- Troubleshooting Layer 3 VPNs: Working with Multiple Layers, Troubleshooting Commands on a PE Device, Multicast Interfaces in Layer 3 VPNs, PE and CE-based Traceroutes, Layer 3 VPN Monitoring Commands
- Draft Rosen Multicast VPNs: Overview, Draft Rosen MVPN Overview, Draft Rosen MVPN Operation, Configuration, Monitoring
- Next Generation Multicast VPNs: Multicast VPN Overview, Next-Generation MVPN Operation, Configuration, Monitoring, Internet Multicast, Ingress Replication, Internet Multicast Signaling and Data Plane, Configuring MVPN Internet Multicast, Monitoring MVPN Internet Multicast
Before fiber optic networks can be constructed, they must be properly designed and, once constructed, they must be managed. Efficiencies in these processes translate into lower cost layout and construction, more productive system migration and field operations, lower optical loss budget, and greater business profitability by bringing fiber to the desk.

The fiber optic network layout design plays an important role in error-free system reliability. Choice of the proper type of network layout depends on the type of process controlled, the possible need for expansion, and the degree of failure immunity desired—all of which must be balanced with cost considerations.

This 3-day, online course provides a detailed review of the major developments in basic layout network designs, including BUS, Star, Ring and Collapsed. System migrations and moving to future networks are also described.

Objectives
Certified Inside Plant System Design training will provide students with the necessary knowledge and skills:
• Design standard-compliant, reliable and cost effective fiber optic networks
• Demonstrate an understanding of fiber optic installations
• Perform budget/loss analysis

Target Audience
Certified Fiber Optic Network Design is designed for new or experienced personnel seeking a deeper understanding of the design of fiber optic networks.

PRICING COURSES & CERTIFICATIONS

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<td>TR-ISPD</td>
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<tr>
<td>TC-ISPD</td>
<td>TFS Certification ISPD</td>
<td>$150</td>
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COURSE PREREQUISITES
Those participating should have a basic knowledge of electromagnetics and a comprehensive understanding of communication networks. Two years of field experience is recommended, including documented experience of installing fiber optic networks.

COURSE OUTLINE TOPICS INCLUDE
• Introduction to fiber optic design
• Fiber Optic applications, current and future
• Overview of Fiber Optic Installation: OSP and ISP
• Practical considerations
• Campus backbone design study
• Building backbone design study
• Planning a Fiber Optic Network
• Choosing components
• Design Review: Component compatibilities, Power budget, Environmental requirements
• Determine requirements: cable, hardware and equipment
• Design, installation and implementation considerations
• Budget/loss analysis to insure correct network operation
• Testing and documentation
• Writing a Project Specification and other documentation
TR-OSPD Outside Plant Network Design

The fiber optic System Designer: Outside Plant Design is for technicians and designers with fundamental fiber optic knowledge or installers and technicians interested in the planning, layout, design and testing of OSP infrastructure.

It focuses specifically on outside plant installations (OSP). OSP includes communications such as building to building or long haul telecommunications (including customer-owned OSP).

Emphasis is on single mode fiber optic infrastructure installation and the associated international standards, theory, and practices and testing procedures.

**COURSE OUTLINE TOPICS INCLUDE**

- **Fiber Theory**: Characteristics of Singlemode and Multimode, Manufacturing, Bandwidth and Linear effects
- **Cables**: Cable Types, Construction and Specifications
- **Connectors and Terminations**: Temporary and Permanent Connections, Connector Types, Mechanical and Environmental Considerations, Performance Specifications, Connector Loss Issues, Splicing Applications
- **Splicing and Fusion and Mechanical**: Fusion Splicing, Mechanical Splicing
- **The 14 Steps toward Design**: Steps necessary include selecting Standards, creating maps, and time-lines, determining fiber performance, cable, connector and splice specifications, and selecting wavelengths. Also covers passive devices, optoelectronic specifications, selecting hardware and defining testing, acceptance values and cost analysis.
- **Installation**: Planning and Standards, Premise/LAN and Methods, Outside Plant and Methods, Aerial and Burial Techniques, Installation Tools and Equipment
- **Test Equipment**: Loss Testing Tools and Equipment, Standards and Methods, Return Loss, Bandwidth and Dispersion, OTDR Theory and Applications, Loss and System Budget Calculations
- **System Components and Design Issues**: Transmitters and Receivers, Passive Optical Components, Couplers and Splitters, WDM and DWDM Issues
- **System Design Exercise**: Tools and Equipment, Practical Applications, Time Saving Techniques

**COURSE PREREQUISITES**

The following knowledge or experience level is recommended:

- 3 years fiber optic installation experience
- Basic knowledge of splicing equipment and procedures
- Basic knowledge of testing equipment and procedures
- Be a TFS OSP Certified Installer/Technician or equivalent (desired)
- Be an ETA Fiber Installer or other Industry equivalent (desired)

**Target Audience**

Certified Outside Plant System Design is designed for those responsible for the basic design and layout of OSP telecommunications projects or who supervise OSP installation personnel. Aimed at employees of utility companies, their subcontractors, and END Users who design, layout, implement and construct OSP projects including “Customer Owned OSP” deployments.

**PRICING COURSES & CERTIFICATIONS**

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<td>TFS Certification OSPD</td>
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The Fiber Optic Marketplace LLC® — Part of the Adtell Group
www.thefiberschool.com
TR-FBE  FiberBase Certified Engineer

EVERYTHING YOU NEED
To get started with
FiberBase®

The FiberBase® software solution has grown immensely since its creation in the mid 1990’s and now proudly offers **over 1000 features** for managing your fiber optic infrastructure.

This course provides participants with the training needed to create and maintain a relational database on a fiber distribution system. Students are asked to bring a sample of what they use to document their fiber networks. On the last day of training, students will further develop their skills by using a CAD/CAM drawing of a particular room or a design drawing of a portion of their long or short haul routes between network structures.

Use FiberBase® as your document repository to quickly find important material related to your network. FiberBase® can store relevant details such as: the location of an enclosure or piece of equipment, a picture of an enclosure or a break out of what fibers terminate where. These are only a few examples of the limitless benefits of storing your business information in FiberBase®.

**Course Outline Topics Include**

- **Introduction to FiberBase**: Presentation Format, Course Objectives, FiberBase Components, FiberBase Configurations
- **FiberBase Fundamentals**: Workspaces, Toolbars and Views, Layers and Groups, Loading Equipment, Templates
- **FiberBase and Fiber Topology**: Long-haul Routes Between Locations, “City Level” Structure Locations, Short-haul Routes Between Locations, Splice-Point Locations, Ducts and Inner Ducts
- **Building Fiber Networks in FiberBase**: Sheaths and Routes, Building and Placing Equipment, Creating Floor Space, Creating Lineups, Creating Fibers from OSP Sheath through to TX/RX
- **FiberBase Functionality**: Linking Traces to Topology, Display the Trace View, Using Twist Factors, FiberBase Reporting, Creating Custom Reports with Crystal Reports, FiberBase and Visio
- **FiberBase Review**: Examination of Pre-Work, Q & A, Instructor and Classroom Survey

**Course Prerequisites**

Those participating should have a basic knowledge of fiber and fiber optic networks. Participants will also benefit from having a good working knowledge of a graphical Windows environment.

**Pricing**

<table>
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<tr>
<th>Product</th>
<th>Description</th>
<th>Price</th>
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<tr>
<td>TR-FBE</td>
<td>FiberBase Engineering (includes course materials)</td>
<td>$1,350</td>
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<tr>
<td>TC-FBE</td>
<td>TFS Certification FBE</td>
<td>$150</td>
</tr>
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Want to learn more about FiberBase?
Schedule a **FREE** demo today.

*For more information on FiberBase go to [http://www.fiberbasenms.com/](http://www.fiberbasenms.com/)*
TR-FBT FiberBase Certified Technician

**BUILD AND MAINTAIN**
Complex fiber networks with **FiberBase**

FiberBase® is a sophisticated database and mapping package designed for today’s broadband environment. Designed by industry professionals, FiberBase® lets you map all your network assets, completely document your network from entire routes to individual fibers, and plan for network expansion.

This four-day FiberBase Certified Technician training course provides participants with the training needed to create and maintain a relational database on a fiber distribution system. FiberBase training students are asked to bring a sample of what they use to document their Fiber networks. On the last day of training students will further develop their skills by using a CAD/CAM drawing of a particular room or a design drawing of a portion of their long or short haul routes between network structures.

**Objectives**
FiberBase Training will provide students with the necessary knowledge and skills:
- Build both long and short haul fiber topology rings
- Enter physical equipment
- Create custom equipment sets

**Target Audience**
FiberBase Training is designed for individuals entering fiber plant information into a relational database.

**COURSE PREREQUISITES**
Those participating should have a basic knowledge of fiber and fiber optic networks. Participants will also benefit from having a good working knowledge of a graphical Windows environment.

**COURSE OUTLINE**
**TOPICS INCLUDE**
- **Introduction** - Presentation Format, Course Objectives, FiberBase Components, FiberBase Configurations
- **FiberBase Fundamentals**: Workspaces, Toolbars and Views, Layers and Groups, Loading Equipment, Templates
- **FiberBase and Fiber Topology**: Long-haul Routes Between Locations, “City Level” Structure Locations, Short-haul Routes Between Locations, Splice-Point Locations, Ducts and Inner Ducts
- **Building Fiber Networks in FiberBase**: Sheaths and Routes, Building and Placing Equipment, Creating Floor Space, Creating Lineups, Creating Fibers from OSP Sheath through to TX/RX
- **FiberBase Functionality**: Linking Traces to Topology, Display the Trace View, Taking Advantage of Twist Factors, FiberBase Reporting

**For current locations and dates go to**
http://www.thefiberschool.com/schedule

**PRICING**
**COURSES & CERTIFICATIONS**

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<tr>
<td>TC-FBT</td>
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Network Asset Management Engineer training is a three-day course which provides participants with the training needed to create and maintain a relational database on a fiber distribution system. Students are asked to bring a sample of what they use to document their fiber networks. On the last day of training students will further develop their skills by using a CAD/CAM drawing of a particular room or a design drawing of a portion of their long or short haul routes between network structures.

Objectives

Network Asset Management Engineer training will provide students with the necessary knowledge and skills:
- Build both long and short haul fiber topology rings
- Enter physical equipment
- Create custom equipment sets

Target Audience

Network Asset Management Engineer training is designed for individuals entering fiber plant information into a relational database.

COURSE PREREQUISITES

Those participating should have a basic knowledge of fiber and fiber optic networks. Participants will also benefit from having a good working knowledge of a graphical Windows environment.

COURSE OUTLINE

- **TOPICS INCLUDE**

  - Introduction to Network Asset Management Engineer: Presentation Format, Course Objectives, Software Components, Software Configurations
  - Fiber Topology: Long-haul Routes Between Locations, “City Level” Structure Locations, Short-haul Routes Between Locations, Splice-Point Locations, Ducts and Inner Ducts
  - Building Fiber Networks: Sheaths and Routes, Building and Placing Equipment, Creating Floor Space, Creating Lineups, Creating Fibers from OSP Sheath through to TX/RX
  - Software: Linking Traces to Topology, Display the Trace View, Taking Advantage of Twist Factors, FiberBase Reporting, Creating Custom Reports with Crystal Reports, FiberBase and Visio
  - Network Asset Management Review: Examination of Pre-Work, Q & A, Instructor and Classroom Survey

PRICING

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For current locations and dates go to http://www.thefiberschool.com/schedule
TR-NAM Network Asset Management Technician

Certified Network Asset Management Technician training is a four-day course which provides participants with the training needed to create and maintain a relational database on a fiber distribution system. Students are asked to bring a sample of what they use to document their Fiber networks. On the last day of training students will further develop their skills by using a CAD/CAM drawing of a particular room or a design drawing of a portion of their long or short haul routes between network structures.

Objectives

Certified Network Asset Management Technician training will provide students with the necessary knowledge and skills:
- Build both long and short haul Fiber Topology rings
- Enter physical equipment
- Create custom equipment sets

Target Audience

Certified Network Asset Management Technician training is designed for individuals entering fiber plant information into a relational database.

COURSE PREREQUISITES

Those participating should have a basic knowledge of fiber and fiber optic networks. Participants will also benefit from having a good working knowledge of a graphical Windows environment.

COURSE OUTLINE TOPICS INCLUDE

- Introduction to Network Asset Management and Software Solutions: Presentation Format, Course Objectives, Software Components, Software Configurations
- Network Asset Management and Fiber Topology: Long-haul Routes Between Locations, “City Level” Structure Locations, Short-haul Routes Between Locations, Splice-Point Locations, Ducts and Inner Ducts
- Building Fiber Networks in an Engineering Software Package: Sheaths and Routes, Building and Placing Equipment, Creating Floor Space, Creating Lineups, Creating Fibers from OSP Sheath through to TX/RX
- Network Asset Management Software Functionality: Linking Traces to Topology, Display the Trace View, Taking Advantage of Twist Factors, FiberBase Reporting, Creating Custom Reports with Crystal Reports, FiberBase and Visio
- Network Asset Management Review: Examination of Pre-Work, Q & A, Instructor and Classroom Survey

PRICING COURSES & CERTIFICATIONS

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<tr>
<td>TC-NAM</td>
<td>TFS Certification NAM</td>
<td>$150</td>
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For current locations and dates go to http://www.thefiberschool.com/schedule
TR-EBH  Ethernet Backhaul Testing

With rising demand for mobile broadband services, network operators are seeing sharp increases in bandwidth requirements. The cellular network infrastructure must evolve to support newer technologies that require more and more bandwidth. Mobile service providers need to gain real-time, insight into their network performance in order to manage existing architectures and ensure a higher quality of service regardless of the underlying technology.

Cellular networks may face challenges such as:

- Quality of Service (QoS)
- Testing multiple technologies – Ethernet, SONET
- SLA’s
- Tracking and validation
- Network monitoring
- Cost of Network Expansion

COURSE PREREQUISITES

Students should be familiar with the basic theory of data transport, have a working knowledge of basic equipment (Power Meter, Light Source, Fusion Splicer, OTDR) and have at least 2-3 years of field experience.

COURSE OUTLINE

LECTURES

- History: mobile services and the need for mobile backhaul
- Network architecture and infrastructure of wireless communications
- Review: Open Systems Interconnection (OSI) Reference module and identifying the functions of each layer
- Overview: Transmission Control Protocol (TCP) and User Datagram Protocol (UDP)
- Primary Transport services (DSn Ethernet)
- Time Division Multiplexing (TDM), DSn and Sonet
- Sonet and DSn Frame structure, testing requirements (Bert, RTD, Service Disruption, network monitoring etc)
- Ethernet 802.3 basics (Frame structure, flow control, ARP VLANS etc)
- Testing Standards RFC2544 and ITU-T Y.1564, (Packet jitter, sequence testing, latency, throughput, frame loss etc)
- Testing for SLA’s

HANDS-ON LABS

- Certification tests
- Testing in the Telco Environment

For current locations and dates go to http://www.thefiberschool.com/schedule
Gigabit Ethernet training by FiberOptic.com is a two-day course that provides students with a detailed understanding of the capabilities of Gigabit Ethernet. Intended for Sales Engineers, Testers, Installers, Managers and other professionals, this course is useful for those who need to plan, design, implement and test the new generation of Ethernet.

This is an area that is growing rapidly within the telecommunications industry. Over the next several years, enterprises are gearing up to adopt Gigabit Ethernet as a switch-to-switch interconnect technology. Potentially, Gigabit Ethernet can also be used for long-distance backbone connections in large campuses, or for building out MANs where dark fiber is available.

**Objectives**

This course covers:

- A Brief History of Ethernet
- 1, 10, 40 and 100-Gigabit Ethernet Overview
- Benefits of Gigabit Ethernet
- Market Requirements
- Protocol Layer
- Gigabit Ethernet Physical and MAC Layers
- MAC Frame Format

**Target Audience**

This course is suitable for Engineers, Technicians, Sales professionals or Marketing experts. Much more than an overview, this class provides a thorough understanding of Gigabit Ethernet: its protocol, core functionality, various options and error recovery strategies.

For current locations and dates go to http://www.thefiberschool.com/schedule
TR-GET 40/100 Gigabit Ethernet

40/100 Gigabit Ethernet training covers all aspects of the 802.3ba-2010 in regards to implementation of 40/100 GbE AKA IEEE 802.3ba. It provides two implementations – 40 GbE with four 10 GbE links (or lanes), or 100 GbE with ten links. An additional standard that uses 25 GbE links is currently under development. The main focus of the 100 GbE is “Data Centers” that need to manage huge amounts of data.

Objectives

In this course, students will learn:
- The basic Definitions of Gigabit Ethernet
- Understand the basics of Media Access Control Parameters, Physical Layers, and Management Parameters for 40 Gb/s and 100 Gb/s Operation
- Detailed Architecture and operation of 10, 40 and 100 Gigabit Ethernet
- Gigabit Ethernet Media Access Control (MAC) Interface Description
- Gigabit Ethernet Physical Coding Sublayer (PCS) Interfaces
- Gigabit Ethernet Physical Medium Attachment (PMA) Interfaces
- Details regarding the implementation and operation of the Gigabit Ethernet
- Test, verify and validate Gigabit Ethernet implementation

Target Audience

40/100 Gigabit Ethernet training is designed for Engineers, Sales and Marketing and Managers.

PRICING COURSES & CERTIFICATIONS

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<th>COURSE</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
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<td>TR-GET</td>
<td>40/100 Gigabit Ethernet Training (Includes course materials)</td>
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<tr>
<td>TC-GET</td>
<td>TFS Certification GET</td>
<td>$150</td>
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COURSE OUTLINE TOPICS INCLUDE

- Introduction - Course Objective
- Gigabit Ethernet Definitions: Media Access Control, MAC parameters, Management, Management Data Input/Output (MDIO) Interface, MDIO Interface Registers, Physical Medium Dependent (PMD)
- Ethernet operation over electrical backplanes
- Physical Layer signaling systems
- Forward Error Correction (FEC) sublayer for BASE-R PHYs
- Functional block diagram for 10GBASE-R PHYs, 40GBASE-R, 100GBASE-R PHYs
- FEC service interface
- Auto-Negotiation for backplane and copper cable assembly
- Introduction to 40 Gb/s and 100 Gb/s networks: Physical Layer signaling systems, 40 Gigabit and 100 Gigabit Ethernet sublayers, Reconciliation Sublayer (RS) and Media Independent Interface, Physical DCoding Sublayer (PCS), PMA and PMD sublayers
- XLGMII and CGMII: XLGMII/CGMII structure, Mapping of XLGMII/CGMII signals to PLS service primitives, XLGMII/CGMII data stream, XLGMII/CGMII functional specifications
- Details of 40 Gb/s and 100 Gb/s Implementation, Testing, Verification, Validation and IP: PCS, 64B/66B transmission code, Transmit Process, PMSA, PMD

A whole new world OF DATA
TR-MET Certified Metro Ethernet for Technical Professionals

**FLEXIBLE**

Network Design with

**METRO ETHERNET**

Metro Ethernet services can scale quickly and easily, allowing you to expand your network as your applications require more bandwidth.

Metro Ethernet training from FiberOptic.com covers concepts and technologies behind Metro Ethernet including Layer 2 virtual private network (VPN), Ethernet deployment solutions, Ethernet Relay Service (ERS), Ethernet Wire Service (EWS), Ethernet Multipoint Service (EMS), Layer 2 VPNs over Multi protocol Label Switching (MPLS), and distributed provider edge solutions.

**Objectives**

This course covers:

- Relate the importance of Metro Ethernet Switching to service-provider markets
- Describe, plan, configure, and troubleshoot Metro Ethernet deployment solutions
- Identify configuration differences between the Layer 2 Metro Ethernet Switching service implementation and Layer 3 MPLS
- Implement the features and functions of platforms supported by Metro Ethernet Switching, including VLAN IDs, Spanning Tree, quality of service (QoS) mechanisms, and network resiliency and security
- Understand mechanisms for QoS and Security over Metro Ethernet Networks
- Understand Ethernet services delivery mechanisms Over MPLS and provider backbone transports

**Target Audience**

This course is intended for those who design Metro Ethernet Switching solutions for service providers or those who implement end-to-end Metro Ethernet Switching services and/or deploy networks Metro Ethernet Switching services.

**COURSE PREREQUISITES**

Students should have a good understanding of IP and WAN principles and a basic understanding of data communications and networking.

**COURSE OUTLINE TOPICS INCLUDE**

- Introduction - Course Objective
- Metro Ethernet Basics: Basics of Ethernet switching, Bridging functions, 802.1d Spanning Tree and Rapid Spanning Tree, Metro Ethernet Overview, Software Features, Components, Ethernet Services Model (ESM), VLANs
- Carrier Ethernet Services: Access, Distribution (Aggregation), Edge and Core Network Deployments, Access Networks, Carrier Ethernet Aggregation, Aggregation Network
- Overview of Metro Ethernet: Native Ethernet, Ethernet as a Carrier-Grade technology, Ethernet-based backhaul solutions, Deploying and maintaining carrier Ethernet Services Layer 2 virtual private network (VPN), Ethernet relay service (ERS), Ethernet wire service (EWS), Ethernet multipoint service (EMS), Link access procedure (LAPS), Over IP AND MPLS, 100GbE
- Metro Ethernet Service Definitions
- Metro Ethernet Transport Methods: Resilient Packet Rings (RPR), Hybrids, Optical Ethernet, High-Speed Ethernet and Other Technologies, 10 Gb/s Ethernet, Switched Ethernet, Wireless Ethernet, Ethernet-Over-VDSL
- Metro Ethernet Network Architecture
- Metro/Carrier Ethernet Backhaul: Network Design Considerations, Network Planning, Technology and Operations
- Pure Metro Ethernet
- SONET/SDH-Based Metro Ethernet
- Metro Ethernet Implementation
- Overview of MPLS-TP (Transport Profile of MPLS)

**PRICING COURSES & CERTIFICATIONS**

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<tr>
<td>TR-MET</td>
<td>Certified Metro Ethernet for Technical Professionals (Includes course materials)</td>
<td>$1,995</td>
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<tr>
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<tr>
<td>TC-MEF-MET</td>
<td>MEF CECP 2.0 Certification</td>
<td>$350</td>
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TR-CONT Certified Optical Network Technician

This 3-day course provides an excellent overview of the complex field of optical networking. This course ties the optical hardware functionality into the overall networking picture. This course is a valuable reference for both practitioners and researchers.

Objectives

This course provides an introduction to optical networking and the types of systems that are in widespread commercial deployment. This course will provide you with a complete technical foundation on today's key networking technologies allowing technicians to fully understand the inter-workings of an optical network that will aid in the installation and maintenance of the optical network.

Target Audience

This course is designed to provide a good technical overview for technical managers, consultants, communication professionals, networking professionals, system engineers, NOC technicians, and others who plan on using, evaluating or working with optical networks. It's also applicable to engineers and technicians responsible for maintaining, monitoring, and optimizing optical systems.

COURSE OUTLINE TOPICS INCLUDE

- **Introduction to Fiber Optics:** Networking Basics, Fiber Optic History, Fiber optic advantages and Applications, Light Propagation
- **Introduction to Optical Networks:** Network architects, circuit switching, packet switching, transparency and the all optical network, transmission Basics, networks Evolution
- **Fiber Types:** G.652, G.653, G.655 and there effects on design
- **Components:** Transmitters, receivers, attenuators, switches, amplifiers, multiplexers, DCMs, OADM
- **Propagation of Signals:** Attenuation, intermodal dispersion, chromatic dispersion, polarization mode dispersion, nonlinear effects, link power budget, optical return loss, four wave mixing, cross phase modulation.
- **Technologies:** CWDM, DWDM, Ethernet, Sonet, OTN, ROADMS, modulation and advanced modulation schemes
- **Physical Layer Troubleshooting:** Attenuation, ORL, dispersion, reflectance, breaks
- **Testing Requirements:** OTDR, Fiber Inspection, Chromatic Dispersion, Polarization mode dispersion, ORL, Loss, GigE (RFC-2544 – Y.1654) Sonet (Bert, Continuity, RTD, frequency offset, fiber path identification)

As an introductory course, some prior knowledge of communication networks and a basic understanding of fiber optics are helpful but not required.

COURSE PREREQUISITES

As an introductory course, some prior knowledge of communication networks and a basic understanding of fiber optics are helpful but not required.

PRICING COURSES & CERTIFICATIONS

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<td>TR-CONT</td>
<td>Certified Optical Network Technician</td>
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<td>TC-CONT</td>
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</table>
TR-CONE Certified Optical Network Engineer

This course ties the optical hardware functionality into the overall networking picture. This course is a valuable reference for both practitioners and researchers.

FiberOptic.com’s 4-day Certified Optical Networking Engineer training is the answer to your professional training. Whether you require an understanding existing network architecture or next generation network design, we articulate the mission critical demands of today’s telecom systems.

With today’s ever increasing bandwidth consumption multiple services are now running across the fiber at increased transmission rates. This course provides you with a complete technical foundation by providing an overview of today’s key networking technologies. Knowing the latest technologies will aid in the designing, planning and operation of your network.

Target Audience

This course is designed to provide a good technical overview for Technical Managers, consultants, communication professionals, networking professionals, system engineers, NOC technicians, and others who plan on using, evaluating or working with optical networks. It is also applicable to engineers and technicians responsible for maintaining, monitoring, and optimizing optical systems.

COURSE OUTLINE TOPICS INCLUDE

- Introduction to Optical Networks: Network architects, circuit switching, packet switching, transparency and the all optical network, transmission basics, networks evolution
- Propagation of Signals: Attenuation, intermodal dispersion, chromatic dispersion, polarization mode dispersion, nonlinear effects
- Components: Couplers, isolators, multiplexers, optical amplifiers, transmitters, detectors, switches, wavelength converters
- Modulation: Subcarrier modulation and multiplexing, demodulation, spectral efficiency, FEC, DQPSK.
- Transmission System Engineering: System Model, Power Penalty, Transmitter, receivers, amplifiers, fiber types, attenuation, Optical Return Loss, Chromatic Dispersion, Polarization mode Dispersion, Non-linear effects, crosstalk
- Networks: Sonet/SDH, Optical Transport Networks, Next Gen Sonet (GFP,LCAS VCAT), Ethernet, MPLS, 100GigE with coherent detection, DWDM, ROADMs
- DWDM and High Speed Impairments: efficiency, bandwidth and/or distance limitations, chromatic dispersion, Polarization mode dispersion, Chromatic dispersion, OSNR, nonlinearities

PRICING COURSES & CERTIFICATIONS

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<td>TC-CONE</td>
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SWITCH TO THE Latest Technologies

Get on board and get certified by industry professionals with the latest technology in optical network design with our 4-day Certified Optical Network Engineer course.

COURSE PREREQUISITES

Some prior knowledge of electromagnetics and a comprehensive understanding of communication networks.

CLASSROOM ONLY

Latest Technologies

Get on board and get certified by industry professionals with the latest technology in optical network design with our 4-day Certified Optical Network Engineer course.

Target Audience

This course is designed to provide a good technical overview for Technical Managers, consultants, communication professionals, networking professionals, system engineers, NOC technicians, and others who plan on using, evaluating or working with optical networks. It is also applicable to engineers and technicians responsible for maintaining, monitoring, and optimizing optical systems.

Pricing Courses & Certifications

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<td>TC-CONE</td>
<td>TFS Certification CONE</td>
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Optical Networking Courses

TR-ONT Optical Networking

Making Connections
All Around the Globe

Fiber Optic technology is the way of the future. What can be better than the speed of light? Optical Networking is the answer to reliable and manageable network structures and the ability to send data around the world in the blink of an eye.

Objectives

With the advent of multiservice transport platforms (MSTPs) and new reconfigurable add-drop multiplexers (ROADMs)— engineers and technicians must not only perform traditional tests, but are now also responsible for verifying packet-based services such as Ethernet, 10 Gigabit Ethernet, 100 GigE, OC-768, Fiber Channel—all running over the same network elements. Furthermore, additional testing is needed at the physical layer to verify the fiber can support these services. This course provides you with a complete technical foundation for installing, maintaining, and troubleshooting today’s networks through the use of hands on testing.

Target Audience

This 4-day course is designed to provide a good technical overview for technical managers, consultants, communication professionals, networking professionals, system engineers, network engineers, Tier 1-3 technicians, NOC technicians, and others who plan on using, evaluating or working with optical networks. It is ideal for engineers and technicians that are responsible for installing, maintaining, monitoring, and optimizing optical systems.

Course Prerequisites

Students will benefit from having taken Certified Optical Network Technician (TR-CONT) or Certified Optical Network Engineer (TR-CONE).

Course Outline

- Introduction to Fiber Optics: Networking Basics, Fiber Optic History, Fiber optic advantages and Applications, Light Propagation
- Light Transmissions: Optical sources, receivers, amplifiers, modulation, fiber types, attenuation, Optical Return Loss, Chromatic Dispersion, Polarization mode Dispersion, Non-linear effects, OSNR
- Technical Details of Optical Communications: The Nature of Light, Light as an Electromagnetic Wave (Photons, Polarization, Interference), Physics of Optics, Fiber Optics Networks Design
- Testing Networks: Hands on testing of DWDM, Sonet, OTN, GigE, 10GigE, 100GigE, Physical Layer testing consisting of OTDR, Loss, ORL, Connector inspection, chromatic dispersion, polarization mode dispersion, etc.

Pricing Courses & Certifications

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<tr>
<td>TR-ONT-L</td>
<td>Instructor Lead / Classroom Option</td>
<td>$500</td>
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TR-STC SONET SDH

The Preferred Network
NETWORK STRUCTURE

SONET SDH

SONET/SDH network structures provide redundant, efficient, resilient, self-healing optical networks at a low cost. SONET deploys multiple routes between transmission and receiving so there is always a backup from point A to point B.

SONET SDH self-healing rings are the most common network architecture because of its relatively simple implementation and easy management.

In normal use, traffic is dispatched in the direction of the shortest path towards its destination. In the event of the loss of a link, or of an entire station, the two nearest surviving stations “loop back” their ends of the ring. In this way, traffic can still travel to all surviving parts of the ring, even if it has to travel “the long way round”.

Self-healing rings offer high levels of resilience at low cost, since it is often geographically easy to take multiple paths across the landscape and link them up into a ring with a small amount of extra fiber length.

Objectives

This course covers:
- Understand Digital Voice & Plesiochronous Digital Hierarchy
- Understand Transmission Hierarchies
- Understand Digital Network Synchronization
- Explore Benefits and Features of SONET/SDH
- Compare and Contrast STS-1 SPE and AU-3
- Understand Automatic Protection Switching (APS)
- Understand Add/Drop Multiplexers (ADMs)
- Understand Digital Cross-Connects (DCCs)
- Explore the evolution of Timing and Synchronization
- Understand SDH and Tributary Multiplexing

Target Audience

This course is designed for Technical Managers, Consultants, Communications Professionals, Software Engineers, System Engineers, Network Professionals, and IT Professionals

COURSE OUTLINE TOPICS INCLUDE

- SONET/SDH Protocols and Concepts: Benefits and Features of SONET/SDH, Evolution from PDH to SONET/SDH Plesiochronous Networks, Building-Block Signals, Unifying SONET and SDH, Frame Structures, Overhead Functions, Pointer Errors
- SONET/SDH Network Elements and Applications: Terminal Multiplexers (TM)s, Functional Block Diagram of TM’s, Functional Block Diagram of ADM’s, Next Generation Digital Loop Carrier (NGDLC), SONET/SDH Interfaces on Switches and Routers
- Synchronizing SDH and SONET
- SONET/SDH Multiplexing

COURSE PREREQUISITES

Students should have a basic understanding of computer networks and the OSI model.

PRICING COURSES & CERTIFICATIONS

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<th>Course Type</th>
<th>Description</th>
<th>Price</th>
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<td>TR-STC</td>
<td>SONET SDH Training Course</td>
<td></td>
<td>$1,495</td>
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<tr>
<td>TC-STC</td>
<td>TFS Certification STC</td>
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<tr>
<td>TR-STC-L</td>
<td>Instructor Lead / Classroom Option</td>
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<td>$500</td>
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</tbody>
</table>

877-529-9114
training@fiberoptic.com

The Fiber Optic Marketplace LLC® — Part of the Adtell Group
www.thefiberschool.com
TR-DWM Dense Wavelength Division Multiplexing (DWDM)

EXPAND YOUR Existing Network with
DENSE WAVELENGTH DIVISION MULTIPLEXING

DWDM training provides an overview of Dense Wavelength Division Multiplexing (DWDM) network planning, architecture, design, protocols, testing and implementation.

Objectives

This course covers:

- Understand the basics of optical communications
- Understand the basics of DWDM
- Explain basic DWDM Network Designs and Engineering
- Identify various optical communication principles as well as communication methodologies in an optical fiber
- Learn how to analyze optical links based on power budget
- Design DWDM networks based on size and performance
- Understand the basic design nodal architectures for different classification of DWDM networks
- Learn how to utilize different parameters in DWDM networks and optical systems

Target Audience

This course is designed to provide a general overview for strategic or technical managers, consultants, communications professionals, software engineers, system engineers, network professionals, marketing and sales professional, IT professionals, and others who plan on using, evaluating, designing or working with SONET/SDH, DWDM and optical networks.

COURSE OUTLINE TOPICS INCLUDE

- **Introduction to Optical Networking:** Fiber Optics, Fiber Losses, Dispersion in Fiber, Nonlinearities, Window of Operations, Fiber Types, Optical amplifiers, Light sources and Transmitters, Photodiodes and receivers, Optical communication systems, The physics of Optical Components, Light-Matter and Light-Matter-Light
- **Common Single Mode Fiber Types:** Standard Single Mode Fiber, Dispersion Shifted Fiber (DSF) Dispersion-compensating fiber (DCF), Non-Zero Dispersion Shifted Fiber (NZ-DSF), Positive Dispersion SMF, Dispersion Compensation Unit (DCU)
- **Introduction to DWDM:** Optical Networking and DWDM, Optical Network Breakthroughs, Special Fibers, Optical Components, Optical Spectral Filters and Gratings, Optical Demultiplexers, The Erbium-Doped Fiber Amplifier (EDFA), The Tunable Laser Diode Operating at 1550nm, Light Sources
- **DWDM Components and Architecture:** DWDM Anatomy, DWDM Impairments, Multiwavelength Transmitters, Multichannel Receivers, DWDM Optical Amplifiers, Wavelength Converters, Modal Effects, Scattering Effects,
- **DWDM Impairments:** Availability, Occupancy, Efficiency, Bandwidth & Distance Limitations, Chromatic Dispersion, Polarization Mode Dispersion (PMD), Noise, Dispersion, Nonlinearities, Four Wave Mixing (FWM)
- **Wavelength Adaptation**
- **Basic DWDM Optical Components and Elements**
- **DWDM Mux and Demux Technology**
- **Networking with DWDM**
- **Span Engineering, Testing, Measurements and OAM&P**

COURSE PREREQUISITES

Students will benefit from a having basic understanding of telecommunications.

PRICING COURSES & CERTIFICATIONS

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
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<td>TR-DWM-L</td>
<td>Instructor Lead / Classroom Option</td>
<td>$500</td>
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</table>
This course provides an advanced technical overview of DWDM training and optical networking concepts. One of the major issues in the networking industry today is the rapidly increasing demand for greater bandwidth. With the development of optical networks and the use of Dense Wavelength Division Multiplexing (DWDM) technology, a new and crucial milestone is being reached.

Objectives
This course covers:
- Understand advanced optical communications topics
- Explain advanced DWDM Network Designs and Engineering
- Maintain and evaluate optical components in DWDM networks
- Learn about the effects of noise in signal propagation, especially from OSNR and BER perspectives
- Maintain optical amplifier-based links
- Learn how to maintain optical links based on power budget, dispersion and nonlinearities
- Maintain optical links based on OSNR
- Classify and maintain DWDM networks based on size and performance
- Learn how to test and measure different parameters in DWDM networks and optical systems

Target Audience
This course is designed for strategic or technical managers, consultants, communications professionals, software engineers, system engineers, network professionals, marketing and sales professional, IT professionals, and others who plan on using, evaluating or working with DWDM and optical networks applications and services.

COURSE OUTLINE TOPICS INCLUDE
- DWDM Components and Architecture: Anatomy, Impairments, Multimode Transmitters, Multichannel Receivers, DWDM Optical Amplifiers, Wavelength Converters, Model Effects, Scattering Effects
- DWDM Impairments: Spectrum, Availability, Occupancy, Efficiency, Bandwidth & Distance Limitations, Noise, Dispersion, Nonlinearities, Four Wave Mixing (FWM), Cross-phase Modulation (XPM), Stimulated Brillouin Scattering (SBS), Stimulated Raman Scattering (SRS), Chromatic Dispersion (CD), Polarization Mode Dispersion (PMD), Amplified Spontaneous Emission (ASE), Modeling of Nonlinearities, Noise-like penalties, Illustrations with System Examples, Optical Power Damage Threshold, Fiber, Components, Noise Sources, Not-Return-to-Zero (NRZ) vs. Return-to-Zero (RZ) Transmission, Dispersion and PMD Compensation, The Effects of Optical Crosstalk
- Analysis of Optical Components: Limits common to all optical components, Optical Filters, Couplers, Power Attenuators, Polarizer and Rotators, Beam Splitters, Light Sources, Ring Resonators
- EDFA Details: Advantages, EDFA Disadvantages, Limited to C and L bands, Pump Laser, Erbium Doped Fiber, Wavelength Selective Coupler, Isolator, A Comparison between EDFA, Raman Amplifier and SOAs
- Networking with DWDM
- DWDM Span Engineering: Engineering a DWDM link, Power Budget Design, Digital Modulation Formats, Fiber Impairments, Loss, Dispersion
- DWDM Testing, Measurements and OAM&P

PRICING COURSES & CERTIFICATIONS

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The Radio Frequency Fundamentals training course is designed for people who work in the field of radio frequency communications as well as those who require a basic understanding of RF fundamentals. FiberOptic.com provides high-quality radio frequency training programs for government agencies, small businesses and Fortune 500 companies. Our RF courses are specifically designed by experts in the field, and the course materials are continuously updated with the latest techniques and industry best practices.

Objectives

Through demonstrations and hands-on labs, students will gain experience in configuring and monitoring the Junos OS and monitoring device operations.

This course covers:
- RF Overview
- RF Technologies and Deployment
- Types of RF Propagation Models and Their Uses
- Link Budget Calculations
- Antenna Theory
- Basic Principles of Traffic Engineering and Optimization
- RF System Design Considerations
- RF Regulatory Considerations

Target Audience

The Radio Frequency Training course is designed for anyone needing a solid foundation for understanding the principles of RF Engineering. Engineers, technicians and managers who are new to RF and require applicable skills in RF design, planning and engineering.

Anyone working within the field of general RF systems, wireless, cellular and microwave systems will benefit from this comprehensive coverage of RF fundamentals.

COURSE PREREQUISITES

Basic mathematical and computing skills are recommended for this course. An electrical engineering background or equivalent practical experience is desired, but not required.

COURSE OUTLINE TOPICS INCLUDE

- Introduction - Course Objectives
- History of RF
- Characteristics of a Radio Signal
- Building Blocks in Radio Design
- Technology Fundamentals
- Cellular and Mobile RF
- Fixed Wireless RF
- Radio Propagation
- Introduction to Microwaves
- Frequency Bands Signal Principles
- Physics and Propagation Mechanisms
- Reliability of Service: Using stats to design for reliability
- Basic Antennas: Isotropic and Dipole radiators
- Horizontal arrays: yagis, log-periodics, etc.
- Bandwidth Limitations
- Dynamic Range
- Intermodulation Distortion
- Power Output
- Spectral Efficiency and System Limitations
- Sample Link Budget Calculations

PRICING COURSES & CERTIFICATIONS

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<tr>
<td>TC-RFF</td>
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<td>$150</td>
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The Advanced RF training course is an interactive, hands-on program intended for anybody working with Radio Frequency (RF) communications, who require a technical level of advanced RF principals. RF principles are employed in various communication technologies, such as Microwave, SATCOM, VSAT, GSM, GPRS/EDGE, CDMA, UMTS, HSPA+, LTE, LTE-Advanced, WiFi, Bluetooth, Zigbee, RFID, NFC and more.

Objectives

This course will provide students with an understanding of all the aspects of Radio Frequency — From the basics of RF planning to advanced topics in system design, specifications and performance.

Target Audience

Technical personnel involved with RF system design/operations, Engineers and managers engaged or expect to be engaged in the specification, procurement, design and development, testing, and operation of current and future RF systems.

COURSE OUTLINE TOPICS INCLUDE

- RF Systems Simulation and Behavioral Modeling: RF Modeling, Spectral efficiency vs Power Efficiency, Antenna Types, Link Budget Calculations, Noise Figure, Receiver Sensitivity, Dynamic Range, Intermodulation Distortion, Scattering Parameter Analysis, RF Regulatory and Safety Considerations
- Practical RF System Design Guidelines: Basic Building blocks in radio and microwave design, tradeoffs in designing wireless systems, Noise and distortion, Low noise amplifiers and mixers, oscillators/phase noise, forward error correction
- RF Transmitters/Receivers: circuit and system level design, typical radio architectures, antenna design considerations
- Evaluation system specifications and performance
- Real-time coverage maps
- Test plan development
- Cell site integration
- Successful Shielding Strategies

COURSE PREREQUISITES

Basic mathematical and computing skills are recommended for this course. An electrical engineering background or equivalent practical experience is desired, but not required.

PRICING COURSES & CERTIFICATIONS

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<tr>
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<td>$150</td>
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</table>

877-529-9114 training@fiberoptic.com

The Fiber Optic Marketplace LLC® — Part of the Adtell Group www.thefiberschool.com
TR-CUST Custom Training

FiberOptic.com will give you the exact training your company needs, we will train you and your employees exactly as needed to insure your field technicians will perform in a highly professional manner on the job. Most of our on-site course offerings are typically 4 days in length and feature agendas and hands-on exercises that can easily be adapted to your specific needs. In many cases these needs can be met within the standard 4 day course offerings but clients often require an additional day to address specific needs such as:

- **“Hands-On”:**
  - You need your craftsmen prepared to begin working immediately with the practical hands-on experience gained in class on the equipment you use.
    - With your specific connector
    - With your specific fusion splicer
    - With your specific splice closure
    - With your specific OLTS or OTDR.

- **Mixed agendas:**
  - You construct a fiber optic course that meets your needs then add items from our available certification courses.
    - Cover basic copper cabling common to Premise Wiring Systems
    - Cover basic Audio Visual systems
    - Cover basic CCTV, CATV, FTTx topics
    - Cover specific topics from our Outside Plant course
    - Cover additional OTDR techniques

- **Experience:** Our skilled instructors and course developers have experience training all kinds of personnel including AT&T, Verizon, US Military, Government agencies, End Users and all categories of contractors enabling FiberOptic.com to easily customize any course.

- **Take Action:**
  1. Select the course and certification desired
     a. Select a topic or issue you desired to be added
  2. Contact FiberOptic.com and request an on-site Custom quote
     a. How many students?
     b. Your location or a location near you?
     c. Select a desired date that meets your needs and schedule
  3. Review our proposal and book your training on-site with FiberOptic.com

---

Client Testimonials

“I enjoyed the personalized class. The one on one time with the instructor and the hands on training were exactly what I needed. The instructor had a vast knowledge and was courteous and helpful.”
- W.M., Florida

“The course was great for me, the hands on portions made the difference. The instructor did a great job and really knew the equipment and was able to answer all of my questions.”
- R.C., Virginia

---

**PRICING**

**COURSES & CERTIFICATIONS**

**TR-CUST** FiberOptic.com Custom Training
(Includes course materials)

Custom course prices can vary depending on depth of material and number of days. Call 877-529-9114 for an individualized quote.
ON-SITE Training

Take advantage of our most efficient and cost effective way to train you and your valuable employees. FiberOptic.com can bring any of its existing courses and certification exams to your location or to a facility near you.

It is always difficult to take valuable employees out of the field to attend training courses to obtain the certifications required to compete in today’s fast paced competitive markets. If your employees are current certification holders, just keeping track of and scheduling their courses to get the required CEC's (Continuing Education Credits) is difficult. In addition ensuring your company field craftsmen are scheduled into the right courses to get and keep the individual certifications that your company requires and your clients expect is a challenge.

All this while getting the most out of your training budget.

Let FiberOptic.com help you meet your training goals with our On-Site training because it is:

Convenient and Flexible:
• You select the course, the start time, the end time, the date, the location
• We bring everything to you:
  - Equipment (or use your equipment)
  - Training manuals, lab exercises and a qualified instructor
  - Certification Exams.
• Your crafts people remain close to the field for unforeseen emergencies

Cost Effective:
• Reduce your company's travel expenses
• Increase your productivity and save time
• Save money - We’ll help you stay within your Training budget

Take Action:
1. Select the course and certification
2. Contact FiberOptic.com and request an On-Site quote
   a. How many students?
   b. Your location or a location near you?
   c. Select a desired date that meets your needs and schedule
3. Review our proposal and book your training On-Site with FiberOptic.com

PRICING COURSES & CERTIFICATIONS
Custom course prices can vary depending on depth of material and number of days.
Call 877-529-9114 for an individualized quote.

On-Site Training - Rosebel Goldmine, Suriname
The Rosebel gold mine was in need of real world, on-site fiber training. The catch - the mine is in the middle of the Amazon! The unique requirements of maintaining a fiber optic infrastructure was no problem for FiberOptic.com. FiberOptic.com was able to develop hands-on training based on field applications.

On-Site Training - Fallujah, Iraq
Bechtel, the world's No. 1 choice for engineering, construction and project management, selected FiberOptic.com as the preferred fiber optic training vendor to create a customized class to train technicians in Fallujah, Iraq.
1. Company Information

<table>
<thead>
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<th>Contact Email:</th>
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2. Costs

**NOTE:** Be sure to include which course you are requesting to attend along with the date that the class begins.

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<tr>
<th>Selected Course Code:</th>
<th>Course Location:</th>
<th>Course Begin Date: (MM/DD/YY)</th>
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- Include TFS Certification (+$150 per student, per class)
- Include ETA Certification** (+$150 per student, per class)

(Course Price) x (Number Attending) + Certification Fees: ___________________________

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</table>

**ETA Certification is not available for all courses

Total Amount Due: ___________________________
Training Registration

FiberOptic.com’s Training Registration Form: Please Complete All Information.
If you have any questions while filling out the registration form,
contact training@fiberoptic.com or 877-529-9114 prompt 2.

3. On-site Training

☐ I would like on-site training    Course Code:________________
City:_______________________ State:_____________ Zip:_____________

*Pricing must be quoted/calculated by training department

4. Payment Information

Check or Credit Card (payment for course required to attendance)

Make Check Payable to: The Fiber Optic Marketplace
Mail Check to: The Fiber Optic Marketplace
              121 Park Avenue
              Quakertown, PA 18951

We Accept: Visa, Mastercard, American Express and Discover

*International Customers: We accept Wire Transfers or PayPal, please contact for more information

Name: _______________________________________________________
Billing Address: _______________________________________________
City:_______________ State:_____________ Zip:_____________

Credit Card Type
☐ Visa
☐ Mastercard
☐ American Express
☐ Discover

Credit Card # ___________________________________________________
Expiration Date:_____________    CVV2:_____________

Authorized Signature: ___________________________________________
Date: _______________________

Please Fax to: 215-689-1464 OR Email to: training@fiberoptic.com

Cancellation Policy: FiberOptic.com may cancel a course that lacks sufficient enrollment a week before it is scheduled to begin. When a course is canceled, we make every effort to notify all registered students promptly. A full refund is processed unless the student elects to transfer to another course or time. You can help avoid cancellation by registering early.

Student Cancellation: No Refunds for cancellation. Substitutions are permitted.

*Hotel & transportation information available upon request

Training dates and locations are subject to change without notice.
For current locations and dates go to http://www.thefiberschool.com/schedule
Broadband Asset Management System

FiberBase is a flexible system utilizing Oracle’s state-of-the-art relational database technology. FiberBase provides extensive documentation of all cable sheaths down to the individual conductor and all of the equipment to which the sheaths are terminated or through which the signal passes. FiberBase supports various network configurations and all types of telecommunications hardware from all vendors, including both Inside Plant and Outside Plant equipment.

- Hierarchically List Your Fiber Assets from Map Regions to Signals on a Cable
- Perform Complex Queries on Your Network Infrastructure
- Reduce Paper Waste
- Locate Outages Quickly and Accurately from OTDR Traces
- Integrate with Networking Monitoring Services

Document
Prevent
Respond
Save $
Put your certificate to work

- 2% Off all purchases*
- Online job postings
- Profile and resume building
- Special email promotions
- “Ask an Expert”

Members Get 2% OFF Every Order*
Placed On Shop.FiberOptic.com

Less than $8 a Month!**
Ask us about MEMBERSHIP

Enroll Now...
MEMBERS SAVE MORE!

Sign up FiberOptic.com’s Membership Program and receive 2% OFF discount off of everything** you buy at FiberOptic.com

Call for more details: 877-529-9114

*Not valid on promotional or discount pricing
**Based on annual purchase of $95.00

Product Index

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<td>Tool Kits</td>
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<td>Fusion Splicers</td>
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<td>Cleaning Kits</td>
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<tr>
<td>Cleaning Supplies</td>
<td>85</td>
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<tr>
<td>Tools</td>
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</tr>
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</table>

All prices are subject to change without notice.
Student Discount Promotions

*FREE TFS Safety T-shirt for attending one of The Fiber School's Training Courses!

TFS High Visibility T-shirt

FEATURES

- 50/50 Cotton/Poly blend
- Advanced moisture management performance
- Tear-away label
- OSHA approved safety green for high visibility

Note: Provide T-shirt size on registration form located on page 82.

Pssst.. Listen Up!

Get 10% Off* PRO brand products for 30 days after taking a class with The Fiber School

Visit Shop.FiberOptic.com or Call a Sales Representative to Get 10% Off* Your Purchase of PRO Products

PRO Technician’s Cleaning Kit

A must-have for all fiber optic technicians: an easy to use, inexpensive fiber optic cleaning kit to keep your splices and connectors free of dirt and debris. The FOM-TK-TECH kit has all of the basic cleaning components a technician will need on the job.

Kit Contains

- (1) - 9” x 12” BLK Nylon Tool Bag w/ FOM Logo
- (2) - PRO-LFW-100 Lint-free Wipe (100ct.)
- (1) - American Polywater AquaKleen Pump-Spray
- (1) - American Polywater QuickKleen Pump-Spray
- (10) - American Polywater SqueekyKleen Wipes
- (10) - Cleaning Stick Wrapped 2.5mm 5 Pack
- (10) - Cleaning Stick Wrapped 1.25mm 5 Pack

ORDERING INFORMATION

PRO-CK-TECH PRO Technician’s Cleaning Kit $129.00

All prices are subject to change without notice.
Recommended Products

Tool Kits

Basic Fiber Optic Tool Kit  
**FOM-TK-BASIC**
A high-quality fiber optic tool kit with all of the bare-essentials. Our custom collection of name-brand fiber optic tools gives you the fiber optic tools you need and leaves out the tools you might not.

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<tr>
<td>Kevlar Shears</td>
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<td>Fiber Optic Stripper Three Hole</td>
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<td>Buffer Tube Stripper</td>
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<td>CST-1900: ROUND CABLE STRIPPER</td>
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<td>High Leverage Cable Cutters</td>
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**ORDERING INFORMATION**

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Basic OSP Fiber Optic Tool Kit  
**FOM-TK-OSP**
A high-quality OSP (outside plant) fiber optic tool kit with all of the bare-essentials. Our custom collection of name-brand fiber optic tools gives you the fiber optic tools you need and leaves out the tools you might not.

<table>
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<td>60mm Clear - Splice Sleeve</td>
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<tr>
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<tr>
<td>FOM-TK-OSP</td>
<td>Basic OSP Fiber Optic Tool Kit</td>
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<td></td>
<td>$375.00</td>
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FTTx Fiber Optic Tool Kit  
**FOM-TK-FTTx**
A high-quality FTTx fiber optic tool kit with all of the bare-essentials. Our custom collection of name-brand fiber optic tools gives you the fiber optic tools you need and leaves out the tools you might not.

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>FTTx Fiber Optic Tool Kit</td>
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<tr>
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<td>Fiber Optic Drop Cable Slitter</td>
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<td>Kevlar Shears</td>
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<td>Fiber Optic Stripper Three Hole</td>
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<tr>
<td>Duplex Zipcord Buffer Stripper</td>
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<tr>
<td>Fiber Buffer Tube Stripper</td>
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<td>CST-1900: ROUND CABLE STRIPPER</td>
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<td>Optic Prep Tissue - 1 Packet</td>
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<td>Fiber Optic Cleaning Cassette</td>
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<td>IBC Cleaner (2.5mm) Cleaning Tool</td>
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<td>IBC Cleaner (1.25mm) Cleaning Tool</td>
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<tr>
<td>Clause Fiber Continuity Tester</td>
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<td>60mm Clear - Splice Sleeves</td>
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**ORDERING INFORMATION**

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All prices are subject to change without notice.
### AFL FUJIKURA 70S+
Core Alignment Fusion Splicer

The Fujikura 70S+ is the world’s fastest and most robust core alignment fusion splicer. Incorporating the proven ruggedized features pioneered by Fujikura, the 70S+ has added automated and enhanced user control features to increase splicing efficiency. A user programmable, automated wind protector expedites the splicing process by automatically closing to initiate the splice process, and opening upon splice completion. Fully programmable “auto open sheath clamps” open one or both sheath clamps, after the tensile test, to prepare the fiber for removal. A new automated “clamshell design” tube heater applies heat to both sides of the splice protection sleeve resulting in a 13-second shrink time. The result is a total splice process time of approximately 21 seconds!

#### ORDERING INFORMATION

| S015580     | Fujikura 70S+ Fusion Splicer (Splicer Only) | $9,100.00 |

### PRO-790
Core Alignment Fusion Splicer

The PRO-790 Fusion Splicer is a rugged, compact fusion splicer that quickly splices 250µm, 900µm and 3mm fiber, as well as Splice-On Connectors. The PRO-790 has an 8-Second splice time, 3.5” LCD monitor and is ruggedized for heavy field use. With an onboard oven capable of accommodating Splice-On Connectors, the PRO-790 is extremely versatile.

#### ORDERING INFORMATION

| PRO-790 | PRO-790 Fusion Splicer | $3,600.00 |

### OFS-935C
Core-Alignment Fusion Splicer

The PRO OFS-935C is the perfect splicer for ANY job. This splicer has it all, from the easy-to-use touch screen interface to the rock solid core alignment splicing — all at a price that is thousands less than other comparable brands. With an innovative design and engineered with precise manufacturing technology, the OFS-935C gives users an unmatched experience. Splice with confidence no matter what harsh environmental condition you encounter. The OFS-935C offers SOC capability.

#### ORDERING INFORMATION

| OFS-935C | OFS-935C Core Alignment Fusion Splicer | $7,995.00 |

### OFS-935C CORE-ALIGNMENT FUSION SPICLER

- Splice-on Connector Capability
- 4.3” Touch Screen
- Waterproof
- Dust-proof
- Anti-Shock
Recommended Products

Organized
Convenient
All-in-One

Many industries
Many tools to track
Many problems

... One solution

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Kit Code</th>
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<td>Contractor Go-Kit #1</td>
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<td>GOK-CON-K2</td>
<td>Contractor Go-Kit #2</td>
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<td>GOK-CON-K3</td>
<td>Contractor Go-Kit #3</td>
<td>$20,495.00</td>
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<td>GOK-ERK-K1</td>
<td>Emergency Response Go-Kit #1</td>
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<td>Emergency Response Go-Kit #2</td>
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<td>GOK-FTTX-K1</td>
<td>Fiber To the Home Go-Kit #1</td>
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<td>GOK-FTTX-K2</td>
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<td>GOK-DAT-K1</td>
<td>Data Center Go-Kit #1</td>
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<td>GOK-OSP-K1</td>
<td>Outside Plant Go-Kit #1</td>
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<td>GOK-DAS-K1</td>
<td>DAS Go-Kit #1</td>
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<td>GOK-DAS-K2</td>
<td>DAS Go-Kit #2</td>
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All prices are subject to change without notice.
**EXFO FTB-1v2 Mainframe with FTB-720C Module**
The FTB-720C is an OTDR that is best suited for most typical short and access networks. It can perform both singlemode and multimode testing. The FTB-720C is designed for fiber-to-the-antenna (FTTA) applications, data-center tier-2 troubleshooting, enterprise and access networks. The FTB-720C test module is hosted in a modular compact FTB-1v2 platform that can also be equipped with other testing capabilities to provide a complete test solution for FTTA contractors.

**ORDERING INFORMATION**
- **TK-1V2-S1-FTB-720C-5M1-EA-ELI-XX**
  - FTB-1v2 OTDR
  - 1310/1550nm, 36/35 dB
  - **$7,982.14**

**FlexScan FS200**
Handheld OTDR
FlexScan OTDRs enable both novice and expert technicians to quickly and reliably troubleshoot optical networks or fully characterize newly installed or repaired networks. Using FlexScan's innovative SmartAuto mode, multiple OTDR scans quickly and accurately detect, locate, identify and measure network components and faults. PRO kit adds FOCIS Flex, 2 Adapter Tips, Fiber Ring, One-Click Cleaner, TRM 3.0 Advanced Flex w/2 adapter tips, soft case

**ORDERING INFORMATION**
- **FS200-100BASPC**
  - FlexScan FS200-100 Basic Kit, 1310/1550 OTDR w/VFL & Soft Case
  - **$3,795.00**

**PRO OBL-301A**
Optical Break Locator
The OBL-301A is a high-performance, easy-to-use diagnostic tool designed for fiber maintenance, locating faults and general troubleshooting. Up to 1,000 test results can be stored onboard and later transferred to a PC, via a built-in USB port.

**ORDERING INFORMATION**
- **OBL-301A**
  - OBL-301A Optical Break Locator 1550nm
  - **$2,000.00**

**PRO LS-201Q Light Source**
Stable Light Source
The LS-201Q Quad Light Source offers excellent stability and portability for accurate fiber optic testing. Dual output ports provide stable laser power at four common wavelengths.

**ORDERING INFORMATION**
- **LS-201Q**
  - LS-201Q Quad Light Source
  - **$1,495.00**

**PRO-6350 Series**
Multifunction OTDR
The PRO-6350 Series is a compact multi-functional platform, specially designed for FTTx/WAN applications and can meet all test requirements of installers, contractors and service operators during network installation, construction, maintenance and troubleshooting. It is convenient and accurate for auto/manual testing, multi-wavelength testing and multifunctional analysis.

**ORDERING INFORMATION**
- **PRO-6350-TS-D38**
  - OTDR 1310/1550 38/37dB
  - **$9,999.00**

**PRO PON-301B**
PON Meter
PRO's PON-301B is unique because it functions as a “pass-through” device, which can be connected anywhere between an OLT and an ONT. The PON-301B operates on all common wavelengths (1310/1490/1550nm) and is designed to be incredibly easy to use. Being a “pass-through” device, the 301B operates by extracting a small percentage of optical signal, allowing the technician to assess the optical signal without any disruption in service.

**ORDERING INFORMATION**
- **PON-301B**
  - **$1,225.00**

**PRO VIP-45**
Video Inspection Probe
The VIP-45 Series Video Inspection Probe connects directly to your PC through the computer's USB 2.0 port. The FBT-80 optional Windows tablet is perfect for utilizing our video capture software. A pass/fail analysis and reporting features can be added with an optional software upgrade.

**ORDERING INFORMATION**
- **VIP-45-K1**
  - Video Inspection Probe Kit 1 (UPC/PC)
  - **$1,100.00**
- **VIP-45-K2**
  - Video Inspection Probe Kit 2 (APC)
  - **$1,100.00**
- **FBT-80**
  - Windows Based Tablet - Display
  - **$250.00**

**PRO PM-204B Power Meter**
Optical Power Meter
The PM-204B, together with our Stabilized Laser Sources, can be used to identify optical fiber, measure optical attenuation, verify continuity and evaluate fiber link transmission quality.

**ORDERING INFORMATION**
- **PM-204B**
  - PM-204B Power Meter (-50dB – +26dB)
  - **$499.95**

All prices are subject to change without notice.
Recommended Products

Cleaning Kits

**PRO** Basic Cleaning Go-Kit

**Kit Includes:**
- 9" x 12" BLK Nylon Tool Bag, Cleaning Stick Wrapped 2.5mm (100/pk), Cleaning Stick Wrapped 1.25mm (100/pk), Optic Prep Presaturated Pads (10pcs), Electro-Wash Wipe (MX) (10pcs), American Polywater SqueekyKleen Wipes (10pcs), American Polywater AquaKleen Pump-Spray, American Polywater QuickKleen Pump-Spray, PRO-LFW-100 Lint-free Wipe (100ct.), PRO-CT-001 Fiber Optic Cleaning Cassette, PRO-CT-004 Replacement Cassette Reel

**PRO** Cleaning Go-Kit w/ Quick Clicks

**Kit Includes:**
- 9" x 12" BLK Nylon Tool Bag, Cleaning Stick Wrapped 2.5mm (100/pk), Cleaning Stick Wrapped 1.25mm (100/pk), Optic Prep Presaturated Pads (10pcs), Electro-Wash Wipe (MX) (10pcs), American Polywater SqueekyKleen Wipes (10pcs), American Polywater AquaKleen Pump-Spray, American Polywater QuickKleen Pump-Spray, PRO-LFW-100 Lint-free Wipe (100ct.), PRO-CT-001 Fiber Optic Cleaning Cassette, PRO-CT-004 Replacement Cassette Reel, PRO-CS-125 Quick Click (TM), 1.25mm (LC), PRO-CS-250 Quick Click (TM), 2.5mm (SC)

**PRO** Fiber Optic Cleaning Cassette

**Kit Includes:**
- 9" x 12" BLK Nylon Tool Bag, Cleaning Stick Wrapped 2.5mm (100/pk), Cleaning Stick Wrapped 1.25mm (100/pk), Optic Prep Presaturated Pads (10pcs), Electro-Wash Wipe (MX) (10pcs), American Polywater SqueekyKleen Wipes (10pcs), American Polywater AquaKleen Pump-Spray, American Polywater QuickKleen Pump-Spray, PRO-LFW-100 Lint-free Wipe (100ct.), PRO-CT-001 Fiber Optic Cleaning Cassette, PRO-CT-004 Replacement Cassette Reel, PRO-CS-125 Quick Click (TM), 1.25mm (LC), PRO-CS-250 Quick Click (TM), 2.5mm (SC), PRO HM-400X Fiber Microscope 400x

**ORDERING INFORMATION**

- **PRO-CK-CLEAN-BA** PRO Basic Cleaning Kit $268.55
- **PRO-CK-CLEAN-01** PRO Cleaning Kit w/ Quick Clicks $479.12
- **PRO-CK-CLEAN-02** PRO Cleaning Kit w/ Microscope $610.00

**ORDERING INFORMATION**

- **PRO-FSC-200** Fiber Scrap Container $5.00
- **PRO-CT-001** Fiber Optic Cleaning Cassette $75.00
- **PRO-CT-004** Cleaning Cassette Replacement Reel $30.00

**PRO** Fiber Optic Cleaner

The PRO-CC-AQ Fiber Optic Connector Cleaner is a special blend of 94% pure deionized water with cleaning solvents. This cleaner is friendly to the environment, less toxic, and safer for use by humans.

The PRO-CC-QC Fiber Optic Connector Cleaner is a unique solvent blend that cleans completely, leaves no residue, and evaporates quickly. No alcohol or water content means no streaking or residue.

**ORDERING INFORMATION**

- **PRO-CC-AQ** Connector Cleaner - Water Base $12.00
- **PRO-CC-QC** Connector Cleaner - Solvent Base $17.75

**PRO** Lint-Free Wipes

The fiber optic industry demands a lint-free product when used with alcohol for cleaning fiber and connector end faces.

**ORDERING INFORMATION**

- **PRO-LFW-100** Lint-free Wipes – 3" x 3" (100ct) $8.95

877-529-9114
training@fiberoptic.com
The Fiber Optic Marketplace LLC® — Part of the Adtell Group
www.thefiberschool.com

All prices are subject to change without notice.
JONARD Fiber Stripper 3 Hole

Three hole Fiber Optic Stripper model performs all common fiber stripping functions. This Fiber Optic Stripper strips the 1.6-3 mm fiber jacket down to the 600-900 micron buffer coating. The second hole strips the 600-900 micron buffer coating down to the 250 micron coating and the third hole is used to strip the 250 micron cable down to the glass fiber without nicks or scratches.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>JIC-375</td>
<td>Fiber Optic Stripper 3 Hole</td>
<td>$28.40</td>
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</tbody>
</table>

ACS Armored Cable Slitter

The ACS Tool is designed to work on jacketed and armored multi-fiber cable. Its main purpose is to gain midspan access to fiber optic conductors by slitting the outer jacket and armor on cables. The tool is designed with a precision adjustable blade to avoid damage to the fibers. The tool works on a cable diameter range of 5/16” - 1-1/8” (8mm - 28.6mm). The blade can be set up to .215” (5.5mm) deep.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACS</td>
<td>Armored Cable Slitter</td>
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<tr>
<td>CB-251K</td>
<td>Replacement Blade Assembly</td>
<td>$66.90</td>
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JONARD FIBER STRIPPER & SCISSOR KIT

Kit includes the JIC-375 Fiber Optic Stripper, ES-1964 Electrician’s Scissor, and convenient molded plastic pouch (with belt loop).

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>TK-375</td>
<td>Fiber Stripper &amp; Scissor Kit</td>
<td>$50.75</td>
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JONARD Three Piece Splicer’s Kit

This compact kit contains a special purpose ergonomic cable splicer’s knife, scissor and leather pouch. The knife features a short 1 3/4” tough, cutlery-steel blade and a non-slip handle. The scissors are made of high carbon steel with scraper and file on one sides plus 2 stripping notches. Both items fit securely in the leather pouch which can be mounted on belts up to 2” wide.

<table>
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<tr>
<td>TK-400</td>
<td>Three Piece Splicer’s Kit</td>
<td>$27.25</td>
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KEVLAR® Shears

KC699 Soft, cushioned oversized bows for operator comfort. Blades are hardened stainless steel with a fine serration on one blade to grip Kevlar fibers and prevent slipping while cutting.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Price</th>
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<tr>
<td>KS-1</td>
<td>Lightweight shears ideal for cutting Kevlar strength members found in fiber optic cable construction.</td>
<td>$20.25</td>
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MILLER MSAT: Mid-Span Access Tool

Quickly and easily access fibers in 2, 2.5 and 3mm buffer tubes in a mid-span location without fiber damage. All blades precisely factory mounted in tube slitting channels with no adjustment required by the installer. Tool design incorporates buffer tube size gages on the tool body for ease of selecting proper tube slitting channel. Convenient spring loaded lever opens and closes the tool and lever becomes flush with the top of the tool body when closed. For use with the following diameter buffer tubes: 2.0mm 1.8-2.2 mm (0.071” - 0.086”) 2.5mm 2.3-2.8 mm (0.090”-0.110”) 3.0mm 2.8-3.2 mm (0.110”- 0.126”). Made in the U.S.A.

<table>
<thead>
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<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>80785</td>
<td>MSAT: Mid-Span Access Tool</td>
<td>$405.00</td>
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All prices are subject to change without notice.
Rental Equipment (Splice & Test)

Don’t see what you’re looking for? FiberOptic.com offers a complete line of rental solutions.

Visit us at our rental website www.RentTele.com. Call us at 877-529-9114, or Email at Rentals@fiberoptic.com to request a quote.

*We will price match any competitor’s quote.

Get a FREE* PRO-CKTK-BASIC Tech Kit when you rent from www.RentTele.com

*Applies to rentals one (1) month or greater only

PRO® Fusion Splicer Rentals

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PRO® Handheld Rentals

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PRO® Go-Kit® Rental Solutions

Go-Kit™

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Quad

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Call 877-529-9114 for Other Configurations

All prices are subject to change without notice.
TOTAL COMMUNICATION SOLUTION

Broadband Services
Outside Plant (OSP) & Construction
OSP Engineering & Installation
Engineering & Design — EFI&T
Rack & Stack
Distributed Antenna System (DAS)
Wireless Design & Consulting
Network Optimization
Emergency Response
Site Survey & Documentation
Support Maintenance
Performance Monitoring
Fiber Optic Training

Managing your network so you don’t have to...

p: 888-423-8355
www.adtellintegration.com
sales@adtellintegration.com
FLAMMABILITY CABLE RATINGS

All premises cables shall be listed and have flammability ratings per NEC 770.50. Cables without markings should never be installed inside buildings, as they do not comply with the National Electric Code. Optical cable markings are as follows:

- **OFN** Optical Fiber Nonconductive
- **OFC** Optical Fiber Conductive
- **OFNR or OFCG** Optical Fiber Amplifier General Purpose
- **OFNP or OFCP** Optical Fiber Plenum Rated Cables for Use in Air–handling Plenums
- **OFN–LS** Optical Fiber Low Smoke Density

COLOR CODING CABLE & JACKETS

Colors of cable jackets for identifying indoor fiber optic cable are not standardized. Typical colors are as follows:

- **Premises Cables**
  - Orange or Gray: Multimode Fiber
  - Yellow: Singlemode Fiber

- **Outside Plant Cables**
  These are typically black to prevent UV radiation damage.

COLORS AND CODES

Fiber Color codes are specified by TIA/EIA 598–A. In loose tube cables, this color code will be used for tubes as well as fibers within the tubes and subgroups. See the chart to the right.

**METRIC/ENGLISH CONVERSIONS**

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<th>METRIC MEASURE</th>
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<tbody>
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<td>mm (millimeters)</td>
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<td>in (inches) x 2.54</td>
<td>cm (centimeter)</td>
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<tr>
<td>ft (feet) x 0.305</td>
<td>m (meters)</td>
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<tr>
<td>mi (miles) x 1.609</td>
<td>km (kilometers)</td>
</tr>
<tr>
<td>lbf (pound force) x 4.444</td>
<td>N (newtons)</td>
</tr>
<tr>
<td>lbf-ft (foot pounds) x 1.355</td>
<td>N-m (newton/meter)</td>
</tr>
<tr>
<td>lbf/in (pounds force/inch) x 1.751</td>
<td>N/cm (newtons/cm)</td>
</tr>
<tr>
<td>lb (pounds) x 0.454</td>
<td>kg (kilograms)</td>
</tr>
<tr>
<td>lb/1000 ft (pounds/thousand feet) x 1.490</td>
<td>kg/km (kilograms/kilometers)</td>
</tr>
<tr>
<td>°F (degree Fahrenheit) - 32, then x 0.555</td>
<td>°C (Celsius)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DECIMAL PREFIXES</th>
</tr>
</thead>
<tbody>
<tr>
<td>G or giga = 10^9 (1,000,000,000 or 1 billion)</td>
</tr>
<tr>
<td>M or mega = 10^6 (1,000,000 or 1 million)</td>
</tr>
<tr>
<td>K or Kilo = 10^3 (1,000 or 1 thousand)</td>
</tr>
<tr>
<td>m or milli = 10^-3 (1/1,000 or 1 thousandth)</td>
</tr>
<tr>
<td>µ or micro = 10^-6 (1/1,000,000 or 1 millionth)</td>
</tr>
<tr>
<td>n or nano = 10^-9 (1/1,000,000,000 or 1 billionth)</td>
</tr>
</tbody>
</table>

**METRIC MEASURE x FACTOR = ENGLISH MEASURE**

<table>
<thead>
<tr>
<th>mm (millimeters) x 0.0394</th>
<th>in (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm (centimeter) x 0.394</td>
<td>in (inches)</td>
</tr>
<tr>
<td>m (meters) x 3.281</td>
<td>ft (feet)</td>
</tr>
<tr>
<td>km (kilometers) x 0.622</td>
<td>mi (miles)</td>
</tr>
<tr>
<td>N (newtons) x 0.225</td>
<td>lbf (pound force)</td>
</tr>
<tr>
<td>N-m (newton/meter) x 0.738</td>
<td>lbf-ft (foot pounds)</td>
</tr>
<tr>
<td>N/cm (newtons/cm) x 0.571</td>
<td>lbf/in (pounds force/inch)</td>
</tr>
<tr>
<td>kg (kilograms) x 2.205</td>
<td>lb (pounds)</td>
</tr>
<tr>
<td>kg/km (kilograms/kilometers) x 0.671</td>
<td>lb/1000 ft (pounds/thousand feet)</td>
</tr>
<tr>
<td>°C (Celsius) x 1.8 then + 32</td>
<td>°F (degree Fahrenheit)</td>
</tr>
</tbody>
</table>

**Did You Know...**

- FiberOptic.com is one of the largest on-line distributors of fiber optic products.
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