

# Fiber Optic Characterization



Evaluate your fiber to intelligently grow your network capacity.

Be sure your embedded fiber meets transport performance requirements before you deploy DWDM and high optical carrier rate network elements.

## Benefits

Lucent can evaluate your fiber to help you:

- Improve fiber utilization and route capacity capabilities
- Simplify DWDM equipment deployments
- Limit technical problems in DWDM deployments
- Reduce personnel effort
- Shrink capital investments for test equipment



Like many service providers, you may need to light up more installed fibers or add new gear to squeeze new wavelengths or faster streams of data through already active fiber-optic lines. Before deploying new DWDM or high optical carrier (OC) rate network elements, you should evaluate your embedded fiber to be sure it can handle the higher data-rate capacities you are planning. Lucent Technologies offers a service that can help—Fiber Optic Characterization. This service will let you know if your embedded fiber will strictly adhere to the engineering parameters for optical loss & reflection, chromatic dispersion, and polarization mode dispersion. It provides not only field test data, but also a full evaluation with recommendations that can be used during DWDM and higher OC rate network design and deployment to verify that your fiber will support the desired level of network element performance.

## Why test optical fiber?

Optical fiber is not perfect. The glass used to make fiber contains impurities, imperfections, and variations which can cause light traveling down the fiber to distort and scatter, causing potential power loss and signal disruptions. In addition, events occurring during the installation of the fiber or over time can cause performance issues. Because of these imperfections and events, some spans of your embedded fiber may not support the stringent engineering standards required for a given DWDM or high OC bit rate application. The Lucent Technologies Fiber Optic Characterization Service can help determine the actual values for these event parameters so you can make the necessary corrections to enable your systems to perform as desired.

## What characteristics does the service test?

As part of the Fiber Optic Characterization Service, Lucent engineers perform four types of fiber testing:

- Optical Time-Domain
- Optical Loss
- Chromatic Dispersion
- Polarization Mode Dispersion

## Optical Time-Domain (OTD) Characterization

This test helps you assess the optical distance and loss for your fiber. It uses an Optical Time-Domain Reflectometer (OTDR) to send a laser pulse down each fiber. The test is performed on both directions of each fiber at 1310 nanometer (nm) and 1550nm wavelengths. The OTDR displays the waveform and locations of events such as fusion and mechanical splices and macro bend locations along your fiber. This characterization shows fiber continuity, loss values, total optical return loss values, and fiber span lengths.

## Optical Loss Testing

This test measures the absolute optical loss on your fiber spans. This dual-ended test measures power loss in dB at 1310nm and 1550nm wavelengths at both ends of your fiber using an Optical Loss Test Set. Using this test data, your actual field measurements are evaluated against manufacturers' specifications. This evaluation can help you determine attenuation versus optical length, and verify whether your fiber spans meet loss budget requirements.



Lucent engineers analyze an OTDR trace depicting specific events such as fusion and mechanical splices and macro bend locations. This shows fiber continuity, loss values and fiber span lengths.

## Chromatic Dispersion (CD) Testing

Chromatic Dispersion (CD) in fiber causes the pulse to spread in time as it travels through the length of the fiber. Therefore, CD is an important performance parameter in DWDM and higher data rate Time Division Multiplexing (TDM) applications where wavelength channel spacing is critical to performance. This test compares chromatic dispersion field measurements to your fiber CD budget specifications.

## Polarization Mode Dispersion Testing

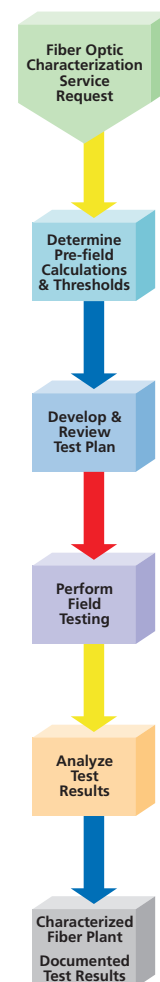
Light is not only made up of many colors, it also travels in two modes of polarization. Polarization affects optical fiber by the fact that one mode of polarization often travels faster than the other. This causes polarization mode dispersion (PMD) or a spreading of the modes of polarization, which can affect transmission quality. PMD testing assesses the extent of PMD within your embedded fiber. This test, conducted at the 1550nm wavelength, compares the PMD field measurements to your system budget specifications to verify whether your network is capable of transporting higher OC data rates and to determine regenerator placement. PMD testing helps locate in-lane (i.e., in-channel) problems where too much PMD may cause bit errors and limit system performance.

Using Fiber Optic Characterization data, you can:

- Assess whether your networks are capable of supporting future DWDM and higher OC applications.
- Determine the optimum number of channels and time division multiplexing rates supported by your embedded fiber plant.
- Identify locations and dispersion values for Dispersion Compensating Modules for use in determining how to accommodate the fiber plant to increase channel capacity.
- Determine regenerator placement.

## Why Lucent?

Lucent is uniquely qualified to provide FOC services, being among the first to offer leading-edge fiber testing technology. In fact, Lucent has been testing optical fiber since the first high speed DWDM systems began to be deployed in 1998. Since that time, Lucent has continually refined its field-proven methodologies and processes so that your fiber infrastructure can be tested and qualified faster. Lucent's expert personnel, who have an in-depth understanding of multiple fiber types, bring the appropriate technical resources to perform cost-effective, fast, and seamless fiber testing according to a well-defined plan that yields a well-documented analysis and summary of your fiber characterization. By taking advantage of our globally-available resources and personnel, you can take the proactive approach to planning enhancements to your network applications.



**Lucent's field-tested and proven FOC process and methodology helps ensure your network is implemented for peak performance.**

### Features

- Optical loss measurements help you determine absolute fiber attenuation, allowing you to verify your link budget and validate your proposed transmission levels.
- Optical time-domain measurements let you determine span length, span loss, and fiber event identification with location, loss, and reflectance data. Analysis of this data examines the integrity and continuity of your fiber and verifies reflection and attenuation behavior.
- Chromatic Dispersion measurements let you determine pulse spreading characteristics of the fiber. The dispersion analysis examines the limitations of the fiber in terms of bandwidth. It also provides verification of the dispersion budget.
- Polarization mode dispersion measurements let you determine the birefringence and polarization mode coupling of your fiber. You can also evaluate the fiber integrity and test the limitations of its transmission rate.

Upon completion of these tests, a comprehensive report of the test data is provided along with a full evaluation of the fiber's ability to support system requirements. If changes to the network design/architecture are necessary, recommendations are provided.

To learn more about our comprehensive portfolio, please contact your Lucent Technologies Sales Representative or call +800 11223333 (Europe wide Freephone) or +32 70 22 20 52.

Visit our web site at [www.lucint.com](http://www.lucint.com).

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