



# **OTDR Functions, Options and Software Applications**

**OTDR functions, options and software  
applications for SmartOTDR and T-BERD/  
MTS 2000/4000**

User Manual



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User Manual



Viavi Solutions  
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# About This Guide

The MTS/T-BERD 2000 of Viavi provides a handheld, modular platform designed for the construction, validation and maintenance of fiber networks.

The topics discussed in this chapter are as follows:

- [“Purpose and scope” on page xviii](#)
- [“Assumptions” on page xviii](#)
- [“Technical assistance” on page xviii](#)
- [“Recycling Information” on page xviii](#)
- [“Conventions” on page xix](#)

## Purpose and scope

The purpose of this guide is to help you successfully use the MTS/T-BERD 2000 features and capabilities. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the MTS/T-BERD 2000 with modules.

## Assumptions

We are assuming that you have basic computer and mouse/track ball experience and are familiar with basic telecommunication and fiber optic concepts and terminology.

## Technical assistance

If you require technical assistance, call 1-844-GO-VIAVI. For the latest TAC information, go to <http://www.viavisolutions.com/en/services-and-support/support/technical-assistance>.

## Recycling Information

Viavi recommends that customers dispose of their instruments and peripherals in an environmentally sound manner. Potential methods include reuse of parts or whole products and recycling of products components, and/or materials.

## WEEE Electrical and electronic Equipment (WEEE)



In the European Union, this label indicates that this product should not be disposed of with household waste. It should be deposited at an appropriate facility to enable recovery and recycling.

## Conventions

This guide uses naming conventions and symbols, as described in the following tables.

**Table 1** Typographical conventions

Description	Example
User interface actions appear in this <b>typeface</b> .	On the Status bar, click <b>Start</b> .
Buttons or switches that you press on a unit appear in this <b>TYPEFACE</b> .	Press the <b>ON</b> switch
Code and output messages appear in this <code>typeface</code> .	<code>All results okay</code>
Text you must type exactly as shown appears in this <b>typeface</b> .	Type: <code>a:\set.exe</code> in the dialog box
Variables appear in this <b>typeface</b> .	Type the new <b>hostname</b> .
Book references appear in this <b>typeface</b> .	Refer to <b><i>Newton's Telecom Dictionary</i></b>

**Table 1**    Typographical conventions (Suite)

Description	Example
A vertical bar   means “or”: only one option can appear in a single command.	platform [a b e]
Square brackets [ ] indicate an optional argument.	login [platform name]
Slanted brackets < > group required arguments.	<password>

**Table 2**    Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press <b>Ctrl+s</b>
A comma indicates consecutive key strokes.	Press <b>Alt+f,s</b>
A slanted bracket indicates choosing a submenu from menu.	On the menu bar, click <b>Start &gt; Program Files.</b>

**Table 3**    Symbol conventions



**NOTE**This symbol represents a general hazard.



**NOTE**This symbol represents a risk of electrical shock.



**NOTE**

This symbol represents a Note indicating related information or tip.

**NOTE**This symbol, located on the equipment or its packaging indicates that the equipment must not be disposed of in a land-fill site or as municipal waste, and should be disposed of according to your national regulations.

**Table 4** Safety definitions



**NOTEWARNING**

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**NOTECAUTION**

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



# Principle of Measurement

This chapter gives the principles of the measurements made by the optical modules.

The topics discussed in this chapter are as follows:

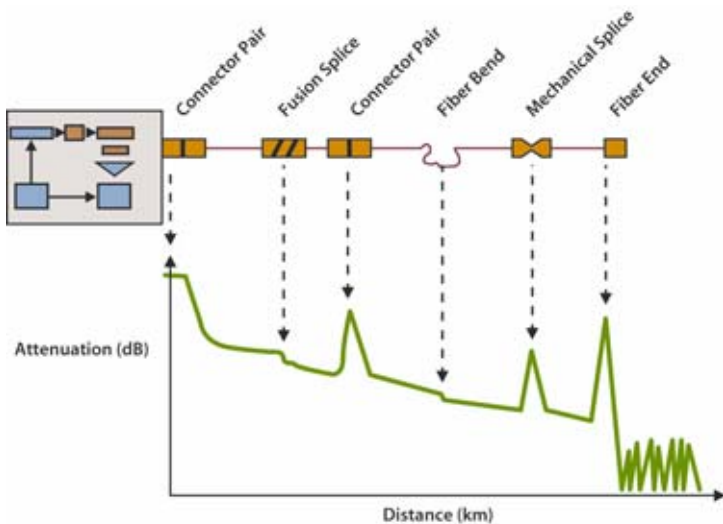
- [“Principle of reflectometry measurements” on page 2](#)
- [“Principle of optical power and attenuation measurements” on page 5](#)

# Principle of reflectometry measurements

Optical time domain reflectometry consists in injecting a light pulse into one end of the optical fiber to be analyzed and observing, at the same end, the optical intensity passing through the fiber in the opposite direction to the propagation of the pulse.

The signal detected is exponentially diminishing in form, typical of the phenomenon of backscattering, with superimposed peaks due to reflections from the ends of the fiber or other variations in the refractive index.

**Figure 1** Trace showing typical backscattering



## Information yielded by the measurement

From a backscatter trace it is possible, in particular, to determine the position of a section of fiber within a link. The measurement result must reveal:



- the attenuation
- the location of faults, by their distance from a point of origin,
- attenuation with respect to distance (dB/km)
- the reflectance of a reflective event or a link.



To locate faults, a reflectometer measures only time. Consequently, group velocity must be introduced in order to determine the distance of the location. This is done by introducing the refractive index of the fiber into the instrument.

## Validity of Measurement ITU-T

ITU-T in recommendations G.650, G.651 and G.652, give backscatter measurement as an alternative method for measuring attenuation, the method of reference being the cut fiber.

The field of application of backscatter is not limited, but the conditions for application of this method are nevertheless stipulated:

- injection conditions: Fresnel reflections must be limited at fiber input.
- a high-power source (laser) should be used.
- receiver bandwidth should be chosen to achieve a compromise between pulse rise time and noise level.
- backscatter power should be represented on a logarithmic scale.

## Reflectance

Reflectance is a value with which the coefficient of reflection of a reflecting optical element can be quantified. It is defined as the ratio of the power reflected by the element over the incident power.

These reflections are due to variations in refractive index all along the optical link in certain telecommunications applications. If they are not controlled, they may degrade the performance of the system by perturbing

the operation of the emitting laser (especially DFB lasers) or may generate interference noise in the receiver by multiple reflections.

The reflectometer is particularly well suited to the measurement of discrete reflectances on an optical fiber link. To calculate the coefficient of reflection, it is necessary to measure the total amplitude of the Fresnel reflection generated and then to apply a conversion formula to obtain the reflectance value.

This formula takes into account:

- the total amplitude of the reflection measured by the reflectometer.
- the pulse width used to measure the amplitude of the reflection (in nanoseconds)
- the backscatter coefficient of the fiber used:
  - typical values of the backscatter coefficient for a pulse of 1 ns and
  - for a single-mode fiber: -79 dB at 1310 nm  
-81 dB at 1550 nm and 1625 nm
  - for a multi-mode fiber: -70 dB at 850 nm  
-75 dB at 1300 nm



#### **NOTE**

To measure the widest range of reflection coefficient, it is necessary to insert a variable optical attenuator between the reflectometer and the link to be tested. This attenuator enables the level of the trace to be adjusted so as to avoid saturation of the reflectometer by the reflection to be evaluated.

# Principle of optical power and attenuation measurements

## Power measurements

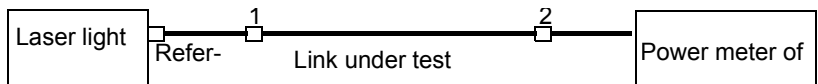
A power meter, is all that is needed to measure emitted or received power:

- to measure emitted power, connect the power meter directly to the output of the optical emitter;
- to measure the power at the input of an optical receiver, the power meter is connected to the end of the fiber, at the point where the optical receiver would be connected.

## Attenuation measurements (optical link loss)

For measurement of the attenuation of power in a complete link or in elements such as sections of fiber, connections or optical components, a light source and a power meter are required.

This attenuation is usually deduced from the measurement of optical power at two points:



$$\text{Attenuation } A_{(\text{dB})} = P1_{(\text{dBm})} - P2_{(\text{dBm})}$$

To perform accurate measurements, the following conditions are necessary

- Use a light source which is stable both in time and as a function of temperature.

- Make sure that all connections and fibers and the receiving cell are perfectly clean.
- Use a reference link between the laser source and the test subject. If several measurements are to be made under identical light injection conditions, this reference fiber must not be disconnected during the period while measurements are taking place.

## **Insertion loss method**

- 1 The power meter is first connected to the laser source via the reference fiber: P1 is measured.
- 2 Then the fiber to be tested is inserted between the reference fiber and the power meter: P2 is measured.

The difference between P2 and P1 gives the attenuation of the fiber under test.

It is preferable to use the same type of connector at both ends of the fiber being tested, to ensure the same connection conditions for measuring P1 and P2.

## **Accuracy of measurements**

- A high degree of accuracy is often required. It is then necessary to perform a preliminary calibration without the fiber under test to eliminate the losses due to connections as far as this is possible. To do this, use the «Reference Value» function.

# Starting up

This chapter describes how to start using the MTS/T-BERD.

The topics discussed in this chapter are as follows:

- [“Unpacking the device - Precautions” on page 8](#)
- [“Fitting and removing a module \(not available with SmartOTDR\)” on page 8](#)
- [“Connecting fiber optic cable” on page 11](#)
- [“Optical connectors and interchangeable adapters” on page 14](#)

## Unpacking the device - Precautions

We suggest that you keep the original packing material. It is designed for reuse (unless it is damaged during shipping). Using the original packing material ensures that the device is properly protected during shipping.

If another packaging is used (for returning the equipment for example), Viavi cannot give warranty on good protection of the equipment.

If needed, you can obtain appropriate packing materials by contacting Viavi Technical Assistance Center.

## Fitting and removing a module (not available with SmartOTDR)

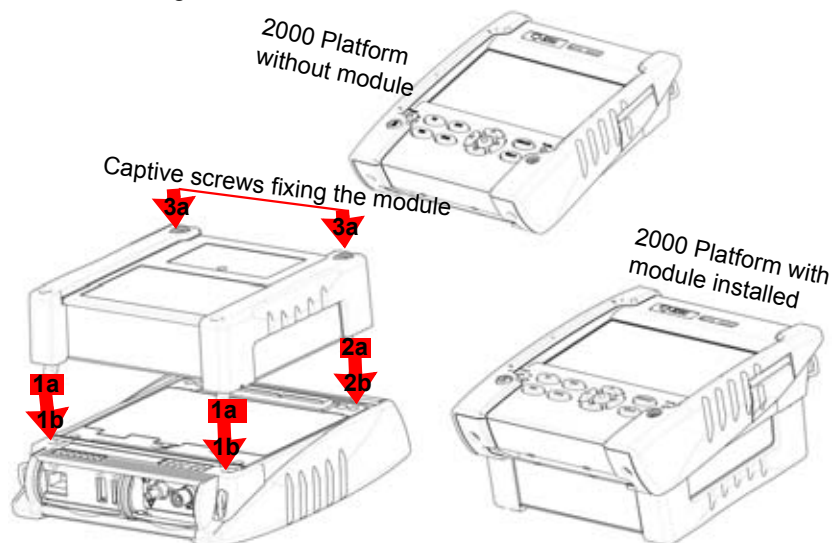


**The MTS/T-BERD must be switched off, and if it is operating on the mains, its supply cable must be unplugged.**

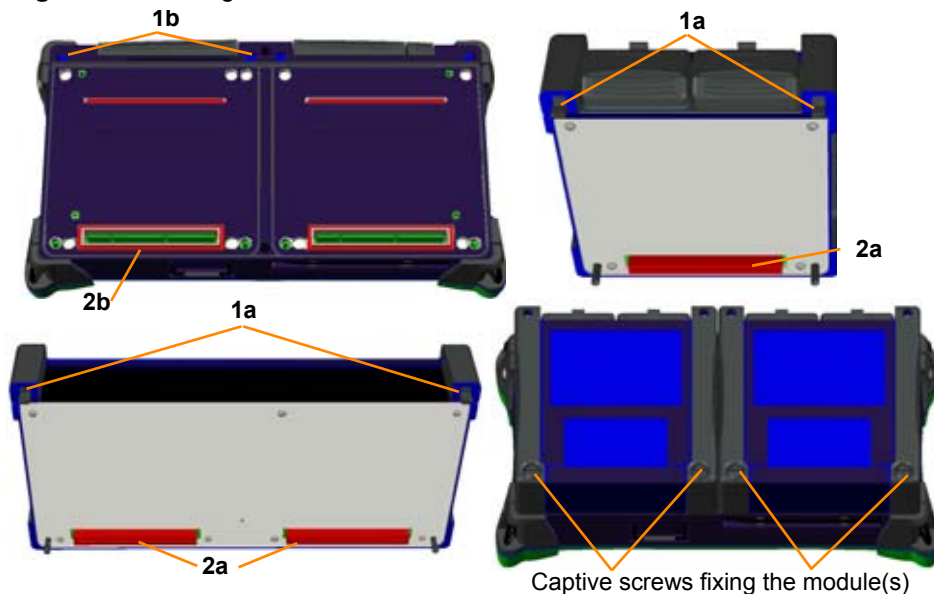
### Fitting a module

- 1 Turn the instrument face down on the work surface.
- 2 Set the two notches on the module part **(1a)** into the two holes provided for that purpose on the Base **(1b)**.
- 3 Make flush the 2 connections **(2a & 2b)**, on module and base.
- 4 Once positioned, fix the module to the base screwing the 2 screws **(3a)** fixing the receptacle.
- 5 With a T-BERD/MTS 4000, repeat the process if a second small module must be installed at the back of the platform.

**Figure 2** Fixing the module to the 2000 Base-Unit



**Figure 3** Fixing the module to the 4000 Base-Unit



## Removing a module

- 1 Unscrew the two captive fixing screws of the module completely (up to the stop).
- 2 Remove the two slots of the module from their housing onto the base.
- 3 Carefully remove the module out of its slot.



# Connecting fiber optic cable

## Inspecting and cleaning connector end faces



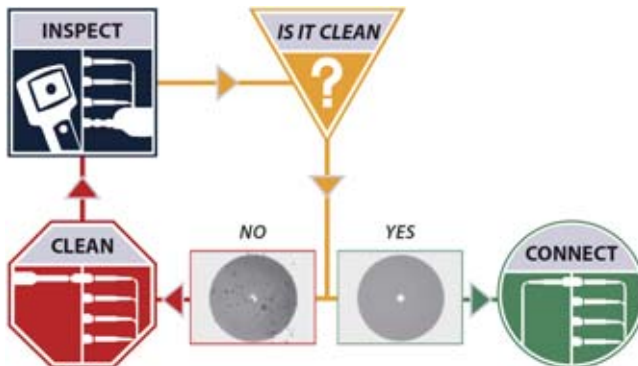
**Always inspect and clean the connector end face of the optical fiber cable and the test port before mating both together.**

**Viavi is not responsible for damage and reduced performance caused by bad fiber handling and cleaning.**

- Optical connector contamination is the #1 source of performance degradation and test equipment repair
- A single particle mated into the core of a fiber can cause significant back reflection, insertion loss and equipment damage. Visual inspection is the only way to determine if the fiber connectors are truly clean before mating them.

Follow this simple "INSPECT BEFORE YOU CONNECT" process to ensure fiber end faces are clean prior to mating connectors

**Figure 4** "Inspect Before You Connect" process



## Optical connector types

There are many optical connectors in the market place. Always ensure to use a high quality connector that meets the international standards.

Two main types of connectors are deployed in the telecommunication industry:

- 1 Straight polished connectors, so called PC or UPC
- 2 Angled polished connectors, so called APC

The PC or UPC-type test port is identified by a grey cap with the addition of a "PC" label.

The APC-type test port is identified by a green cap with the addition of a "APC" label.

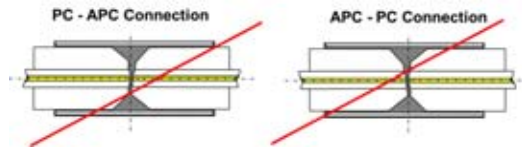
**Figure 5** Modules with APC and PC connector for T-BERD/MTS 2000 & 4000



## Caution

Never connect a PC connector into an APC test port or vice versa. This will result in damaging the connector end faces.

**Figure 6** PC/APC bad connection



### WARNING

Viavi declines responsibilities of connector damages if a poor quality connector is used or APC to PC connections made. Test port connector repair will be charged



### WARNING

All the universal connectors are available on the OTDR Modules, except on the LA Module.

## Connecting Fiber optic cable to test port

After ensuring proper cleaning of both end connectors, follow the below steps in order to correctly and safely connect the optical fiber into the test port:

- 1 Carefully align the connector and test port to prevent the fiber end from touching the outside of the port and scratching the end face.



**NOTE**

If your connector features a keying mechanism, ensure that it is correctly fitted into the test port's insert.

- 2 Push the connector to firmly place it inside ensuring physical end face contact.



**NOTE**

If your connector features a screw-on sleeve, tighten the connector to firmly maintain the fiber in place. Do not over tighten as this will damage the fiber and the test port.



**WARNING**

Never force the connector ferrule or insert it with an angle into the test port adapter. Mechanical stress may permanently damage the ceramic sleeve of the adapter or the end face of the connector. A new adapter purchase only will get the unit back to operation

## Optical connectors and interchangeable adapters

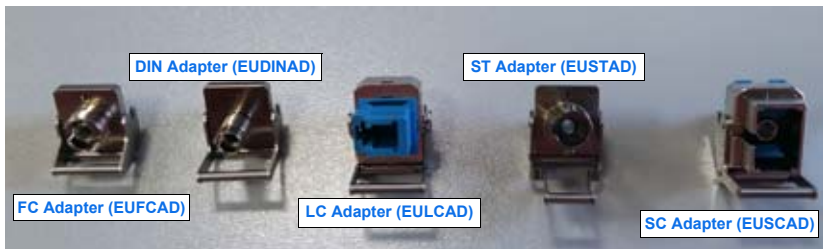
Fiber Optic modules may come equipped with a universal connector and adapter selected at time of order.

## Adapter types

Viavi offers 5 different adapters, all compatible with this connector, allowing the user to switch from one adapter to another according to which fiber type he intends to work with.

Adapter types supplied are: FC, SC, DIN, ST and LC.

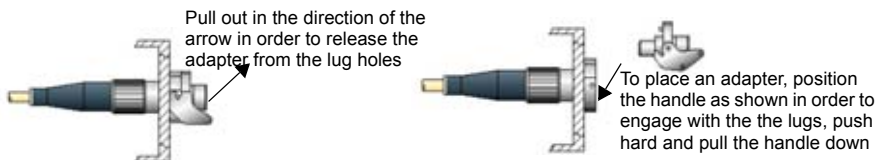
**Figure 7** 5 different types of adapters may be mounted on the universal connector



## Switching adapter type

In order to switch from an adapter to another, proceed as shown.

**Figure 8** Removing and refitting an adapter



## Changing the adapter on a LA OTDR Module and on the SmartOTDR

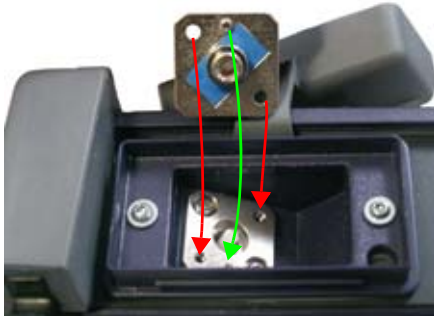
The LA modules are equipped with specific connector and adapters.

The adapters available are FC or SC adapters, screw type.

To mount a new adapter onto the LA Module:

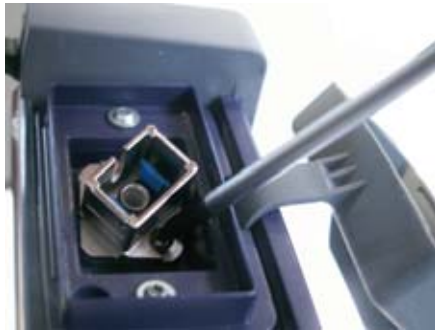
- 1 Unscrew the two screws of the adapter currently mounted onto the connector.
- 2 Remove the adapter
- 3 Set the new adapter vertically on the optical connector, making flush the «mark» on the adapter with the mark on the connector.

**Figure 9** Position of the adapter onto the connector



- 4 Fix the adapter with the two screws.

**Figure 10** Fixing the adapter



**NOTE**

When changing the optical connector, take caution not to scratch the connector mating surfaces. Carefully align the removable piece and the baseplate ferrule when inserting the adapter part.

Once adapter is mounted, the module is ready to be used onto the Base-Unit.

## Cleaning universal connectors

Remove the adapter in order to access the ferrule and clean it using a cotton swab.





# Activating OTDR function

Once the OTDR module is correctly set onto the equipment and the MTS/T-BERD is switched on, the desired OTDR function must be selected before any OTDR configuration, or measurement.

The topics discussed in this chapter are as follows:

- ["Selecting the Smart Test" page 20](#)
- ["Selecting the OTDR Expert function" page 21](#)

# Selecting the Smart Test

## Principle of the Smart Test

The Smart Test is used to perform OTDR acquisitions using a pre-loaded configuration file (no setup required) and access to essential analysis features.

## Selecting Smart Test

The Smart Test function is available whatever is the OTDR module set onto the MTS/T-BERD.

To select this function, after the equipment starts:

- 1 Press the **HOME** button

**Figure 11** Home page



- 2 Select the Smart Test icon
- The icon turns yellow
- 
- Two icons are shown. The top one is a blue square icon with a white line graph, labeled 'Smart TEST'. The bottom one is a yellow square icon with a white line graph, labeled 'Singlemode Smart-TEST'.

After a few seconds, the **Results** page displays.



**NOTE**

The selection of Smart Test icon automatically deselects the **Expert OTDR** icon and vice-versa.



**NOTE**

In the case a Singlemode/Multimode module, one line contains the Multimode icons and a second one the Singlemode icons. To distinguish both modes, multimode icons contain the MM mark.

## Selecting the OTDR Expert function

### Principle of the OTDR Expert

The OTDR Expert is used to

- perform OTDR acquisitions with full OTDR setup capabilities, and advanced analysis features.
- create configuration files that can be loaded by Smart Test users.

### Selecting OTDR Expert


The OTDR Expert function is available whatever is the OTDR module set onto the MTS/T-BERD.

To select this function, after the equipment start:

1 Press the **HOME** button

2 Select the OTDR Expert icon



The icon turns yellow .

After a few seconds, the **Results** page displays.



**NOTE**

The selection of OTDR Expert icon automatically deselects the Smart Test icon and vice-versa.



**NOTE**

In the case a Singlemode/Multimode module, one line contains the Multimode icons and a second one the Singlemode icons.

To distinguish both modes, multimode icons contain the MM mark.

# Configuring the reflectometry test

This chapter describes the different stages in configuring a reflectometry measurement using an OTDR module, in Smart Test or Expert OTDR.

The topics discussed in this chapter are as follows:

- ["Configuring the unit for Smart Test" page 24](#)
- ["Configuring the test in Expert OTDR" page 27](#)

## Configuring the unit for Smart Test

Once the Smart Test icon is validate, the **Results** page displays automatically.

Before any test in Smart Test:

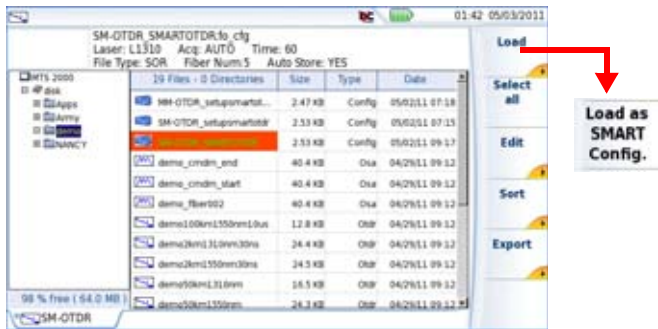
- 1 select the configuration file, which contains all acquisition parameters and file storage setup, and which has been created in Expert mode (see [“Saving OTDR configuration in a file” on page 50](#)).
- 2 the user can then configure / modify some parameters before starting the test

## Selecting the configuration file

To load the configuration file to be used for Smart Test test:

- 1 Press **SETUP** hard key.
- 2 On bottom right of setup page, press **Load Config.** menu key.
- 3 In the Explorer, select the desired file configuration (example: `Auto test singlemode`)
- 4 Press **Load > Load as SMART Config.** menu keys.  
A beep is emitted to validate the selection of the configuration file.

Figure 12 Load file as Smart Test Configuration



- 5 Press **RESULTS** hard key to go to results page and perform OTDR acquisition with the pre loaded configuration.



#### NOTE

Most of the configuration files are available into the equipment, in disk/config.

## Modifying some parameters before the acquisition

In Smart Test mode, the user have access to 4 parameters he can modified before launching the test.

To display and modify i necessary the parameters:

- 1 Once **Results** page is displayed, press **SETUP** hard key  
The Setup page for OTDR acquisition in Smart Test mode displays.

**Figure 13** Smart Test Setup page



<b>Laser</b>	The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select <b>All</b> to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.
<b>Fiber Number</b>	Modify, if necessary, the number of the fiber using left and right direction keys.
<b>Distance unit</b>	select the unit to be used for distance ( <b>km</b> / <b>kfeet</b> / <b>miles</b> / <b>meter</b> / <b>feet</b> ).
<b>Config.</b>	This parameter displays the configuration file selected for Smart Test acquisition, and <u>cannot be modified</u> .

Press **RESULTS** hard key to return to results page and launch the acquisition (it can be launched directly from the **Setup** page).



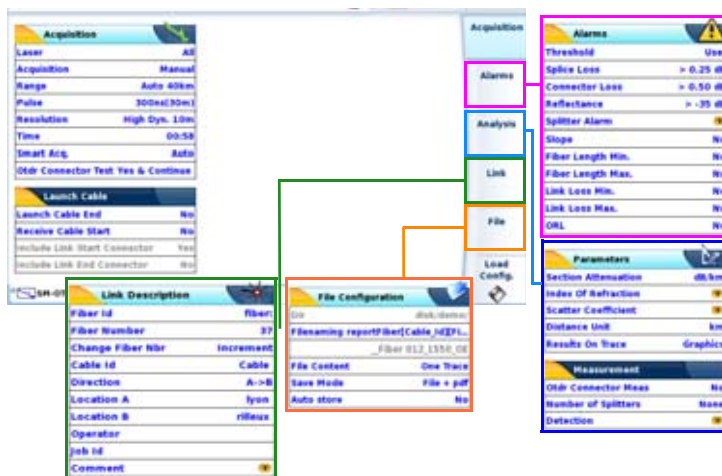
## Configuring the test in Expert OTDR

Once the Expert OTDR icon is selected, the **Results** page automatically displays.

In Expert OTDR, the parameters for acquisition and for file storage can be configured.

- 1 To call up the test configuration window, press the **SETUP** button.  
Dialog boxes and menu keys on the same screen enable selection of
  - Acquisition parameters
  - Alarms parameters
  - Analysis parametersUsed for the OTDR acquisition
  - Link parameters
  - File parametersUsed for the OTDR results saving

Figure 14 OTDR setup in Expert OTDR mode



In these windows, the parameter selected is in video inverse.

## Configuring the Acquisition parameters

You can choose the OTDR acquisition parameters.

- 1 Once the **Setup** page is displayed, press **Acquisition** menu key to configure the Acquisition parameters.

The Acquisition Setup page is divided into two parts: the **Acquisition** box and the **Launch cable** box.



If some acquisition parameters are not accessible (not visible or displayed in grey), check in the **Home** page that the Expert OTDR function is selected (see ["Selecting the OTDR Expert function" page 21](#)).

### Parameters

#### Laser

The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.

#### Acquisition

Select the kind of acquisition to be performed:

**Manual**            The acquisition parameters **Pulse / Range / Resolution** can be set by user.

**Auto**              The acquisition parameters **Pulse / Range / Resolution** are defined automatically and cannot be modified

The **Measurement time** will be set to **Auto**, but can be modified (see ["Time" page 29](#)).

## Range

The possible range depends on the pulse length selected. This range is given for each pulse length in the paragraph "[Ranges](#)" [page 258](#). This parameter is exclusively configurable if **Acquisition** parameter is set to **Manual**. It depends on the module/SmartOTDR used.

**Auto** allows to detect automatically the range. The range is selected as a function of the end of the fiber.

## Pulse

From 3ns to 20 $\mu$ s according to module/SmartOTDR used. Parameter selectable only if **Acquisition** parameter is set to **Manual**.

See "[Typical specifications](#)" [page 256](#).



### NOTE

According to the value selected for **Pulse** parameter, the **Range** parameter can be automatically modified, and vice-versa.

## Resolution

This parameter is exclusively configurable if **Acquisition** parameter is set to **Manual**.

**Auto** resolution is selected automatically according to the last two parameters above.

**High Resolution** the highest resolution is applied

**High Dynamic** the highest dynamic is applied

## Time

**Real time** the equipment performs up to ten acquisitions per second (see "[Performing OTDR acquisitions](#)" [page 56](#)).



**NOTE**

Whatever is the acquisition mode selected, an acquisition in real time mode can be launched maintaining the **START/STOP** button pushed for about 2 seconds.



**NOTE**

If the **Acquisition** parameter is defined to **Auto**, then the **Time** parameter is defined to **Auto**, but can be modified.

- Manual** Enter the acquisition time desired (from 5 s. to 5 minutes max).
- Predefined** Select one of the acquisition times predefined: 10 seconds / 20 seconds / 30 seconds / 1 minute / 2 minutes / 3 minutes.

**Smart Acquisition** (not available in Multimode)

This parameter allows to launch a short acquisition before the standard one.

The first acquisition is performed with the shortest pulse in order to detect more precisely the events at the beginning of the fiber.

To configure the Smart Acq. parameter:

- Auto** a first short acquisition is performed with the shortest pulse in the range, before the standard one.
- No** the standard acquisition is directly launched.

If the option **OptiPulses** is available, see [“Configuring the OTDR acquisition with OptiPulses”](#) <sup>TM mode</sup> on page 105 to configure the OTDR acquisition with this option.

## Otdr Connector test

This parameter allows to choose if a test of the front connector must be performed when acquisition is launched.

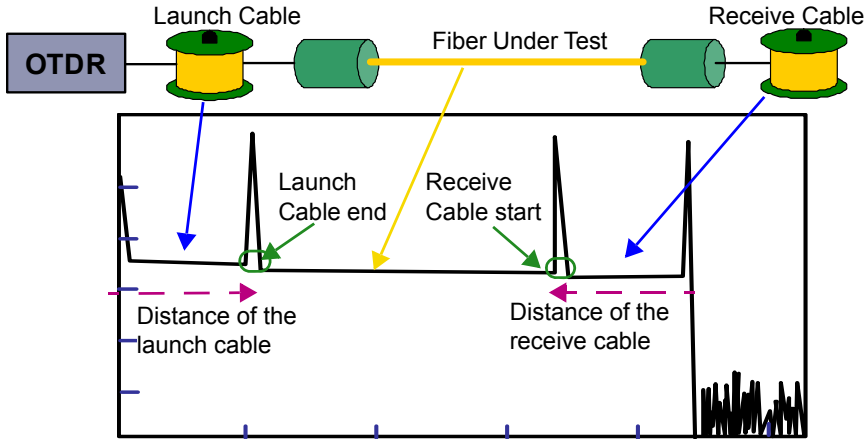
- |                           |  |
|---------------------------|--|
| <b>No</b>                 | the OTDR connection is tested with indication Bad/Good.  |
| <b>Yes &amp; Continue</b> | the OTDR connection is tested, and if the state is not good, the acquisition continues but a warning displays. |
| <b>Yes &amp; Abort</b>    | the OTDR connection is tested, and if the state is bad, a warning displays and the acquisition stops.          |

## Launch cable parameters

### Launch Cable End / Receive Cable Start

- |                    |   |
|--------------------|---|
| <b>No</b>          | All the results are displayed and referenced on the basis of the board of the module.   |
| <b>Evt 1, 2, 3</b> | The results relating to the launch cable are eliminated from the table. Attenuation and distances are then measured on the basis of the marker Evt 1, 2 or 3 selected.              |
| <b>Distance</b>    | Use the <b>Edit Number</b> key to enter a distance (Min= 0 / Max=50 km / 164.042 kfeet / 31.075 miles) or affect the active cursor value, using the <b>Set Cursor Distance</b> key. |

**Figure 15** Launch Cable / Receive Cable



**Include Link Start Connector / Include Link End Connector**

Defining the **Launch Cable End** parameter with an event number or a distance will automatically activate the corresponding parameter **Include Link Start Connector**. This parameters can be set to **Yes** if the budget must include the connectors loss of the launch cable at end

Defining the **Receive Cable Start** parameter with an event number or a distance, will automatically activate the corresponding parameter **Include Link End Connector**. This parameters can be set to **Yes** if the budget must include the connectors loss of the launch cable at start

If those parameters are set to **No**, the budget only displays the connector loss of the fiber.

## Configuring the Alarms parameters

In the **Setup** page, press **Alarms** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Alarms**).

Once the **Alarms** page is displayed, configure the parameters for applying thresholds to results displayed.

### Threshold

**None** The alarm function is not active.

**User** Thresholds can be defined for: Splice Loss / Connector Loss / Reflectance / Splitter Alarm / Slope / Fiber Length Min and Max / Link Loss Min and Max / ORL.

TIA-568 C / ISO/IEC 11801 / Default / G.697/G.98x PON / G.697/IEEE PON

Select one of this parameter to configure the alarm thresholds with predefined values:

**Table 1** Singlemode Modules

	Default	G.697/G.98x PON G.697/IEEE PON	TIA-568C ISO/IEC 11801
Splice Loss	> 0.20 dB	> 0.30 dB	> 0.30 dB
Connector loss	> 0.50 dB	> 0.50 dB	> 0.75 dB
Slope <sup>1</sup>	> 1.00 dB/km	-	> 1.00 dB/km
Reflectance	> - 35 dB	> - 35 dB	
ORL	< 27 dB		
Splitter Alarm			
1 X 2	> 5.0 dB	> 4.2 dB	
1 X 4	> 8.0 dB	> 7.8 dB	
1 X 8	> 11.0 dB	> 11.4 dB	
1 X 16	> 14.0 dB	> 15.0 dB	


**Table 1** Singlemode Modules


	<b>Default</b>	<b>G.697/G.98x PON G.697/IEEE PON</b>	<b>TIA-568C ISO/IEC 11801</b>
1 X 32	> 17.0 dB	> 18.6 dB	
1 X 64	> 21.0 dB	> 22.0 dB	
Link Loss Max	Select: <b>No/ Manual</b> or: <ul style="list-style-type: none"><li>for G.697/G.98x PON: <b>20 dB (A) / 25 dB (B) / 30 dB (C)</b></li><li>for G.697/IEEE PON: <b>30 dB (C) / 23 dB (PX-10) / 26 dB (PX-20)</b></li></ul>		

1. This parameter is not available in OEO-OTDR configuration

**Table 2** Multimode Modules (not available in SmartOTDR)

	<b>Default</b>	<b>TIA-568C ISO/IEC 11801</b>
Splice Loss	> 0.20 dB	> 0.30 dB
Connector Loss	> 0.50 dB	> 0.75 dB
Slope 850 nm	> 3.50 dB/km	> 3.50 dB/km
Slope 1300 nm	> 1.50 dB/km	> 1.50 dB/km
Reflectance	> - 35 dB	-
ORL	< 27 dB	-

If results are above those thresholds, they are highlighted in red in the table of results, and the icon  appears at the top right of the screen.

If all the results lie within the thresholds (no result is in red or yellow), they are displayed in green in the table and the icon  is displayed at the right top of the trace.



## Configuring the Analysis parameters

In the **Setup** page, press **Analysis** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Analysis**).

The Analysis Setup page is divided into two parts: the **Parameters** box and the **Measurement** box.

### Parameters

#### Section Attenuation

<b>dB/km</b>	Displays the section slope in the table of results. When the fiber is too short to measure the slope accurately, no value is displayed (empty field).
<b>dB</b>	Displays the section Loss in the table of results. With short fiber where the slope cannot be measured with a good accuracy, the loss in dB is approximate and displayed.
<b>None</b>	The section attenuation and Loss values are not displayed in the table of results.

#### Index of refraction

Choice of group refraction index of the whole fiber.

<b>User</b>	Define for each wavelength (1310 SM, 1360-1510 SM, 1550 SM, 1625 SM) a refraction index of 1.30000 to 1.69999. The selection of an index alters the value of the section AB (actual distance between cursors A and B). or, If the actual distance between the cursors A and B is known, enter its value under Section AB to establish the index of the fiber. Selection of this distance causes the display of the indices. The extreme distance values are given by the index values (1.30000 à 1.70000).
-------------	--

**Predefined** It is possible to choose one of the predefined values given for certain cables. The corresponding indices given in the table below are repeated on the screen.

**Figure 16** Predefined index values (Single Mode)

<b>Wavelength (nm)</b>	<b>1310 SM</b>	<b>1360 - 1510 SM</b>	<b>1550 SM</b>	<b>1625 - 1650 SM</b>
Generic G652 G657	1.46750	1.46800	1.46800	1.46850
Generic G653 G655	1.46750	1.46800	1.46800	1.46850
ATT SM	1.46600	1.46700	1.46700	1.46700
Corning SMF-28	1.46750	1.46810	1.46810	1.46810
Corning SMF-DS	1.47180	1.47110	1.47110	1.47110
Corning SMF-LS	1.47100	1.47000	1.47000	1.47000
Corning-Leaf	1.46890	1.46840	1.46840	1.46900
Draka SMF	1.46750	1.46800	1.46800	1.46850
Draka Longline	1.46700	1.46700	1.46710	1.46750
Draka Teralight	1.46820	1.46820	1.46830	1.46850
Draka Benbright	1.46750	1.46750	1.46800	1.46850
Fitel Furukawa	1.47000	1.47000	1.47000	1.47000
OFS Lucent Allwave	1.46750	1.46750	1.46750	1.46850
Lucent Truwave	1.47100	1.47100	1.47000	1.47000
SpecTran SM	1.46750	1.46810	1.46810	1.46810
Sterlite	1.46700	1.46700	1.46750	1.46750
Sumitomo Litespec	1.46600	1.46600	1.46700	1.47000
Sumitomo Pure	1.46600	1.46600	1.46700	1.47000

**Figure 17** Predefined index values (Multi Mode) - Not available in SmartOTDR

Wavelength (nm)	850 MM	1300 MM
Corning 62.5	1.50140	1.49660
Corning 50	1.48970	1.48560
SpecTran 62.5	1.49600	1.49100
Generic 50	1.49000	1.48600
Generic 62.5	1.49000	1.48700
Generic OM1-62/125	1.49600	1.49100
Generic OM2-3- 4 50/125	1.48200	1.47700

### Scatter coefficient

**User** Selects for each wavelength, the backscatter coefficient of -99 dB to -50 dB by increments of 0.1dB. Modification of the backscatter coefficient K changes the measurements of reflectance and ORL.

**Auto** Backscatter coefficients are selected automatically for each wavelength.

In Multimode, two predefined scatter coefficients are available:

**Generic 50** 850 MM -> -66.3 dB  
1300 MM -> -73.7 dB

**Generic 62.5** 850 MM -> -66.1 dB  
1300 MM -> -70.3 dB



The default values are given in the paragraph ["Reflectance" page 3](#).

### Distance Unit

Define the unit of the distances displayed: km, kfeet, miles, meter, feet.

### Results on trace

- None**            the trace alone
- All**             the trace with results and markers.
- Graphics**      the trace with markers only.

If **All** or **Graphics** is selected, the reflectometry trace is displayed with a dotted vertical line set on the end of launch cable  (if the Launch Cable is defined in the **SETUP** menu) and a dotted vertical line on the end of fiber .

### Event Notes<sup>1</sup>

- No**                no display of notes
- Notes**          display of notes entered by the user
- Uncertainty**   display of indicators of the level of confidence in the measurement result.

## Measurement

### Otdr Connector Measurement

This parameter allows to choose if a measurement of the front connector must be performed when acquisition is launched.

- No**                In the results table, the first line corresponds to the first event detected.
- Yes**             In the results, the first result corresponds to the front connector measurement, at 0 meter (estimated value).

### Number of Splitters (not available in Multimode)

Once parameter is selected, press **Edit Number** key to display the numeric keypad and select the wished value:

---

<sup>1</sup>.Available exclusively if Super Expert license is installed

- None** there is no splitter set onto the network.
- Discover** Auto-detection and identification of PON splitter types.
- 1 to 3** If the number of splitters is known, select it from the list (from 1 splitter to 3 splitters).

This selection opens a sub menu into which the splitters types must be defined for all splitters installed.

### **Splitters types**

**Splitter 1:** define the splitter type among the list:

- 1x2 / 1x4 / 1x8 / 1x16 / 1x32 / 1x64
- 2x2 / 2x4 / 2x8 / 2x16 / 2x32 / 2x64

**Splitter 2 and Splitter 3:** define the splitter type among the list:

- 1x2 / 1x4 / 1x8 / 1x16 / 1x32 / 1x64

### **Detection**

**Splice** Select if a level of detection for splice must be defined.

Press **Edit Number** soft key and select a value:

- Enter a min level of detection, from 0.01 to 1.99 dB
- **No**: no splice detection
- **Auto**: to automatically detect splice

**Reflectance** Select if level of detection for reflectance must be defined.

Press **Edit Number** soft key and select a value:

- Enter a min level of detection, from -98 to -11 dB
- **None**: no reflectance detection
- **All**: all reflectances are detected

**Ghosts** Choice (Yes / No / No Analysis) of whether information relating to ghosts is to be displayed. If ghosts are displayed, the reflection icon in the table of results appears dotted and the reflection value is displayed in brackets on the trace, for example «(R:-50 dB)».

**Fiber end** Once parameter is selected, press **Edit Number** key to display the numeric keypad and select the wished value:

- **Auto** (recommended): option in which the T-BERD/MTS automatically detects the end of a fiber.
- **> 3 to > 20 dB** (steps of 1 dB): threshold of detection of end of fiber.

**Bend** (not available in Multimode) With any dual or triple-wavelength measurement module, the user will have access to the macro bend detection function in the test setup. Each event of the selected wavelengths will then be compared.

Once parameter is selected, press **Edit Number** key to display the numeric keypad and select the wished value:

- **None**: Bend will not be detected.
- **Auto**: Bend will be automatically detected.
- **Define by user**: Enter the bend value (in dB), with direction keys or numeric keypad.

## Configuring the Link parameters

In the **Setup** page, press **Link** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Link**).



### NOTE

The softkey **Copy File/Link to all** is displayed when one parameter is selected in the Link or File Setup page and when the Powermeter or Source function is active.

It allows to apply the Link and File configuration parameters of the current applications to all the other active Fiber Optic applications (powermeter, and source).

The information entered in the **Link Description** window concerns the editing and/or the modifications of the cable and fiber parameters. When a trace is recalled without recall of the configuration, the parameters of this trace will be present only in its signature.

## Fiber ID

Select the parameter **Fiber Id** and enter a name for the fiber, using the edition keypad.

## Fiber Number / Fiber Code

The parameter **Fiber Number** becomes **Fiber Code** if, in the **Cable Structure** window, the **Cable Content** parameter is defined on another parameter than **Fiber** (**Ribbon/Fiber**, **Tube/Fiber** or **Tube/Ribbon/Fiber**). See [page 43](#).

The fiber code corresponds to the fiber number if, in the **Cable Structure**, the parameter **Color coding** is defined on **No**.

The fiber code corresponds to the fiber color if, in the **Cable Structure**, the parameter **Color coding** is defined on **Yes**.

- 1 Select the parameter **Fiber Number/Fiber Code** and modify the parameter using the left and right direction keys.

The fiber number can be automatically incremented/decremented at each new file save if it has been configured in the File Setup page (see [“Configuring the file storage parameters” on page 47](#)).



### NOTE

The Fiber Code and the fiber number concatenated with **Fiber Name** are interdependent: they are incremented or decremented at the same time. However, the fiber number remains a number only, while the fiber code is alphanumerical. Whether it includes a color code or not (see [“Cable structure” on page 43](#)), it may be composed of one, two or three parts (see figure [Table 18 on page 42](#)).

Figure 18 Example of incrementation of fiber code

Fiber and cable parameters used in the example:

Fiber Name: 'Fiberx'  
Cable Content: 'Tube/Fiber'  
Max Tube: 12  
Max Fiber: 24  
Coding used for the fiber and the tube: TIA

	Fiber N		Fiber N+1	
Color Code	Yes	No	Yes	No
<Fiber Name>	Fiberx24	Fiberx24	Fiberx25	Fiberx25
<Fiber Code>	Bl/Aq-	1/24	Gold/Bl	2/1

Change Fiber Nbr

- Increment** the fiber number is automatically incremented at each new file-save.
- Decrement** the fiber number is automatically decremented at each new file-save
- User defined** Use **Edit Number** softkey to enter the increment/decrement value for fiber number.

Note: to decrement the number, enter the sign «-» before the number. Example: -1.

Min: -999 / Max: 999 / Auto: 0

- No** the Fiber number must not automatically modified.

Extremities are different<sup>1</sup>

In some cases, it is interesting to save different information for the origin and the extremity of the cable.

1.Available exclusively if Super Expert license is installed



If this option is validated, it is possible, after selecting the extremity to be edited in the **Cable Structure** menu, to modify the values specific to the cable (cable name, color coding, content of the coding), for each of these extremities. See chapter [“Cable structure” on page 43](#))

To display/modify the data specific to the fiber (name and code), it is necessary to change direction temporarily. In the "O->E" direction, the information on the origin can be edited, and in the "E->O" direction, that on the extremity.

### **Cable Id**

This parameter allows to enter an identification of the cable, using the Edition menu.

### **Direction**

The direction shows if the acquisition has been made from the origin to the extremity (A->B) or from the extremity to the origin (B->A). Changing direction makes it possible, when different extremities are handled, to see the parameters of the fiber for the other extremity.

### **Location A**

The name of the Location A of the link may be entered here.

### **Location B**

The name of the Location B of the link may be entered here.

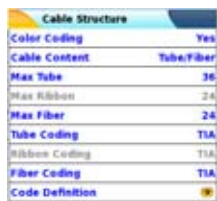
### **Cable structure<sup>1</sup>**


This line opens a sub-menu, all the parameters of which can be different for each extremity.

---

1.Available exclusively if Super Expert license is installed

Figure 19 Cable structure menu



Cable Structure	
Color Coding	Yes
Cable Content	Tube:Fiber
Max Tube	36
Max Ribbon	24
Max Fiber	24
Tube Coding	T1A
Ribbon Coding	T1A
Fiber Coding	T1A
Code Definition	



**NOTE**

The **Cable Structure** window is specific to an extremity. Each struc-ture keeps its own parameters by default. Modifications made to the one are not automatically applied to the other. Thus, after the values relating to the origin have been modified, it is normal not to find these same values entered for the extremity.

**View extremity**

If extremities are declared as different (see “[Extremities are different](#)” on page 42), this parameter allows to navigate between the Extremity and Origin parameters.

**Cable Id**

If the extremities are different, you can specify the cable identification for the origin and the extremity.

**Color Coding**

Choice of whether or not to apply a color coding to the fiber. This choice is made at link level, as all the fibers of a given link, for a given extremity, will be coded the same way. This choice modifies the result of the <Fiber Code> line. See “[Fiber Number / Fiber Code](#)” on page 41.

**Cable content** Shows how the color code is to be used (see figure “[Cable structure menu](#)” on page 44):

- FiberOnly the color code of the fiber is proposed (example: «Gold»)

- Ribbon/Fiber The color code of the fiber is preceded by that of the ribbon, and separated by a '/' (example: 'Bl/Or')
- Tube/Fiber The color code of the fiber is preceded by that of the tube, and separated by a '/' (example: 'Br/Or')
- Tube/Ribbon/Fiber  
The color code of the fiber is preceded by that of the tube, then by that of the ribbon; the three being separated by a '/' (example: 'Br/Bl/Or'). See ["Fiber Number / Fiber Code" on page 41](#).

<b>Max tube</b>	Shows the maximum number of tubes in the cable for the extremity selected. This information influences the automatic coding of the fiber. See <a href="#">"Fiber Number / Fiber Code" on page 41</a> .
<b>Max ribbon</b>	Shows the maximum number of ribbons in the cable for the extremity selected. This information influences the automatic coding of the fiber. See <a href="#">"Fiber Number / Fiber Code" on page 41</a> .
<b>Max fiber</b>	Shows the maximum number of fibers in the cable for the extremity selected. This information influences the automatic coding of the fiber. See <a href="#">"Fiber Number / Fiber Code" on page 41</a> .



#### NOTE

Certain parameters are not valid in the configuration selected. Thus, if no tube is selected in **Cable Content**, all the lines relating to the tube concept will be deactivated (grayed out in the menu).

### Tube Coding, Ribbon Coding, Fiber Coding

The lines Tube Coding, Ribbon Coding and Fiber Coding enable selection of the color coding of the tube, the ribbon and the fiber from 5 different codes described below: TIA, USER 1, USER 2, USER 3 and USER 4.

### **Code Definition**

The Code Definition line opens a sub-menu, with which the different color codes possible on the instrument can be displayed and modified.

Five different codes can be managed by the T-BERD/MTS, including a standard code.

The standard code (TIA) may be displayed but it cannot be modified.

The other codes, called by default USER1, USER2, USER3 and USER4, can be entirely personalized.

- Edited codeselects the code for display or modification.
- Code nameto give a new name to the code selected, press the ► key, which calls up the edit menu.
- View codesdisplays the color codes 1 to 12, 13 to 24 or 25 to 36.
- Code 1...23Use the arrow ► to modify the codes if necessary.

### **Operator**

Use the arrow ► to enter the name of the operator carrying out the measurement.

### **Job Id**

Use the arrow ► to enter a description of the measurement to be performed.

### **Comment**

In contrast to the other data in this menu, the comment is specific to a fiber. This line is thus used to enter a new comment and not to display it. The comment appears at the top of the screen, with the other parameters of the fiber.

This comment will remain available for the next acquisition, unless it is deleted. It is also saved when a trace is saved with a comment.

## Configuring the file storage parameters

The File storage parameters must be also configured, in order to define how the results traces will be saved onto the MTS/T-BERD 2000.

In the **Setup** page, press **File** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **File**).



### NOTE

The softkey **Copy File/Link to All** is displayed when one parameter is selected in the Link or File Setup page and when the Powermeter or Source function is active.

It allows to apply the Link and File configuration parameters of the current applications to all the other active Fiber Optic applications (powermeter, and source).

### Dir

This parameter cannot be configured, and display the directory selected by default into which the file(s) will be saved (the last directory selected).

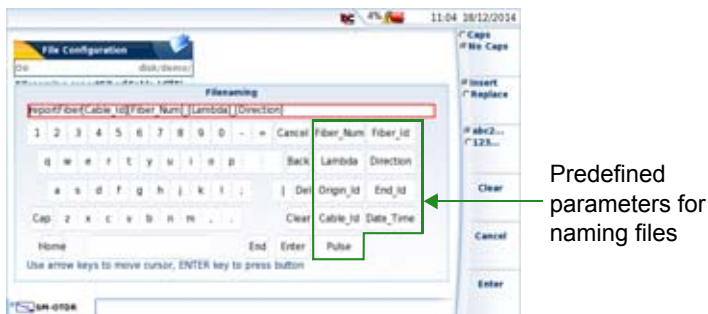
To modify the directory, go to the **Explorer** page and select another directory.

### Filenaming

Select **Filenaming** parameter and press the right arrow key to modify the name of the file for the result trace.

In the edition keypad, enter a name manually for the file and/or use the predefined parameters available (**Cable\_Id**, **Fiber\_Num**...).  
Then, press **Enter** to validate.

**Figure 20**    Filenaming - Edition keypad



or

Press **Default Filename** to apply the name by default to the file:

```
Fiber[Cable_Id][Fiber_Num]_[Lambda]_[Direction][Pulse]
```

The name of the file is displayed in grey under **Filenaming** parameter

## File Content

In this parameter, select the file content for traces saving:

- |                   |  |
|-------------------|--|
| <b>One Trace</b>  | in case of traces in overlay, each trace is saved in a distinct file (.sor extension).   |
| <b>All Traces</b> | in case of traces in overlay, all traces are saved in one single file (.msor extension). |

## Save Mode

When a trace or more is displayed, in the parameter **Save Mode**, you can select three types of methods for storing traces:

- File Only**      only the trace(s) is/are stored in one/several file(s), with its extension (.sor, .msor)

- File + txt** the trace(s) is/are stored in one/several file(s), with its extension and one txt file is also generated.
- File + pdf** the trace(s) is/are stored in one/several file(s), with its extension and one pdf file is also generated.
- All** the trace(s) is/are stored in one/several file(s), with its extension and one pdf file + one txt file are also generated.

### Auto Store

Select **Yes** to store automatically the trace or traces resulting from each acquisition according to the filenames rules.

## Configuration in Test Auto mode

The **Test Auto** key imposes the parameters for acquisition, measurement and display of results defined as default settings in factory.

<b>ACQUISITION</b>	Acquisition	Laser	All
		Acquisition	Auto
		Time	Auto
		Smart Acq	No
		OTDR Connector Test	Yes & Cont
	Launch Cable	Launch Cable End	No
		Launch Cable Start	No
<b>ALARMS</b>	Alarms	Thresholds	None
<b>ANALYSIS</b>	Parameters	Section Attenuation	dB/km
		Index of Refraction	G652 G657
		Scatter Coefficient	Auto
		Results on trace	Graphics
	Measurement	OTDR Connector Meas.	No

		Number of Splitters	None
		Splice	Auto
		Reflectance	All
		Ghost	No
		Fiber End	Auto
		Bend	Auto
LINK	Link Description	Change Fiber Nr	Increment
FILE	File configura- tion	<b>Filenaming</b>	Auto filenaming
	Fiber[Cable_Id][Fiber_Num]_[Lambda][Direc- tion][Pulse]		
		Auto Store	Yes


## Saving OTDR configuration in a file

Once File and Measurement parameters have been configured, those parameters can be kept in memory and saved in a configuration file.

This configuration file can then be recalled in two cases:

- in order to be applied when acquisition in Smart Test mode is performed.
- in order to be recalled for future acquisition in Expert OTDR

To save parameters in a configuration file:

- 1 If necessary, press **SETUP** to return to **Setup** page.
- 2 Select one parameter in one of the setup page (acquisition, link..)
- 3 Press menu key  .  
An edition keypad displays
- 4 Enter a name for the configuration file (max. 20 characters).

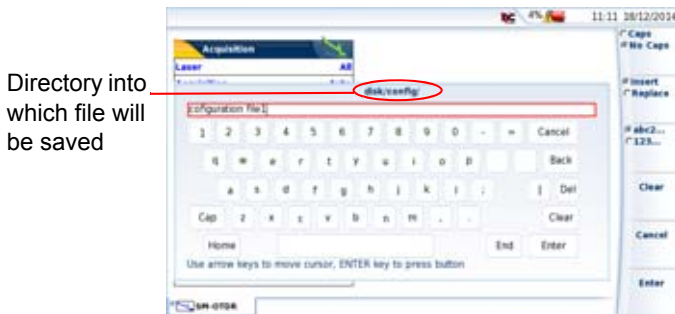




#### NOTE


Configuration file is saved by default in the directory **disk/confi-**  
**fig.**

**Figure 21** Save Configuration file - Edition keypad



**5** Press **Enter** to validate

A sound is emitted to indicate the file is saved.

The configuration file is saved with the extension **.fo\_cfg** (icon ) and can be recalled at any time from the **Explorer** page.

This configuration file can be selected in Smart Test (see [“Selecting the configuration file” on page 24](#)) or loaded for Expert OTDR.

## Loading an existing OTDR configuration

To load a configuration file previously created or available in the T-BERD/ MTS/ SmartOTDR and apply parameters to new OTDR Expert tests:

## From the File Explorer page

- 1 Press **FILE** hard key
- 2 Select the configuration file desired
- 3 Press **Load > Load Config.**
  - Press **SETUP** hard key to display the OTDR acquisition parameters saved in the selected configuration file.

You can modify some acquisition or file storage parameters, and save them in a new configuration file (see [“Saving OTDR configuration in a file” on page 50](#)).

## From the Setup page

- 1 Select one header in either Setup page (Acquisition, Link, File...)
- 2 Press **Load Config.** menu key.  
The file Explorer page displays
- 3 Select the configuration file desired
- 4 Press **Load Config.** to load the configuration file for acquisition in OTDR Expert mode.  
A sound is emitted to confirm the loading.  
The **Setup** screen is displayed again.



If the menu key **Load as SMART Config.** is pressed, the configuration is applied for acquisition in OTDR Expert, and in Smart Test mode too.

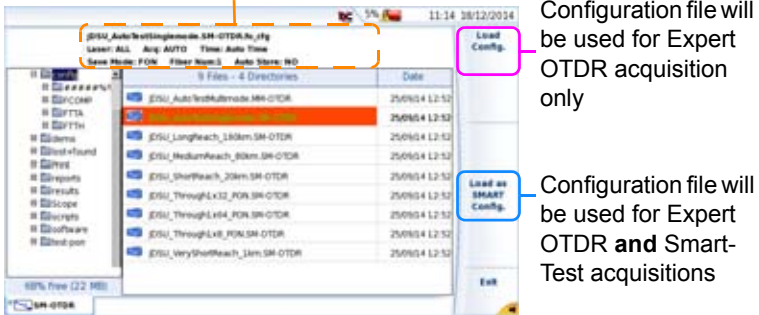


### NOTE

Most of the configuration files are available into the equipment, in `disk/config`.

**Figure 22** Loading a configuration file

The main parameters available in the selected configuration file are displayed in the File signature.





# Launching a reflectometry test and displaying results

Once the configuration for acquisition and file storage has been defined, the instrument is ready to launch an OTDR measurement.

Pressing the **START/STOP** key is all that is needed to start or stop an OTDR measurement on the MTS/T-BERD or on the SmartOTDR.

This chapter describes the different stages in a reflectometry measurement. It then describes the functions available on trace(s).

The topics discussed in this chapter are as follows:

- ["Performing OTDR acquisitions" page 56](#)
- ["Results display" page 66](#)
- ["Advanced functions in Expert OTDR mode" page 81](#)
- ["Saving the trace\(s\) and generating a report" page 96](#)
- ["SLM \(Smart Link Mapper\) option" page 100](#)
- ["OptiPulses™ option" page 104](#)

# Performing OTDR acquisitions

## Performing an acquisition in Real Time mode

### Principle of the Real time mode

Acquisition in real time must not be used if a precise measurement is required because of the high noise level, but it is sufficient for rapid optimization of a connection and for observing a fiber in process of utilization.

### Performing acquisition in Real Time

To carry out an acquisition in real time:

- 1 Hold the **START/STOP** key down for about three seconds, to launch the acquisition in real time, either in Smart Test or Expert OTDR mode, whatever is the acquisition mode selected.

or

If the **Time** parameter is defined with **Real Time** in **Setup** page in Expert OTDR mode, press **START/STOP** hard key.

The red **Testing** indicator will go on to show that real time acquisition is in progress. The trace acquired is displayed in real time.

An indicator of the state of the connection (**Good/Bad**) is displayed below the trace:

**Table 3** Connection indicator

State	Connection
Good	The connection is OK
Bad	<ul style="list-style-type: none"> <li>There are several connectors close to the external connector of the MTS/T-BERD.</li> <li>One of the connectors is dirty or badly connected. Replace the launch cable, make the connection again properly or clean the connector of the OTDR or of the jumper.</li> <li>No fiber is connected.</li> </ul>

If the state of the connection is bad, it is still possible to carry out a measurement, but the results will not be very reliable.

**Figure 23** Example of acquisition in Real Time (with Expert OTDR)



## Traffic detection

Traffic on the fiber under test is automatically detected and reported.

Press the **START/STOP** key to begin the measurement. A message indicates there is traffic on the fiber and asks you if you wish to continue or not:


- If you click on **No**, the measurement is not launched.
- If you click on **YES**, the measurement is performed, despite the traffic.



#### **NOTE**

If the measurement is validated despite the traffic (key **YES**), the next measurement will be automatically performed, even if traffic is still detected on fiber.

If the measurement is cancelled (key **No**), and the **START/STOP** pushed another time, the box asking if you wish to continue or not is displayed.

The functioning of Traffic Detection is then indicated in the scaled down representation of trace, on the upper left part of screen .

During an acquisition in real time, several actions can be made on results in progress: see ["Actions on trace during acquisition" page 63](#).

## **Stopping the real time acquisition**

To stop or interrupt an acquisition in real time mode, press the **START/STOP** key at any time.

## **Performing a measurement with Smart Test**

The acquisition is carried out with the parameters saved in the Configuration file. It may be stopped at any time using the **START/STOP** key.

At the end of test, the results page displays.

- 1 Press **START/STOP** hard key to launch measurement.

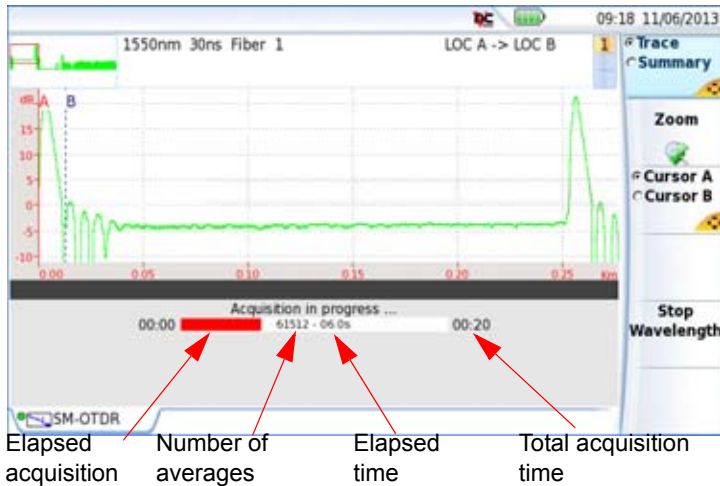
The red **Testing** indicator goes on to show that the T-BERD/MTS is in process of acquisition and the screen displays the trace in process of acquisition.



- 2 The quality of the connection is displayed for a few seconds (see [Table 3 on page 57](#))
- 3 Then, a bar graph shows elapsed and remaining acquisition time.



**Figure 24** Acquisition in progress in Smart Test



At the end of the acquisition, a beep is emitted, and the measurements are displayed.



**NOTE**

During acquisition, the traffic on fiber is automatically detected (see ["Traffic detection" page 57](#))

# Performing an acquisition with Expert OTDR

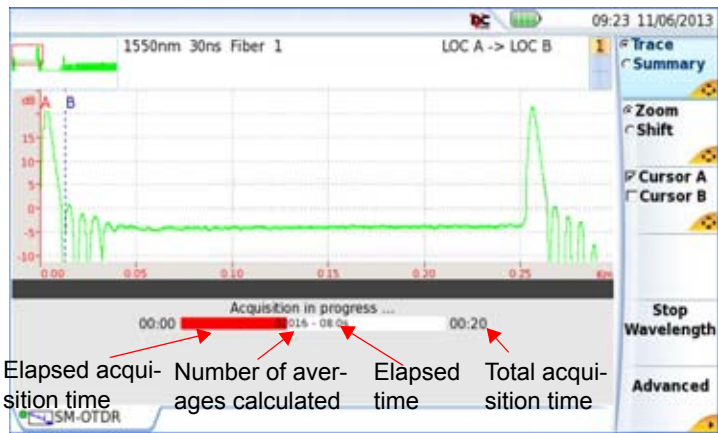
In this mode, the equipment carries out a number of averagings defined as a function of the maximum acquisition time specified in the Acquisition menu, and then terminates the acquisition.

The acquisition is carried out with the parameters previously selected in the **Acquisition** menu. It may be stopped at any time using the **START/STOP** key.

- 1 Press the **START/STOP** key to start the acquisition.  
The red indicator goes on to show that the product is in process of acquisition and the screen displays the trace in process of acquisition.
- 2 The quality of the connection is displayed for a few seconds (see [Table 3 on page 57](#))
- 3 Then, a bar graph shows elapsed and remaining acquisition time.



**Figure 25** Acquisition in progress with Expert OTDR



At the end of the acquisition, a beep is emitted, the trace is displayed and an automatic measurement is started.



**NOTE**

During acquisition, the traffic on fiber is automatically detected (see ["Traffic detection" page 57](#))



**NOTE**

To stop the acquisition, the **START/STOP** key may be pressed at any time. Then an automatic measurement is carried out, but some events cannot be detected (a manual measurement must then be made).

## Performing an acquisition from Results page

Once the results page is displayed, you can perform a new acquisition modifying the main acquisition parameters.



**Before launching a new OTDR acquisition, make sure the trace(s) displayed have been previously saved if necessary, as the new acquisition will automatically delete the displayed results.**

- 1 On **Results** page:  
in Expert OTDR mode, press the softkey **Quick Setup**: the acquisition parameters that can be modified display under the results trace.  
In Smart Test mode, press the softkey **Setup**: the Setup screen displays (see [Figure 13 on page 26](#)).

**Figure 26** Results page and Quick Setup menu (Expert OTDR)



- 2 Modify the acquisition parameters wished in the displayed menu:
  - In Expert OTDR mode: Laser / Acquisition / Range / Pulse / Time  
See [page 28](#) and [page 29](#).
  - In Smart Test mode: Laser / Fiber Number / Distance unit  
See [page 24](#).
- 3 Once configured, launch the new OTDR test pressing the **START/STOP** hard key.

Press again **(Quick) Setup** menu key to hide the menu under the trace.

## Multi-wavelength acquisition

If the module possesses several lasers, to perform successive acquisitions on all the wavelengths:

- 1 In the **SETUP** menu, check in **Laser** line, that **several lasers are selected (or select All if a module with only one OTDR port is used)**.
- 2 Start the acquisition by pressing the **START/STOP** button.

- 3 Once the acquisition for the first wavelength is finished, the acquisition for the following wavelength starts automatically.  
or  
To stop manually the acquisition for current wavelength, click on **Stop Wavelength**. This will allow to automatically start the measurement for the following wavelength.

The different traces appear in the same window and can be handled similarly to overlaid traces (see "[Overlay trace function](#)" page 90).



## Actions on trace during acquisition

During an acquisition, several actions are available on results in progress.

### Positioning Cursors A and B


- 1 Select **Cursor A** or **Cursor B** and:
  - Set both cursors A & B to control distance between two points.
  - Set one cursor A or B to get the distance from one point.
  - Set one cursor A or B to zoom on this cursor

### Zooming on trace

- 1 Select **Zoom** function:
  - use the menu key  in Smart Test
  - use the menu key  in Expert OTDR
- 2 Use touchscreen or validation key to zoom in and zoom out on trace (see "[Zoom function](#)" on page 74)

## Shifting the trace (Expert OTDR only)


In Expert OTDR mode only, the trace can be shifted vertically or horizontally during the acquisition:

- 1 Select **Shift** function on menu key 
- 2 Use touchscreen or direction keys to shift horizontally or vertically the trace (see [“Shift function \(Expert OTDR only\)” on page 77](#))

## Displaying Trace or Summary page

- 1 Use the menu key **Trace/Summary** to display either:
  - the acquisition trace in progress and the bar graph of time
  - the Summary page with exclusively the bar graph of time.

In the case of measurement on several wavelengths, once a measurement is completed for one wavelength:

- the **Trace** function allows to display the trace and results table for this wavelength: once **Trace** is selected, press validation key ( or **ENTER**) to pass from Trace + results table on 1 line to Trace + results table on 4 lines, and vice-versa,
- the **Summary** function allows to display a summary of results for this wavelength.

## Modifying acquisition parameters (in Real Time mode only)

You can modify the acquisition parameters without returning to the **SETUP** menu.

- 1 Press the **Acquisition Param** key
- 2 Use displayed keys to scroll through the possible values of the various acquisition parameters.

Figure 27 Example of acquisition in Real Time



## Zooming on the fiber end (in Real Time mode only)

During a real time acquisition, you can reach the end of the fiber under test at any time:

- 1 Press **Zoom to End** menu key.  
The display automatically reaches the end of the fiber under test.  
The menu key **Zoom to End** becomes **Zoom to Start**.

Press **Zoom to Start** to display the start of the fiber under test.

## Performing measurements during acquisition (Real Time mode only)

The real time mode allows to make Loss, ORL or Reflectance measurement using the A & B cursors and the key **Loss / ORL / Reflect.**:

- 1 Position A & B cursors on the trace
- 2 Click as many times as necessary on key **Loss / ORL / Reflect.** to get the measurement between A & B cursors.



**Figure 28** Example of loss measurement



# Results display

The traces acquired or recalled from a memory are displayed on the Results page. According to the mode of acquisition (Expert OTDR or Smart Test), the results page offers similar functions, but also different functions.

**Figure 29** Example of results trace with Smart Test







**Figure 30** Example of results trace with Expert OTDR



- On the upper right side, the alarm icon is displayed (if some alarm thresholds are defined in the pre loaded configuration file).

**Table 4** Alarms display


	Fail	Indicates that at least one result exceeds the alarm thresholds defined in the configuration file used for acquisition Results are displayed in red in table.
	Valid	Indicates that all the results lie within the thresholds (no result is in red or yellow). Results are displayed in green in the table.


## Common functions

### Display of events on the trace

Each event detected is referenced under the trace by a serial number. The reflectometry trace is displayed with a dotted vertical line set on the start of

launch cable  (if the **Launch Cable End** parameter is defined in the **SETUP** menu)

The trace can also be displayed with a dotted vertical line on the end of fiber .

The icon  is displayed on trace if the **Receive Cable Start** parameter has been defined in the Setup menu.

The results of the measurements of attenuation, reflectance and slope can be marked on the trace.

The reflectance of a ghost event is displayed in brackets on the trace.

## Criteria for display of an event

An event will be displayed if its attenuation or its reflectance exceeds the corresponding threshold selected in the **SETUP** menu (see "[Configuring the test in Expert OTDR](#)" [page 27](#)). Attenuation and reflectance results for an event will be displayed if they can be calculated

The reflectance of an event is always measured except when the event causes a saturated Fresnel peak or if it is drowned out by noise. In this case, the T-BERD/MTS displays > to show that the actual reflectance exceeds the value displayed.

## Results table

Under the trace is displayed the results table with all the events detected during acquisition.

- In Smart Test: if the Total Loss and End of fiber values are displayed under the trace (see [Figure 29 on page 66](#))
  - click on the trace overview (upper left part of the screen) to display the 4-lines results table

or

- select **Trace** on **Trace/Summary** softkey and press validation key (⊙ or ENTER) to display the 4-lines results table

Repeat one of this method to come back to Total Loss and End of fiber values.

**Figure 31** Trace + Table results in Smart Test



- In ExpertOTDR mode, once **Trace** is selected, press validation key (⊙ or ENTER) to pass from Trace + results table on 1 line to Trace + results table on 4 lines, and vice-versa

The table with one line displayed under the trace gives the type and characteristics of the event nearest to the cursor.

The 4 lines table gives the type and the characteristics of all the events detected during the measurement: the 4 first lines displayed correspond to the 4 first events nearest to the cursor. The line corresponding to the event nearest to the cursor is highlighted. This highlighting moves if the cursor is moved.

Figure 32 Example of trace and results table in Expert OTDR



At the top of the table, a line shows the generic parameters of the fiber: numbers of events present, total ORL of the link and, in ExpertOTDR mode, reference trace icon (if trace is the reference trace - see [“Reference Trace function” on page 93](#)).

Each event is referenced under the trace by a number which is repeated in the first column of the table. The table then shows:

- icon symbolizing the type of the event:

- ➡ Receive cable Start
- ➡ Launch cable End: the attenuation and distances are measured on the basis of the corresponding marker.
- Non-reflective attenuation (e.g. splice).
- ⚡ Splitter.
- ⚡ Reflective event. (e.g. connector)
- 👤 Ghost reflection


 Slope of the fiber (when no fault follows the slope).

 End of fiber

 OTDR connector

 Merged Connectors Loss

- Total group loss = loss on last connector
- Loss connector N-1 = 0 dB)

 Event marker when a measurement cannot be carried out. If the event to be added is too close to an existing event, the icon appears on the trace and the table, but no measurement is carried out: to obtain the results for this event, a manual measurement is necessary.

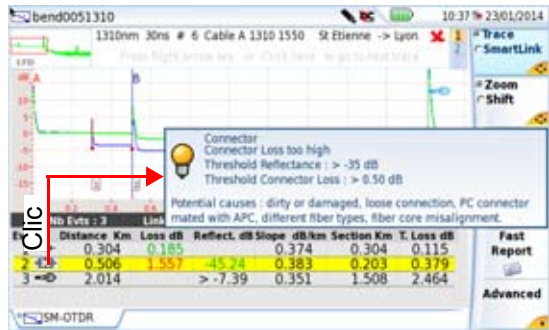
The event underlined in yellow is the one the nearest of the cursor set on trace. To visualize an event, click on this event on the table to set the cursor on it onto the trace.

## Detailed description of an event

Click on one event icon in the results table to display the event type and the alarm threshold defined for this event (if Alarms have been defined in the Setup page).

If the value of the event selected exceeds the defined threshold, then the possible causes for this alarm are described in the window:

**Figure 33** Event description



The following columns are then displayed next to each event icon:


Distance	The distance of the event from the beginning of the fiber, in meters (or miles)
Loss	The attenuation due to the event, in dB
Reflect.	The reflectance of the event, in dB
Slope (Expert OTDR only)	The slope before the event, in dB/km (or dB/kft) if it can be measured
Section (Expert OTDR only)	The length of the section = the distance between the marker of the event and the previous marker.
T. Loss	The total attenuation of the fiber (total loss), in dB

### Cursors

The cursors A and B are represented by vertical lines of different colors:

- in a solid line if the cursor is selected.
- in a dotted line if the cursor is not selected.

## Positioning the cursor

- 1 Press the key  to activate the cursor.
- 2 Touch the screen on the required location on trace where the active cursor must be set.  
You can also use the direction keys ◀ and ▶ to move the selected cursor along the trace


Above the trace is shown the 2-points loss measurement between the two cursors, together with the distance between the two cursors.



**The cursors data are displayed exclusively if the Cursor menu key is active. If another key is active, the display shows help tooltips, different according to the selected function.**

When the cursor function is selected, the keys ▲ and ▼ move the trace vertically.

## Cursors information

The information related to cursors are displayed exclusively when the Cursor function is selected (menu key  selected).

Above the trace are shown the co-ordinates of the points of intersection of the cursors A and B with the trace, together with the distance between the two points.

**Figure 34** Cursors information



## Cursor function not selected

When Cursor menu key is not selected, the upper banner displays information, different according to the menu key selected:

- If the **Trace/Summary** key is selected, with **Trace** function valid, the upper banner indicates that to change the displayed trace, you can click on the banner or on the right arrow key
- If the **Zoom/Shift** key is selected, and the **Zoom** function valid, the upper banner indicates that to get an automatic or full zoom, you must press validation key (⊙ or ENTER).

## Zoom function

The Zoom function is used to analyze part of the trace in greater detail. The zoom is centred on the active cursor.

The position of the section of trace displayed with respect to the complete trace is represented by a red rectangle on the mini-trace at the top left-hand corner of the screen.



## Defining a zoom on the trace using the touchscreen or screen deported on PC




- 1 Press **Zoom** or **Zoom/Shift** softkey to activate the zoom function
  - menu key  in Smart Test
  - menu key  in Expert OTDR
- 2 Press once in one location on the screen, which will represent the upper left corner of the zoomed area.  
The icon  is displayed on the screen.
- 3 Press another time on the location which will represent the lower right corner of the zoom.

Figure 35 Zoom on trace using touchscreen



## Defining a zoom level on the trace using direction keys

- 1 Select **Cursor A** or **B** and center it on the zone to be examined
- 2 Press **Zoom** softkey.
- 3 Use the **►** or **◄** key to increase or reduce the zoom factor, keeping the selected cursor centered on screen.

## Swapping from an automatic zoom to full trace and vice-versa

The automatic zoom allows to get an optimized display of the trace.

To apply an automatic or entire zoom on the trace:

- 1 Press **Zoom** softkey.
- 2 Press validation key (ⓘ or **ENTER**) to apply an auto zoom on trace.  
Press again validation key (ⓘ or **ENTER**) to display the trace in full screen.

## Specific functions of the zoom with a touchscreen

With the touchscreen, once the **Zoom** function is selected on menu key **Zoom**, you can:

- maintain your finger pressed on screen and shift the traces horizontally or vertically
- position your finger on a cursor and move it on trace maintaining your finger pressed and moving it toward left or right
- once a zoom is performed, double click on the zoomed zone to undo the zoom

## Zooming on the different events in succession

- 1 Set the cursor on one event
- 2 Define a zoom on this event.
- 3 Click on another event in the results table.  
The cursor is automatically positioned on this event, which is always centered on the screen, keeping the zoom level selected.

## Shift function (Expert OTDR only)

The Shift function is used to displace the displayed section of the trace by pressing the direction keys or directly clicking on the touchscreen.

The horizontal shift is performed maintaining the point of intersection between the trace and the selected cursor at the same level, scrolling the trace horizontally while following it vertically, so that it never goes off the screen.

To use this function:

- 1 Select the zoom factor as described above.
- 2 Choose cursor A and cursor B position.
- 3 On the **Zoom/Shift** key, select **Shift**.
- 4 Displace trace manually on touchscreen toward left/right or upward/backward.  
or  
Use the direction keys to shift the trace in the desired direction

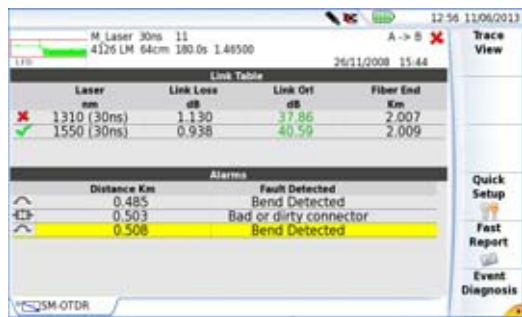
## Summary

To display a summary of the results, select **Summary** function on **Trace/Summary** menu key.

The upper table displays a summary of results for each wavelength onto which measurement has been performed.

Some results can be displayed in color (green or red) if they lie within or exceed the alarm thresholds defined in the Setup screen in ExpertOTDR mode and defined in the configuration file used for acquisition in Smart Test mode (see [“Selecting the configuration file” on page 24](#)).

Figure 36 Summary page & Alarms table



In the lower part of the screen, the **Alarms** table, gives the summary of the alarms detected (Reflectances, Splices, Splitters, Connectors, Bends...).

Select one event in the Alarm table and click on **Event Diagnosis** menu key or directly on the event icon in the Alarm table to get a detailed description of the event.

Figure 37 Summary key - Event Diagnosis



Click on **Trace View** softkey to return to display of Trace + Results Table.

## Display of traces in overlay

- The traces are shown in different colors (the active trace is green).
- The mains acquisition parameters are displayed at the top of the screen.

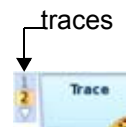
Figure 38 Traces in overlay



## Selecting one trace from overlaid traces

To make actions on a trace in overlay (move on events, set a cursor...), it must first be swapped with the active trace. To do this:

- 1 Press the **Trace** key
- 2 Press the direction keys ◀ and ▶, as many times as necessary, until the active trace is displayed in green.  
or  
Click on the trace numbers in the upper right side of the result page until the trace desired is selected.  
or  
Click on the upper part of the screen, in Trace information zone to scroll the traces.





**NOTE**  
Actions relative to traces (move cursors, move on events...) are exclusively done on the active trace (in green), not on the other ones.

## Traces display in double acquisition mode

When a double acquisition has been performed, i.e. a short acquisition preceding a standard one (see “[Smart Acquisition \(not available in Multi-mode\)](#)” on page 30), two traces are displayed in the same window.

**Figure 39** Traces display in double acquisition mode



**Figure 40**

The short trace is the one resulting from the short acquisition and stops while the standard one continues until the end of measurement.


## Advanced functions in Expert OTDR mode

Several actions on trace displayed can be performed in ExpertOTDR mode only.

### Automatic measurement and detection

If the instrument does not detect all the expected events, additional manual measurements can be carried out.

To delete all the markers:



- 1 Press the **Advanced** key
- 2 Press the **Modify meas.**key,
- 3 Select **Delete**.
- 4 Press validation key (  or **ENTER**)

The following procedure is then recommended:

- 1 By default, the instrument locates the events and proceeds to the measurements.
- 2 Addition of events (see [“Addition of events” on page 82](#)) in the cases of splices showing low attenuation and of close events. The T-BERD/MTS then automatically measures the slope before and after the markers selected and measures the attenuation of the splice.
- 3 Addition of manual measurements if necessary (for deeper analysis). The T-BERD/MTS performs the measurements requested by the user.

To start an automatic measurement while a measurement is already in progress:


- 1 Press the **Advanced** key.
- 2 Press the **Modify meas.**key


- 3 Select **Delete** and press validation key (  or **ENTER**).
- 4 Select **Auto Meas.** and press validation key (  or **ENTER**).

## Addition of events


You can also manually place markers in addition to those positioned automatically during automatic measurement.

### Representation of the events

The events are represented by the symbol  : if they are set during a measurement.

The events are represented by the symbol  if they are set manually in **Advanced** mode.

To add markers of events:

- 1 Select a cursor (A or B).
- 2 Use the direction keys or touchscreen to move the cursor to the place where you want to position a marker.
- 3 Press the keys: **Advanced** > **Set Event**.
- 4 An event marker  is displayed at the position of the cursor and a measurement is carried out on the event.

Measurement of slope before the marker starts just after the previous event (or at the end of the dead zone at the beginning of the fiber); measurement of slope after the marker stops just before the next marker or at the end of the fiber.



## Hints on the positioning of markers

- Do not add markers (with the **Set Event** key) after a manual measurement, as all the results will be recalculated automatically by the instrument.
- If two markers are too close together, they will appear on the trace and the table but no measurement will be carried out on the second marker: to obtain results for this marker, a manual measurement is necessary.
- If you press the **Set Event** key when the cursor is very close to a marker, the latter will be deleted.

## Deleting events

To delete an event, move the cursor onto the event and press the **Set Event** key. The event selected will be deleted and a complete measurement, without this event, is carried out.

Deletion of events can cause incorrect measurement results.


## Manual measurements

As soon as you have made an acquisition, with or without automatic measurement, you can make manual measurements on any event on the trace by means of the cursors A and B, in association with the functions of slope, detection of splice and calculation of ORL.

- 1 The manual measurements are accessible in the **Results** page, after pressing the keys: **Advanced**, **Modify meas**, then **Manual Measurement**.

## Measurements of slope

To make a manual measurement of slope, press the **RESULTS** button to call up the trace and then:

- 1 Place the cursor A at the beginning of the section of the trace where the slope is to be measured.
- 2 Place the cursor B at the end of this section.
- 3 Press the **Advanced** key
- 4 Press the **Modify Meas.** key
- 5 Press the **Manual** key, then select **Slope**.
- 6 Press validation key (  or **ENTER** ) : the slope of the specified trace section is displayed.


**Figure 41** Manual Measurement results



## Result of slope measurement

The result is displayed on the screen between the two slope indicators [ and ].

The measurement results are also available in the table:


- 1 Press **Exit** to return to the initial results page.
- 2 Select **Trace** using **Trace/Summary** soft key
- 3 Press validation key (  or **ENTER**) to display results table under the trace.

"Distance" shows the distance between the beginning of the trace and the end of the slope;

If no result is displayed in the table, this means that the distance between the cursors A and B is too small.

## Deleting a slope measurement

To delete a particular slope measurement result:


- 1 Superimpose the cursors A and B on the slope concerned
- 2 Select **Slope** (after, if necessary, pressing **Advanced > Modify Meas.> Manual Meas.**).
- 3 Press validation key (  or **ENTER**) : the slope of the specified trace section is deleted.

## Measurement of ORL

It is possible to carry out an ORL measurement on a part of the fiber.

Follow the following procedure to measure a part of the fiber:

- 1 Position the cursors A and B to delimit the section that you wish to measure.

- 2 Press the **Advanced > Modify Meas.> Manual Meas.**, then select **ORL**.
- 3 Press validation key (  or **ENTER** ) .  
The ORL is measured for the section of trace defined.

**Figure 42** Result of ORL measurement



**ORL on a saturated trace**


If saturation occurs during an ORL measurement, the result is given with the sign <. This means that the actual ORL value is less than the value displayed.

**Measurement of Reflectance**

It is possible to carry out a reflectance measurement of a Fresnel for a reflective event.

Follow the following procedure to measure the reflectance:

- 1 Position the cursor A at the base of the peak

- 2 Position the cursor B at the top of the peak of the required Fresnel, or after the peak to calculate automatically the maximum reflectance.
- 3 Press the **Advanced > Modify Meas.> Manual Meas.**, then select **Reflec..**
- 4 Press validation key (  or **ENTER** ) .

The Reflectance value is defined in dB, and displayed in the trace in purple.

Figure 43 Reflectance measurement



## Splice measurements

There are two methods of carrying out manual measurements of splices on the trace: the two-cursor method and the five-cursor method.


The five-cursor method is the more accurate, as it takes into account the difference of level between the slope before the splice and the slope after the splice. This method should be used whenever possible.

If very close events have created a dead zone preventing the measurement of slope by the five-cursor method, it is possible to use the two-cursor method. This considers the difference in level between the cursors.

Before performing one of these measurements, define in the **Setup** menu the splice detection threshold.

### Two points method

To perform a splice measurement by the "two-points" method, display the **Results** page, then:

- 1 Place cursor A exactly on the fault, then place cursor B after the splice that you wish to define.
- 2 Press the **Advanced** key, then **Modify Meas.> Manual Meas.**, then select the function **2 Pt Loss**.
- 3 Press validation key (  or **ENTER**).  
The splice marker is placed at the point defined by the first (left-hand) cursor and the result is displayed on the screen. If the fault is reflective, the reflectance value is also measured and displayed. These results are added to the table of results.




#### **NOTE**

If you try to measure a splice on a slope, the measurement is not carried out and the following error message is displayed: "Slope found between two cursors".

### Five points method

To carry out a splice measurement by the "five points" method:

- 1 Measure the slope preceding the fault to be measured, then the slope following it.
- 2 Place the cursor on the fault (between the two sections).
- 3 Press the **Advanced** key, then **Modify Meas.> Manual Meas.**, then select **5 Pt Loss**.
- 4 Press validation key (  or **ENTER**).

The splice event marker is placed on the cursor and the result is displayed on the trace and in the table of results.



**NOTE**


If no result is displayed, it is possible that the display threshold of the attenuation measurement result is higher than the attenuation that you are trying to measure.



**NOTE**

If you try to measure a splice on a slope, the measurement is not carried out and the following error message is displayed: *Slope found between two cursors.*

## Memorization of the position of events

To memorize the position of events with a view to repeating the measurements at the same place during a future acquisition or on another trace, press the **Advanced** key, then select **Lock Evts**. The event memorization icon  will appear in the title bar.

The positions memorized will then be used in the subsequent measurements, either at the end of the manual acquisition, or when a stored trace is recalled.




**NOTE**

This function memorizes the markers placed on the current trace.

The following procedure is recommended to start a measurement with markers:

- 1 Carry out an automatic measurement.

- 2 Memorize the position of the events selecting **Lock with the key** in the **Advanced** menu  .
- 3 Add the manual measurements required (keys: **Advanced > Manual Meas.**).

## CAUTION

If an event is added (with the **Set Events** key) after manual measurements have been performed, then all the events on the trace will be converted into AUTO markers and an automatic measurement will be performed using these events. The previous manual measurements will be lost.

Provided the event memorization icon  is displayed, the automatic measurement following the acquisition is carried out using the events which were present before the acquisition.

If you wish to make a measurement without events, deactivate memorization of events by pressing the **Free Events** key.

## Overlay trace function

This very useful function enables up to eight traces to be displayed on the screen at once:

- either to compare traces acquired on a number of different fibers in the same cable,
- or to observe changes over time in traces taken of one and the same fiber.



Figure 44 Example of overlaid traces




## Overlaying several traces stored in memory

To display up to 8 traces from the memory, deleting the current trace(s) already loaded:

- 1 Press the **FILE** button.
- 2 Select the files of the traces for display.
- 3 Press the **Load** key.
- 4 Press **View trace(s)**.
- 5 When loading is complete, the **Results** screen appears: the first trace selected is the active trace (in green), the other traces being overlaid.

## Display of traces in overlay

- The traces are shown in different colors (the active trace is green).
- Their serial numbers are repeated at the top of the screen.
- The OTDR markers are referenced on the active trace by the symbol , and on the other traces by vertical dashes.

## Adding traces in overlay

With one or more traces already displayed, to add further traces to the display (the number of traces displayed cannot exceed 8):

- 1 Define at least one trace as reference (see [“Reference Trace function” on page 93](#))
- 2 Press the **FILE** button, and in the Explorer , select the files of the traces to be added.
- 3 Press **Load** key.
- 4 Press the **View Trace(s) or Load Trace + Config.**

When loading is complete, the new traces are displayed in overlay with those that were defined as reference traces (see. [“Reference Trace function” on page 93](#))



### NOTE

If the number of files selected exceeds the display capacity, a message gives warning that loading will be incomplete: only the trace or traces selected first will be displayed, up to the permitted limit of 8 traces.

## Swapping overlay traces

Measurements can only be made on the active trace and not on overlaid traces. To make measurements on a trace in overlay, it must first be swapped with the active trace.

- 1 Press the **Trace** key,
- 2 Press the ◀ and ▶ direction keys, as many times as necessary, until the active trace is displayed in green.

or

Click on the trace numbers in the upper right side of the result page until the trace desired is selected.



## Removing a trace

### Removing the current trace in overlay

It is possible to remove a trace displayed. To do this, first select it (see previous paragraph), then successively press **Advanced** > **Overlay** > **Remove Current Trace**.

### Removing all the traces in overlay

To remove all the traces except the current trace, then successively press **Advanced** > **Overlay** > **Remove Other Traces**.

## Quitting the overlay menu

To quit the overlay menu, press the **Exit** key.

## Reference Trace function


The reference trace function consists in defining trace(s) which will be «blocked» on screen and used as models before acquiring or loading other standard trace(s).

## Use of the reference trace function in the Result page

Once one or several trace(s) is/are displayed, after an acquisition or loaded from the explorer:

- 1 If several traces are in overlay, check the correct current trace is selected
- 2 Go in the **Advanced** menu
- 3 Click on **Overlay**
- 4 Click on **Set curve As Reference** key.

The active trace becomes the reference trace;

- the icon  appears on the upper right hand part of the results table.

To define all the traces displayed as reference traces, click on **Set All As Reference** key (whatever is the active trace).

## Removing the reference trace(s)

To change one reference trace into a «standard» trace, select it using the **Trace/Event** key, and in the **Advanced > Overlay** menu, click once again on **Set curve As Reference**.

To change all the reference traces displayed into «standard» traces, whatever is the active trace, go in the **Advanced > Overlay** menu and click on **Set All As Reference**.

## Performing an acquisition once one or several trace(s) is/are defined

Three situations can occur once an acquisition is performed:

- Only reference trace(s) is/are displayed: the trace acquired is added to the reference ones.
- Reference trace(s) and «standard» trace(s) are displayed: the reference trace(s) are «blocked», the standard ones are removed and the new trace acquired is displayed with the reference one(s).
- No reference trace(s) defined: all the «standard» traces are removed and only the new trace acquired is displayed.

## Using the reference trace function in the explorer

A trace stored in memory can be set as reference trace before loading one or several «standard» trace(s).

### To open one or several reference trace(s):

- 1 Go on the **File Explorer**
- 2 Select the trace(s) to be defined as reference
- 3 Click on **Load** and select **Reference = Yes** on the key
- 4 Click on **View Trace(s)** or **Load Trace + Config**.



The icon  appears on the upper right part of the results table.



### To open «standard» traces to be added to the reference ones:

- 1 Go back to the **Explorer**
- 2 Select the trace(s) to be opened in the same screen as the reference traces
- 3 Click on **Load** and select **Reference = No** on the key
- 4 Click on **View Trace(s)** or **Load Trace + Config**.



# Saving the trace(s) and generating a report

Once the results page is displayed, the trace(s) can be saved and a report can be generated directly from the results screen.

The traces saving and report generation can have already been performed automatically if the parameter **Auto Store** was defined on **Yes** in the Setup screen (see “Auto Store” on page 49) with the appropriate **Save Mode** (file only or file + txt or + pdf).

## Saving results and creating a report from results page

To save the trace and generate a report:



- 1 Press **Fast Report** key  ->  .  
A menu displays under the trace.
- 2 In the menu, configure the file saving mode (and the report)

Figure 45 Fast report configuration

Save Mode	File + pdf	File Only	File + txt	File + pdf
Cable Id				
Fiber Number	6			
Direction	A->B			
Location A				
Location B				

- a In the **Save Mode** parameter, select:  
**File Only** to save exclusively the trace in a sor file  
**File + txt** to save the trace in a sor file and to generate a txt file of the results

- File + pdf** to save the trace in a sor file and to generate a report in a pdf format
- b** In the **Cable Id** parameter, enter/modify the name of the Cable using the edition keypad.
  - c** Modify the **Fiber Number** using the key ►.
  - d** In the **Direction** parameter, select/modify the direction, to define if the measurement has been performed from Origin to Extremity (**A -> B**) or from Extremity to Origin (**B -> A**)
  - e** In the **Location A** and **Location B** parameters, enter/modify the name of Origin and Extremity.
- 3** Once saving is configured as wished, press **Save All** menu key
- 4** Enter a name for the file in the edition keypad.  
or  
Click on **Auto Filenaming** menu key to apply the file name defined in the Setup screen, in **Filenaming** parameter (see [“Filenaming” on page 47](#))
- 5** Press **Enter** to validate



**NOTE**

The sor file and the txt or pdf file will have the same name.

The icon 🗂️ displays during saving process.

Once saving is completed, a sound is emitted onto the Platform.



**NOTE**

The file and the report are saved in the last storage media and directory selected.

## Saving and report for traces in overlay

If several traces are displayed in overlay in the results page, one or several file(s)/report(s) is/are generated:

- If in the File Setup page (**SETUP > File**), the parameter **File Content** is defined with **One Trace**, one .sor file and one pdf/txt report will be generated for each trace  
Example: if 3 traces are displayed in overlay, 3 **.sor** files and 3 pdf/txt files will be saved.
- If in the File Setup page (**SETUP > File**), the parameter **File Content** is defined with **All Traces**, one single .msor file and one single txt/pdf report will be generated, bringing together all traces.  
Example: if 3 traces are displayed in overlay, one single **.msor** file and one single txt/pdf file (with one trace per page; except if the results table is too long for one page) will be saved.

## Opening a report

- 1 To open the report, press **FILE** hardkey
- 2 In the **Explorer** page, in the directory selected, select the file/report.  
The file name is:  
For the txt file: *trace file\_sor.txt*  
For the pdf file: *trace file.sor.pdf*
- 3 Press **Load**.  
The file opens on the T-BERD/MTS.



Figure 46 PDF report



#### NOTE

A PDF Report can also be generated from the File Explorer page onto the T-BERD/MTS 2000/4000 (see [“Generating pdf report\(s\)” on page 249](#)).

# SLM (Smart Link Mapper) option

The SLM function is delivered as a license, available on option with the MTS/T-BERD.  
It is usable with OTDR trace exclusively and can be used either with a trace just acquired or with OTDR trace(s) saved onto the equipment.

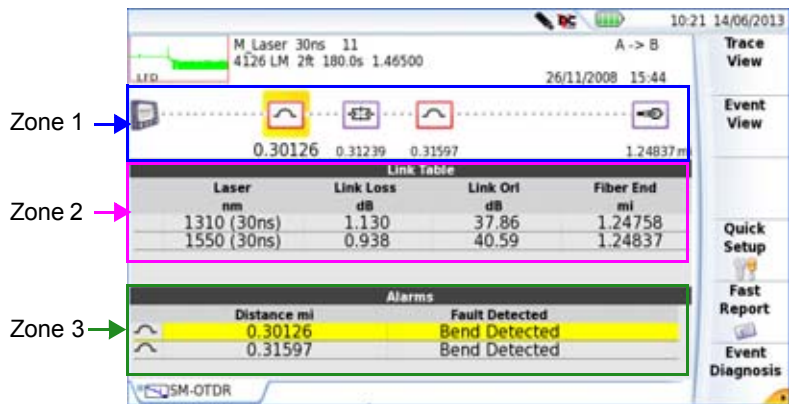


**NOTE**  
The SLM option is automatically available with the FTTH and FTTA options.

Once the installation of the license is completed (see Base-Unit manual):

- 1 Return to the result trace pressing **RESULTS** hard key (or load an OTDR file from the Explorer).  
The **Trace/Summary** key is replaced by the **Trace/SmartLink** key.
- 2 Click on this menu key to select **SmartLink**.  
A screen as the following one is displayed:

Figure 47 SmartLink function



The screen is divided into three zones:

- **Zone 1:** Graphical representation of the link, with icons symbolizing the different events detected.
- **Zone 2:** Link Table, which gives a summary of results for each wavelength, with results within/without thresholds in green/red (according to Alarm thresholds defined in the setup screen).
- **Zone 3:** Alarms table (if any)

## Show the detailed information of one event

The information concerning the event, its type and the alarm thresholds defined for this event, can be displayed from the SmartLink screen.

- 1 Select the event for which information must be displayed, on the graphic using the touchscreen or direction keys.

The event is highlighted in yellow once selected.



- 2 Click on the **Event Diagnosis** menu key.

A small window displays. It describes:

- the event type
- the value above which it is on defect

Figure 48 Event Diagnosis



## Event View

- 1 Click on **Event View** menu key to display a detailed description of one event detected on trace.
- 2 Select the event to be described on graphic (highlighted in yellow).  
The corresponding event description is displayed on the Zone 3, with a recall of alarm threshold for this event:

**Figure 49** SmartLink: Event View



- 3 Click on **View Trace** to display the selected event in the results table and zoomed on trace.



**NOTE**

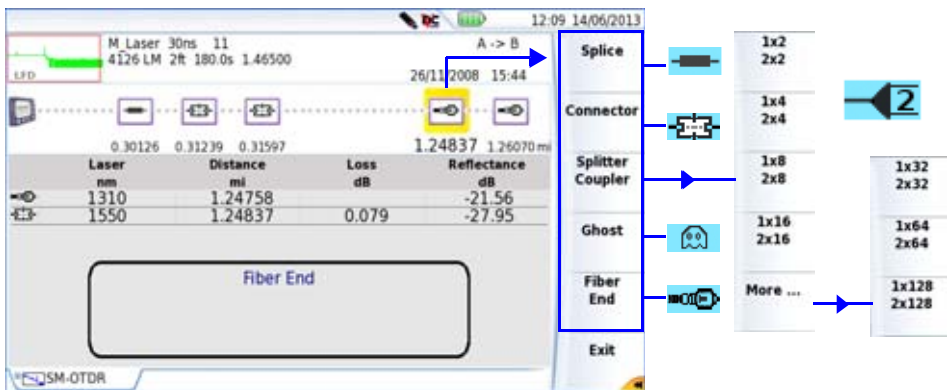
The event is framed in red if it is above the alarm thresholds defined in the setup menu.  
It is framed in green if it lies within the thresholds.  
It is framed in grey if no alarm has been defined in the Setup menu

## Changing the type of an event

Once the **Event View** is displayed, the type of event can be modified:

- 1 Select the event to be modified (framed in yellow)
- 2 Press **Event Code** menu key
- 3 Click on the event type to be applied to the selected event:

Figure 50 Event Code



- 4 Click on **Exit** to return to **Event View**.
- 5 Click back on **Event View** menu key to return to Summary screen or  
Click on **Trace View** menu key to return to trace (and table) results screen.





### NOTE



The event modification is automatically applied on trace and in the results table.

## Splitter sub-menus


The **Splitter** icon is different according to the menu key pressed in the Splitter sub-menus.





Example:

If the menu key  is pressed, the icon  is displayed

If the menu key  is pressed, the icon  is displayed.

Moreover, the icon and splitter configuration is different according to the number of «clicks» on one menu key.

Example with the menu key  :

- Click once: the icon is 
- Click twice: the icon is 
- Click three times: the icon is 
- Click four times: the icon is 

Click a sixth time to reset the event by default.

## OptiPulses™ option

The OptiPulses™ option is automatically available with the FTTH-SLM option.

OptiPulses™ is a software license key for OTDR applications that uses multipulse acquisitions and advanced algorithms to deliver detailed information on every element of the link (available in the ExpertOTDR module).

This option is configurable in ExpertOTDR mode.

## Configuring the OTDR acquisition with OptiPulses™ mode

Once the installation of the licence is completed (see Base-Unit manual) and the Expert OTDR icon is selected in the **Home** page:

- 1 Press **SETUP** hard key to display the configuration parameters
- 2 In the **Acquisition** parameters, select **OptiPulses** and configure the acquisition:

<b>No</b>	No OTDR short acquisition with the shorted pulsewidth is performed before the standard one
<b>Auto</b>	this parameter allows to perform a short acquisition, before the standard one, with the <b>Short Pulse</b> and <b>Short Range</b> parameters defined automatically.
<b>Manual</b>	this parameter allows to perform a short acquisition, before the standard one, with the <b>Short Pulse</b> and <b>Short Range</b> parameters defined by the user in the two following lines.

**Figure 51** OptiPulses configuration



See “[Smart Acquisition \(not available in Multimode\)](#)” on page 30 for information on principle of the acquisition.

- 1 Configure the other parameters for the OTDR acquisition to be performed

- 2 Launch the acquisition pressing **START/STOP** key  
A beep is emitted at the end of the acquisition.

# Results in OptiPulses™ mode

Once the acquisition is completed, a screen as the following one displays:

**Figure 52** OTDR Traces with OptiPulses



With the OptiPulses™ option, the screen is as follows:

- Two traces for each wavelength measured: the trace with shortest pulse and the standard one,
- One single results table per wavelength with results from both traces merged.

Example: if OTDR acquisition is performed on two wavelengths, the screen displays 4 traces and 2 results table.

Click on one event in the results table to automatically turns the trace on which it has been detected active

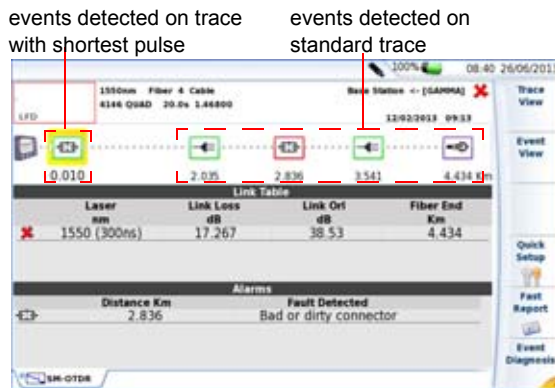
In the **Summary page**, the Link Table is displayed in one single line is displayed for the wavelength.



## OptiPulses and SmartLink option

If the OptiPulses option is used with the SmartLink option, then the SmartLink screen displays the graphical representation of the link with all the events detected, whether they are detected on the trace with shortest pulse or on standard trace.

**Figure 53** OptiPulses results in SmartLink mode





# Power meter and Source options of the OTDR Modules

A variety of options are available when ordering an OTDR Module.

With the T-BERD/MTS 2000 and T-BERD/MTS 4000:

- E41OTDRPM is the power meter option for the OTDR Modules
- E41OTDRLS is the Light Source option for the OTDR Modules.

With the SmartOTDR:

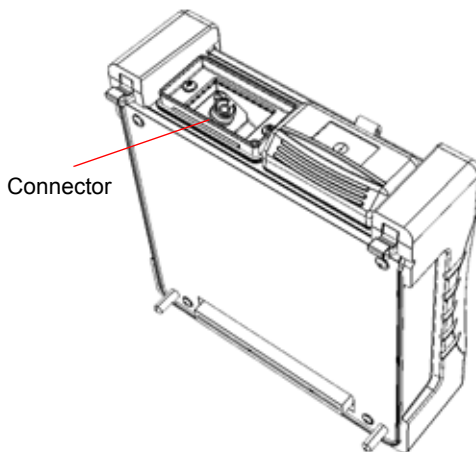
- E10PM is the built-in powermeter option

The topics discussed in this chapter are as follows:

- [“Connection to the power meter” on page 110](#)
- [“Configuring the Power meter” on page 111](#)
- [“Activating the Source function” on page 121](#)
- [“Result page” on page 122](#)
- [“Performing the power level measurement” on page 126](#)
- [“Performing the insertion loss measurement” on page 127](#)
- [“Storing and reloading results” on page 133](#)

## Connection to the power meter

**Figure 54** Optical connector for the Powermeter or Source on the OTDR Module (T-BERD/MTS 2000/4000)



The type of optical connector used for the power meter is the same as the OTDR port.

With 2 OTDR ports, select the port of connection according to the wavelength available at each port (a label gives information at the back of the OTDR module).



**It is not possible to use simultaneously the Source function and the Power meter function, when both options are set onto the OTDR module, as they use the same connector.**

## Configuring the Power meter

For T-BERD/MTS 2000/4000, the power meter function is an option chosen at the time of order and incorporated into the OTDR module in the factory.

To activate the function:

- 1 Press the **HOME** button
- 2 Select the power meter icon in the section of the OTDR Module

The icon turns yellow



The effect of this action will be to bring the power meter into use.

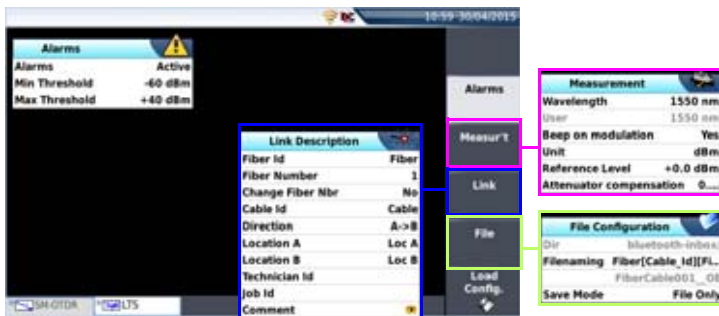


The Powermeter icons of the singlemode port and the one of the Multimode port cannot be selected at the same time. When one is selected, it automatically deselects the other one.

## Configuring the measurement parameters of the power meter

The measurement parameters can be accessed with the **SETUP** key.

Figure 55 Configuration of power measurement



## Configuring the alarm parameters

**Alarm**                      Activation of the Alarm function: any result below the lower threshold or above the upper threshold will be displayed in red on the Results page.

### Min and max thresholds

Choice of lower and upper thresholds for each available wavelength, from -60 to +40 dBm (selected with the direction keys).



#### NOTE

To copy one value of the Lower or/and Upper threshold for all wavelengths, select the reference value and click on **Update for All Wavel..**



#### NOTE

A continuous push on direction keys increments the value by 10 dBm.

## Configuring the Measurement parameters

In the **Setup** page, press **Measur't** soft key (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Measur't**)

**Wavelength**              Select wavelength:  
**Auto:** the wavelength of the input signal will be automatically detected and selected to perform the measurement:  
**1310, 1490, 1550, 1625 or 1650 nm:** measurement performed at specified wavelength.



#### NOTE

Using MP 60 or MP80 power meter, set manually to **Auto** the Lambda to automatically detect the wavelength: in results page, press **Power Config. > Wavelength** key multiple times until **Auto** is displayed.

#### Beep on modulation

Select if a sound must be heard when a modulation occurs (**Yes / No**)

#### Unit

Unit of power displayed:

**Watt, dBm** for displaying absolute power

**dB** for displaying a result relative to a reference (link loss)

#### Reference level

If dB units were chosen in the previous line, selection of the reference value for the wavelength selected. Using the direction keys, first choose the wavelength, then press the > key to access choice of the value (+XXX.XX), then confirm this value with the **ENTER** key. This reference is also automatically available, in the **Results** page, using the **Set as Reference** key.

#### Attenuator compensation

Choice of level to be applied to the wavelength chosen for measurement to compensate for the loss due to the external attenuator (+XX.XX dB). First use the direction keys to choose the wavelength, then press ► to access choice of value, then confirm this value pressing **ENTER**.



#### NOTE

To copy a Reference Level/Attenuator Compensator on all wavelengths, select the reference wavelength and click on **Update for All Wavel..**

## Configuring the Link parameters

In the **Setup** page, press **Link** soft key (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Link**).



### NOTE

The softkey **Copy File/Link To all** is displayed when one parameter is selected in the Link or File Setup page and when the Powermeter or Source function is active.

It allows to apply the Link and File configuration parameters of the current applications to all the other active Fiber Optic applications (powermeter and source).

The information entered in the **Link Description** window concerns the editing and/or the modifications of the cable and fiber parameters. When a trace is recalled without recall of the configuration, the parameters of this trace will be present only in its signature.

### Fiber ID

Select the parameter **Fiber Id** and enter a name for the fiber, using the edition keypad.

### Fiber Number / Fiber Code

The parameter **Fiber Number** becomes **Fiber Code** if, in the **Cable Structure** window, the **Cable Content** parameter is defined on another parameter than **Fiber (Ribbon/Fiber, Tube/Fiber or Tube/Ribbon/Fiber)**. See [page 117](#).

The fiber code corresponds to the fiber number if, in the **Cable Structure**, the parameter **Color coding** is defined on **No**.

The fiber code corresponds to the fiber color if, in the **Cable Structure**, the parameter **Color coding** is defined on **Yes**.



Select the parameter **Fiber Number/Fiber Code** and modify the parameter using the left and right direction keys.

The fiber number can be automatically incremented/decremented at each new file save if it has been configured in the File Setup page (see "[Change Fiber Nbr](#)" page 115).



#### NOTE

The Fiber Code and the fiber number concatenated with **Fiber Name** are interdependent: they are incremented or decremented at the same time. However, the fiber number remains a number only, while the fiber code is alphanumerical. Whether it includes a color code or not (see "[Cable structure](#)" page 117), it may be composed of one, two or three parts (see [Figure 56](#)).

**Figure 56** Example of incrementation of fiber code

Fiber and cable parameters used in the example:

Fiber Name: 'Fiberx'

Cable Content: 'Tube/Fiber'

Max Tube: 12

Max Fiber: 24

Coding used for the fiber and the tube: TIA

	Fiber N		Fiber N+1	
Color Code	Yes	No	Yes	No
<Fiber Name>	Fiberx24	Fiberx24	Fiberx25	Fiberx25
<Fiber Code>	Bl/Aq-	1/24	Gold/Bl	2/1

#### Change Fiber Nbr

**Increment** the fiber number is automatically incremented at each new file-save.

**Decrement** the fiber number is automatically decremented at each new file-save

**User defined** Use **Edit Number** softkey to enter the increment/decrement value for fiber number.

Note: to decrement the number, enter the sign «-» before the number. Example: -1.

Min: -999 / Max: 999 / Auto: 0

**No** the Fiber number must not automatically modified.

## **Extremities are different**

In some cases, it is interesting to save different information for the origin and the extremity of the cable.

If this option is validated, it is possible, after selecting the extremity to be edited in the **Cable Structure** menu, to modify the values specific to the cable (cable name, color coding, content of the coding), for each of these extremities. See chapter ["Cable structure" page 117](#))

To display/modify the data specific to the fiber (name and code), it is necessary to change direction temporarily. In the "O->E" direction, the information on the origin can be edited, and in the "E->O" direction, that on the extremity.

## **Cable Id**

This parameter allows to enter an identification of the cable, using the Edition menu.

## **Direction**

The direction shows if the acquisition has been made from the origin to the extremity (A->B) or from the extremity to the origin (B->A). Changing direction makes it possible, when different extremities are handled, to see the parameters of the fiber for the other extremity.

## **Location A**

The name of the Location A of the link may be entered here.

## Location B

The name of the Location B of the link may be entered here.

## Cable structure

This line opens a sub-menu, all the parameters of which can be different for each extremity.

Figure 57 Cable structure menu

Cable Structure	
View Extremity	Location A
Cable Id	Cable
Color Coding	Yes
Cable Content	Tube/Fiber
Max Tube	36
Max Ribbon	24
Max Fiber	24
Tube Coding	T1A
Ribbon Coding	T1A
Fiber Coding	T1A
Code Definition	



### NOTE

The **Cable Structure** window is specific to an extremity. Each structure keeps its own parameters by default. Modifications made to the one are not automatically applied to the other. Thus, after the values relating to the origin have been modified, it is normal not to find these same values entered for the extremity.

**View extremity** If extremities are declared as different (see "[Extremities are different](#)" page 116), this parameter allows to navigate between the Extremity and Origin parameters.

**Cable Id** If the extremities are different, you can specify the cable identification for the origin and the extremity.

**Color Coding** Choice of whether or not to apply a color coding to the fiber. This choice is made at link level, as all the fibers of a given link, for a given extremity, will be coded the same way. This choice modifies the result of the <Fiber Code> line. See ["Fiber Number / Fiber Code" page 114](#).

**Cable content** Shows how the color code is to be used (see figure ["Cable structure menu" on page 117](#)):

- FiberOnly the color code of the fiber is proposed (example: «Gold»)
- Ribbon/Fiber The color code of the fiber is preceded by that of the ribbon, and separated by a '/' (example: 'Bl/Or')
- Tube/Fiber The color code of the fiber is preceded by that of the tube, and separated by a '/' (example: 'Br/Or')
- Tube/Ribbon/Fiber  
The color code of the fiber is preceded by that of the tube, then by that of the ribbon; the three being separated by a '/' (example: 'Br/Bl/Or'). See ["Fiber Number / Fiber Code" page 114](#).

**Max tube** Shows the maximum number of tubes in the cable for the extremity selected. This information influences the automatic coding of the fiber. See ["Fiber Number / Fiber Code" page 114](#).

**Max ribbon** Shows the maximum number of ribbons in the cable for the extremity selected. This information influences the automatic coding of the fiber. See ["Fiber Number / Fiber Code" page 114](#).

**Max fiber** Shows the maximum number of fibers in the cable for the extremity selected. This information influences the automatic coding of the fiber. See ["Fiber Number / Fiber Code" page 114](#).



#### NOTE

Some parameters are not valid in the configuration selected. Thus, if no tube is selected in **Cable Content**, all the lines relating to the tube concept will be deactivated (grayed out in the menu).

### Tube Coding, Ribbon Coding, Fiber Coding

The lines Tube Coding, Ribbon Coding and Fiber Coding enable selection of the color coding of the tube, the ribbon and the fiber from 5 different codes described below: TIA, USER 1, USER 2, USER 3 and USER 4.

#### Code Definition

The Code Definition line opens a sub-menu, with which the different color codes possible on the instrument can be displayed and modified.

Five different codes can be managed by the SmartOTDR, including a standard code.

The standard code (TIA) may be displayed but it cannot be modified.

The other codes, called by default USER1, USER2, USER3 and USER4, can be entirely personalized.

- Edited code: selects the code for display or modification.
- Code name: to give a new name to the code selected, press the ► key, which calls up the edit menu.
- View codes: displays the color codes 1 to 12, 13 to 24 or 25 to 36.
- Code 1...23: Use the arrow ► to modify the codes if necessary.

### Operator

Use the arrow ► to enter the name of the operator carrying out the measurement.

## Comment

In contrast to the other data in this menu, the comment is specific to a fiber. This line is thus used to enter a new comment and not to display it. The comment appears at the top of the screen, with the other parameters of the fiber.

This comment will remain available for the next acquisition, unless it is deleted. It is also saved when a trace is saved with a comment.

## Configuring the File parameters

The File storage parameters must be also configured, in order to define how the results will be saved on to the MTS/T-BERD 2000.

In the **Setup** page, press **File** soft key (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **File**).

### Dir

This parameter cannot be configured, and display the directory selected by default into which the file(s) will be saved (the last directory selected).

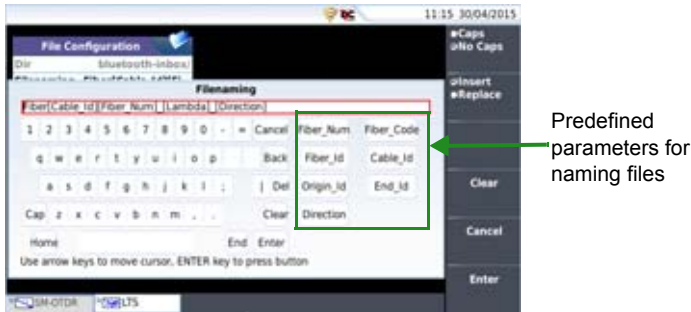
To modify the directory, go to the **Explorer** page and select another directory.

### Filenaming

Select **Filenaming** parameter and press the right arrow key to modify the name of the file for the result trace.

In the edition keypad, enter a name manually for the file and/or use the predefined parameters available (**Cable\_Id**, **Fiber\_Num**...).  
Then, press **Enter** to validate.

Figure 58 Filenaming - Edition keypad



or

Press **Default Filename** to apply the name by default to the file:

Fiber[Cable\_Id][Fiber\_Num]\_[Lambda]\_[Direction]

The name of the file is displayed in grey under **Filenaming** parameter

## Save Mode

When a trace or more is displayed, in the parameter **Save Mode**, you can select three types of methods for storing traces:


**File Only** only the trace(s) is/are stored in one/several file(s), with its extension (.sor, .msor)

**File + txt** the trace(s) is/are stored in one/several file(s), with its extension and one txt file is also generated.

## Activating the Source function

The Source function is an option chosen at the time of order and incorporated into the OTDR module in the factory.

To activate the function:

- 1 Press the **HOME** button
- 2 Click on the icon **Source** in the OTDR Section  
The icon turns yellow .



**CAUTION**

The Singlemode and Multimode Source icons cannot be selected at the same time. When one is selected, it automatically deselects the other one.

# Result page

The results page, automatically displayed after the icon selection, gives the information relating to the measurement in progress, results previously saved and the commands available for measurement and saving.

## Result page of the Power meter

The power measured by the power meter is displayed in large characters, in the units selected in the **Setup** menu, together with:

- the mode of transmission of the signal measured: continuous (CW) or modulated to a frequency of 270Hz, 330Hz, 1KHz, or 2KHz.
- the wavelength of the signal measured.
- the reference level expressed in dB.
- the level of Attenuation Compensation.

## Table of results

For one and the same fiber, the power meter displays a table of 9 results corresponding to the different possible wavelengths. The table shows the



power measured in dBm, the relative power (in dB) and the reference level in dBm (if units = dB), together with the mode.

- A measurement result is displayed in the table when the **Keep Result** softkey is pressed.
- The **Clear Table** softkey orders deletion of all the results displayed in the table.
- If the Alarm function has been activated, any result that exceeds the selected thresholds appears in red in the table. Otherwise, results are shown in the table in green.
- When the instrument is switched off, results present in the table are saved.

Figure 59 Results and commands of the power meter



## Commands of the power meter parameters

When the Powermeter function is selected, the following softkeys are available on the results page:

The different configuration buttons are displayed:

- Wavelength**                      selection of the wavelength  
**Unit**                                      choice of the unit

**Zero** Adjustment of the Zero value when the power meter's optical input is closed with a plug (a validation is required).

On the results page, the following actions are available:

**Set as Reference** Selects the current result as reference value to measure the attenuation of a link. This reference is displayed under the measurement result until a new reference value is chosen.

**Keep Result** Saves the result on the corresponding line of the table.

**Clear Table** Deletes all the results recorded in the table.

If the Source function is selected (either on this Platform, on the base Unit or on an OTDR module, or on another Platform), the Power meter results page is different:

- The **Wavelength**, **Unit** and **Zero** menu keys are accessible via the menu key **Power Config**.
- The **Power Ref.** menu key allows to reach the **Standard Ref** menu key. It also allows to reach the **Jumper Ref** menu key if Power meter function is associated with Source function onto another unit (see [“Carrying out the reference in loopback mode” on page 130](#)).

## Result page of the Source


Once the source icon is selected, the results page displays and the Source can be configured.

**Figure 60** Source result page



### **Laser On / Laser Off**

Activation or shut-down of the laser (same function as the **START/STOP** button)

When the laser is **on**, the icon  is displayed.

The parameters of the source can be accessed directly on the result screen:

**Wavelength** To change the wavelength when a multi-wavelength source is present (depending on option).

The wavelength value is displayed.

**Mode** To vary the mode of emission of the source. Possible modulation values are:

– 270 Hz / 330 Hz / 1 kHz / 2 kHz

- Auto (the sources emit on determined frequencies to enable the power meter to detect the wavelength used automatically)
- TwinTest (cyclical emission on all available wavelengths for a few seconds on each wavelength), compatible with the Viavi OLP 34/35/38.
- CW (continuous emission)

The mode used is displayed, above the icon .

**Standard Reference:** to perform a side by side reference measurement (see [“Carrying out the side by side reference” on page 128](#)).


If the power meter function is selected onto the equipment (either on Base-Unit or on OTDR module) the menu keys are different on screen:

- **Source Config:** allows to display the **Wavelength** and **Mode** menu keys
- The **Source Reference** menu key allows to open a sub-menu with the following keys:

**Standard Ref:** to perform a reference in side by side mode (see [“Carrying out the side by side reference” on page 128](#)).

**Jumper Ref:** to perform a reference measurement in loopback mode (see [“Carrying out the reference in loopback mode” on page 130](#)).

## Performing the power level measurement

The power meter is started up as soon as the function  is activated in the **HOME** page.



**It is not possible to use simultaneously the Source function and the Powermeter function, when both options are set onto the OTDR module, as they use the same connector.**



Power measurement is automatically updated in consequence. The value «<-50 dBm» is displayed when the laser is switched off and if the source output is looped on to the power meter input.

- 1 Connect the light source to be tested to the rear connector (see [“Connection to the power meter” page 110](#)).
- 2 In the **SETUP** menu, choose the units dBm or Watts.
- 3 Press the **START/STOP** key to start the measurement.

The result will appear in the results page and can be memorized in the table (see [“Table of results” page 122](#)).

- 4 Press the **START/STOP** key to stop the measurement.

## Performing the insertion loss measurement

Using light source and power meter options, an insertion loss measurement can be performed, having previously carried out a reference measurement.

### Setting the zero value of the power meter

- 1 Fix the plug over the optical input of the power meter so that no light can reach the photodiode of the power meter. If the zero adjustment is made without this plug, an error message may be displayed, as the photodiode will detect too much light.
- 2 In the **Results** page, press **Powermeter config.** > **Zero** soft key and validate.



It is important to set the zero of the power meter before making any measurements where accuracy is required, as the noise from the germanium photodiode fluctuates over time and with variations in temperature.

### Carrying out the reference

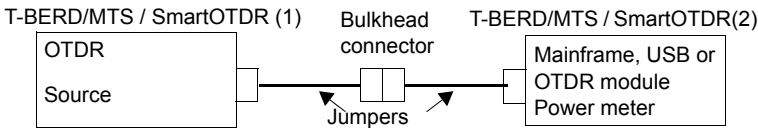
Using two T-BERD/MTS platforms or two SmartOTDR, with an OTDR module including a laser source option and a Power meter option, an insertion loss measurement in continuous wave can be performed.

Two types of reference are available: referencing in side by side mode and referencing in loopback mode.

## Carrying out the side by side reference

This reference can be carried out when both units are connected together meaning they have to be at the same location.



**Figure 61** Side by side reference



**NOTE**

The reference can be performed with one T-BERD/MTS 2000 at one side and one T-BERD/MTS-4000 at the other side.

- 1 Before connecting fiber/jumper, use appropriate cleaning tool to clean connector end-faces.
- 2 Connect the two jumpers together via a bulkhead connector.

- 3 Set, on equipment (1), the OTDR light source as "**Standard Ref**"
  - a Press the **HOME** key
  - b Use the arrow keys or touchscreen to select the Source function on **Home** page .
  - c Press **RESULTS** key
  - d In the Results page, press **Source Config.> Source Reference > Standard Ref**
  - e Press **Exit** and go back to the result Page
  - f Select the **Twintest** mode by skipping through the different modes
  - g Press **Laser On** key to activate the source
- 4 Set, on equipment (2), the power meter (from OTDR module, from the Base-unit or from USB) as "**Standard Ref**"
  - a Press the **HOME** key
  - b Use the arrow keys or touchscreen to select the Powermeter function in **Home** page .
  - c Press **RESULTS** key
  - d In the **Results** page, press **Pow.Reference > Standard Ref.**  
The actual power level is set as the new reference level for the selected wavelength. Then, the displayed value is around 00.00 dB.
  - e Press **Exit** and go back to the **Results** page.

The reference levels are stored into the unit, and have been automatically filled into the setup.

## Carrying out the reference in loopback mode

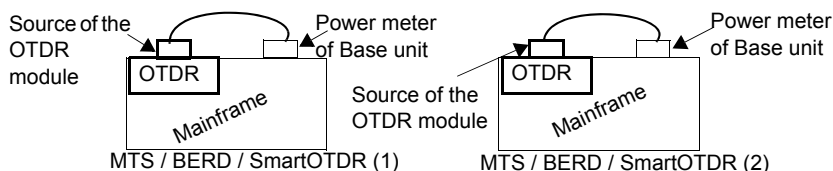
This reference can be carried out when the units are separated, at different locations. It is made using the OTDR source and the power meter built-in the platform.




### NOTE


Each platform must be equipped with a power meter set onto the base-unit.

**Figure 62** Reference in loopback mode



- 1 To reference the OTDR light source, on T-BERD/MTS (1)
  - a Select the OTDR Source icon in **Home** page , on the OTDR area.
  - b Press **RESULTS** key
  - c In the LTS result page, press **Source Config. > Source Reference > Jumper Ref.**  
A popup message appears
  - d Connect the jumper from the OTDR source to the mainframe power meter, and then press **OK**.  
The reference measurement is performed automatically.  
A popup message appears when it's done: press any key to continue



- 2 To reference the mainframe power meter, on T-BERD/MTS (2)
  - a Select the Optical powermeter icon of the mainframe in **Home** page  (on the upper part, on the base options line)
  - b In the LTS result page, press **Pow. Reference > Jumper Ref..**  
A popup message appears
  - c Connect the jumper from the OTDR port to the mainframe power meter, and then press **OK**  
The reference is performed automatically.  
A popup message appears once done. Press any key to continue

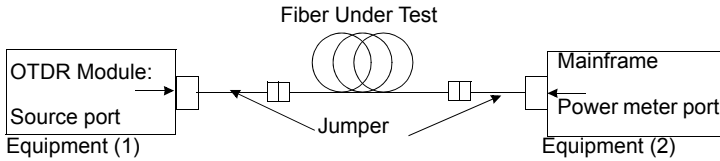
The reference levels are stored into the unit, and have been automatically filled into the setup.

## Measurements on the fiber under test

Once the references have been performed on both units:

- 1 After a reference in loopback mode, disconnect the jumper from the powermeter port on the T-BERD/MTS (1) and the jumper from the Source port on the T-BERD/MTS (2).  
After a reference in Side by side mode, disconnect the bulkhead connector and keep the jumpers connected to the Source and Powermeter ports.
- 2 Connect the jumpers to the fiber under test using the appropriate method (ex. keying mechanism for FC/PC types).
- 3 On MTS / T-BERD (1) select **Laser On** to activate the light source.

**Figure 63** Measurement of the fiber under test



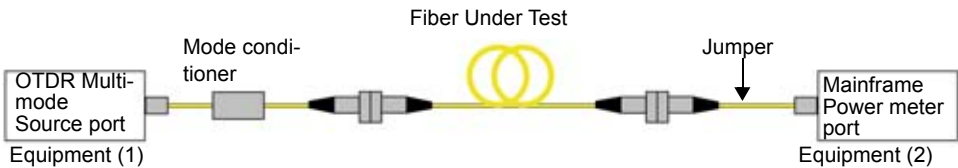
### Measurement using a mode conditioner

To perform an Insertion Loss measurement with a Source that is compliant to IEC 61280-4-1 Ed2 Standard on encircled flux, it is recommended to use a mode conditioner after the OTDR Source port.

Once the Source on T-BERD/MTS (1) and the Powermeter on T-BERD/MTS (2) are referenced in loopback or side-by-side mode:

- 1 Connect the Multimode source (1) to the mode conditioner
- 2 Connect the Powermeter port (2) to the jumper
- 3 Connect extremities of the mode conditioner and jumper to the fiber under test using the appropriate method (ex. keying mechanism for FC/PC types).

**Figure 64** Measurement of the Insertion Loss with a mode conditioner



- 4 On T-BERD/MTS (1) select **Laser On** to activate the light source.

# Storing and reloading results

## File Setup


Click on the button **FILE** to access the **File** setup. See "[Description of the explorer](#)" [page 240](#) for a complete description of all parameters, options and the explorer.

## Storing results

In order to save the results of a measurement, click on **FILE** and select **Store trace**. Two files are being saved :

- The first file is to be used with the product and allows to retrieve all measurement results. It is saved with the extension **.Lts**.
- The second file is a ASCII file using tabulations to separate values. It is saved with the extension **«.txt»** and can be opened by the 4000 Platform via the Web Browser. It has been designed to be used with a spreadsheet program on a PC where it allows to retrieve all measurement results and format them in a nice customized table.

## Loading results

In order to load the results of a measurement, select a file  with the extension **«.Lts»** in the file explorer (see [Chapter 11](#)), click on **Load > View trace**.

The LTS tab is displayed with the loaded results in the table.



# FTTA-SLM Software option

This chapter describes the use of the FTTA-SLM option, when the software license has been purchased with an OTDR module.

The topics discussed in this chapter are as follows:

- [“Principle of FTTA-SLM” on page 136](#)
- [“Configuring the Reflectometry test for FTTA network” on page 138](#)
- [“Launching the acquisition” on page 147](#)
- [“Results page” on page 148](#)
- [“Saving the trace\(s\) and generating a report” on page 155](#)

## Principle of FTТА-SLM

FTТА-SLM is an OTDR software application that is delivered as an option of the OTDR module (see references in the ordering information section), and is installed onto the mainframe as a license key (see the 2000/4000 base-unit user manual for the instructions on license files installation).

FTТА-SLM simplifies OTDR testing for cell-tower technicians and eliminates complexities of result interpretation.

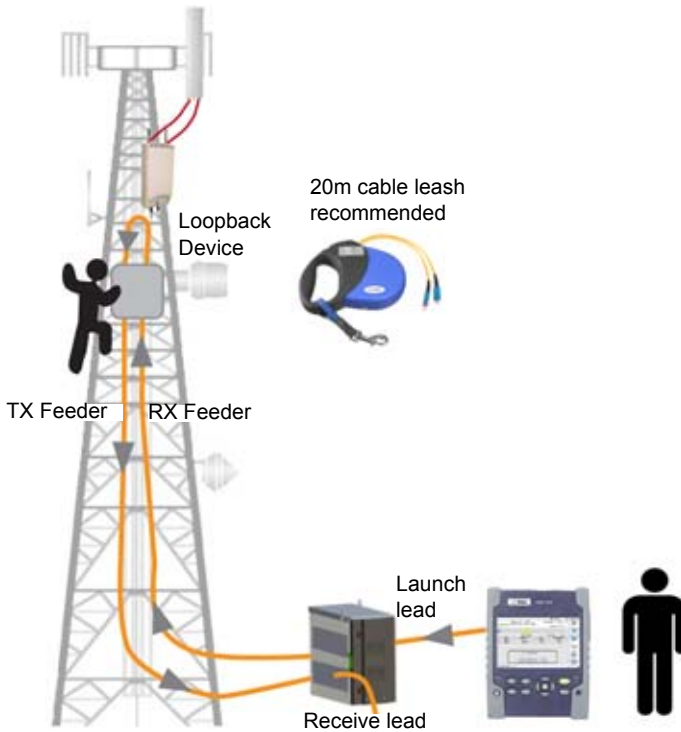
In a FTТА environment, the OTDR module, associated with the FTТА-SLM application, allows to:

- Characterize and measure the fiber link loss, measure the loss and reflectance of each passive element, and provide the position for each one: **Acceptance Testing**
- Locate and identify causes of failure on a fiber link: **Troubleshooting / Maintenance**.

## Acceptance Testing

One way to judge installation quality is to use a loopback device (a retractable/expandable fiber leash cable or a patchcord) on duplex fiber to test at the junction box or RRU location and shoot with an OTDR from the BBU or fiber-patch panel location to qualify the entire fiber channel.

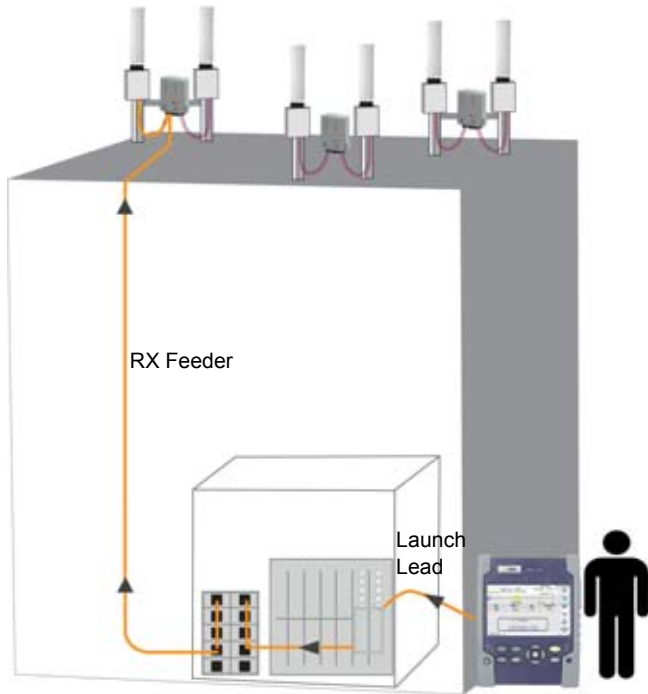
**Figure 65** Acceptance Testing



## Troubleshooting Testing


An OTDR from the BBU or fiber patch panel location will troubleshoot the fiber link up to the RRU/RRH. Before performing the OTDR measurement, make sure that the fiber being tested has no signal and the equipment is shut down.

**Figure 66** Troubleshooting Testing



# Configuring the Reflectometry test for FTTA network

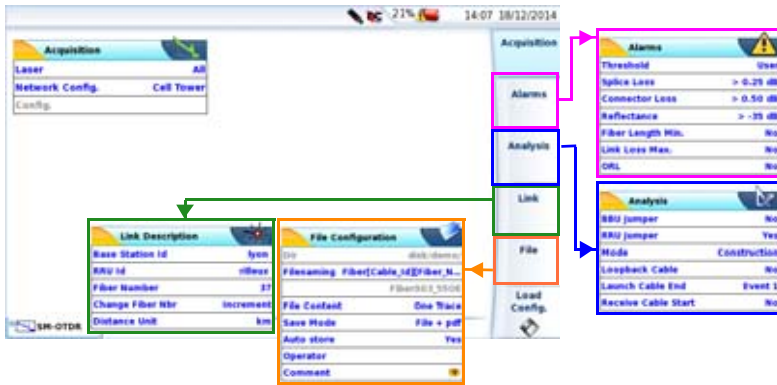
Once the OTDR module is set into the T-BERD/MTS, and the FTTA-SLM license installed:

- 1 Select the FTTA-OTDR icon  .  
The results page automatically displays.



- 2 Press **SETUP** hard key to display the OTDR configuration screen for FTTA network.

Figure 67 FTTA OTDR Setup



## FTTA setup

### Acquisition (FTTA)

In the first screen, configure the following parameters:

#### Laser

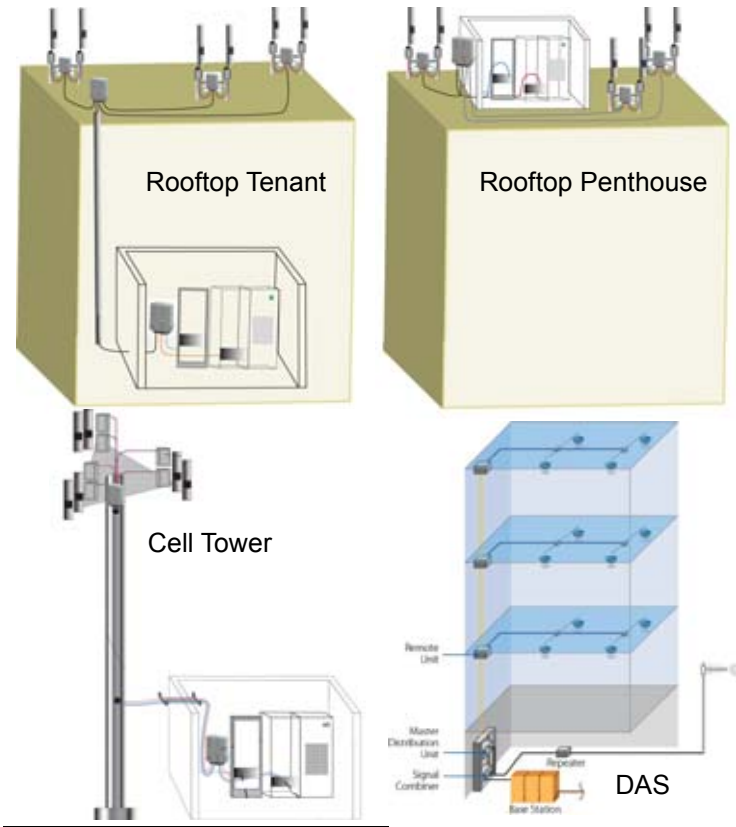
The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.

**Network Config.<sup>1</sup>**

This parameter is used to identify the network type:

<b>Cell Tower</b>	Typical macro cell tower topology
<b>Rooftop Tenant</b>	Rooftop topology
<b>Rooftop Penthouse</b>	Rooftop topology
<b>Das</b>	Ditributed Antenna System

**Figure 68** Network configurations



1.Active exclusively if the License «FTTA Extended» is installed

## Config.

This parameter displays the last configuration file loaded and cannot be modified unless a new configuration file is loaded.

## Alarms

In the **Setup** page, press the **Alarm** menu key (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Alarms**).

### Alarms > Threshold

**None** The alarm function is not active.


**User** Define your own thresholds values for one or several elements: Splice Loss / Connector Loss / Reflectance / Fiber Length Min / Link Loss Max / ORL


#### TIA-568 C / ISO/IEC 11801 / Default

Select one of this parameter to configure the alarm thresholds with predefined values:

	Default	TIA-568C & ISO/IEC 11801
Splice Loss	> 0.20 dB	> 0.30 dB
Connector Loss	> 0.50 dB	> 0.75 dB
Slope <sup>1</sup>	> 1.00 dB/km	> 1.00 dB/km
Reflectance	> - 35 dB	-
ORL	< 27 dB	-

1. This parameter is not available in OEO-OTDR configuration

If results are above the thresholds, they will be highlighted in red in the table of results, and the icon  will appear at the top right of the screen.

If all the results lie within the thresholds (no result is in red), results are displayed in green in the table and the icon is .

# Analysis

In the **Setup** page, press **Analysis** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Analysis**).

This screen allows to configure the network:

## BBU Jumper

Test from the patchcord that will be plugged into BBU.  
(not applicable for DAS networks)

## RRU Jumper

Test from the patchcord that will be plugged into RRU.  
(not applicable for DAS networks)

## Mode

Select the kind of acquisition to be performed:

**Construction**      Select this mode to perform the OTDR acquisition in the case of an Acceptance Testing (see [“Acceptance Testing” on page 136](#)).

**Maintenance**      Select this mode to perform the OTDR acquisition in the case of Troubleshooting (see [“Troubleshooting Testing” on page 137](#)).

## Loopback Cable

Select if a loopback cable is used (parameter available exclusively in **Construction** mode).

**Launch Cable End / Receive Cable Start** (not available in Maintenance mode)

**No**                      All the results are displayed and referenced on the basis of the board of the module.

- Evt 1, 2, 3** The results relating to the launch cable are eliminated from the table. Attenuation and distances are then measured on the basis of the marker Evt 1, 2 or 3 selected.
- Distance** Use the **Edit Number** key to enter a distance (Min= 0 / Max=50 km / 164.042 kfeet / 31.075 miles) or affect the active cursor value, using the **Set Cursor Distance** key.

## Link

In the **Setup** page, press **Link** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Link**).

The information entered in the **Link Description** window concerns the editing and/or the modifications of the cable and fiber parameters. When a trace is recalled without recall of the configuration, the parameters of this trace will be present only in its signature.

### Base Station Id or Headend Id (in case of DAS)

If known, enter the name of the Base Station using the edition keypad, displayed pressing the right arrow key.



#### NOTE

The name of Location A entered in ExpertOTDR configuration is displayed by default in this parameter (see [“Location A” on page 43](#)).

### RRU Id or Remote End Id (in case of DAS)

If known, enter the name of the RRU/RRH (Remote Radio Unit / Head) using the edition keypad, displayed pressing the right arrow key.



**NOTE**

The name of Location B entered in ExpertOTDR configuration is displayed by default in this parameter (see [“Location B” on page 43](#)).

**Fiber Code / Fiber Num**

To use the Fiber Code convention, with Rx/Tx labeling, choose between the following config files: *FTTA\_Rx\_Tx.SM-OTDR* or *FTTA\_Rx\_Tx.MM-OTDR*.

For a simple labeling of the fiber number (1 to 24), load one of the following config files: *FTTA\_Simple.SM-OTDR* or *FTTA\_Simple.MM-OTDR*

Example of fiber code in:

- Construction mode (with loopback): from **1-Rx\_1-Tx** to **24-Rx\_24-Tx**
- Maintenance mode: from **1-Rx** to **24-Rx**

**Change Fiber Nbr**

Select if the fiber number must be automatically **Incremented** or **Decrement**ed at each new file save.

**Increment**      the fiber number is automatically incremented at each new file-save.

**Decrement**    the fiber number is automatically decremented at each new file-save

**User defined**   Use **Edit Number** softkey to enter the increment/decrement value for fiber number.

Note: to decrement the number, enter the sign «-» before the number. Example: -1.

Min: -999 / Max: 999 / Auto: 0

**No**                the Fiber number must not automatically modified

## Distance unit

Select the unit to be used for distance (**km** / **kfeet** / **miles** / **meter** / **feet**).

## File

In the **Setup** page, press **File** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **File**).

### Dir

The **Dir** parameter displays the directory (and sub-directory) into which file(s) will be saved and cannot be modified.

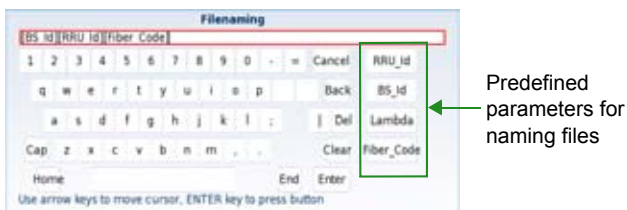
To modify the location of files saved, go to explorer page (pressing File hard key) and select another media storage/directory.

### Filenaming

Select the parameter and modify the name of the file for the result trace.

- a In the edition keypad, enter a name manually for the file and/or use the predefined parameters available (**RRU\_Id**, **Lambda**...).
- b Press **Enter** to validate.

**Figure 69** Filenaming - Edition keypad



The name of the file is displayed in grey under **Filenaming** parameter

## **File Content**

In this parameter, select the file content for traces saving:

- One Trace**            in case of traces in overlay, each trace is saved in a distinct file (.sor extension).
- All Traces**            in case of traces in overlay, all traces are saved in one single file (.msor extension) Define the **Auto Store** parameter

## **Save Mode**

When a trace or more is displayed, in the parameter **Save Mode**, you can select three types of methods for storing traces:

- File Only**            only the trace(s) is/are stored in one/several file(s), with its extension (.sor or .msor)
- File + txt**            the trace(s) is/are stored in one/several file(s), with its extension and one txt file is also generated.
- File + pdf**            the trace(s) is/are stored in one/several file(s), with its extension and one pdf file is also generated.
- All**                    the trace(s) is/are stored in one/several file(s), with its extension and one pdf file and one txt file are also generated.

## **Auto store**

Select **Yes** to store automatically the trace or traces resulting from each acquisition according to the filenaming rules.

## **Operator**

Use the arrow ► to enter the name of the operator carrying out the measurement.

## **Comment**

Use the arrow ► to enter a comment, which will be displayed in the file signature, on the upper part of the screen.



## Launching the acquisition



**Inspect & clean all fiber connections prior connecting fiber cables into the ports (BBU, distribution boxes, OVP and RRU/RRH and SFP ports).**

- 1 Press **START/STOP** hard key to launch measurement.  
The red **Test** indicator goes on to show that the T-BERD/MTS is in process of acquisition and the screen displays the trace in process of acquisition.
- 2 The quality of the connection is displayed for a few seconds (see [Table 3 on page 57](#))
- 3 Then, a bar graph shows elapsed and remaining acquisition time.



**Figure 70** Acquisition in progress



At the end of the acquisition, a beep is emitted, the trace is displayed and an automatic measurement is started.



#### **NOTE**

During acquisition, the traffic on fiber is automatically detected (see [“Traffic detection” on page 57](#))

If the module possesses several lasers, to perform successive acquisitions on all the wavelengths:

- 1 In the **SETUP** menu, check in **Laser** line, that **several lasers are selected or select All**.
- 2 Start the acquisition by pressing the **START/STOP** button.
- 3 Once the acquisition for the first wavelength is finished, the acquisition for the following wavelength starts automatically.

or

To stop manually the acquisition for current wavelength, click on **Stop Wavelength**. This will allow to automatically start the measurement for the following wavelength.

A beep is emitted once the acquisitions on all lasers are completed.

The different traces appear in the same window and can be managed as traces in overlay (see [“Overlay trace function” on page 90](#)).

## Results page

The trace(s) acquired or recalled from a memory is/are displayed on the Results page.

## Trace View


The Trace view is displayed by default once OTDR acquisition is completed.

**Figure 71** FTTA OTDR Trace



Once trace is displayed, you can:

- Zoom on trace (see [“Zoom function” on page 74](#)).
- Set Cursor A and/or Cursor B (see [“Cursors” on page 72](#)).
- Save the traces and launch a report of results (see [“Saving the trace\(s\) and generating a report” on page 155](#)).

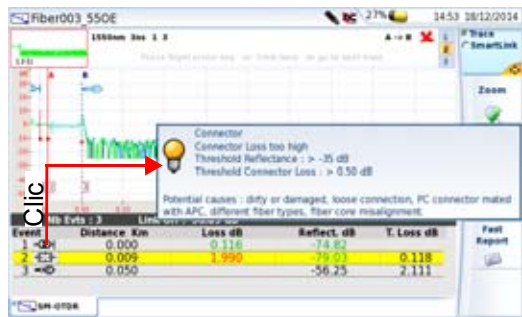
The available event types are similar to the events for OTDR measurement (see [“Results table” on page 68](#)) except the Merged Connector Loss . In FTTA results:

Loss per connector = total group loss / nb of events in the group

## Detailed description of an event

When clicking on one event icon in the results table, a popup window describes the event type and provides a diagnosis to help troubleshoot faulty optical elements (indicated in red).

Figure 72 Event description

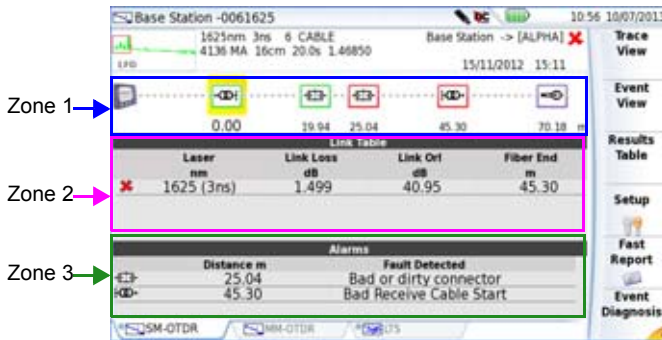


Press **SETUP** hard key to go back to FTTA Setup screen and modify the parameters before launching a new acquisition.

## SmartLink view

- 1 Click on the menu key **Trace/SmartLink** to select **SmartLink**.  
A screen as the following one is displayed:

**Figure 73** SmartLink function



The screen is divided into three zones:

- **Zone 1:** Graphical representation of the link, with icons symbolizing the different events detected.
- **Zone 2:** Link Table, which gives a summary of results for each wavelength, with results within/without thresholds in green/red (according to Alarm thresholds defined in the setup screen).
- **Zone 3:** Alarms table (if any)



**If several traces are displayed in overlay, with the same wavelength, then only the Zone 2 is displayed, there is no graphical representation of the link (Zone 1).**

## Merged connectors

When 2 or more connectors are very close to each others (in the attenuation dead zone), usually the reflectances can be measured but the loss of the individuals can't be - the loss of these connectors is "merged"



The following formula is then applied (only in FTTA mode):

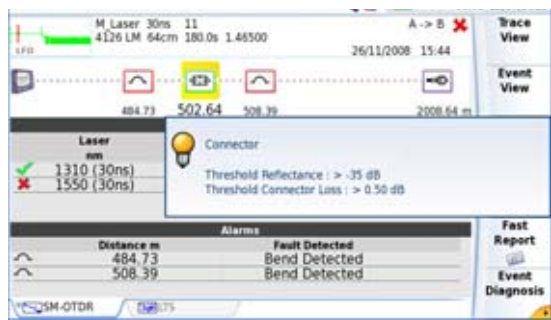
loss per connector = (total group loss) / (nb of connectors in the group)

## Getting a diagnostic of an event

Diagnosis is used to provide further information about events and eventual problems, such as root cause possibilities of a failed optical element.

- 1 Select the event to be described (underlined in yellow).
- 2 Click on **Event Diagnostic** soft key  
A new window, on the lower part of the screen, gives the details of the selected event:
  - its type
  - the thresholds applied for this event.
  - the possible causes of the alarm

Figure 74 Event Detail window



## Results Table

To display exclusively the results table from the SmartLink page, press the **Results Table** softkey.

**Figure 75** FTTA Smart Link: Results Table

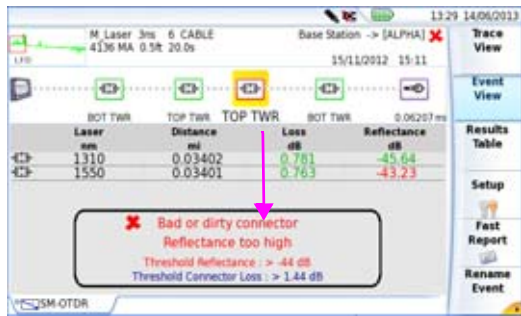
Event	Distance Km	Loss dB	Reflect dB	T. Loss dB
1 -CD-	0.000	0.116	-74.67	0.118
2 -C-	0.009	1.990	-79.61	0.118
3 -C-	0.050		-56.25	2.111

Press again the **Results Table** menu key to return to SmartLink display.

## Event View

- 1 Click on **Event View** menu key to display a detailed description of one event detected on trace.  
In this view, an algorithm automatically detects the elements of the FTTA link and label them.
- 2 Select the event to be described on the graphic (highlight in yellow).  
The corresponding event description is displayed on the Zone 3, with a recall of alarm threshold for this event:

Figure 76 SmartLink: Event View



- 3 Click on **Trace View** to display the selected event in the results table and zoomed on trace.




**NOTE**

The event is framed in red if it is above the alarm thresholds defined in the setup menu.  
It is framed in green if it lies within the thresholds.  
It is framed in purple if no alarm has been defined for this type of event.

**Changing the name of an event**

Once the **SmartLink** screen is displayed, the name of an event can be modified:


- 1 Select the event to be modified (highlighted in yellow) 
- 2 Press **Rename Event** menu key
- 3 In the edition keypad, enter a new name for the event



**Figure 77** Rename Event



- 4 Click on **Enter** to return to **Event View**.

The event name is displayed under the icon, and replaces the previous FTTA label .

Click on **Replay Label** to rename the event as it was previously (at last saving).

## Saving the trace(s) and generating a report

Once the results page is displayed, the trace(s) can be saved and a report can be generated directly from the results screen.

Saving and report can have been automatically generated if, in the file configuration, the **Auto Store** parameter has been set to **Yes** (see [page 146](#)) with the appropriate **Save Mode**.

## Saving results and creating a report from results page

To save the trace and generate a report:



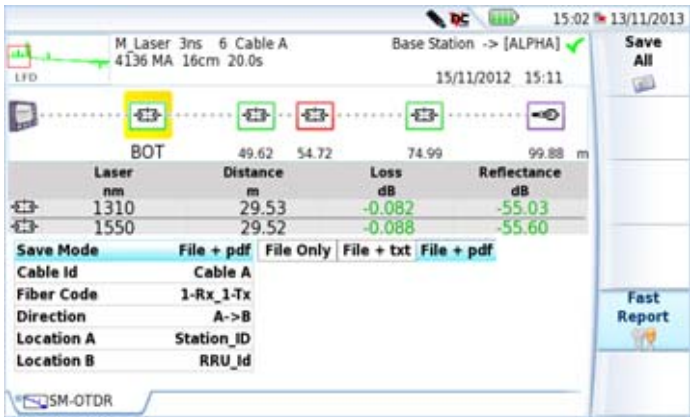
- 1 Press **Fast Report** key  ->  .  
A menu displays under the trace.
- 2 In the menu, configure the file saving mode (and the report)

Figure 78 Fast report configuration



- a In the **Save Mode** parameter, select:  
**File Only** to save exclusively the trace in a sor file  
**File + txt** to save the trace in a sor file and to generate a txt file of the results  
**File + pdf** to save the trace in a sor file and to generate a report in a pdf format
- b Enter a name for the Cable in the **Cable Id**<sup>1</sup> parameter.
- c In the **Fiber Code / Fiber Number** parameter use the left and right direction keys to define the fiber code / fiber number by scrolling the available codes/numbers.

1.Available exclusively if the License «FTTA Extended» is installed

**Fiber Code:** from **1-Rx\_1-Tx** to **24-Rx\_24-Tx** if the configuration file selected is *FTTA\_Rx\_Tx.SM-OTDR* or *FTTA\_Rx\_Tx.MM-OTDR*.


**Fiber Number:** from **1** to **24** if the configuration file selected is *FTTA\_Simple.SM-OTDR* or *FTTA\_Simple.MM-OTDR*

- d In the **Direction<sup>2</sup>** parameter, select/modify the direction, to define if the measurement has been performed from Origin to Extremity (**A -> B**) or from Extremity to Origin (**B -> A**)
  - e In the **Location A** and **Location B** parameters<sup>2</sup>, enter/modify the name of Origin and Extremity.
- 3 Once all the parameters are configured, press **Save All** menu key.
  - 4 Enter a name for the file in the edition keypad.  
or  
Click on **Auto Filenaming** menu key to apply the file name defined in the Setup screen, in **Filenaming** parameter (see [page 145](#)).
  - 5 Press **Enter** to validate



#### NOTE

The sor file and the txt or pdf file will have the same name.

The icon  displays during saving process.

Once saving is completed, a sound is emitted onto the Platform.



#### NOTE

The file and the report are saved in the last storage media and directory selected.

## Adding a logo to a pdf report

To display a logo, or any other image (other than the logo displayed by default) on the upper left part of the report:

- 1 Reach the **System Settings** screen:
  - on the T-BERD/MTS 2000, on the **Home** page, press the **Settings** icon
  - on the T-BERD/MTS 4000, on the **Home** page, press the **System Settings** menu key.
- 2 On the T-BERD/MTS 2000, in the **Reports** menu, in the **Mode** parameter, select **Report**  
On the T-BERD/MTS-4000, in the **Printer** menu, reach the **Printer** parameter and select **File (Formatted)**.
- 3 Select the **File Format** of the report: **JPG**, **PNG** or **PDF**.
- 4 In the **Logo** parameter, enter the full path of the image file (with file extension)  
Example: `disk/Logo.jpg`
- 5 Click on **Exit** to return to **Home** page.
- 6 Press **FILE** and in the **Explorer**, open the file for which a pdf report must be generated.
- 7 Launch the report.  
Once report is generated, the logo is displayed on the upper left part of the page.

## Opening a report

- 1 To open the report, press **FILE** hardkey
- 2 In the **Explorer** page, in the directory selected, select the file/report.  
The file name is:  
For the txt file: *trace file\_sor.txt*  
For the pdf file: *trace file.sor.pdf*
- 3 Press **Load**.  
The file opens on the T-BERD/MTS.

Figure 79 Fast Report with FTTA-SLM option



**NOTE**

A pdf report can also be generated from the File Explorer page onto the T-BERD/MTS (see [“Generating pdf report\(s\)” on page 249](#)).



# FTTH-SLM Software option

This chapter describes the use of the FTTH option, when the software license has been purchased with an OTDR module.

The topics discussed in this chapter are as follows:

- [“Principle of FTTH” on page 162](#)
- [“Configuring the Reflectometry test for FTTH network” on page 163](#)
- [“Launching the acquisition” on page 170](#)
- [“Results page” on page 172](#)
- [“Saving the trace\(s\) and generating a report” on page 179](#)

# Principle of FTTH

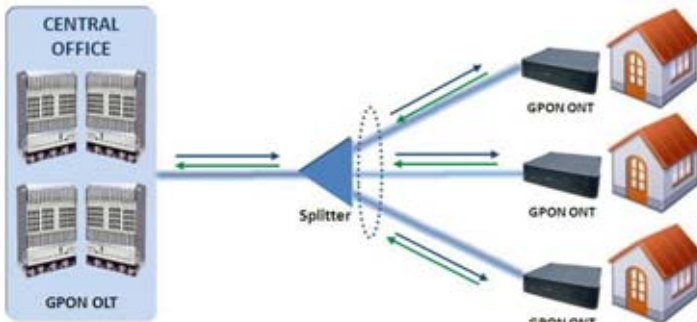
FTTH-SLM is an OTDR software application that is delivered as an option of the OTDR module (see references in the [Chapter 13 on page 269](#)), and is installed onto the mainframe as a license key (see the 2000/4000 base-unit user manual for the instructions on license files installation).

FTTH-SLM application brings an FTTH user interface and a specific algorithm for OTDR measurements, especially through PON splitters (Passive Optical Network).

In a FTTH environment, the OTDR module, associated with the FTTH-SLM application:

- Selects optimized test parameters to conduct reliable measurements, especially through optical splitters, and to detect close events near the start (Central Office splices/ connectors) (OptiPulses Automatic Algorithm).
- Automatically identifies all network elements such as PON splitter types/ratios (Discover Mode).
- Iconically displays a map of OTDR trace results (SmartLink View)
- Guarantees measurements with automatic PASS/FAIL analysis to ITU-T/IEEE PON standards or customer-defined specifications.

**Figure 80** FTTH network





# Configuring the Reflectometry test for FTTH network

Once the OTDR module is set into the T-BERD/MTS, and the FTTH-SLM license installed:


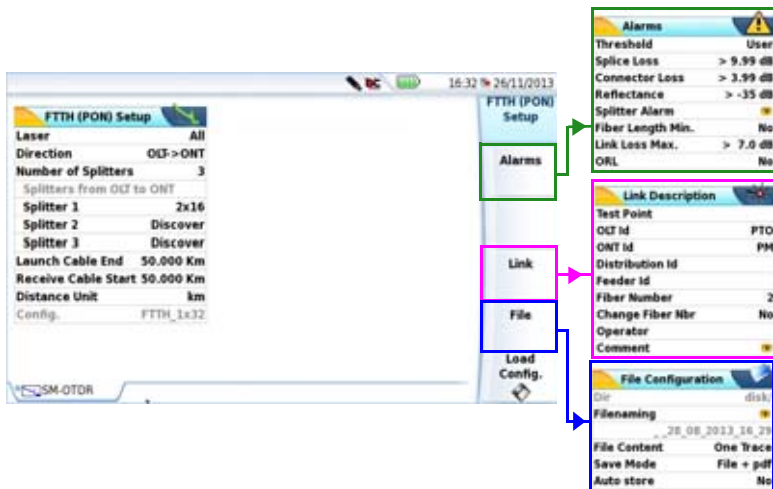
- 1 Select the FTTH-OTDR icon  .  
The results page automatically displays.
- 2 Press **SETUP** hard key to display the OTDR configuration screen for FTTH network.

Figure 81 FTTH OTDR Setup



## FTTH setup

In the first screen, configure the following parameters:

## FTTH (PON) Setup

### Laser

The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.

### Direction

- OLT: Optical Line Terminal (switch at the Central Office)
- ONT: Optical Network Terminal (media converter and gateway in the Home)

Select the direction of the measurement:

- Downstream: from OLT to ONT (**OLT -> ONT**)
- Upstream: from ONT to OLT (**ONT -> OLT**)

### Number of Splitters

If known, enter the number of splitters installed in the FTTH network.



**It is preferred to know the number of splitters in order to get Pass/Fail status for the splitters' loss.**

**None:** no splitter is installed

**Discover:** auto-detection and identification of PON splitter types.



#### NOTE

The **Discover** mode does not allow Pass/Fail analysis

**1 / 2 / 3:** select the number of splitters.

This selection opens a sub menu into which the splitters types must be defined for all splitters installed.

## **Splitters types**

**Splitter 1:** define the splitter type among the list:

- 1x2 / 1x4 / 1x8 / 1x16 / 1x32 / 1x64
- 2x2 / 2x4 / 2x8 / 2x16 / 2x32 / 2x64

**Splitter 2** and **Splitter 3:** define the splitter type among the list:

- 1x2 / 1x4 / 1x8 / 1x16 / 1x32 / 1x64

## **Launch Cable End / Receive Cable Start**

**No** All the results are displayed and referenced on the basis of the board of the module.

**Length** Use the **Edit Number** key to enter a distance (Min= 0 / Max=50 km / 164.042 kfeet / 31.075 miles) or affect the active cursor value, using the **Set Cursor Distance** key.

## **Distance Unit**

Define the unit of the distances displayed: **km, kfeet, miles, meter, feet**

## **Config.**

This parameter displays the configuration file selected for acquisition, and cannot be modified from Setup page. To modify the configuration file to be used:

- 1** Click on the menu header **FTTH (PON) Setup**
- 2** Click on **Load Config.** menu key
- 3** Select the file in the Explorer.

# Alarms parameters

Press the **Alarm** menu key (or **Next** key when one parameter of the Setup page is selected) to configure the alarm thresholds for the OTDR measurement.

- None

The alarm function is not active.
- User


Define your own thresholds values for one or several elements: Splice Loss / Connector Loss / Reflectance / Splitter Alarm / Fiber Length Min / Link Loss Max / ORL


## Default / TIA-568 C / ISO/IEC 11801 / G.697/G.98x PON / G.697/IEEE PON

Select one of this parameter to configure the alarm thresholds with predefined values:

	Default	G.697/G.98x PON & G.697/IEEE PON	TIA-568C & ISO/IEC 11801
Splice Loss	> 0.20 dB	> 0.30 dB	> 0.30 dB
Connector Loss	> 0.50 dB	> 0.50 dB	> 0.75 dB
Slope	> 1.00 dB/km	-	> 1.00 dB/km
Reflectance	> - 35 dB	> - 35 dB	
ORL	< 27 dB	< 27 dB	
Splitter Alarm			
Splitter 1x2	> 5.0 dB	> 4.2 dB	
Splitter 1x4	> 8.0 dB	> 7.8 dB	
Splitter 1x8	> 11.0 dB	> 11.4 dB	
Splitter 1x16	> 14.0 dB	> 15.0 dB	
Splitter 1x32	> 17.0 dB	> 18.6 dB	
Splitter 1x64	> 21.0 dB	> 22.0 dB	

Default	G.697/G.98x PON & G.697/IEEE PON	TIA-568C & ISO/IEC 11801
Link Loss Max	Select: <b>No</b> , <b>Manual</b> or: <ul style="list-style-type: none"><li>• for G.697/G.98x PON: <b>20 dB (A) / 25 dB (B) / 30 dB (C)</b></li><li>• for G.697/IEEE PON: <b>23 dB (PX-10) / 26 dB (PX-20)</b></li></ul>	

If results are above the thresholds, they will be highlighted in red in the table of results, and the icon  will appear at the top right of the screen.

If all the results lie within the thresholds (no result is in red), results are displayed in green in the table and the icon is .

## Link parameters

In the **Setup** page, press **Link** softkey, or press **Next** if one parameter is selected in the current screen until the Link Setup page displays.

The information entered in the **Link Description** window concerns the editing and/or the modifications of the cable and fiber parameters. When a trace is recalled without recall of the configuration, the parameters of this trace will be present only in its signature.

### Test Point / OLT Id / ONT Id / Distribution Id / Feeder Id

Those parameters allow to enter an identification for each element of the network (test point, OLT, ONT...) using the Edition menu.

### Fiber Number

- 1 Select the parameter **Fiber Number** and modify the number of the fiber to be tested.

The fiber number can be automatically incremented/decremented at each new file save if it has been configured in the **Change Fiber Nbr** parameter (see "[Change Fiber Nbr](#)" page 168).

### **Change Fiber Nbr**

**Increment**      the fiber number is automatically incremented at each new file-save.

**Decrement**    the fiber number is automatically decremented at each new file-save

**No**                the Fiber number must not automatically modified.

**User defined**   Use **Edit Number** softkey to enter the increment/decrement value for fiber number.

Note: to decrement the number, enter the sign «-» before the number. Example: -1.

Min: -999 / Max: 999 / Auto: 0

### **Operator**

Use the arrow ► to enter the name of the operator carrying out the measurement.

### **Comment**

Use the arrow ► to enter a comment, which will be displayed in the file signature, on the upper part of the screen.

## **File parameters**

Press the **File** menu key (or **Next** key when one parameter of the File page is selected) to configure the File saving parameters for the OTDR measurements.

### **Dir**

The **Dir** parameter displays the directory (and sub-directory) into which file(s) will be saved and cannot be modified.

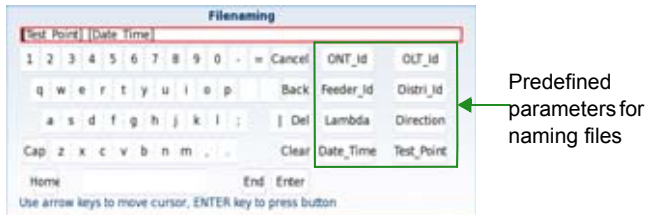
To modify the location of files saved, go to explorer page (pressing File hard key) and select another media storage/directory.

## Filenaming

Select the parameter and modify the name of the file for the result trace.

- a In the edition keypad, enter a name manually for the file and/or use the predefined parameters available (**ONT\_Id**, **Feeder\_Id**...).
- b Press **Enter** to validate.

Figure 82 Filenaming - Edition keypad



The name of the file is displayed in grey under **Filenaming** parameter

Press the **Default Filename** menu key to apply the name by default for the file: [Test\_Point]\_[Date\_Time].

## File Content

In this parameter, select the file content for traces saving:

- One Trace** in case of traces in overlay, each trace is saved in a distinct file (.sor extension).
- All Traces** in case of traces in overlay, all traces are saved in one single file (.msor extension)

## Save Mode


When a trace or more is displayed, in the parameter **Save Mode**, you can select three types of methods for storing traces:

<b>File Only</b>	only the trace(s) is/are stored in one/several file(s), with its extension (.sor or .msor)
<b>File + txt</b>	the trace(s) is/are stored in one/several file(s), with its extension and one txt file is also generated.
<b>File + pdf</b>	the trace(s) is/are stored in one/several file(s), with its extension and one pdf file is also generated.
<b>All</b>	the trace(s) is/are stored in one/several file(s), with its extension and one pdf file and one txt file are also generated.

**Auto store**

Select **Yes** to store automatically the trace or traces resulting from each acquisition according to the filenames rules.

# Launching the acquisition



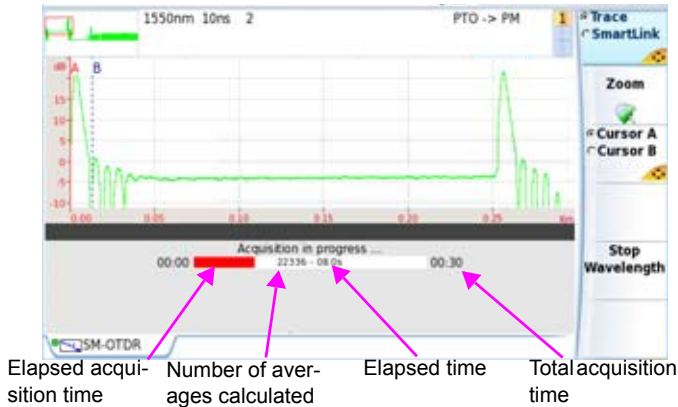
**Inspect & clean all fiber connections prior connecting fiber cables into the ports (patch panels, OLT or ONT...).**

- 1 Press **START/STOP** hard key to launch measurement.  
The red **Test** indicator goes on to show that the T-BERD/MTS is in process of acquisition and the screen displays the trace in process of acquisition.
- 2 The quality of the connection is displayed for a few seconds (see [Table 3 on page 38](#))
- 3 Then, a bar graph shows elapsed and remaining acquisition time.





**Figure 83** Acquisition in progress



At the end of the acquisition, a beep is emitted, the trace is displayed and an automatic measurement is started.



**NOTE**

During acquisition, the traffic on fiber is automatically detected (see [“Traffic detection” on page 39](#))

If the module possesses several lasers, to perform successive acquisitions on all the wavelengths:

- 1 In the **SETUP** menu, check in **Laser** line, that **several lasers are selected or select All**.
  - 2 Start the acquisition by pressing the **START/STOP** button.
  - 3 Once the acquisition for the first wavelength is finished, the acquisition for the following wavelength starts automatically.
- or

To stop manually the acquisition for current wavelength, click on **Stop Wavelength**. This will allow to automatically start the measurement for the following wavelength.

A beep is emitted once the acquisitions on all lasers are completed.

The different traces appear in the same window and can be managed as traces in overlay (see [“Overlay trace function” on page 63](#)).

## Results page

The trace(s) acquired or recalled from a memory is/are displayed on the Results page.

### Trace View

The Trace view is displayed by default once OTDR acquisition is completed.

Figure 84 FTTH OTDR Trace



Once trace is displayed, you can:

- Zoom on trace (see “Zoom function” on page 51).
- Set Cursor A and/or Cursor B (see “Cursors” on page 50).
- Save the traces and launch a report of results (see “Saving the trace(s) and generating a report” on page 179)

## Detailed description of an event

When clicking on one event icon in the results table, a popup window describes the event type and provides a diagnosis to help troubleshoot faulty optical elements (indicated in red).

**Figure 85** Event description



Press **SETUP** hard key to go back to FTTH Setup screen and modify the parameters before launching a new acquisition.

## SmartLink view

- 1 Click on the menu key **Trace/SmartLink** to select **SmartLink**.  
A screen as the following one is displayed:

Figure 86 SmartLink function



The screen is divided into three zones:

- **Zone 1:** Graphical representation of the link, with icons symbolizing the different events detected.
- **Zone 2:** Link Table, which gives a summary of results for each wavelength, with results within/without thresholds in green/red (according to Alarm thresholds defined in the setup screen).
- **Zone 3:** Alarms table (if any)



If several traces are displayed in overlay, with the same wavelength, then the Zone 2 indicates the results for each wavelength. The graphical representation of the Zone 1 is a combination of multiple pulses and wavelengths acquisitions.

## Getting a diagnostic of an event

Diagnosis is used to provide further information about events and eventual problems, such as root cause possibilities of a failed optical element.

- 1 Select the event to be described on the graphic (underlined in yellow).
- 2 Click on **Event Diagnostis** soft key  
A popup window, on the lower part of the screen, gives the information related to the selected event:
  - its type
  - thresholds applied for this event.
  - possible causes for the fail status of the selected link element

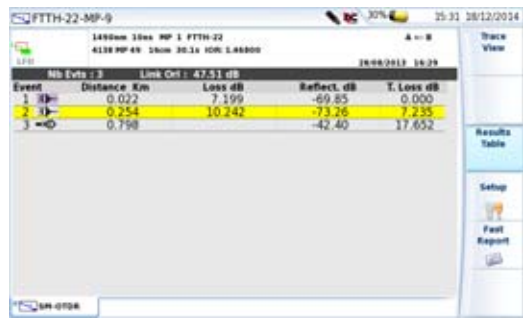
**Figure 87** Event Diagnosis window



## Results Table

To display exclusively the results table from the SmartLink page, press the **Results Table** softkey.

Figure 88 FTTH Smart Link: Results Table



Event	Distance Km	Loss dB	Reflect dB	T. Loss dB
1	0.022	7.199	-69.85	0.000
2	0.254	10.242	-73.26	7.235
3	0.798		-42.40	17.652

Press again the **Results Table** menu key to return to SmartLink display.

Event View

«Event View» provides the possible loss and reflectance of the selected event, per tested wavelengths.

- 1 Click on **Event View** menu key.  
In this view, an algorithm automatically identifies the elements of the FTTH link and label them.
- 2 Select the event to be described on the graphic (highlight in yellow).  
The corresponding event description is displayed on the Zone 3, with a recall of alarm threshold for this event:

Figure 89 SmartLink: Event View



- 3 Click on **Trace View** to display the selected event in the results table and zoomed on trace.



#### NOTE

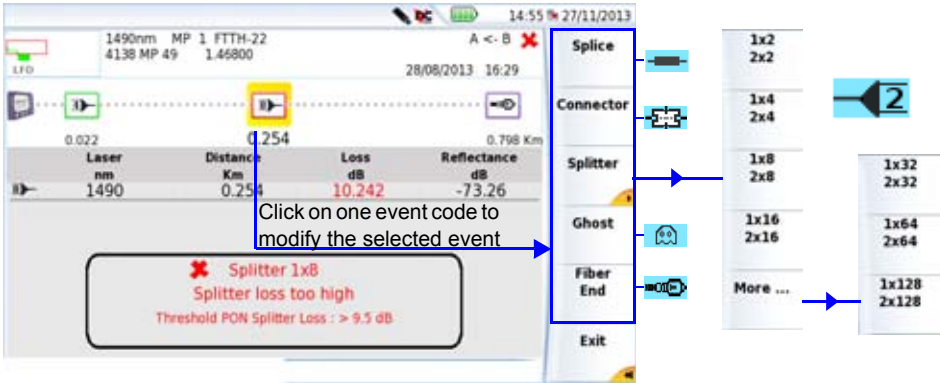
The event is framed in red if it is above the alarm thresholds defined in the setup menu.  
It is framed in green if it lies within the thresholds.  
It is framed in purple if no alarm has been defined for this type of event.

## Changing the type of an event

Once the **Event View** is displayed, the type of event can be modified:

- 1 Select the event to be modified (highlighted in yellow)
- 2 Press **Event Code** menu key
- 3 Click on the event type to be applied to the selected event:

Figure 90 Event Code



- 4 Click on **Exit** to return to **Event View**.
- 5 Click back on **Event View** menu key to return to Summary screen  
or  
Click on **Trace View** menu key to return to trace (and table) results screen.





**NOTE**

The event modification is automatically applied on trace and in the results table.



**Splitter sub-menus**

The Splitter icon is different according to the menu key pressed in the **Splitter** sub-menus.


Example:





If the menu key  is pressed, the icon  is displayed



If the menu key  is pressed, the icon  is displayed.

Moreover, the icon and splitter configuration is different according to the number of «clicks» on one menu key.

Example with the menu key  :

- Click once: the icon is 
- Click twice: the icon is 
- Click three times: the icon is 
- Click four times: the icon is 

Click a fifth time to reset the event by default.



## Saving the trace(s) and generating a report

Once the results page is displayed, the trace(s) can be saved and a report can be generated directly from the results screen.

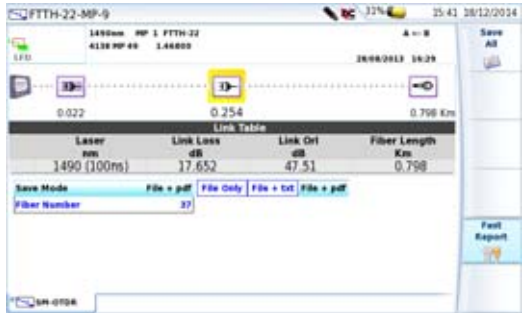
Saving and report can have been automatically generated if, in the file configuration, the **Auto Store** parameter has been set to **Yes** (see [page 170](#)) with the appropriate **Save Mode**.

## Saving results and creating a report from results page

To save the trace and generate a report:

- 1 Press **Fast Report** key  ->  .  
A menu displays under the trace.
- 2 In the menu, configure the file saving mode (and the report)

**Figure 91** Fast report configuration



- a In the **Save Mode** parameter, select:
    - File Only** to save exclusively the trace in a sor file
    - File + txt** to save the trace in a sor file and to generate a txt file of the results
    - File + pdf** to save the trace in a sor file and to generate a report in a pdf format
    - All** to save the trace in a sor file and to generate two reports: one in a pdf format and one in txt format.
  - b In the **Fiber Number** parameter use the left and right direction keys to define the fiber number by scrolling the available numbers.
- 3 Once all the parameters are configured, press **Save All** menu key.
  - 4 Enter a name for the file in the edition keypad.  
or  
Click on **Auto Filenaming** menu key to apply the file name defined in the Setup screen, in **Filenaming** parameter (see [page 169](#)).
  - 5 Press **Enter** to validate



**NOTE**

The sor file and the txt or pdf file will have the same name.

The icon 🗑️ displays during saving process.

Once saving is completed, a sound is emitted onto the Platform.



**NOTE**

The file and the report are saved in the last storage media and directory selected.

## Adding a logo to a pdf report

To display a logo, or any other image (other than the logo displayed by default) on the upper left part of the report:

- 1 Reach the **System Settings** screen:
  - on the T-BERD/MTS 2000, on the **Home** page, press the **Settings** icon
  - on the T-BERD/MTS 4000, on the **Home** page, press the **System Settings** menu key.
- 2 On the T-BERD/MTS 2000, in the **Reports** menu, in the **Mode** parameter, select **Report**  
On the T-BERD/MTS-4000, in the **Printer** menu, reach the **Printer** parameter and select **File (Formatted)**.
- 3 Select the **File Format** of the report: **JPG**, **PNG** or **PDF**.
- 4 In the **Logo** parameter, enter the full path of the image file (with file extension)  
Example: disk/Logo.jpg
- 5 Click on **Exit** to return to **Home** page.
- 6 Press **FILE** and in the **Explorer**, open the file for which a pdf report must be generated.

**7** Launch the report.

Once report is generated, the logo is displayed on the upper left part of the page.

## Opening a report

**1** To open the report, press **FILE** hardkey

**2** In the **Explorer** page, in the directory selected, select the file/report.

The file name is:

For the txt file: *trace file\_sor.txt*

For the pdf file: *trace file.sor.pdf*

**3** Press **Load**.

The file opens on the T-BERD/MTS.

**Figure 92** Fast Report with FTTH-SLM option



#### NOTE

A pdf report can also be generated from the File Explorer page onto the T-BERD/MTS (see [“Generating pdf report\(s\)” on page 249](#)).



# Cable-SLM option

This chapter describes the use of the Cable-SLM option, when the software license has been purchased with an OTDR module.

The topics discussed in this chapter are as follows:

- [“Principle of Cable-SLM” on page 186](#)
- [“Configuring the Cable-SLM project” on page 186](#)
- [“Starting project test process” on page 189](#)
- [“Results of project cable” on page 191](#)
- [“Files and Project storage” on page 194](#)

## Principle of Cable-SLM

The Cable-SLM option is a function used to manage a cable commissioning or a multi-fiber test project.


The aims of this option is to:

- improve workflow in cable commissioning (P2P links even with different distances, for example FTTH drops)
- ensure test consistency
- reduce manipulation errors / issue
- generate a report text file

## Configuring the Cable-SLM project

### Configuring the project

Once the OTDR module is set into the T-BERD/MTS, and the Cable-SLM license installed:

- 1 From the Home page, select the **Expert OTDR** function.  
The results page automatically displays.  
If not, press **RESULTS** hard key to display results page.
- 2 Press **SETUP** hard key to display the OTDR configuration screen and:
  - Configure the OTDR **Acquisition** parameters (see [page 28](#))
  - Configure the OTDR **Alarms** parameters (see [page 33](#))
  - Configure the OTDR **File** parameters (see [page 47](#))
- 3 Press **Link Cable** menu key  .
- 4 Configure the **Link Description** parameters (see [page 40](#))

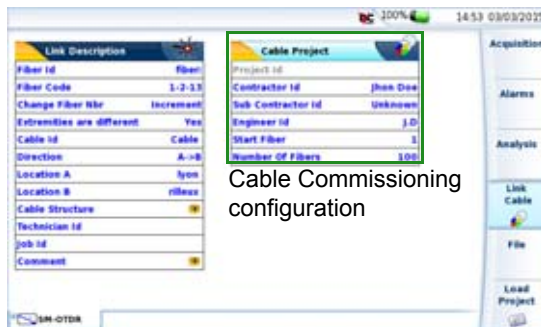


- 5 In the new window **Cable Project**, configure the project as required:
  - Use the Edition keypad to enter a name for **Contractor Id / Sub Contractor Id / Engineer Id**.
  - On the parameter **Start Fiber**, press **Edit Number** soft key to enter the number of the first fiber of the cable to be tested (Min 1 / Max 100)
  - On the parameter **Number Of Fibers**, press **Edit Number** soft key to enter the total number of fibers of the cable (Min 1 / Max 100)

OR

Press **Load Project** soft key to load an existing project (see [“Loading a existing project” on page 188](#)).

**Figure 93** Smart Link Cable Setup



## Saving the project

Once all configuration parameters are defined, save the project:

- 1 Press **Save Project** soft key (displayed when one parameter of the Cable Project window is displayed).
- 2 In the Edition keypad opened, enter a name for the project and press **Enter** to validate.

**Figure 94** Enter a name for the project



The project file (.prj) contains Acquisition / Alarms / Link / File parameters and is saved in root disk or Harddisk under `cable_co > OTDR` directory.

A directory is automatically generated with the project name, and it is saved under `disk > cable_co > OTDR`. Measurements are stored into this directory, as well as a summary text file.




**NOTE**

Once a project is created, the parameters cannot be modified except the acquisition ones.

## Loading a existing project

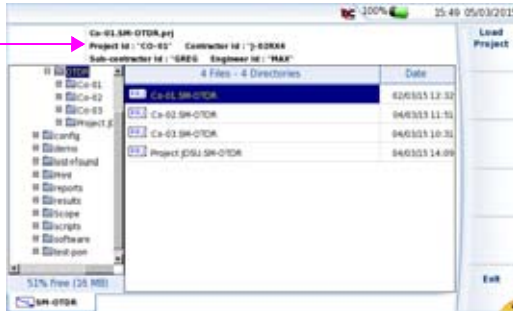
To open the project just created or to load an existing project:

- 1 Press the **Load Project** soft key on the Setup screen .
- 2 Select the project file to be used (.prj) in `disk > cable_co > OTDR` directory.

3 Press **Load Project** softkey.

**Figure 95** Loading a project

Recall of the  
Cable Project  
parameters



A summary table of all fibers and measurements performed is displayed.

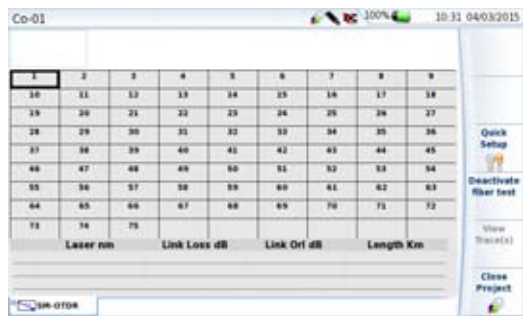
## Starting project test process



**Inspect & clean all fiber connections prior to connecting fiber under test to the OTDR port.**

Once the project is loaded, the following screen is displayed.

Figure 96 Cable view



- 1 Click on the first fiber to be tested.  
The fiber number is framed in black (n°1 in Figure above)
- 2 If necessary, press **Quick Setup** soft key to modify some acquisition parameters before launching the measurement

Figure 97 Quick Setup sub-menu



- 3 Press **START/STOP** hard key to start the acquisition.



**If a test is launched onto a fiber already tested, a dialog box displays: «Test already done. Do you really want to repeat the test? Results files will be deleted.».**

Click on **Yes** to confirm the new test, and by consequence, to delete existing file(s).

Click on **No** to cancel the test.

- 4 Once all wavelengths have been measured, a window opens, asking:



- Click on **Yes** to test next fiber
- Click on **No** to return to project table.

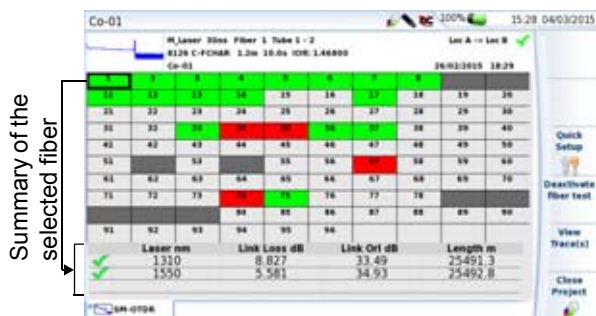
## Trace saving

The traces are automatically stored into the project directory and according to defined filenaming convention.

## Results of project cable

Once fibers have been tested, the project page updates on the fly:

**Figure 98** Cable project



### Description of the table

The number of fiber is highlighted in different color according to the alarm status:

## Deactivate the fiber test

Before starting the test, some fibers can be deactivated so that the acquisition will not be performed.

- 3 Repeat the process for the fibers which do not have to be tested.

**Figure 99** Fibers 4 and 6 deactivated

1	2	3	4	5	6	7
10	11	12	13	14	15	16
19	20	21	22	23	24	25

The deactivated fibers will be skipped while moving to next fiber to test.



**If a test is deactivated on a fiber already tested, a dialog box displays: «You're about to delete acquisition files. Are you sure?».**

Click on **Yes** to confirm the deactivation, and by consequence, to delete corresponding trace(s).

Click on **No** to cancel the deactivation.

## View Trace


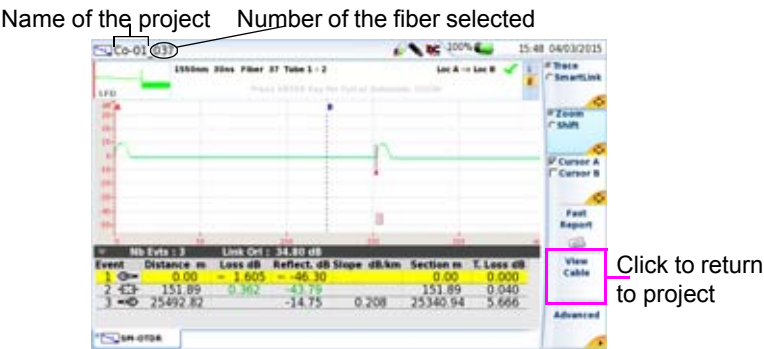
- 1 In the project page, click on the fiber number for which you want to display the corresponding trace (e.g. .
- 2 Click on **View Trace(s)** soft key.  
The trace result page displays.

Figure 100 Trace from fiber selected in project



Click on **View Cable** to return to project page.

## Files and Project storage

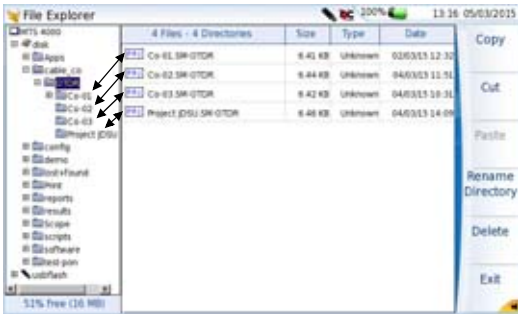
As soon as a project is saved from Setup page (see “[Saving the project](#)” on [page 187](#)), a folder is automatically generated with associated sub-directories.

The project and all corresponding test files are saved in the folder `cable_co`, automatically created.

The project file is saved in the directory `cable_co > OTDR`.



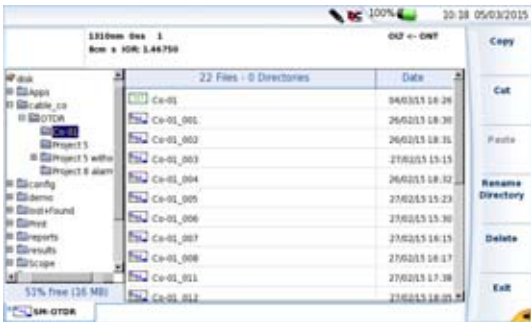
Figure 101 Project files



The project file is not visible in the explorer until the project is closed.

For each project, a subdirectory with the project Id is created, containing test OTDR files and summary results (in text format): `cable_co > OTDR > Project_Id`.

Figure 102 Project directory structure with file contents



# Text file content

As soon as one acquisition is performed from the project, a summary text file (.txt) is associated to the OTDR test data.

Each new test is inserted into the text file as project process evolves.

This file contains all the summary values of all tested fibers:

- Link loss
- Link distance
- Link ORL

This file uses tabulations to separate values. It is saved with the extension «.txt» and can be opened by the Platform.

**Figure 103** Text file



Co-02-001 - Results					
Header					
Date IN (JJ)					
Date 06/05/2004					
Time 16:19					
File Name Co-02-001					
Cable Project Co-02					
Project ID 3-02000					
Contractor ID 0000					
Sub Contractor ID 0000					
Engineer ID 0000					
Check Fiber 0					
Number of Fibers 0					
Results					
Fib. #	Loss (dB)	Link Loss (dB)	Link Dist (m)	Length (m)	Length (ft)
1	1.000	0.000	10.00	10.00	32.81
2	1.000	0.000	10.00	10.00	32.81
3	1.000	0.000	10.00	10.00	32.81
4	1.000	0.000	10.00	10.00	32.81
5	1.000	0.000	10.00	10.00	32.81
6	1.000	0.000	10.00	10.00	32.81
7	1.000	0.000	10.00	10.00	32.81
8	1.000	0.000	10.00	10.00	32.81
9	1.000	0.000	10.00	10.00	32.81
10	1.000	0.000	10.00	10.00	32.81

# FiberComplete Modules

This chapter describes the functions of the FiberComplete™ modules (Combined OTDR or Fault Finder and auto bidirectional IL/ORL and Distance) and their use.



**This function is not available with SmartOTDR.**

The topics discussed in this chapter are as follows:

- ["General introduction" page 198](#)
- ["Activating the function" page 202](#)
- ["Establishing References" page 202](#)
- ["Configuring the units" page 207](#)
- ["Performing the tests" page 224](#)
- ["Results screen" page 227](#)
- ["Saving results and generating a report" page 231](#)
- ["File management" page 235](#)

# General introduction

## Principle

FiberComplete is used to perform automatically and through a single connection port, the following tests:

- Bidirectional insertion loss (IL)
- Bidirectional optical return loss (ORL) using the continuous wave method (OCWR)
- Distance/length measurements
- Unidirectional / Bidirectional OTDR or fault analysis

To carry out the measurements, 2x T-BERD/MTS are needed, both equipped with FiberComplete capable modules (see references in [Chapter 13](#)) and broadband power meters on the mainframes.

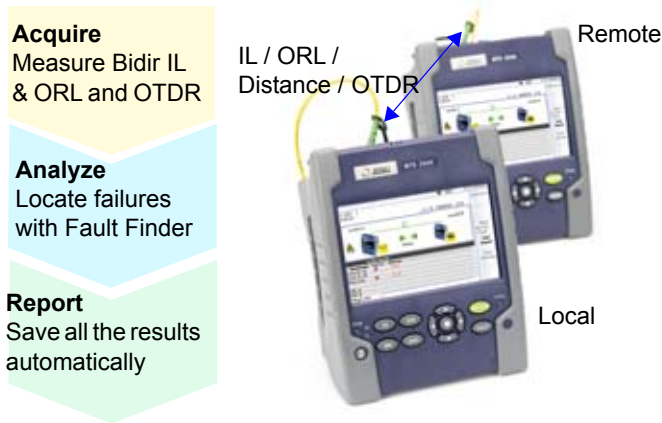
Using one unit at each end of the fiber under test and without any connection/disconnection, IL/ORL and distance measurements are performed and results exchanged via the fiber under test (FUT).

If the OTDR is selected, an OTDR measurement is launched automatically:

- **Unidirectional mode:** the OTDR acquisition is performed from the primary unit where the test has been initiated. Traces are saved locally
- **Bidirectional mode:** the OTDR acquisition is initiated successively from each unit. The traces are saved locally.

A failed value of IL or ORL may trigger the Fault Finder function automatically in order to identify the faulty event.

**Figure 104** Configuration for FiberComplete function



**NOTE**

The FiberComplete function can be performed with one T-BERD/MTS-2000 and one T-BERD/MTS-4000.

## Configurations

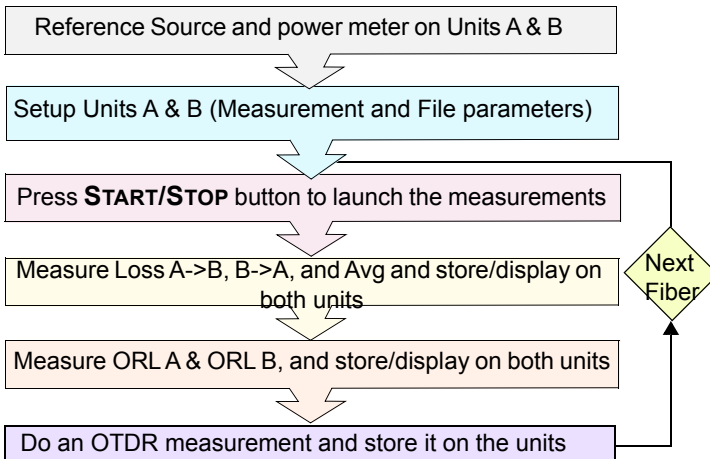
Two configurations are available, depending on the tests that have to be performed:

- Construction/Installation tests with loss, optical return loss, distance and OTDR.
- Acceptance Tests with loss, optical return loss and distance, and faults detection in case of problem.

## Construction/Installation Test

In this configuration, bidirectional IL and ORL, length and/or unidirectional/ bidirectional OTDR measurements are performed. The bidirectional IL/ ORL and length results are stored on each unit, the OTDR traces are stored on the locally unit (where the test has been initiated).

**Figure 105** Construction/Installation Test



**If a Bidirectional OTDR measurement is performed, the OTDR results are automatically saved on each unit;**

- The OTDR results trace for acquisition performed from Location A to Location B is stored on the primary unit (Location A)
- The OTDR results trace for acquisition performed from Location B to Location A is stored on the secondary unit (Location B)

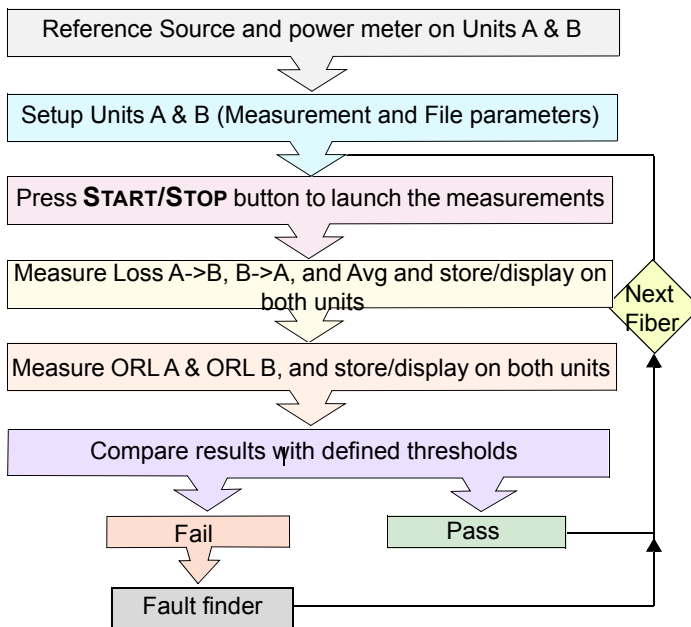
## Acceptance Tests

In this configuration, the bidirectional IL, ORL and length measurements are performed and results are automatically stored on each unit.

If the **Fault Finder** function has been selected in the **Setup** menu, and if at least one result exceeds the defined thresholds, the predominant defects causing the failure are identified and located.

The FiberComplete screen displays an easy to interpret result table that prompts predominant issues for easy troubleshooting.

**Figure 106** Acceptance Test



# Activating the function

- 1 Press the **HOME** button.
- 2 Select the icon FCOMP



The icon turns yellow and Fiber Complete is displayed



# Establishing References

To get a meaningful measurement, the two leads or patch cords used for the measurement have to be referenced. The references are valid for all fibers that will be tested during the day with the same patch cords. If, at anytime, the patchcords are disconnected from the test instruments and/or have been contaminated by dirt or dust, the patchcords have to be re-inspected and referencing stage has to be redone.



## Reference methods for insertion loss and ORL testing

**Table 5** Reference methods for Insertion Loss and ORL Testing

	IL Loopback Reference Method	IL Side-by-side Reference method	Zero ORL reference method
Setup requirement	No specific require- ment	Units shall be at the same location for ref- erences	No specific requirement
Description	Each unit is per- forming its own IL reference, with its source from the module port and powermeter from the base-unit, this with one dedicated jumper.	Each unit is perform- ing its own IL refer- ence, and units are connected using two jumpers and a bulk- head adapter.	Each unit is per- forming its own ORL reference, with its source / powermeter from the module, this with one dedi- cated jumper



**Table 5** Reference methods for Insertion Loss and ORL Testing

	<b>IL Loopback Reference Method</b>	<b>IL Side-by-side Reference method</b>	<b>Zero ORL reference method</b>
<b>Recommendations</b>	Easiest process. Not recommended for short links. Once the reference is performed, do not disconnect jumper from the source	Most accurate setup, but both units must be at the same location for references. Once the reference is performed, do not disconnect jumper from units ports.	Easy process. Once the reference is performed, do not disconnect jumper from the source. Use of non reflective terminator is mandatory for bend insensitive jumper.
<b>Loss principle</b>	Link ORL, including link connectors.	Link IL including one link connector	Link ORL measurement after jumper, for optimized testing. Requires mandrel wrap or non reflective termination at link end.
			

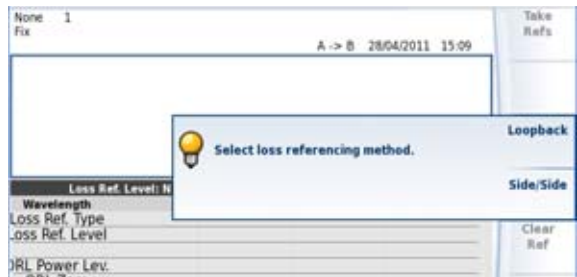
## Reference stage process

The Power Meter option is mandatory onto the Mainframe.

Each test equipment must set its own references and conform to the following process:

- 1 Press **RESULTS** button
- 2 Press **References > Take Refs** keys and follow the step by step instructions to perform references on each unit.
- 3 Choose between side by side or loopback for you loss referencing method

Figure 107 Select the reference to be performed



## Loopback Referencing method

The loopback referencing is used when the two units are at different location.

After clicking on **Loopback**, the wizard will guide you through two steps:

- 1 The self reference is used for loss and ORL testing. Connect the jumper from the module port to the mainframe powermeter and press **Ok** to start referencing.

Figure 108 Self reference

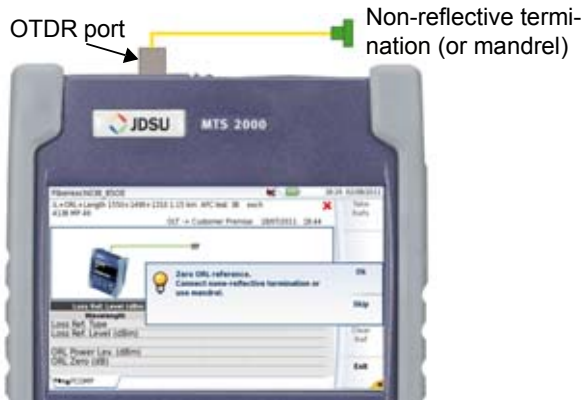


The reference values are stored and displayed at the end

- 1 The zero ORL reference is necessary for ORL testing. Once the self reference measurement has been carried out, the Zero ORL adjustment can be performed

Connect the jumper from the module port to the non-reflective termination via a mating sleeve. If you don't have a non-reflective termination, a mandrel can be used. Press **Ok** to start referencing.

**Figure 109** Zero ORL reference



**NOTE**

Non-reflective terminations are mandatory when bend insensitive jumpers are used.

## Side-by-Side referencing method

The side-by-side referencing is used when the two units are at the same location and is the preferred method for better loss measurement accuracy.

After clicking on **Side/Side**, the wizard will guide you through three steps:

- 1 The side-by-side reference is used for ORL testing. Connect the jumper from the module port to the mainframe powermeter and press **Ok** to start referencing.
- 2 The zero ORL reference is necessary for ORL testing. Once the self reference measurement has been carried out, the Zero ORL adjustment can be performed

Connect the jumper from the module port to the non-reflective termination via a mating sleeve. If you don't have a non-reflective termination a mandrel can be used. Press **Ok** to start referencing.

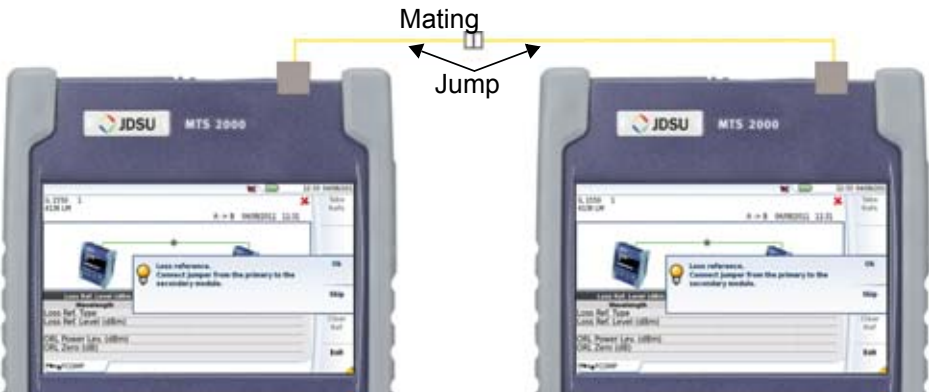
- 3 For the loss reference, connect the jumper from the module port of the primary unit, toward the module port of the secondary one via a mating sleeve. Press **Ok** to start referencing.



**NOTE**

The side-by-side loss reference is bidirectional and performed automatically on both units.

**Figure 110** Loss Reference



## Factory References

In the **Take Refs** sub-menu, the softkey **Factory Refs** is available.

It allows to apply the reference values defined by default in factory.

The following figure show the values defined by default in factory:

**Figure 111** Factory References



## Configuring the units

Once references have been taken on both Units, the acquisition parameters must be configured.

- 1 Press **SETUP** button to display the Setup menu of the FiberComplete function.



**The Laser selection and Analysis parameters must be configured on both units. Other acquisition setups shall be set on the primary unit.**

Figure 112 FiberComplete Setup



# Acquisition parameters

**Laser** select the desired wavelength(s).  
**All:** acquisition is performed for all wavelengths available in the instruments.

**NOTE**  
It is possible to select individual wavelength per unit. For example, one can make 1490/1550 nm test from one end, and 1310 nm from the other end.

**The following acquisition parameters are only taken into account if the test is performed from this unit. If not, those parameters are not taken into account.**

**Loss measurement** select the loss measurement mode.  
**Unidir.:** loss is measured in one direction only  
**Bidir.:** loss is measured in both direction  
**None:** loss is not measured.

**ORL measurement** select the ORL measurement mode.  
**Unidir.:** ORL is measured in one direction only  
**Bidir.:** ORL is measured in both direction  
**None:** ORL is not measured.



**A measurement will be performed only if at least Loss or ORL parameter is selected.**

**Length Measurement** select if the fiber length must be measured during the test.

**Yes:** the fiber length will be measured.

**No:** the fiber length will not be measured during the test.

**Length Measurement** select if the fiber length must be measured during the test.

**Yes:** the fiber length will be measured.

**No:** the fiber length will not be measured during the test.

**OTDR Measurement** select the measurement method for OTDR.

**None.:** OTDR measurement is not performed after FiberComplete test.

**Unidir.:** OTDR measurement is performed in one way: from the primary unit toward the secondary one.

**Bidir.:** OTDR measurement is performed with parameters defined in automatic mode in the two ways: from primary to secondary unit, and from secondary to primary unit.

**OTDR Acquisition** if OTDR measurement is configured with **Unidir** or **Bidir** parameter, select the acquisition mode for OTDR.

**Auto.:** OTDR acquisition is performed with parameters defined in automatic mode.

**Manual;** OTDR measurement is performed with the parameters manually defined in the OTDR Setup menu (see "[Configuring the test in Expert OTDR](#)" page 27).

**No:** OTDR measurement is not performed.



**NOTE**

This parameter is not available when only the Fault Finder function is available in the module.

**Fault Finder**

select if Fault Finder function must be activated.

**Yes:** if a result for Loss and/or ORL exceeds one limit value defined in the **Thresholds** parameters (see "[Alarms parameters](#)" on page 211), the Fault Finder function is automatically triggered in order to identify the faulty events.

**No:** the Fault finder function is not activated (no fault finding occurs, even if one value exceeds the thresholds).



**If «Fault Finder» parameter is set to Yes, the «OTDR» parameter is automatically set to No, and vice-versa.**



**The following parameters, defined on master unit, are automatically applied/transferred to the slave unit: Laser - IL/ ORL Bidir. - OTDR Acquisition Auto** (if **OTDR Acquisition** is defined on **Manual**, both units will performed a manual measurement, but according to their own configuration in the OTDR tab: the parameters can then be different).



## Alarms parameters

In the **Setup** page, press **Alarms** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Alarms**).

### Thresholds

select the user defined thresholds to be used:  
**User 1 / User 2 / User 3 / User 4** and enter limits for:

- **Loss**: enter a loss threshold for each wavelength (dB)
- **ORL**: enter an ORL threshold for each wavelength (dB)

Or select the **Default** parameter to define thresholds by default for Loss and ORL values:

- **Loss**: > 40 dB for each wavelength
- **ORL**: < 27 dB for each wavelength

Select **None** if alarm thresholds must not be defined

## Analysis parameters

In the **Setup** page, press **Analysis** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Analysis**).

### Unit

Select the unit for the distance measurement: km / kfeet / miles.

### Table View

Allows to choose the kind of table to be displayed at the end of acquisition.

### Fiber

displays detailed results for one fiber: Loss B -> A and loss A -> B at each wavelength; the average

loss at each wavelength and the ORL A and ORL B at each wavelength. See ["Fiber View" page 228](#).



**NOTE**

If **Fiber View** is selected, and if results are stored, then the file-naming convention is; *[fiber Id][fiber Num]*. Therefore, the unit will generate one IL / OLR / Distance file per fiber.

**Cable**

displays cable result of multiple fibers: the average loss and the ORL A and ORL B at each wavelength. See ["Cable view" page 227](#).



**NOTE**

If **Cable View** is selected, and if results are stored, then the file-naming convention is; *[cable ID]*. Therefore, the unit will generate one IL / OLR / distance file per complete cable.

## Link parameters

In the **Setup** page, press **Link** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Link**).



**NOTE**

The softkey **Copy File/Link to All** is displayed when one parameter is selected in the Link or File Setup page and when the Powermeter or Source function is active.

It allows to apply the Link and File configuration parameters of the current applications to all the other active Fiber Optic applications (powermeter, and source).

The information entered in the **Link Description** window concerns the editing and/or the modifications of the cable and fiber parameters. When a trace is recalled without recall of the configuration, the parameters of this trace will be present only in its signature.

## Fiber ID

Select the parameter **Fiber Id** and enter a name for the fiber, using the edition keypad.

## Fiber Number / Fiber Code

The parameter **Fiber Number** becomes **Fiber Code** if, in the **Cable Structure** window, the **Cable Content** parameter is defined on another parameter than **Fiber** (**Ribbon/Fiber**, **Tube/Fiber** or **Tube/Ribbon/Fiber**). See [page 215](#).

The fiber code corresponds to the fiber number if, in the **Cable Structure**, the parameter **Color coding** is defined on **No**.

The fiber code corresponds to the fiber color if, in the **Cable Structure**, the parameter **Color coding** is defined on **Yes**.

- 1 Select the parameter **Fiber Number/Fiber Code** and modify the parameter using the left and right direction keys.

The fiber number can be automatically incremented/decremented at each new file save if it has been configured in the File Setup page (see "[File parameters](#)" [page 219](#)).



### NOTE

The Fiber Code and the fiber number concatenated with **Fiber Name** are interdependent: they are incremented or decremented at the same time. However, the fiber number remains a number only, while the fiber code is alphanumerical. Whether it includes a color code or not (see "[Cable structure](#)" [on page 215](#)), it may be composed of one, two or three parts (see figure [Table on page 214](#)).

**Figure 113** Example of incrementation of fiber code

Fiber and cable parameters used in the example: Fiber Name: 'Fiberx' Cable Content: 'Tube/Fiber' Max Tube: 12 Max Fiber: 24 Coding used for the fiber and the tube: TIA				
	<b>Fiber N</b>		<b>Fiber N+1</b>	
<b>Color Code</b>	<b>Yes</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
<b>&lt;Fiber Name&gt;</b>	Fiberx24	Fiberx24	Fiberx25	Fiberx25
<b>&lt;Fiber Code&gt;</b>	BI/Aq-	1/24	Gold/BI	2/1

**Change Fiber Nbr**

**Increment**      the fiber number is automatically incremented at each new file-save.

**Decrement**    the fiber number is automatically decremented at each new file-save

**User defined**   Use **Edit Number** softkey to enter the increment/decrement value for fiber number.

    Note: to decrement the number, enter the sign «-» before the number. Example: -1.

    Min: -999 / Max: 999 / Auto: 0

**No**                the Fiber number must not automatically modified.

**Extremities are different<sup>1</sup>**

In some cases, it is interesting to save different information for the origin and the extremity of the cable.

If this option is validated, it is possible, after selecting the extremity to be edited in the **Cable Structure** menu, to modify the values specific to the

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1.Available exclusively if Super Expert license is installed

cable (cable name, color coding, content of the coding), for each of these extremities. See chapter [“Cable structure” on page 215](#))

To display/modify the data specific to the fiber (name and code), it is necessary to change direction temporarily. In the "O->E" direction, the information on the origin can be edited, and in the "E->O" direction, that on the extremity.

### **Cable Id**

This parameter allows to enter an identification of the cable, using the Edition menu.

### **Direction**

The direction shows if the acquisition has been made from the origin to the extremity (A->B) or from the extremity to the origin (B->A). Changing direction makes it possible, when different extremities are handled, to see the parameters of the fiber for the other extremity.

### **Location A**

The name of the Location A of the link may be entered here.

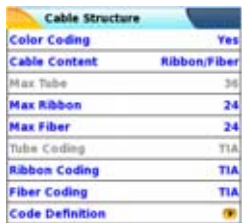
### **Location B**


The name of the Location B of the link may be entered here.

### **Cable structure**

This line opens a sub-menu, all the parameters of which can be different for each extremity.

Figure 114 Cable structure menu

A screenshot of a software window titled "Cable Structure". It contains a list of configuration options with their current values. The options are: Color Coding (Yes), Cable Content (Ribbon/Fiber), Max Tube (36), Max Ribbon (24), Max Fiber (24), Tube Coding (TIA), Ribbon Coding (TIA), Fiber Coding (TIA), and Code Definition (a button with a yellow icon).

Cable Structure	
Color Coding	Yes
Cable Content	Ribbon/Fiber
Max Tube	36
Max Ribbon	24
Max Fiber	24
Tube Coding	TIA
Ribbon Coding	TIA
Fiber Coding	TIA
Code Definition	



**NOTE**

The **Cable Structure** window is specific to an extremity. Each struc-ture keeps its own parameters by default. Modifications made to the one are not automatically applied to the other. Thus, after the values relating to the origin have been modified, it is normal not to find these same values entered for the extremity.

**View extremity**

If extremities are declared as different (see [“Extremities are different” on page 214](#)), this parameter allows to navigate between the Extremity and Origin parameters.

**Cable Id**

If the extremities are different, you can specify the cable identification for the origin and the extremity.

**Color Coding**

Choice of whether or not to apply a color coding to the fiber. This choice is made at link level, as all the fibers of a given link, for a given extremity, will be coded the same way. This choice modifies the result of the <Fiber Code> line. See [“Fiber Number / Fiber Code” on page 213](#).

<b>Cable content</b>	Shows how the color code is to be used: <ul style="list-style-type: none"><li>– FiberOnly the color code of the fiber is proposed (example: «Gold»)</li><li>– Ribbon/Fiber The color code of the fiber is preceded by that of the ribbon, and separated by a '/' (example: 'Bl/Or')</li><li>– Tube/Fiber The color code of the fiber is preceded by that of the tube, and separated by a '/' (example: 'Br/Or')</li><li>– Tube/Ribbon/Fiber The color code of the fiber is preceded by that of the tube, then by that of the ribbon; the three being separated by a '/' (example: 'Br/Bl/Or'). See <a href="#">“Fiber Number / Fiber Code” on page 213</a>.</li></ul>
<b>Max tube</b>	Shows the maximum number of tubes in the cable for the extremity selected. This information influences the automatic coding of the fiber. See <a href="#">“Fiber Number / Fiber Code” on page 213</a> .
<b>Max ribbon</b>	Shows the maximum number of ribbons in the cable for the extremity selected. This information influences the automatic coding of the fiber. See <a href="#">“Fiber Number / Fiber Code” on page 213</a> .
<b>Max fiber</b>	Shows the maximum number of fibers in the cable for the extremity selected. This information influences the automatic coding of the fiber. See <a href="#">“Fiber Number / Fiber Code” on page 213</a> .



#### NOTE

Certain parameters are not valid in the configuration selected. Thus, if no tube is selected in **Cable Content**, all the lines relating to the tube concept will be deactivated (grayed out in the menu).

### Tube Coding, Ribbon Coding, Fiber Coding

The lines Tube Coding, Ribbon Coding and Fiber Coding enable selection of the color coding of the tube, the ribbon and the fiber from 5 different

codes described below: TIA, USER 1, USER 2, USER 3 and USER 4.

### **Code Definition**

The Code Definition line opens a sub-menu, with which the different color codes possible on the instrument can be displayed and modified.

Five different codes can be managed by the MTS/T-BERD 4000, including a standard code.

The standard code (TIA) may be displayed but it cannot be modified.

The other codes, called by default USER1, USER2, USER3 and USER4, can be entirely personalized.

- Edited codeselects the code for display or modification.
- Code nameto give a new name to the code selected, press the ► key, which calls up the edit menu.
- View codesdisplays the color codes 1 to 12, 13 to 24 or 25 to 36.
- Code 1...23Use the arrow ► to modify the codes if necessary.

### **Technician Id**

Use the arrow ► to enter the name of the operator carrying out the measurement.

### **Job Id**

Use the arrow ► to enter a description of the measurement to be performed.

### **Comment**

In contrast to the other data in this menu, the comment is specific to a fiber. This line is thus used to enter a new comment and not to display it. The comment appears at the top of the screen, with the other parameters of the fiber.

This comment will remain available for the next acquisition, unless it is deleted. It is also saved when a trace is saved with a comment.



## File parameters

The File storage parameters must be also configured, in order to define how the results traces will be saved onto the MTS/T-BERD 2000.



**The following parameters defined in the Setup > File page of the master unit are automatically applied/transferred to the slave unit: Filenaming - Save mode.**

In the **Setup** page, press **File** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **File**).



### NOTE

The softkey **Copy File/Link to All** is displayed when one parameter is selected in the Link or File Setup page and when the Powermeter or Source function is active.

It allows to apply the Link and File configuration parameters of the current applications to all the other active Fiber Optic applications (powermeter, and source).

### Dir

This parameter cannot be configured, and display the directory selected by default into which the file(s) will be saved (the last directory selected).

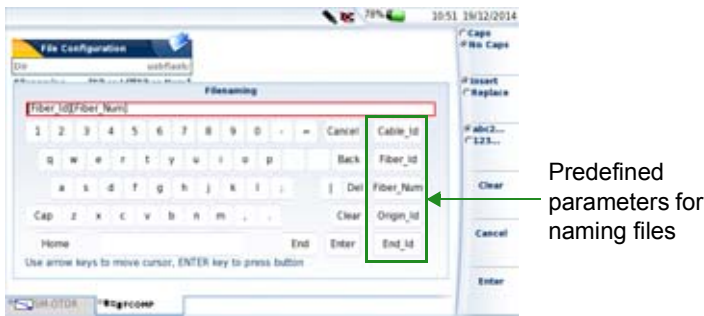
To modify the directory, go to the **Explorer** page and select another directory.

### Filenaming

Select **Filenaming** parameter and press the right arrow key to modify the name of the file for the result trace.

In the edition keypad, enter a name manually for the file and/or use the predefined parameters available (**Cable\_Id**, **Fiber\_Num**...). Then, press **Enter** to validate.

Figure 115 Filenaming - Edition keypad



or  
Press **Default Filename** to apply the name by default to the file:

**Default Filename for FCOMP results**

**Filenaming convention in Fiber View**

In Fiber View, the filenaming convention is as follows:

[Fiber\_Id][Fiber\_Num]

**Filenaming convention in Cable View**

In Cable View, the filenaming convention is as follows:

[Cable\_Id]

As soon as the Cable Id changes, the result table is cleared and the next tests are stored with the new Cable Id name.

The table view can be modified in the **Setup** page (see [Figure 104 on page 199](#)).

### Filenaming convention for Fault Finder results

If the fault finder is selected, the fault finder sor trace is using the following filenaming convention:

`[Cable_Id] [Fiber_Id] [Fiber_Num]`

The name of the file is displayed in grey under **Filenaming** parameter

### Save Mode

When a trace or more is displayed, in the parameter **Save Mode**, you can select three types of methods for storing traces:

<b>File Only</b>	only the trace(s) is/are stored in one/several file(s), with its extension (.sor, .msor)
<b>File + txt</b>	the trace(s) is/are stored in one/several file(s), with its extension and one txt file is also generated.
<b>File + pdf</b>	the trace(s) is/are stored in one/several file(s), with its extension and one pdf file is also generated.

### Auto Store

Select **Yes** to store automatically the trace or traces resulting from each acquisition according to the filenaming rules.

## Automatic configuration

Press the key **Auto Setup** to configure automatically the acquisition parameters as follows:


- Lasers: **All**
- Loss Measurement: **Bidir.**
- ORL Measurement: **Bidir.**
- Distance: **Yes**
- OTDR Measurement: **None**
- Fault Finder: **No**
- Table View: **Fiber**
- Threshold: **Default**

## **Saving the parameters from FiberComplete configuration**

Once the OTDR and FCOMP File and Measurement parameters are configured, it can be saved in a configuration file.

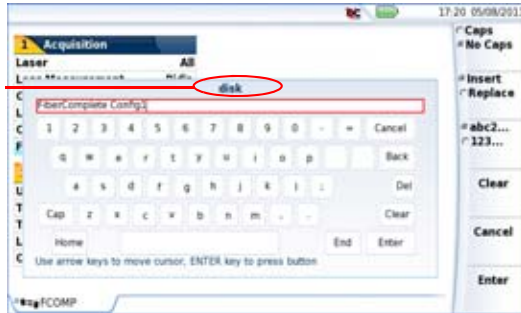
This configuration file can then be recalled for future acquisition in Fiber-Complete mode.

To save parameters in a configuration file:

- 1 In the **Setup** page, select one parameter & press menu key .  
An edition keypad displays
- 2 Enter a name for the configuration file.

**Figure 116** Save Configuration file - Edition keypad


Directory into  
which file will be  
saved



**NOTE**

Configuration file is saved in the current directory, the last one used.

- 1 Press **Enter** to validate

The configuration file is saved with the extension «fo\_cfg» (icon ).



**NOTE**

The FiberComplete configuration file includes data storage and measurement settings of FCOMP and SM\_OTDR. This configuration file can be shared and reused with other units.

## Loading a configuration file FiberComplete

FiberComplete configuration file includes OTDR and FCOMP setup and file parameters.

To load a configuration file previously created and apply parameters to new tests:

- 1 Press **FILE** hard key
- 2 Select the configuration file in the wished directory.
- 3 Press **Load > Load Config.**
  - Press **SETUP** hard key to display the OTDR and FCOMP acquisition parameters saved in the configuration file.

You can modify some acquisition or file storage parameters, and save them in a new configuration file (see [“Saving the parameters from FiberComplete configuration” on page 222](#)).



**NOTE**

Some configuration files are available in the Platform: press **FILE** and select **disk > config > FCOMP**.

## Performing the tests

Once **Setup** is configured on both units, they can be linked to the fiber to be tested.

- 1 Press **RESULTS** hard key to display the results page for FiberComplete function

### Automatic pairing / continuity check

As soon as the secondary (B) unit is connected to the fiber, the primary (A) unit detects it (and vice-versa).



One unit is disconnected of the fiber link, or there is a break



Both unit are connected to the same fiber

## Sending a message to the distant Platform

Once both Platforms are paired via the fiber to be tested, each one can send a message to the other Platform.

This message can be sent to launch a test, to wait before launching the test, to clean the connectors...

To send a message to the distant Platform:

- 1 Go to the **Results** page.
- 2 Press **Send a message** softkey.  
A new screen displays.

Figure 117 Messages list



- 3 Select the message to send.

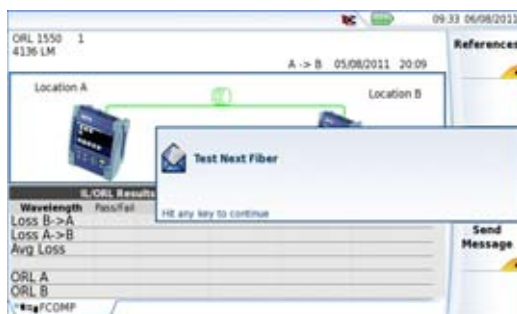


**NOTE**

If the message "Go to Fiber Nb" is selected, use left and right direction keys to decrement/increment the fiber number.

- 4 Press the **Send Message** softkey.  
The message displays automatically on distant Platform.

**Figure 118** Receipt of the message on the distant Platform



## Starting the test

Below are described the steps when bidirectional IL/ORL and distance are selected in the **Setup** menu.

- 1 Press **START/STOP** button to launch the test
  - a Unit A and B are performing IL test and mutually exchange their result values
  - b Unit A and B are performing ORL test (using OCWR method) and mutually exchange their result values.
  - c Distance measurement is performed and recorded on both units.



Figure 119 Test in progress



- d Once all tests are performed, results are displayed on both units
- e If **OTDR** parameter is set to **Auto** or **Manual** in the **Setup** menu, the OTDR acquisition starts.
- f If **Fault Finder** parameter is set to **Yes** and an IL or ORL value reaches one of the user defined thresholds, the Fault Finder starts.

See “Configuring the units” on page 207.

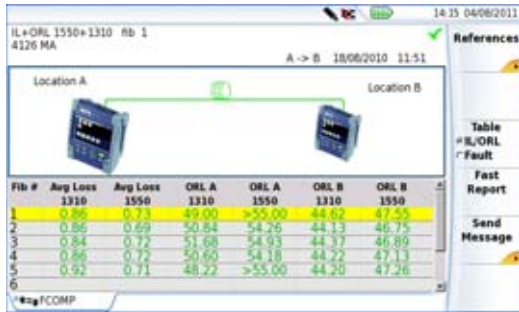
## Results screen

Once the tests are completed, the results screen displays on both units.

## Cable view

If, in the **Setup** page, the parameter **Table View** is set to **Cable**, the following result table is displayed:

Figure 120 Result Cable View



The **Cable View** allows to display results of multiple fibers:

- the average loss at each wavelength
- the ORL A and ORL B at each wavelength
- the distance is displayed on top of the screen



**NOTE**

In order to erase the results table, the Cable ID must be modified in the **File Setup** menu (see [“Description of the explorer” on page 240](#)).

## Fiber View

If, in the **Setup** page, the parameter **Table View** is set to **Fiber**, a screen as the following one displays:

**Figure 121** Result Fiber View



The Fiber View allows to display results of one fiber:

- Loss B -> A and loss A -> B at each wavelength
- the average loss at each wavelength
- the ORL A and ORL B at each wavelength
- the distance is displayed on top of the screen

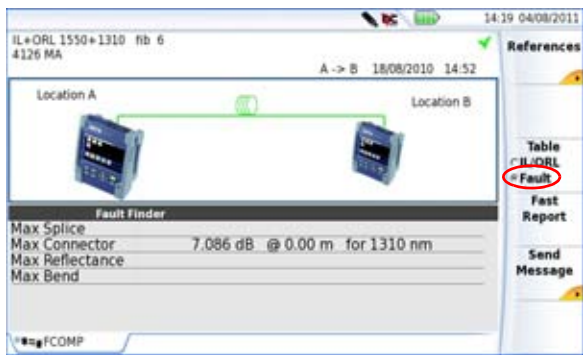
## Fault Finder

If, in the **Setup** page, the **Fault Finder** parameter is set to **Yes**, a Fault analysis is automatically launched, if one value exceeds the thresholds defined in the Setup menu.

As soon as the Fault Finder finishes its analysis, an easy to interpret table displays. It indicates the attenuation values and/or reflectance of the predominant defects that may have caused the IL / ORL values to fail.

- 1 Select **Table IL/ORL - Fault** to switch between the IL/ORL and Fault Finder result.

Figure 122 Fault finder result screen



## OTDR

If the **OTDR** parameter has been set to **Manual** or **Auto**, the OTDR acquisition is launched and the trace(s) can be seen by selected the OTDR tab at the bottom of the screen.

Figure 123 OTDR trace





**NOTE**

In **Unidir/Bidir** modes, the wavelengths selected for IL/ORL are also used for OTDR testing.

In **Manual** mode, all the OTDR parameters can be adjusted in the OTDR setup menu.



**NOTE**

To go from one tab to the other one, press the **RESULTS** button or, with touchscreen, directly select the tab wished.



**NOTE**

In bidirectional mode:

- The OTDR results trace for acquisition performed from Location A to Location B is stored on the primary unit (Location A)
- The OTDR results trace for acquisition performed from Location B to Location A is stored on the secondary unit (Location B).



## Saving results and generating a report

Once the results page is displayed, the results can be saved and a report can be generated directly from the results screen.

Saving and report can have been automatically generated if, in the file configuration, the **Auto Store** parameter has been set to **Yes** (see [page 221](#)) with the appropriate **Save Mode**.

## Saving results and creating a report from results page

To generate a report:

- 1 Press **Fast Report** soft key  ->  .  
A menu displays under the trace.
- 2 In the menu, configure the file saving mode (and the report)

**Figure 124** Fast report configuration



- a In the **Save Mode** parameter, select:  
**File Only** to save exclusively the results in a blts file  
**File + txt** to save the results in a blts file and to generate a txt file of the results  
**File + pdf** to save the results in a blts file and to generate a report in a pdf file
- b In the **Cable Id** parameter, enter/modify the name of the Cable using the edition keypad.
- c Modify the **Fiber Number** / **Fiber Code** using the key ►.  
The parameter is different according to the Cable Structure configuration (see [“Cable structure” on page 215](#)).
- d In the **Direction** parameter, select/modify the direction, to define if the measurement has been performed from Origin to Extremity (**A -> B**) or from Extremity to Origin (**B -> A**)

- e In the **Location A** and **Location B** parameters, enter/modify the name of Origin and Extremity.
- 3 Once saving is configured as wished, press **Save All** menu key
- 4 Enter a name for the file in the edition keypad  
or  
Press **Auto Filenaming** to apply the file name defined in the Setup screen, in **Filenaming** parameter (see [“Filenaming” on page 219](#))
- 5 Press **Enter** to validate



**NOTE**

The blts file and the txt or pdf file will have the same name.

The icon 🌟 displays during saving process.

Once saving is completed, a sound is emitted onto the Platform.



**NOTE**

The file and the report are saved in the last storage media and directory selected.

## Adding a logo to a pdf report

To display a logo, or any other image (other than the logo displayed by default) on the upper left part of the report:

- 1 Reach the **System Settings** screen:
  - on the T-BERD/MTS 2000, on the **Home** page, press the **Settings** icon
  - on the T-BERD/MTS 4000, on the **Home** page, press the **System Settings** menu key.
- 2 On the T-BERD/MTS 2000, in the **Reports** menu, in the **Mode** parameter, select **Report**

On the T-BERD/MTS-4000, in the **Printer** menu, reach the **Printer** parameter and select **File (Formatted)**.

- 3 Select the file format of the report: **JPG**, **PNG** or **PDF**.
  - 4 In the **Logo** parameter, enter the full path of the image file (with file extension)  
Example: `disk/Logo.jpg`
  - 5 Click on **Exit** to return to **Home** page.
  - 6 Press **FILE** and in the **Explorer**, open the file for which a pdf report must be generated.
  - 7 Launch the report.
- Once report is generated, the logo is displayed on the upper left part of the page.

## Opening a report

- 1 To open the report, press **FILE** hardkey
- 2 In the **Explorer** page, in the directory selected, select the file of the report.  
For the txt file: `trace file_sor.txt`  
For the pdf file: `trace file.sor.pdf`.
- 3 Press **Load**.  
The file opens on the T-BERD/MTS.



**Figure 125** Example of PDF report

Wavelength	Loss B->A	Loss A->B	Avg Loss	ORL A	ORL B
1310	19.95	19.96	19.95	29.15	33.83
1550	20.03	19.96	19.99	26.97	35.58
1625	20.06	---	20.06	---	36.21



#### NOTE

A pdf report can also be generated from the File Explorer page onto the T-BERD/MTS 8000 V2 or 6000/6000A (see [“Generating pdf report\(s\)” on page 249](#)).

## File management

### Storing results

Although each measurement is automatically stored, it is possible to save the results under a different file name, directory etc.

Once the results are displayed:

- 1 Press the **FILE** button
- 2 Select **Setup** with the key **Setup/Explorer**
- 3 Modify the parameter you want in the **File** configuration menu

## Filenaming convention

The filenaming convention is automatically generated by the unit.

### Filenaming convention in Fiber View

In Fiber View, the filenaming convention is as follows:

**[Fiber\_Id] [Fiber\_Num]**

One blts file is created per each individual fiber tested. The Fiber Number is automatically incremented.

### Filenaming convention in Cable View

In Cable View, the filenaming convention is as follows:

**[Cable\_Id]**

The cable results, which includes all fibers, are stored in a .blts file.

As soon as the Cable Id changes, the result table is cleared and the next tests are stored with the new Cable Id name.

The table view can be modified in the Setup page (see [Figure 112 on page 208](#)).

### Filenaming convention for OTDR results

If the OTDR is set to Auto, the sor traces have the following filenaming convention:

**[Cable\_Id] [Fiber\_Id] [Fiber\_Num]**

A pre formatted .txt file can also be generated automatically at each measurement. It includes the Fault Finder table.

Please refer to [Chapter 11 “File management”](#) for more information on storage/recall functions.



# File management

The topics discussed in this chapter are as follows:

- [“Description of the explorer” on page 240](#)
- [“Saving and loading files” on page 243](#)
- [“Exporting files” on page 246](#)

# Description of the explorer

## Opening the file explorer

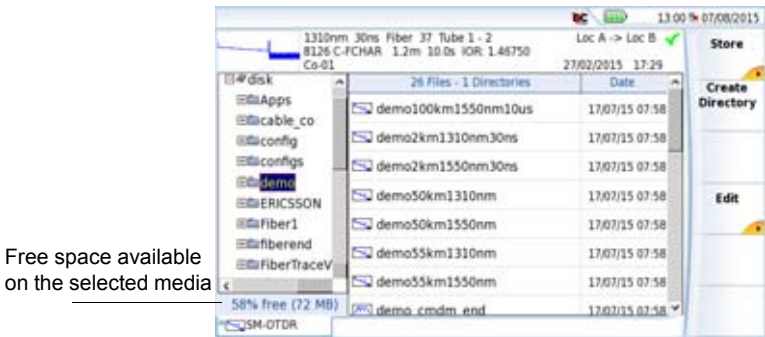
To access the Explorer

- 1 Press the **FILE** button

The explorer is used to select the storage medium, and to create or rename directories and files:

- The left-hand part presents the storage architecture. Click on the left of the screen or use the keys ▲ and ▼ to move around among all the media and their respective directories.
- The right-hand part displays all the files present in the directory selected.

**Figure 126** Example of explorer



Free space available  
on the selected media

The direction keys can be used to move horizontally between the two parts and vertically within each zone.

At the top of the screen, the file signature selected is repeated (see [Figure 127 on page 241](#)).

## Managing tabs

Tabs give access to the File menu of each application present in the modules of the instrument.

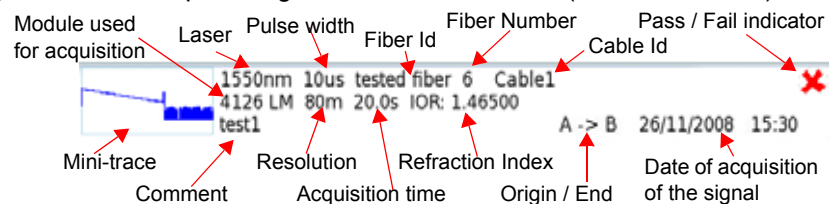
It is possible to open a file even if the corresponding module is not present in the instrument. A new tab then temporarily manages this application.

When several different applications (corresponding to modules for different measurements) are managed by the SmartOTDR, pressing the **FILE** key several times in succession changes from one tab to another to give access to the file configuration of the desired application (e.g. FCOMP, LTS etc.).

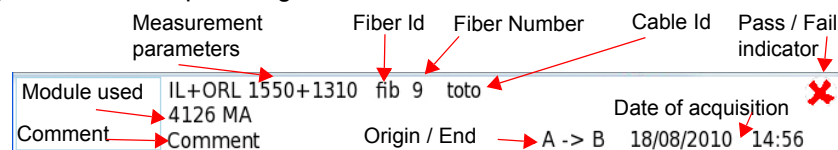
## File signature

The acquisition parameters of the trace contained in the selected file are displayed at the top of the screen together with a small-scale representation of the trace (provided it was acquired on a MTS / T-BERD).

**Figure 127** Example of signature of an OTDR file (in the File Menu)



**Figure 128** Example of signature with FCOMP file



## Buttons on the right of the screen

### Saving traces

Three buttons are used to save one or more traces.

- **Store Trace:** allows to save the current trace opened.
- **Store all Traces:** allows to store all the traces displayed in overlay (OTDR) in one single file.
- The softkey **Next Trace** is used to activate the menu of the following trace, when several OTDR traces are in overlay.



## Storage media

For saving or recalling data, the equipment offers a wide choice of media, both built-in and external.

Free space on selected media is clearly displayed at the bottom of the left panel.



### NOTE

#### Remote Base Unit and data transfer

During a data transfer (with the option Data/Talkset), the distant Base-Unit hard drive connected by the fiber is displayed as a storage media. File and directory edition features may all be used in the same manner with this storage media as with the other ones



## Directories and files editing function

The Files and directories editing functions are similar to those available in the Explorer page of the Platform.

Refer to 2000/4000 Platform or SmartOTDR User Manual if you want to work on directories and files (copy/paste, rename...).

## Saving and loading files

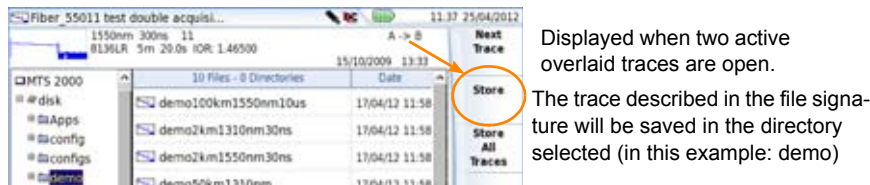
### Saving files from the Explorer

When the explorer is displayed, the active trace for the selected tab is displayed in the File Signature.

You can then save the active trace:

- 1 Select a directory by clicking once on it
- 2 Click on **Store** to save the active trace  
A new sub-menu displays
- 3 For OTDR traces only click on **Next Trace** to change the file signature on the top part of the screen and to save the next trace from traces in overlay
- 4 Click on **Save All** or on **Save** (OTDR files only).  
The **Save All** menu key in OTDR tab allows to save all the traces opened, whereas the **Save** menu key allows to save exclusively the trace described in the file signature.
- 5 If you wish, click on **FILE** button to display the Explorer page for another application and save, using the same method, the active trace from this application.

Figure 129 Saving active trace from the explorer (with OTDR trace)



This will open automatically the edition keypad, in order to give a file-name for the active trace.



The «Store» menu key is not available if the type of saving for OTDR files is defined to «All Traces» in the File Content parameter (see “File Content” on page 48).

## Loading files and displaying traces

To access the functions for loading one or more files, select the file(s) in the explorer and press **Load**.



### NOTE

For TXT, PDF, LTS and FCOMP, only one file can be opened at a time.

## Simple loading

The key **View Trace(s)** enables simple loading of traces, using the current parameters of the SmartOTDR. The current trace is then replaced with this new trace.

## Load with configuration

The key **Load Trace + Config** will display the traces, recalling the configuration recorded in the file. Thus the zooms, cursors and parameters present at the time of acquisition will be used for the display.

This function also enables to recall and set the parameters defined in the screens corresponding respectively to the **FILE** and **SETUP** keys.

It is then possible to perform an acquisition under the same conditions as those of the trace recalled.

- If the SmartOTDR was equipped with a different module from the current one when the trace was acquired, certain configuration parameters cannot be updated. A message warns the user of this.
- If several traces are selected, the configuration used will be that of the first trace.
- If the number of traces added and the number of traces present is greater than 8, then the last traces added will not all be taken into account.



**The configuration cannot be recalled if the trace was not originally created by a SmartOTDR or SmartOTDR.**

## Loading several traces in overlay

Up to 8 traces in the same application (OTDR) can be displayed simultaneously in overlay.

To obtain a display of multiple traces, two methods are possible:

- Select all the files to be loaded at the same time (see 2000 or 4000 Platform User manual for multiple selection of files) and click on **Load > View Trace(s)**
- Define a reference trace in a first time, open it, then come back to the explorer to select the other traces to be added (see [“Reference Trace function” on page 93](#)).

# Exporting files

Click on the **Export** menu key allows to display a sub-menu from which selected files can be:

- generated into one/several reports
- merged into one file (for txt/pdf files only)
- sent by e-mail

## Explorer/Link Manager

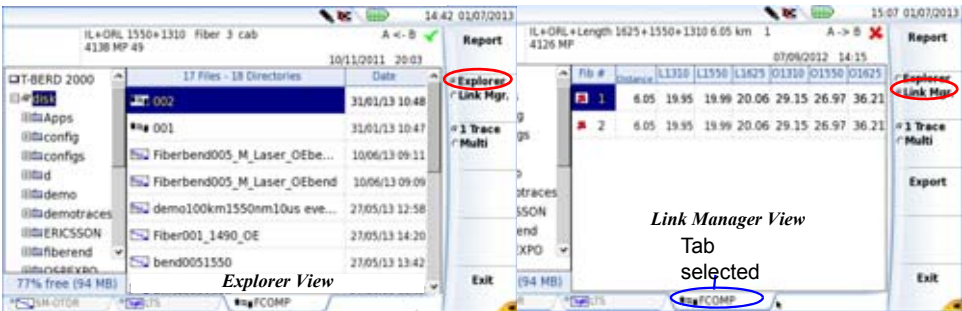
Before exporting file(s), the display can be modified, and the Link Manager can be selected instead of the Explorer using the **Explorer/Link Mgr** menu key.

The Link Manager function allows to display the explorer with all the link information exclusively for the active application (the function must be activated in **Home** page, or at least one result trace must be opened to get the tab and display files in the Link Manager page).

For example, if the **Link Mgr.** function is selected in the tab OTDR, only the link information from the OTDR files will be displayed (wether in multimode or singlemode).

Select **Link Mgr** with the menu key **Explorer/Link Mgr.** to display the corresponding files for the active tab.

Figure 130 Explorer and Link Manager display



According to the application selected, the fiber information available are different. The table below describes the fiber information displayed for each selected tab:



**NOTE**

The files in the Link Manager window can be sorted according each column available for a tab.

**Table 6** Fiber Information displayed

Column.	OTDR & OEO	FCOMP	LTS
1st	Alarm status (icon) & Fiber number		
2nd	Direction	Distance	Laser
3rd	Lambda	Lambda	Power (dBm)
4th	Total Loss	Lambda	Loss (dB)
5th	Distance	Lambda	Ref (dBm)
6th	Nb of Event	ORL at 1310 nm	-
7th	Max Splice	ORL at 1550 nm	-
8th	Total ORL	ORL at 1625 nm	-

## Editing function

The same editing functions as those from the Explorer are available with the Link Manager function, except the merging function (as this is used with txt files):

- Directory: Copy (or cut) / Paste; Rename, Delete... See [“Directories and files editing function” on page 243](#)).
- File(s): Copy / Cut, Rename, Delete... See [“Directories and files editing function” on page 243](#).

Moreover, the **Edit** menu from the **Link Manager** page allows to export the whole directory, with the files corresponding to the active tab, in a txt file.

## Exporting a directory in a txt file

- 1 Click on **Export** and select the **Link Manager** function
- 2 Select the tab corresponding to the files you want to use
- 3 Select the directory to open
- 4 Select one file from the list
- 5 Click on **Export** menu key.

The txt file is automatically generated, in the same directory as the one selected for the export.

The name by default for the txt file is: *fiber\_info\_"name of application selected".txt*.

For example, for the export of the Fiber Information from the OTDR application, the txt file will be called: *fiber\_info\_otdr.txt*



### NOTE

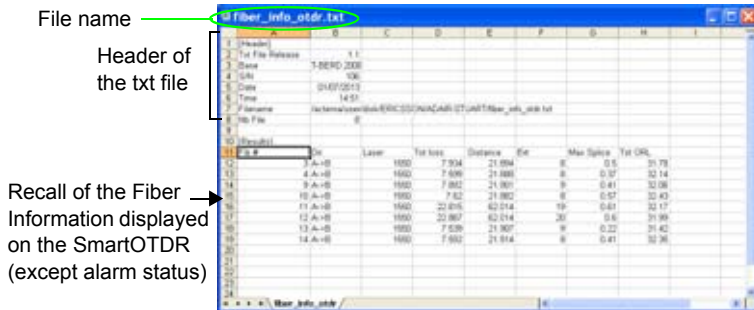
The txt file can be renamed once it is saved.

This file is made of two parts:

- The Header, with general information: the equipment used and its serial number, the date and time of export, the location of the file, and the number of files exported.
- The table, containing all the fibers information coming from the files of the active tab.

Once generated, the txt file can be transferred onto a PC and opened via a spreadsheet program (e.g. Excel...).

**Figure 131** Example of a directory exported in a txt file (open with Excel)



## Generating pdf report(s)

Several files of a same type (example: all OTDR files) can be generated in one/several pdf report(s).



- 1 Select the file(s) to be generated in a pdf report
  - 2 Press **Export** menu key
  - 3 Using the menu key  select:
    - **1 Trace** if the report must be generated with one trace per page
    - **Multi** if the report must be generated with up to three traces per page (for OTDR files only).
  - 4 Click on **Report**
  - 5 In the edition menu displayed, enter the name for the report
  - 6 Press **Enter** to validate and launch the report
- The icon  display during report generation.  
Once report is generated, a beep is emitted.

Figure 132 Report: 1 Trace and Multi (with OTDR files)



**NOTE**  
The report is saved in the same directory as the selected files.

## Using the Merge key, with the txt/pdf files

The txt or pdf files that have been saved/generated from a results page can be merged into one txt/pdf file from the Explorer.


The key **Merge** is used to merge several txt or pdf files into one file, putting together the results of all files.



- 1 In the explorer, select the txt/pdf files generated with the trace files you want.



**The merging can be done exclusively from files of the same format. Pdf and txt files cannot be selected at the same time to generate a merged file.**

- 2 Click on **Export > Merge** key  
The icon  displays during merging process, and a beep is emitted once process is completed.

The file is saved with the filename: *merged\_yyyy\_mm\_day\_\_hr\_mn\_sec.pdf/*  
*txt*

It is automatically saved in the same directory as the one where the txt/pdf files have been selected.




**NOTE**

The file can be renamed once it is saved.

## Sending files by e-mail (T-BERD/MTS 4000 only)

Several files can be sent by e-mail.

- 1 Check in the Setup page that the File Export parameters are correctly configured (see 4000 Base Unit User Manual).
- 2 In the Explorer, select the file(s) to be sent by e-mail
- 3 Press **Export** menu key.
- 4 Click on **Send by mail** menu key .
- 5 If necessary, in the edition menus displayed, modify the e-mail address and/or the subject of the e-mail.
- 6 Press **Enter** to validate and send the file

The menu key **Send by mail**



turns inactive until the end of process

Once mail is sent, menu key is active again and the message `Mail Sent` is displayed.

Click on any key to follow.

# Technical specifications

This chapter shows the technical specifications of the OTDR modules and of the options available for the or T-BERD/MTS 2000 or MTS/T-BERD 4000, and the OTDR technical specifications for SmartOTDR.

The topics discussed in this chapter are as follows:

- [“OTDR modules for T-BERD/MTS 2000/4000” on page 254](#)
- [“Technical specifications of the Power meter function on module for T-BERD/MTS 2000/4000” on page 260](#)
- [“Technical specifications of the Source function on module for T-BERD/MTS 2000/4000” on page 261](#)
- [“Technical specifications of the FiberComplete modules” on page 262](#)
- [“OTDR Technical specifications for SmartOTDR” on page 264](#)

## **OTDR modules for T-BERD/MTS 2000/4000**

### **Characteristics of reflectometry measurements**

#### **Distance measurement**

- Dual cursor
- Distance displayed takes into account the calibration of the refractive index of the fiber.
- Index adjustable from 1,30000 to 1,70000 in steps of 0,00001
- Resolution of display: 1 cm max.
- Resolution of cursor: 1 cm max.
- Spacing of measurement points: from 4 cm, with up to 256 000 acquisition points.
- Accuracy:  $\pm 1\text{m} \pm \text{sampling resolution } \pm 10^{-5} \times \text{distance}$  (excluding errors of calibration of refractive index of the fiber).
- Display span: 3.25 m to 260 km

#### **Attenuation measurement**

- Dual cursor
- Resolution of display: 0,001 dB
- Resolution of cursor: 0,001 dB
- Linearity:  $\pm 0.05 \text{ dB/dB}$  with LA Modules  
 $\pm 0.03 \text{ dB/dB}$  with MA, MAE, MP & QUAD/MM Modules
- Display span: 1.25 dB to 55 dB

## **Reflectance Measurement**

- Resolution of display: 0,01 dB
- Accuracy:  $\pm 2$  dB

## **Automatic measurement**

- Automatic measurement of all the elements of the signal. Slope measurement by least squares or 2 points of measurement.
- Display threshold of faults:
  - 0 to 5.99 dB in steps of 0.01 dB for event thresholds
  - -11 to -99 dB in steps of 1 dB for the reflectance
  - 0.01 to 5.99 dB in steps of 0.01 dB for attenuation
- Display of slope and attenuation for a segment of fiber.
- Display of the position of a fault and of attenuation.
- Display of the reflectance of the fault.
- Display of ORL

## **Manual Measurement**

- Measurement of slope between the cursors.
- Measurement of attenuation between two segments of fiber.
- Measurement of reflectance of a reflecting element.
- Measurement of ORL between the two cursors.
- Measurement of splice by 2 or 5 points method

# Typical specifications

Typical values, measured at 25°C unless specified.

Multimode OTDR Module	41XXMM
Central Wavelength <sup>1</sup>	850 / 1300 nm ± 30 nm
Typical RMS Dynamic Range <sup>2</sup>	26 / 24 dB
Distance Range	Up to 80 km
Pulse width	3 ns to 1 µs
Event Dead Zone <sup>3</sup>	0.8 m
Attenuation Dead Zone <sup>4</sup>	4 m

- 1. Laser in CW mode, at 25° C
- 2. Typical value corresponding to the difference (in dB) between the level of back-diffusion extrapolated at the beginning of the fiber and the RMS noise level, after 3 minutes of averaging, with the largest pulse width.
- 3. EDZ measured at +/- 1.5 dB below the peak of a non-saturated reflecting event at shortest pulse width.
- 4. ADZ measured at +/- 0.5 dB on the basis of a linear regression, using a - 40 dB type reflectance, at shortest pulse width.

Singlemode Modules	LA 41xxLA	MA 41xxMA	MAE 41XXMAE	MP 41xxMP
Central Wavelength <sup>1</sup>	1310 ± 20 nm 1550 ± 20 nm 1650 ± 20 nm	1310 ± 20 nm 1550 ± 20 nm 1625 ± 10 nm 1650 ± 20 nm	1310 ± 20 nm 1550 ± 20 nm	1310 ± 20 nm 1490 ± 20 nm 1550 ± 20 nm 1625 ± 10 nm 1650 ± 20 nm
RMS Dynamic Range <sup>2</sup>	35 dB 33 dB 30 dB	40 dB 38 dB 37 dB 37 dB	40 dB 38 dB	43 dB 41 dB 41 dB 41 dB 40 dB
Distance Range	up to 260 km			

Singlemode Modules	LA 41xxLA	MA 41xxMA	MAE 41XXMAE	MP 41xxMP
<b>Pulse width</b>	5ns to 20 $\mu$ s	3 ns to 20 $\mu$ s	3 ns to 20 $\mu$ s	3 ns to 20 $\mu$ s
<b>Event Dead Zone</b> <sup>3</sup>	1.5 m <sup>4</sup>	0.9 m	0.9 m	0.8 m <sup>f</sup>
<b>Attenuation Dead Zone</b> <sup>5</sup>	6 m	4 m		

1. Laser at 10  $\mu$ s and 25° C
2. Typical value corresponding to the difference (in dB) between the level of back-diffusion extrapolated at the beginning of the fiber and the RMS noise level, after 3 minutes of averaging, with the largest pulse width.
3. EDZ measured at 1.5 dB below the peak of a non-saturated reflecting event at shortest pulse width.
4. At 1310 nm
5. ADZ measured at +/- 0.5 dB on the basis of a linear regression from a reflectance of type FC/UPC (-55 dB) at shortest pulse width, at 1310 nm.

	<b>Multimode / Singlemode OTDR Module</b>	
<b>Central Wavelength</b> <sup>1</sup>	850 / 1300 nm $\pm$ 30 nm	1310 / 1550 nm $\pm$ 20 nm
<b>Typical RMS Dynamic Range</b> <sup>2</sup>	26 / 24 dB	37 / 35 dB
<b>Distance Range</b>	Up to 80 km	Up to 260 km
<b>Pulse width</b>	3 ns to 1 $\mu$ s	3 ns to 20 $\mu$ s
<b>Event Dead Zone</b> <sup>3</sup>	0.8 m	0.9 m
<b>Attenuation Dead Zone</b>	4 m <sup>4</sup>	4 m <sup>5</sup>

1. Laser in CW mode, at 25° C
2. Typical value corresponding to the difference (in dB) between the level of back-diffusion extrapolated at the beginning of the fiber and the RMS noise level, after 3 minutes of averaging, with the largest pulse width.
3. EDZ measured at +/- 1.5 dB below the peak of a non-saturated reflecting event at shortest pulse width.
4. ADZ measured at +/- 0.5 dB on the basis of a linear regression using a -40 dB type reflectance, at shortest pulse width.
5. ADZ measured at +/- 0.5 dB on the basis of a linear regression from a reflectance of type FC/UPC (-55 dB) at shortest pulse width, at 1310 nm.

# Ranges

## Ranges for LA Modules

	5 ns	30 ns	60ns	100 ns	300 ns	1 µs	3 µs	10 µs	20 µs
0.1 km	x	x							
0.5 km	x	x							
1 km	x	x	x						
2 km	x	x	x	x					
5 km	x	x	x	x	x				
10 km	x	x	x	x	x	x			
20 km	x	x	x	x	x	x	x		
40 km	x	x	x	x	x	x	x	x	x
80 km		x	x	x	x	x	x	x	x
260 km					x	x	x	x	x

## Ranges for MA, MAE and MP Singlemode Modules

	3 ns	10 ns	30 ns	100 ns	300 ns	1 µs	3 µs	10 µs	20 µs
0.5 km	x	x	x						
1 km	x	x	x						
2 km	x	x	x	x					
5 km	x	x	x	x	x				
10 km	x	x	x	x	x	x			
20 km	x	x	x	x	x	x	x		
40 km	x	x	x	x	x	x	x	x	x
80 km			x	x	x	x	x	x	x
160 km					x	x	x	x	x
260 km							x	x	x



## Ranges for Multimode Modules

	3 ns	10 ns	30 ns	100 ns	300 ns	1 $\mu$ s
0.5 km	x	x				
1 km	x	x	x			
2 km	x	x	x	x		
5 km	x	x	x	x	x	
10 km	x	x	x	x	x	x
20 km		x	x	x	x	x
40 km				x	x	x
80 km				x	x	x

## Class of the lasers of the OTDR modules

Module Standard	EN 60825-1, Ed 1.2, 2001 -08	FDA21CFR§1040.10
Singlemode LA, MA & MAE OTDR Modules	Class1	Class 1
Singlemode MP OTDR Module	Class 1M @ 1310 nm Class 1 @ 1490, 1550, 1625 & 1650 nm	Class 1
Multimode OTDR Modules	Class 1M @ 850 nm Class 1 @ 1300 nm	Class 1

## OTDR modules measurement

Weight: approx. 300 g (0,66 lbs) (400g for the QUAD OTDR Module)

Dimensions (in mm) - w x h x d: 128 x 134 x 41

## Technical specifications of the Power meter function on module for T-BERD/MTS 2000/4000

Specifications given for 25°C, after 20 minutes stabilization time and after zero setting.

## Power meter option for Singlemode Modules

Plug-ins Singlemode	Power meter of the MA, MAE & MP Modules	Power meter of the E4126 LA Module
Measurement Wave-length	1310 / 1490 / 1550 / 1625 / 1650 nm	1310 / 1490 / 1550 nm
Calibrated Wavelength	1310 / 1490 / 1550 / 1625 / 1650 nm	1310 / 1550 nm
Accuracy at calibrated wavelengths	± 0.5 dB (at -30 dBm)	± 0.5 dB (at -30 dBm)
Input power range	- 55 to 0 dBm	- 50 to -2 dBm
Maximum resolution	0.01 dB / 0.01nW	0.01 dB / 0.01nW
Linearity within the specification range	± 0.5 dB (- 50 to - 5 dBm)	-

## Power meter option for Multi/Single mode Modules

Plug-ins Single / Multi mode	Singlemode Power meter	Multimode Power meter
Measurement Wavelength	1310 / 1490 / 1550 / 1625 / 1650 nm	850 and 1300 nm
Calibrated Wavelength	1310 / 1490 / 1550 / 1625 / 1650 nm	850 and 1300 nm

Plug-ins Single / Multi mode	Singlemode Power meter	Multimode Power meter
<b>Accuracy at calibrated wave-lengths</b>	$\pm 0.5$ dB (at -30 dBm)	$\pm 1$ dB (at -15 dBm) <sup>1</sup>
<b>Input power range</b>	- 50 to - 2 dBm	- 30 to -3 dBm
<b>Maximum resolution</b>	0.01 dB / 0.01nW	
<b>Linearity within the specification range</b>	$\pm 0.5$ dB (- 45 to - 5 dBm)	-

1. Using a mode conditioner

## Technical specifications of the Source function on module for T-BERD/MTS 2000/4000

- Laser Class 1
- Wavelength lasers at 25°C, depending on the wavelengths available in the module:
  - $850 \pm 20$  nm
  - $1300 \pm 30$  nm
  - $1310 \pm 20$  nm
  - $1490 \pm 20$  nm
  - $1550 \pm 20$  nm
  - $1625 \pm 20$  nm
  - $1650 \pm 20$  nm

The wavelengths available for the source are the same as those available for the OTDR module.

- Spectral bandwidth: 5 nm RMS typical
- Stability: 0.3 dBm

Output level

- - 3.5 dBm typical for continuous signal (CW)
- modulated mean level: - 6.5 dBm typical

Emission mode

- Continuous signal (CW), not available for the 1650 nm wavelength on the MP OTDR Module.
- Signal including lambda information for the power meter (Autoλ).
- Modulated signal to identify the fiber (at 270 Hz/330 Hz/1kHz/2kHz).
- Wavelengths activated one after the other (TwinTest mode).

Technical specifications of the  
FiberComplete modules



This function is not available with SmartOTDR.

Typical values, measured at 25°C unless specified.

Bi-directional testing	
Wavelength	1310 / 1490 / 1550 / 1625 nm <sup>1</sup>
Insertion Loss	
Dynamic range	40 dB typ
IL uncertainty	+/- 0,25 dB <sup>2</sup>
IL repeatability	< 0,05 dB <sup>3</sup>
Display resolution	0.01 dB

<b>ORL</b>	
ORL range	up to 55 dB
ORL uncertainty	+/- 0,5 dB <sup>4</sup>
ORL repeatability	< 0,1 dB <sup>5</sup>
Display resolution	0.01 dB
Length <sup>6</sup>	
Measurement range	150 km
Accuracy - From 50 m to 20 km range - Above 20 km	+/- 30m +/- 100m

1. 1625nm not available with filtered version
2. side by side reference
3. without disconnection
4. from 10 to 45 dB range
5. from 20 to 40 dB
6. measurement @ 1550 nm with an index of refraction n = 1.468

For the OTDR specifications, please refer to [page 254](#).

# OTDR Technical specifications for SmartOTDR

## OTDR Optical Interfaces

Interchangeable optical connectors: FC, SC<sup>1</sup>

## OTDR Optical characteristics

Laser safety class (21 CFR)	Class 1
Distance units	Kilometer, meter, feet, and miles
Group index range	1.300000 to 1.700000 in 0.00001 steps
Number of data points	Up to 256,000 data points
Distance measurement	Automatic or dual cursor
Display range	0.1 km to 260 km for single-mode
Cursor resolution	1 cm
Sampling resolution	4 cm for single-mode
Accuracy	±1 m ±sampling resolution ±1.10–5 * x distance (Excluding group index uncertainties)

---

1.SC mandatory for E136FB configuration

## Characteristics of reflectometry measurements

### Distance measurement

- Automatic or Dual cursor
- Distance displayed takes into account the calibration of the refractive index of the fiber.
- Index adjustable from 1,30000 to 1,70000 in steps of 0,00001
- Resolution of display: 1 cm max.
- Resolution of cursor: 1 cm max.
- Spacing of measurement points: from 4 cm, with up to 256 000 acquisition points.
- Accuracy:  $\pm 1\text{m} \pm \text{sampling resolution} \pm 1.10^{-5} \times \text{distance}$  (excluding errors of calibration of refractive index of the fiber).
- Display span: 0.1 km m to 260 km for single mode

### Attenuation measurement

- Automatic, manual, 2-point, 5-point, and LSA
- Resolution of display: 0,001 dB
- Resolution of cursor: 0,001 dB
- Linearity:  $\pm 0.04 \text{ dB/dB}$  for single mode
- Display span: 1.25 dB to 55 dB

### Reflectance / ORL Measurement

- Resolution of display: 0,01 dB
- Accuracy:  $\pm 2 \text{ dB}$

**Automatic measurement**

- Automatic measurement of all the elements of the signal. Slope measurement by least squares or 2 points of measurement.
- Display threshold of faults:
  - 0 to 5.99 dB in steps of 0.01 dB for event thresholds
  - -11 to -99 dB in steps of 1 dB for the reflectance
  - 0.01 to 5.99 dB in steps of 0.01 dB for attenuation
- Display of slope and attenuation for a segment of fiber.
- Display of the position of a fault and of attenuation.
- Display of the reflectance of the fault.
- Display of ORL

**Manual Measurement**

- Measurement of slope between the cursors.
- Measurement of attenuation between two segments of fiber.
- Measurement of reflectance of a reflecting element.
- Measurement of ORL between the two cursors.
- Measurement of splice by 2 or 5 points method

**Typical specifications**

Typical values, measured at 25°C unless specified.

	<b>E136FB (2 ports)</b>	<b>E126A</b>
<b>Central Wavelength<sup>1</sup></b>	1310 +/- 20nm 1550+/- 20nm filtered 1625 nm +/- 20nm	1310 nm +/- 20nm 1550 nm +/- 20nm
<b>Typical RMS Dynamic Range<sup>2</sup></b>	40 / 40 / 41 dB	35 / 33 dB



	<b>E136FB (2 ports)</b>	<b>E126A</b>
<b>Distance Range</b> <sup>3</sup>	Up to 150 km	Up to 100 km
<b>Pulse width</b>	3 ns to 20µs	5 ns to 20µs
<b>Event Dead Zone</b> <sup>4</sup>	0.90 m	1.30 m
<b>Attenuation Dead Zone</b> <sup>5</sup>	2.5 m	4 m
<b>Splitter Attenuation Dead Zone</b>	45 m after 15dB splitter loss	N/A

1. Laser, at 25° C and measured at 10 µs
2. Typical value corresponding to the one-way difference (in dB) between the extrapolated back-scattering level at the beginning of the fiber and the RMS (SNR = 1) noise level, after 3 minutes averaging, using the largest pulse width.
3. At 1550 nm
4. EDZ measured at +/- 1.5 dB below the peak of a unsaturated reflective event using the shortest pulse width.
5. ADZ measured at +/- 0.5 dB from the linear regression, using a FC/UPC- type reflectance, at shortest pulse width.



# Options and accessories

This chapter shows the references of the options and accessories for the modules of the MTS/T-BERD 2000 or T-BERD/MTS-4000, and the references for the SmartOTDR

The topics discussed in this chapter are as follows:

- [“References of measurement modules for T-BERD/MTS 2000/4000” on page 270](#)
- [“References of the SmartOTDR” on page 273](#)
- [“User manual references” on page 274](#)
- [“References of optical connectors and adapters” on page 274](#)

# References of measurement modules for T-BERD/MTS 2000/4000

## OTDR Modules<sup>1</sup>

### Multimode Module

Modules	Reference
Multimode 850 / 1300 nm OTDR Module	E4123MM

### Singlemode Module

LA Modules	Reference
LA OTDR 1310/1550 nm Module with source option	E4126LA
LA OTDR 1550 nm Module with source option	E4115LA
LA OTDR filtered 1650 nm Module	E4118RLA65

MA Modules	Reference
Metro Access 1310/1550 nm OTDR Module	E4126MA
Metro Access 1310/1550/1625 nm OTDR Module	E4136MA
Metro Access Range filtered 1650 nm OTDR Module	E4118RMA65
Metro Access Range 1310/1550 nm & filtered 1625 nm one port OTDR module	E4136RMA

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1. Specify optical connector of each OTDR ports

<b>MAE Modules</b>	<b>Reference</b>
Extended Metro Access Range 1310/1550 nm OTDR Module	E4126MAE

<b>MP Modules</b>	<b>Reference</b>
Metro PON 1310/1550 nm OTDR Module with Source option	E4126MP
Metro PON 1310/1550/1625 nm OTDR Module with Source option	E4136MP
Metro PON 1310/1490/1550 nm OTDR Module with Source option	E4138MP49
Metro PON 1310/1550 nm and Filtered 1625 nm OTDR Module with Source option	E4136RMP
Metro PON 1310/1550 nm and Filtered 1650 nm OTDR Module with Source option	E4138RMP65
Metro PON Filtered 1650 nm OTDR Module with Source option	E4118RMP65

<b>Multimode/Singlemode Modules</b>	<b>Reference</b>
Multimode/Singlemode 850/1300/1310/1550 nm OTDR Module	E4146QUAD

## FiberComplete module with OTDR function

<b>Modules</b>	<b>References</b>
1310/1550 nm FiberComplete with 37/35 dB MA OTDR	E4126FCOMP-MA
1310/1550/1625 nm FiberComplete with 37/35 / 35 dB MA OTDR	E4136FCOMP-MA

Modules	References
1310/1550/ Filtered 1625 nm FiberComplete with 37/35/35 dB MA OTDR	E4136FCOMP-RMA
1310/1490/1550 nm FiberComplete with 41/39/39 dB MP OTDR	E4138FCOMP-MP

## FiberComplete module with Fault Finder function

Modules	References
1310/1550 nm FiberComplete	E4126FCOMP-FF
1310/1550/1625 nm FiberComplete	E4136FCOMP-FF
1310/1490/1550 nm FiberComplete	E4138FCOMP-FF

## Options

Modules	Reference
Power meter option for OTDR modules	E41OTDRPM
Light source option for OTDR modules	E41OTDRLS

Mode Conditioner for Multimode fiber	References
Encircled flux mode conditioner embedded in a patchcord for 50 µm multimode fiber in FC/PC	EFJEF50CONFCPC
Encircled flux mode conditioner embedded in a patchcord for 50 µm multimode fiber in SC/PC	EFJEF50CONSCPC

Non Reflective Terminator Packages	References
SC/PC and SC/APC non-reflective terminator package	ENRTERMSC
FC/PC and FC/APC non-reflective terminator package	ENRTERMFC

## References of the SmartOTDR

OTDR Configurations <sup>1</sup>	References
SmartOTDR 1550nm A Range Handheld Tester With Continuous Light Source & PC Connector	E100A-PC
SmartOTDR 1550nm A Range Handheld Tester With Continuous Light Source & APC Connector	E100A-APC
SmartOTDR 1310/1550nm A Range Handheld Tester With Continuous Light Source & PC Connector	E126A-PC
SmartOTDR 1310/1550nm A Range Handheld Tester With Continuous Light Source & APC Connector	E126A-APC
SmartOTDR 1310/1550nm & Filtered 1625nm B Range Handheld Tester With Continuous Light Source & PC Connector <sup>2</sup>	E136FB-PC
SmartOTDR 1310/1550nm & Filtered 1625nm B Range Handheld Tester With Continuous Light Source & APC Connector	E136FB-APC

1. Comes with AC/DC converter/adaptor, hands-free carrying case, stylus and getting started manual.  
OTDR connector adapter and battery type (LiPo mandatory for E126A and E136FB) are not included.
2. available with SC OTDR connector adapter (EUSCADS) only

## User manual references

User manuals for MTS/T-BERD modules	References
Printed user manual for OTDR functions, Options and Software applications (French)	E4100M01
Printed user manual for OTDR functions, Options and Software applications (English)	E4100M02
Printed user manual for OTDR functions, Options and Software applications (German)	E4100M03



**NOTENOTE**

The User Manuals are available in pdf format, into the unit.  
The printed versions are available on option, in French, English or German.

## References of optical connectors and adapters

Front Panel Optical Connectors for modules <sup>1</sup> Single-mode Universal OTDR (Except LA OTDR Modules)	Reference
Universal PC Connector with FC adapter	EUNIPCFC
Universal PC Connector with SC adapter	EUNIPCSC
Universal PC Connector with ST adapter	EUNIPCST



<b>Front Panel Optical Connectors for modules<sup>1</sup> Single-mode Universal OTDR (Except LA OTDR Modules)</b>	<b>Reference</b>
Universal PC Connector with DIN adapter	EUNIPCDIN
Universal PC Connector with LC adapter	EUNIPCLC
Universal APC Connector for SM only with FC adapter	EUNIAPCFC
Universal APC Connector for SM only with SC adapter	EUNIAPCSC
Universal APC Connector for SM only with ST adapter	EUNIAPCST
Universal APC Connector for SM only with DIN adapter	EUNIAPCDIN
Universal APC Connector for SM only with LC adapter	EUNIAPCLC

1. A connector (universal) must be specified at time of order of the module

<b>Front Panel Optical Connectors for Single-mode LA OTDR modules<sup>1</sup></b>	<b>Reference</b>
Universal PC Connector with FC adapter for LA Modules (Screw Type)	EUNISPCFC
Universal PC Connector with SC adapter for LA Modules (Screw Type)	EUNISPCSC
Universal APC Connector with FC adapter for LA Modules (Screw Type)	EUNISAPCFC
Universal APC Connector with SC adapter for LA Modules (Screw Type)	EUNISAPCSC

1. A connector (universal) must be specified at time of order of the module

<b>Front Panel Optical connectors for plug-ins<sup>1</sup> Multi-mode Universal OTDR</b>	<b>Reference</b>
Universal PC Connector with FC adapter	EUNIPCFCMM
Universal PC Connector with SC adapter	EUNIPCSCMM

<b>Front Panel Optical connectors for plug-ins<sup>1</sup> Multi-mode Universal OTDR</b>	<b>Reference</b>
Universal PC Connector with ST adapter	EUNIPCSTMM
Universal PC Connector with DIN adapter	EUNIPCDINMM
Universal PC Connector with LC adapter	EUNIPCLCMM

1. A Connector (fixed or universal) must be specified at time of order of the plug-in

<b>Additional Adapters for Universal Connectors<sup>1</sup></b>	<b>Reference</b>
Universal FC Adapter	EUFCAD
Universal FC Adapter (Screw Type)	EUFCADS
Universal SC Adapter	EUSCAD
Universal SC Adapter (Screw Type)	EUSCADS
Universal ST Adapter	EUSTAD
Universal DIN Adapter	EUDINAD
Universal LC adapter	EULCAD

1. Interchangeable in the field



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**E4100M02/UM/06-15/AE**  
**Rev 011, 01-16**  
**English**

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