

# Fiber Optic Concepts

<b>Course Length</b>	2 days
<b>Course Code</b>	1200
<b>Prerequisites</b>	None
<b>Course Overview:</b>	This course introduces the student to Fiber concepts with emphasis on Fiber Splicing and testing. The majority of the course is hands-on working with fiber splicing, how to properly clean connectors and measuring and interpreting test results.

\*This course can be customized or combined to meet specific system requirements

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## Course Outline

### Day 1

#### History of Fiber Optics

- The evolution of light in communications
- The manufacturing process
- Advantages and Disadvantages
- Current Fiber Optic integration and industry applications

#### Principles of Fiber Optic Transmission

- Basic Properties of Light
- How light is used to transmit a digital signal
- Light Sources – LASER and LED
- Light Propagation
- Understanding wavelengths
- Basic parts of a Fiber Optic Link
- Transmitters and Receivers
- Multiplexers, Regenerators, Amplifiers and Attenuators
- How to express gain and loss in dB
- How to express optical power in dBm
- Explain impairments of light transmission – reflection, refraction, Fresnel reflections, refractions, attenuation (optical power loss), dispersion, micro and macro bends



**NetForce Solutions, Inc.**  
P.O. Box 1710  
Denver, NC 28037

**phone** (301) 943-5062  
**fax** (509) 757-1661

info@netforcesolutions.com

[www.netforcesolutions.com](http://www.netforcesolutions.com)

# Fiber Optic Concepts

## Fiber Optic Safety

- Dangers of Light transmission –(LASERS)
- How to safely handle and dispose of Fiber optic cables

## Fiber Optic Cables

- Basic parts of an optical fiber—core, cladding, buffer and jacket
- Single-mode and Multimode cables
- Outdoor and Indoor cables
- General Fiber optic cable installation guidelines

## Pigtails and Connectors

- Patch cords and connectors
- Legacy Connectors
- Form Factor connectors

## Care and cleaning of fiber cables and connectors

- Inspection with scope
- Proper method of cleaning and handling fiber ends
- Importance of recording measurements

## Day 2

## Splicing and Termination

- Mechanical Splicing
- Fusion Splicing
- Splice trays
- Patch Panels
- Fiber Distribution Hubs

## Testing Fiber Optics

- Types of Tests to perform
- Types of Test Equipment
- Performing Optical Power Measurements
- Understanding Loss Budgeting
- Optical Return Loss (ORL) Measurements
- OTDR and OSA testing

## Fiber Optic Installation Testing

- Cable Tests – Reel Test, Splicing Installation test, Acceptance
- Fiber Acceptance Criteria
- Bit Error Rate Test (BERT)
- Receiver Threshold Test

# **Fiber Optic Concepts**

## **Fiber Optic Maintenance**

Non-Service Affecting Maintenance  
Service-Affecting Maintenance

## **Fiber Optic Troubleshooting**

## **Emergency Cable Repair**

## **Future of Fiber Optics**

## **\*Extensive\* Hands-on Exercises**