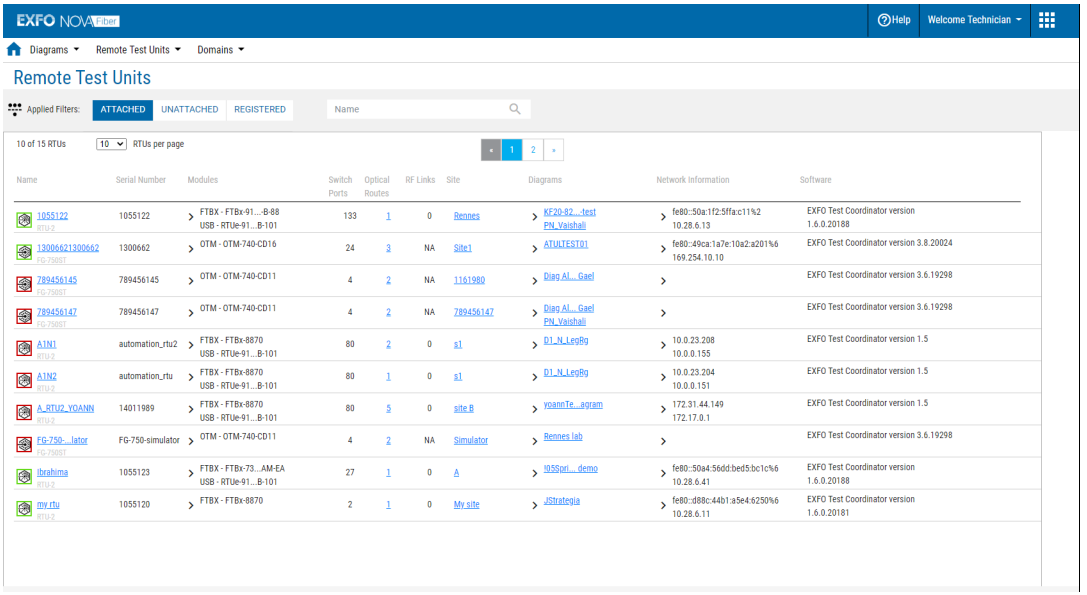
User Guide

Nova Fiber FMS



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1 Introducing Nova Fiber FMS

EXFO's Nova Fiber FMS solution is a physical layer monitoring management system. It provides a front-haul remote access testing solution for real-time, on-demand testing, and 24/7 monitoring of the radio frequency (RF) spectrum and optical fiber networks. The FMS includes macro and Centralized/Cloud-Radio Access Network (C-RAN) optical switch expansion, automatic passive intermodulation (PIM) detection, and Common Public Radio Interface (CPRI™) rates up to option 7 (9.8 Gbit/s).

The FMS is ideal for today's macro cell sites with a compact, 1U rackmount chassis and is easily scalable to address tomorrow's large C-RAN hubs. As a server-based solution, it delivers network-wide visibility of the mobile spectrum and provides mobile network operators (MNO) performance, flexibility, and scalability. The system will help you achieve significant savings in costs and time through the following:

- Eliminating unnecessary travel time to remote or hard-to-reach cell sites.
- Minimizing troubleshooting time.
- Pinpointing the exact location of fiber network issues along the fiber span.
- Having a future-proof design to support higher CPRI rates and next-generation fronthaul interface (NGFI) protocols.

Main Features

Your Nova Fiber FMS can be used for different type of tests and monitoring.

Fiber Characterization

- Delivers best-in-class fiber monitoring thanks to its patented OTDR/iOLM technology and Link-Aware™ technology.
- Uses advanced algorithms to pinpoint the exact locations of fiber faults thanks to the iOLM application, which is 85 % faster than the traditional OTDR approach.
- Features two modes of operation: on-demand testing and monitoring of the fiber links.

Field Portable and Rackmount Solutions

Provides seamless transition from field portable to remote solution—bringing workforce efficiency to the forefront, as there is no learning curve from field to desk.

Network Visibility

Provides a server-based solution delivering visibility across fronthaul networks.

Configuration Solutions

Depending on your needs, a macro cell site or C-RAN configuration will be better adapted for you.

Macro Cell Site Configurations

The FMS's modularity, flexibility, and scalability are designed for macro cell sites where rackmount space is limited. The basic FMS starts at 12 ports using a simplex 12-port optical switch module.

C-RAN Configurations

C-RAN topologies are divided into small and large hub sites.

- For a small C-RAN site, the total count of fiber links is low (below 50), the fiber spans are short (below 2 kilometers or 1.24 miles), and point-to-point is used as the transport mechanism between the baseband unit (BBU) and the RRH (using grey optics).

  Port count can be increased (beyond 18 ports) with external ½U optical switches to address testing and monitoring requirements of small C-RAN architectures. The external optical switch is available in various port densities such as 26 or 52 ports for simplex monitoring (uplink) or duplex 26 ports monitoring (uplink and downlink).

Note: *In some cases, a macro cell site may be converted to a small C-RAN site where two or more macro cell sites are combined into one.*

- For a large C-RAN site, the total number of links may be in the hundreds with fiber spans between the central BBU location and the remote antenna sites reaching up to 15 kilometers, or 9.3 miles. For C-RAN hub sites, the transport mechanism between the BBU and the RRH may use grey optics for point-to-point communication but also colored optics C/DWDM (course/dense wavelength division multiplexing) technology thus reducing the fiber count.

  Your FMS can grow as the C-RAN hub site grows, allowing for port count monitoring expansion by stacking external optical switches to increase the number of links to be monitored. The FMS external optical switches can be stacked to allow for monitoring of thousands of fiber links. The decision factor of how many ports should be monitored using a single FMS comes down to the desired testing availability (that is, the total amount of time required to test each port in a system).

Conventions

Before using the product described in this guide, you should understand the following conventions:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in *death or serious injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *minor or moderate injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *component damage*. Do not proceed unless you understand and meet the required conditions.

IMPORTANT

Refers to information about this product you should not overlook.

2 Getting Started With Your Nova Fiber FMS

This chapter provides information on accessing the FMS as well as navigating the user interface.

Accessing the FMS

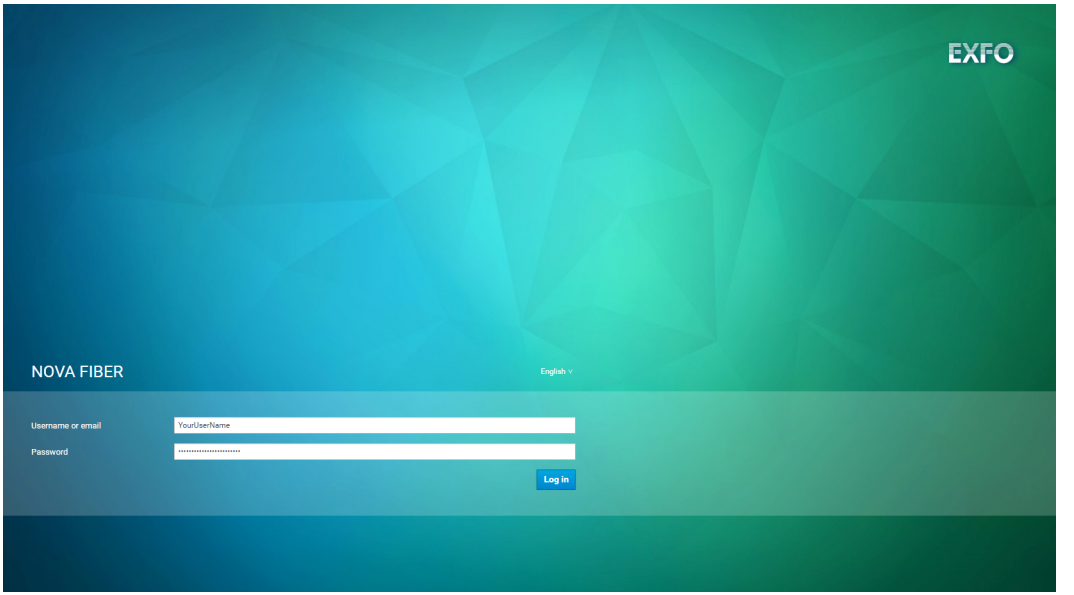
To reach the FMS application over the LAN, you should enter the address provided by your organization. You can create a link on your browser to the server address to make the access easier and faster.

The FMS application can only be accessed on a secured connection. All the data, including user names and passwords are sent in an encrypted form. This ensures data security while accessing the application.

Note: *As system administrators typically specify the login names and passwords for the users when creating them, all the procedures and information presented in this user guide are intended for a user that has administrator rights that can perform all of the described tasks.*

To log onto the FMS:

1. Double-click the icon located on the desktop or use the shortcut in your browser.
2. Enter your account credentials, then click **Log in**.



After a successful login, the FMS Topology view is displayed.

To log out of the FMS:

From the main window, click **Welcome**, then **Logout**.

Working With the Application

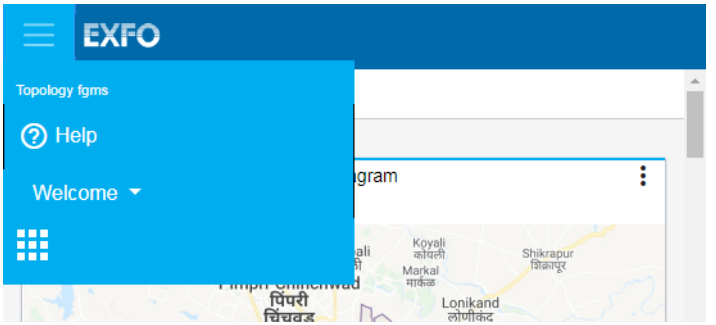
The FMS solution supports the integration of OpticalRF, OTDR and iOLM measurement capabilities provided by the monitoring units (known as SkyRAN or RTU-2). Platform control, configuration, and test result management are done by the FMS. Real-time analytics are provided by EXFO Xtract.

Note: *For more information about Xtract, refer to the corresponding user documentation.*

Once logged on, a general section on the right of the header gives access to the available pages.

- *Account* opens the user management administrator console login page.
- *Alarms* (available through the button) opens the page where you can view, and manage the alarms detected by your system.
- *Diagrams* lets you access the topology diagrams.
- *Help* is where you can find the version number of the system, as well as contact information and user guides in PDF format.
- *Remote Test Units* lets you access the list of all the RTUs in the system.
- *Domains* lets you group users with optical routes to optimize alarm notifications.
- *Topology* (available through the button) provides an overview of the network under test using the physical inventory. Integrating with the internal system through identifiers, this application allows you to prepare to monitor.

When you minimize the application window, the menu bar will transfer to the left to a menu button but it still gives you access to the drop-down items:

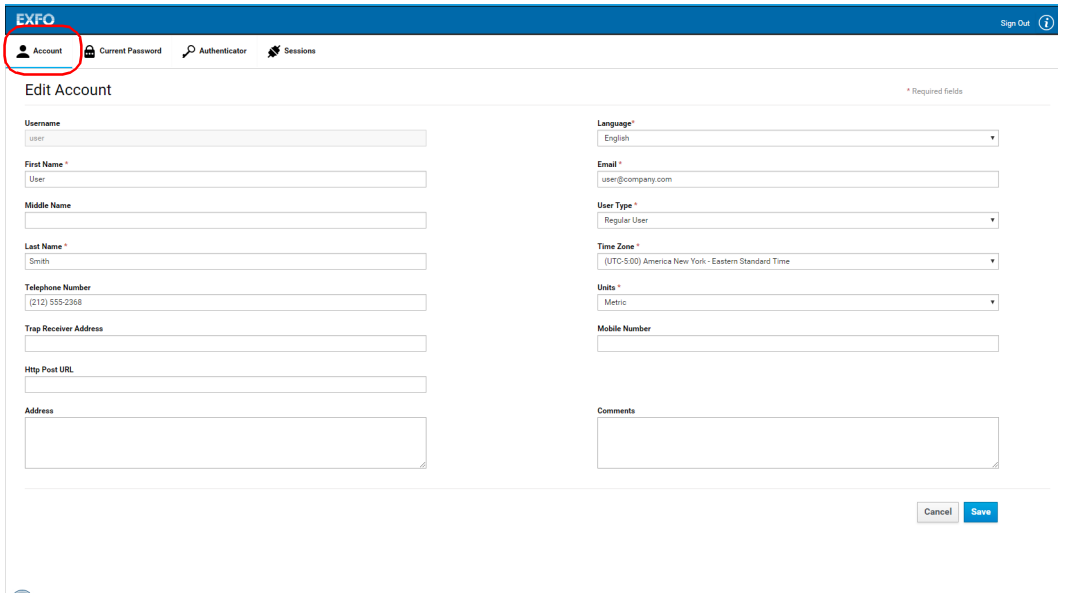


Managing your User Account and Settings

You have complete access to your account information within the application. Once logged in, you can update your account information, your password and view your active sessions.

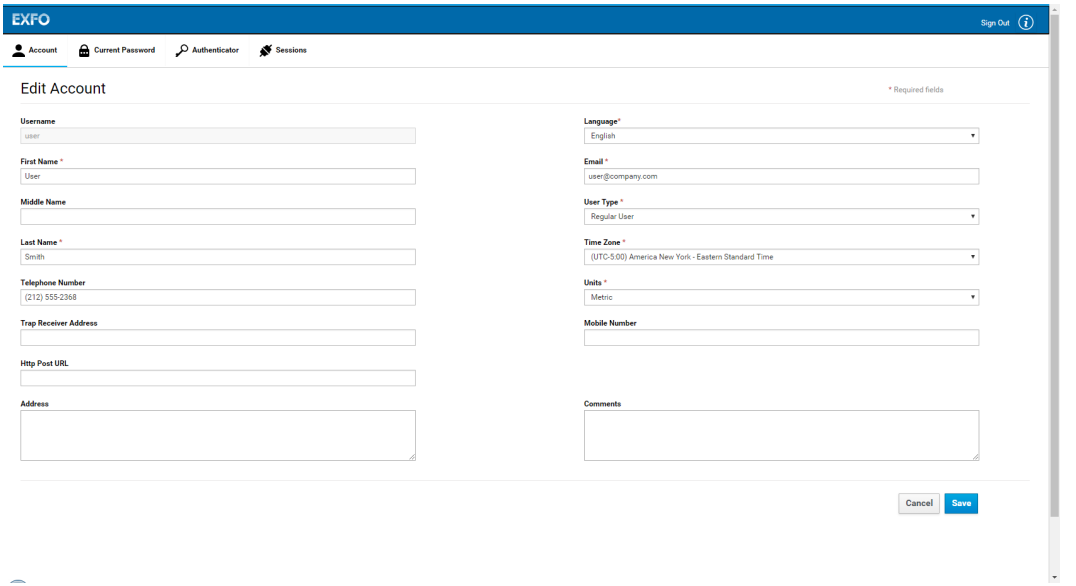
To access the user account page:

From the main window, click **Welcome**, then **Account**.



To update your account information:

1. From the main window, access the user account page, then select the **Account** tab.
2. Change the account information as needed.

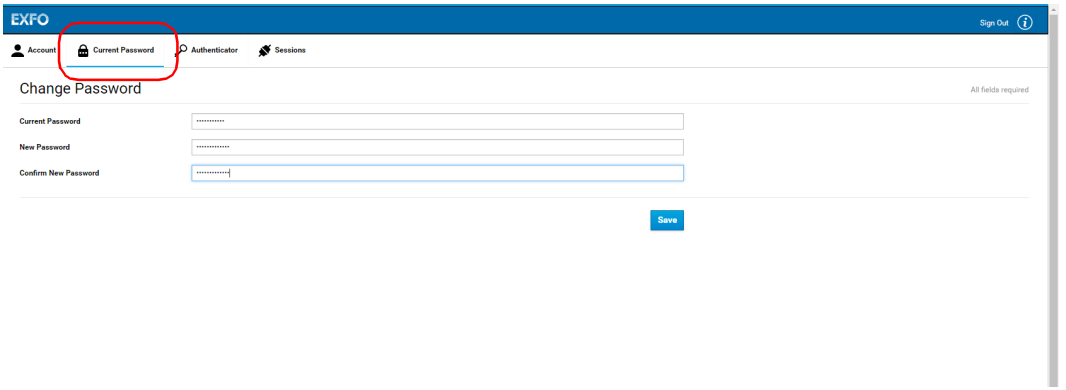


3. To confirm the changes, click **Save**.

Note: *Depending on the items you have modified, you may have to log off and log on again to see the changes.*

To change your password:

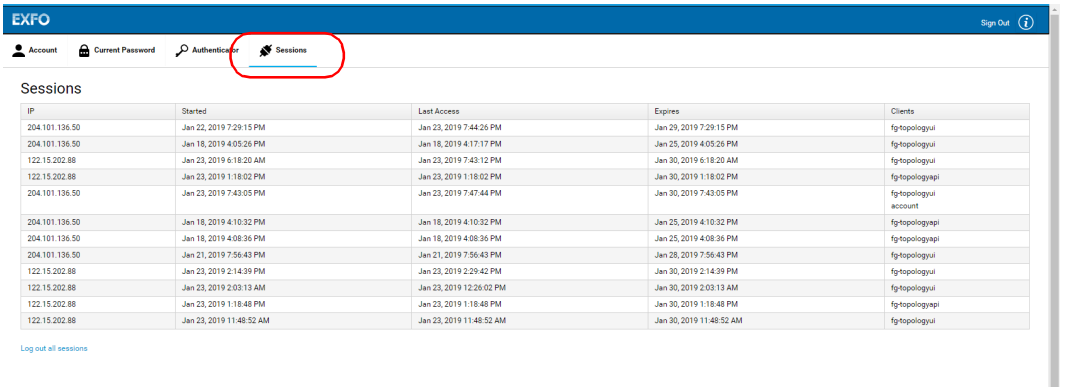
1. From the main window, access the user account page, then select the **Current Password** tab.



2. Enter your current password, then the new one you want to use. Confirm the new password, then click **Save.**

To view the active sessions:

From the main window, access the user account page, then select the **Sessions** tab.



You can close all of the active sessions by selecting the corresponding option at the bottom of the list.

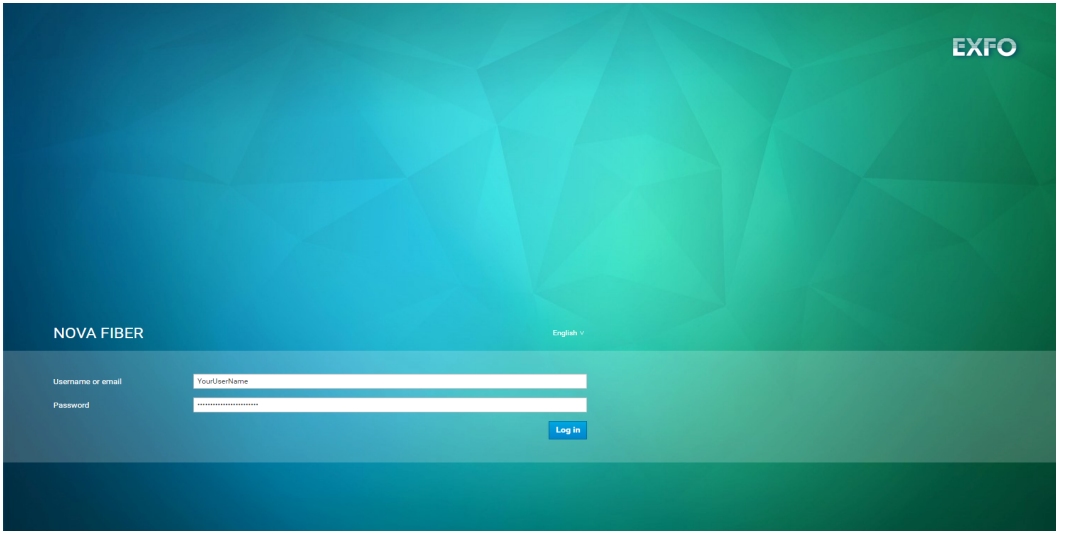
3 Managing Users and Groups

The Fiber console module is an open-source enterprise-class Identity and Access Management (IAM) solution which EXFO has customized and integrated to its Fiber Guardian/NQMSfiber products. It offers simple, secured, and extensive authentication and auditing functions.

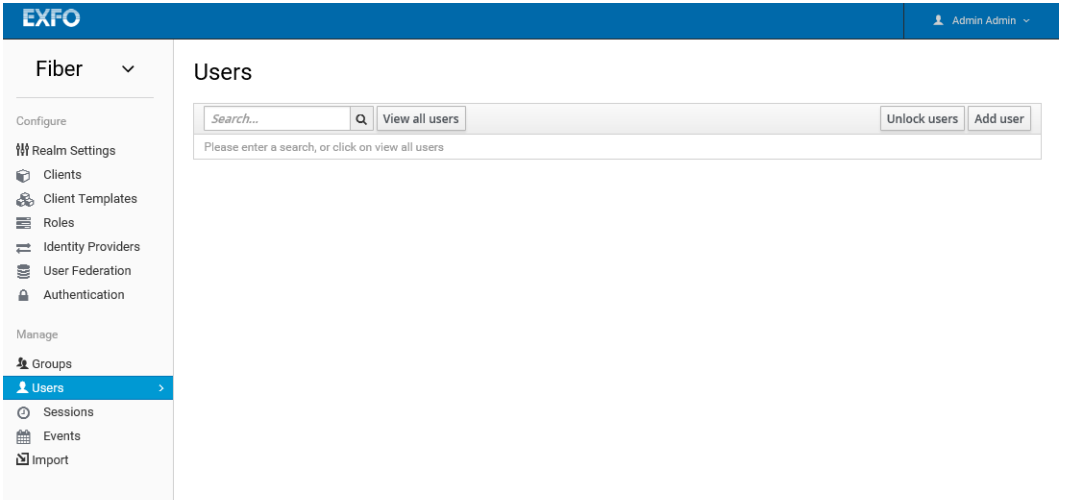
As a user in a centrally managed installation, you are now authenticated through a single sign-on/out instance which can itself be connected to your existing Lightweight Directory Access Protocol (LDAP) service. For centrally managed solutions, it means one log-on to move from one application (for example, central) to another (for example, local).

To log in to the administration console:

1. Go to the welcome page of the console using the corresponding URL for your system and log in.



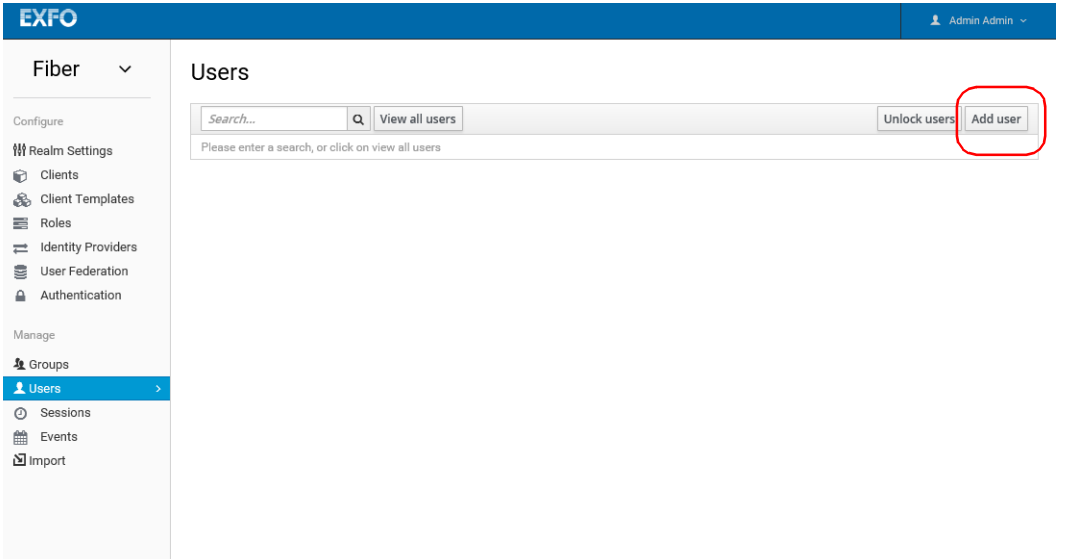
2. To access the console, use the **Users** menu item in the navigation bar.



Note: *If you are curious about a certain feature, button, or field within the Admin Console, hover your mouse over the question mark ? icon. This will pop up tooltip text to describe the area of the console you are interested in.*

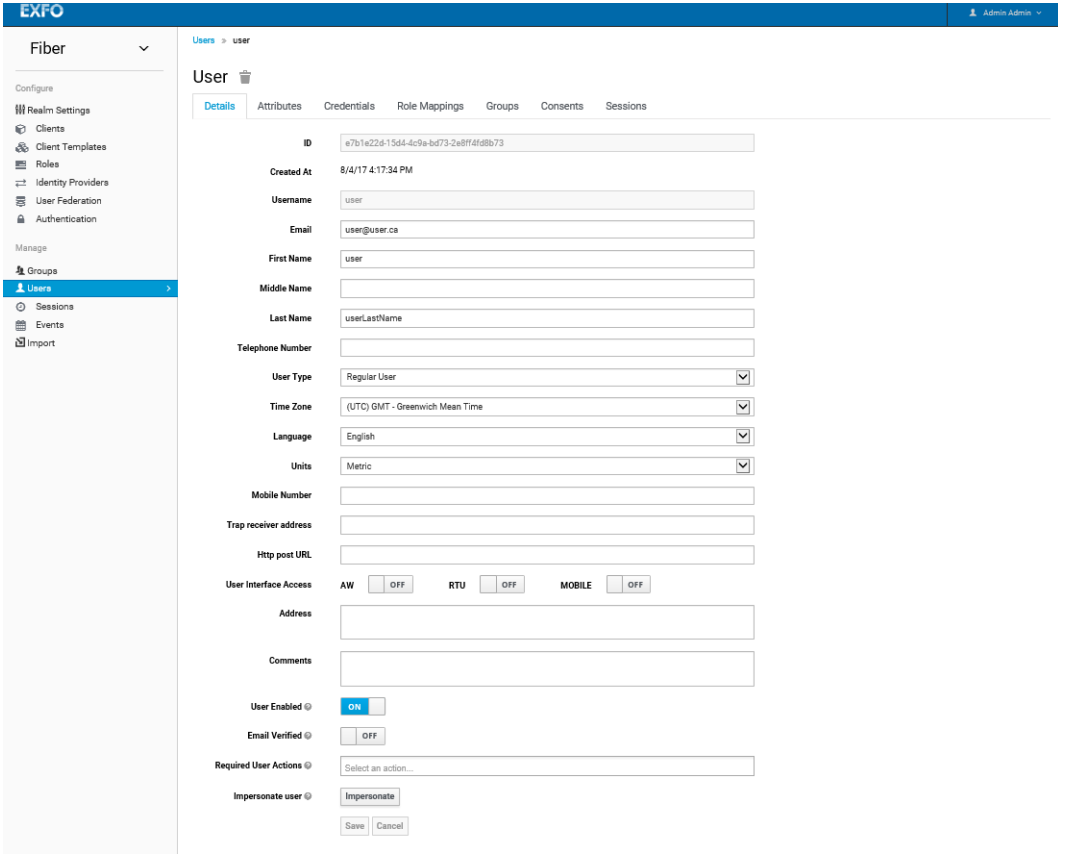
To create users:

1. From the **Users** page, click **Add user**.



2. Enter the mandatory fields highlighted with an asterisk.

3. Click **Save**. This will bring you to the management page for your new user.



The **Details** tab displays all the data relevant to the user, including the following:

- **User Type** is either regular user or customer (applies to NQMSfiber).

  Regular user is a person who uses the system to provide Quality of Service (QoS) data for the customer. They do not receive alerts according to the fault position, as they are not associated with the optical route sections. However, they receive alerts for each alarm defined in the alarm type.

  Customer is an individual, a partner, an association, a joint stock company, a trust, a corporation, or a governmental entity that subscribes to telecommunications services offered by the company operating the Fiber Guardian system. Customers are different from regular users because they cannot access the system (neither EMS nor RTU) through the administrative workstation (AW) but can receive alerts and automatically generated reports through e-mails. However, they are mostly interested in faults that occur on the sections of an optical route that belong to them. Thus, different customers can be defined for different sections of each optical route.

Note: *If you are not part of a region in which the RTU is located, you will not see the alarms coming from that RTU as well as the status and the results associated. You will not be able to access that RTU and change its configurations.*

- **Time Zone** is the preferred time zone used to display the date and time in the AW windows.
- **Mobile Number** is the number of the user's mobile device.

- **Trap receiver address** is for the remote test unit (RTU) only. The default is the manager IP address / DNS name of the SNMP manager. You can change the value when you configure a user. For existing users, this value is configured under **Configuration** > **Host** > **Northbound Settings** > **SNMP**. Provide the HTTP post URL where the JavaScript Object Notation (JSON) object for an event will be posted if the HTTP post notification channel is configured.
- **HTTP post URL (applies to RTU-2)**: Parameters in a post are either in the body (default) or directly in the string. You can also have parameters in the string like this: https://example.com/page?parameter=value&also=another.

  Include the names of the desired fields with a $ in front. For example, https://example.com/page?param1=$FaultGroupDate&param2=$Position. In this example, the values of FaultGroupDate and Position would go in param1 and param2.

  Available values are as follows (case insensitive):

  FaultIdOnRtu, FaultResultIdonRTU, FirstReferenceIdonRTU, LastLearningIdonRTU, FaultType, Confirmations, Position, MinPosition, MaxPosition, Loss, ThresholdType, ThresholdValue, AppliedThreshold, EventType, OpticalRoute, TestSetupId, TestSetupName, TestType, RTUName, RTUIP and OTDRSerialNumber.
- **User Interface Access** (applies to NQMSfiber) allows you to enable or disable access for the following:

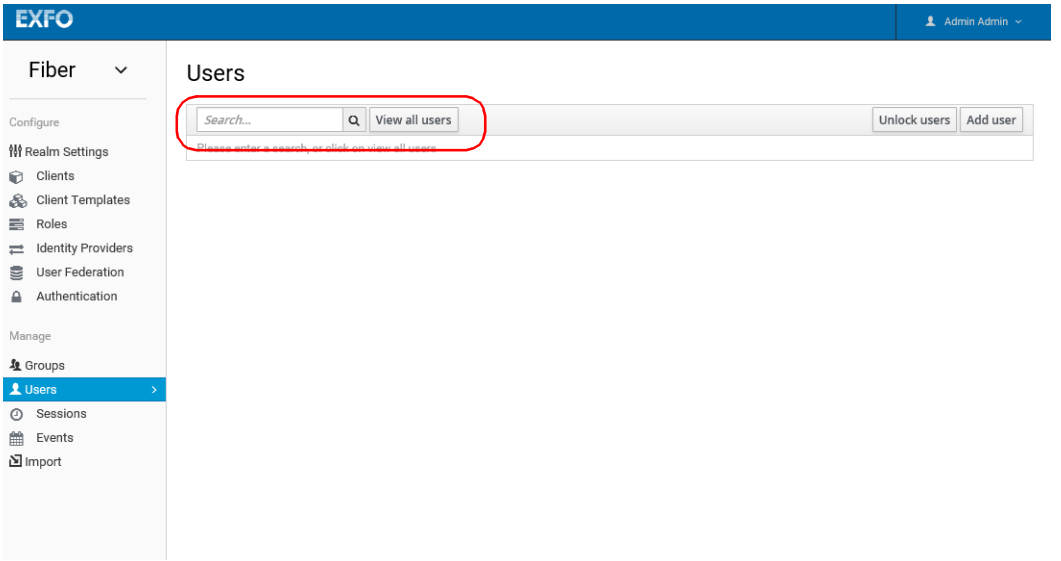
  AW (administrative workstation) which is required to view the EMS web interface.

  RTU (remote test unit) for access from the EMS.

  MOBILE for mobile app access.
- **User Rights for RTU** (applies to NQMSfiber) is allowing you to grant viewing or editing rights for the RTU application.

To search for users:

From the **Users** page, enter a search item, then click . It can be a first name, last name or e-mail address. To view the complete list in the system, select **View all users** instead.



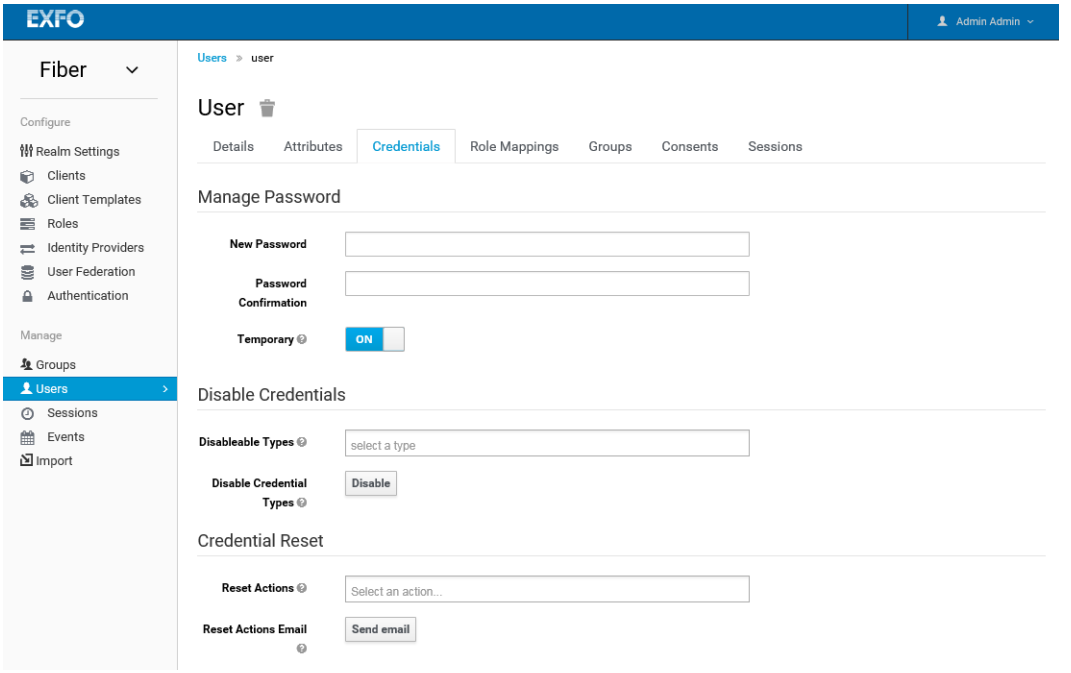
Note: *This will search just the local user database and not the federated database (LDAP) because some LDAP does not have a way to page through users.*

If you want the users from federated backend to be synced into the user database you need to either:

- Adjust your search criteria. That will sync just the backend users matching the criteria into the user database.
- Go to **User Federation** tab and click **Sync all users** or **Sync changed users** in the page with your federation provider. See *Federating External User Databases* on page 27 for more details.

Managing Credentials

The **Credentials** tab of the **Users** page regroups the pieces of data that are used to verify the identity of a user, such as passwords, digital certificates, or even fingerprints. This is where you can create, disable, and reset passwords.



To change a password:

From the **Credentials** tab, enter a new password in the corresponding box. A **Reset Password** button will appear for you to click, after you have confirmed the new password. If the **Temporary** switch is **ON**, this new password can only be used once and will need to be changed after login.

Alternatively, if an e-mail is set up in the **Realm Settings**, you can send an e-mail to the user that will ask them to reset their password. Choose **Update Password** from the **Reset Actions** list box and click **Send email**. The sent e-mail contains a link that will bring the user to the update-password screen.

As it is the case for passwords, you can send an e-mail to the user that asks them to reset their one-time password (OTP) generator. Choose **Configure OTP** in the **Reset Actions** list box and click the **Send email** button. The sent e-mail contains a link that will bring the user to the OTP setup screen.

Assigning a Role Mapping to a User

Roles are configured at the realm level and identify a type or category of user. Admin, user, manager, and employee are all typical roles that may exist in an organization. For example, the Admin Console has specific roles which give users the permission to access parts of the Admin Console UI and perform certain actions. There is a global namespace for roles and each user also has its own dedicated namespace where roles can be defined.

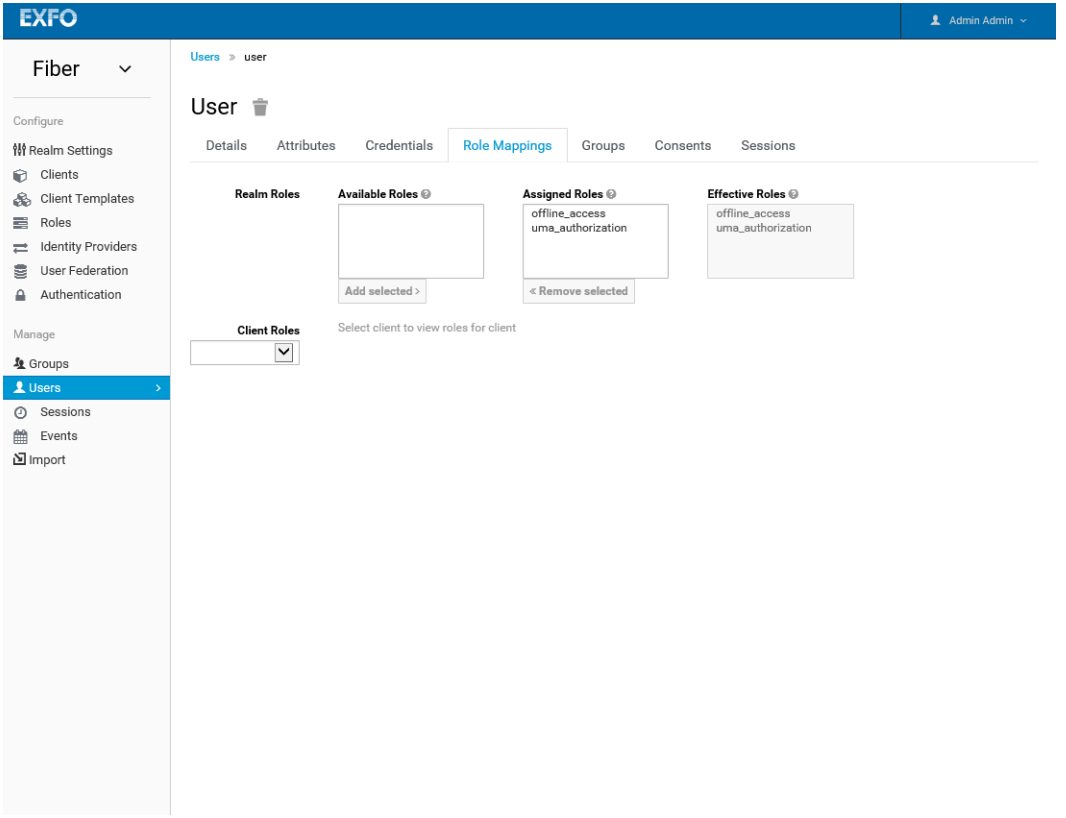
User role mappings can be assigned individually to each user and defines a mapping between a role and a user. A user can be associated with zero or more roles. This role mapping information can be encapsulated into tokens and assertions so that applications can decide access permissions on various resources they manage.

The table below lists the different role mappings along with the associated permissions:

Role Mapping	Role Bearer Permissions
fg-topology-master	Access and edit all items defined in the topology.
fg-topology-read	View all items defined in topology.
fg-alarm-master	Perform all actions on any alarm in the system.
fg-alarm-all	Assign and change severity on active and closed alarms.
fg-alarm-acting	Assign any unassigned active alarm to themselves.
fg-results-master	Access and edit test results.
fg-results-read	Read test results
fg-test-control-master	Apply configuration changes on RTUs.

To set the role mapping for a user:

1. From the **Users** page, select the **Role Mappings** tab.
2. Move the roles that are available in the list to the appropriate list depending on which you want to assign to this particular user.

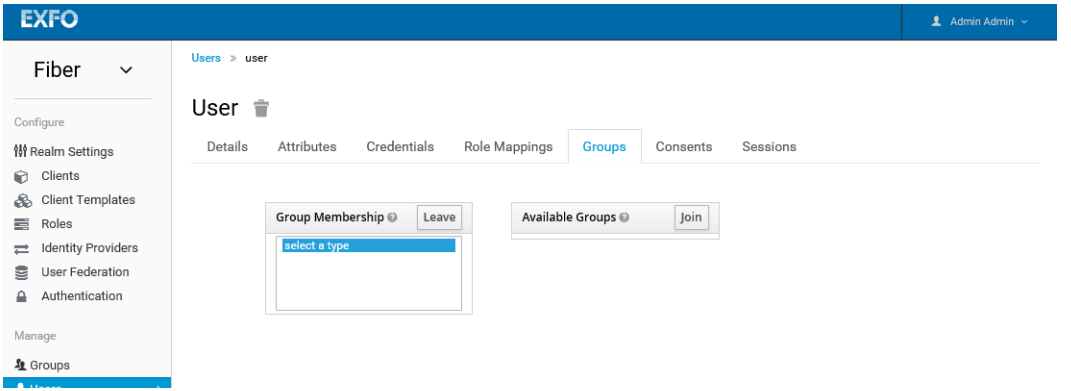


Associating a User to a Group

Groups features specific attributes that you might want to associate your user with. You can map roles to a group as well. Users that become members of a group inherit the attributes and role mappings that group defines.

To associate a user to a group:

1. From the **Users** page, select the **Groups** tab.
2. Select a group from the **Available Groups** tree and click the **Join** button to add the user to a group. To remove the user, select a group from the **Group Membership** list and click **Leave**.



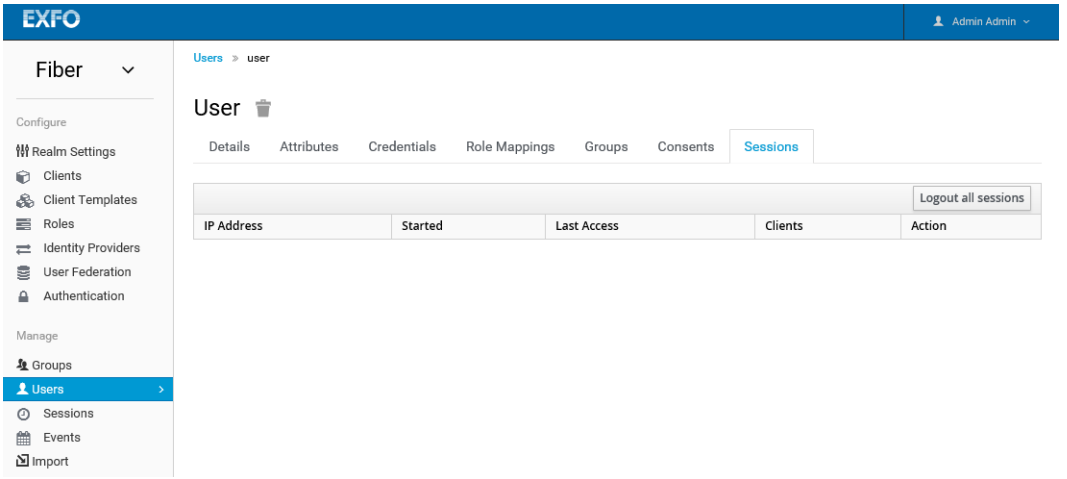
Note: *If you go in the **Groups** page and consult the detail page for that group, you will see that the user list has been updated in the **Members** tab.*

Viewing Sessions

Sessions are created when a user logs in. A session manages the login session and contains information like when the user logged in and what applications have participated within single-sign on during that session. Both admins and users can view session information.

To view the sessions:

From the **Users** page, select the **Sessions** tab.



Managing Groups

Groups allow you to manage a common set of attributes and role mappings for a set of users. Users can be members of zero or more groups. Users inherit the attributes and role mappings assigned to each group.

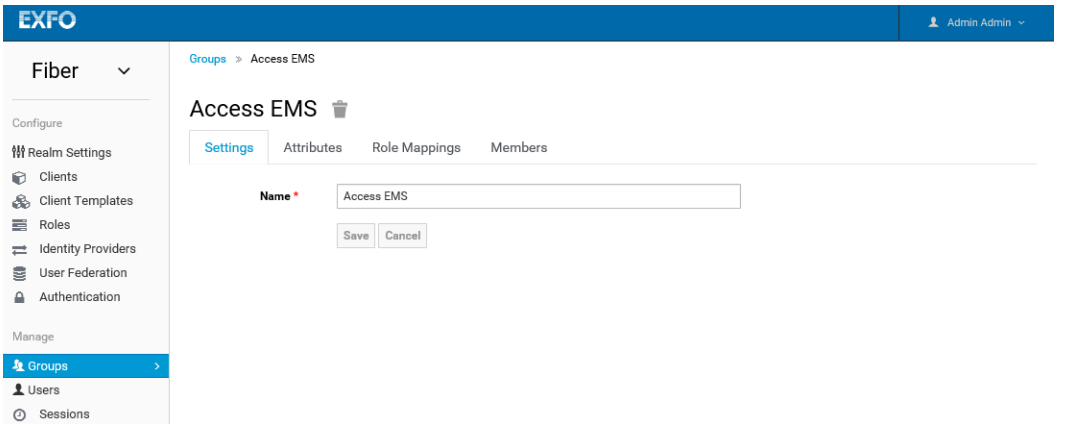
Groups are hierarchical. A group can have many subgroups, but a group can only have one parent. Subgroups inherit the attributes and role mappings from the parent. This applies to the user as well. So, if you have a parent group and a child group and a user that only belongs to the child group, the user inherits the attributes and role mappings of both the parent and child.

To create a group:

1. From the main window, select **Groups**.
2. If you want to add a parent group, click **New**

   OR

   If you want to add a child group, click on the parent you want to add a new child to and click **New**.
3. Enter a name for the group, then click **Save**.

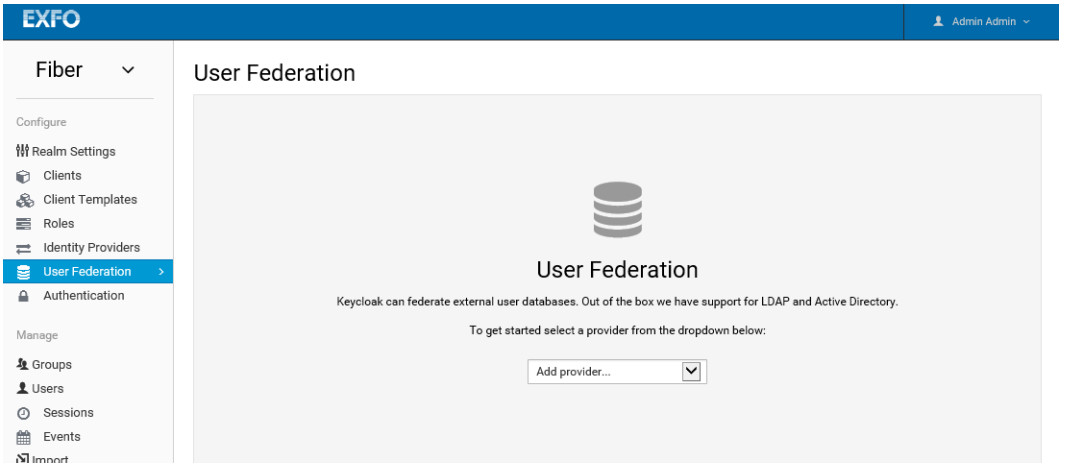


Any attributes and role mappings you define will be inherited by the groups and users that are members of this group. To add a user to a group you need to go back to the user detail page and click the **Groups** tab there. For more information, see page *Associating a User to a Group* on page 24.

Federating External User Databases

Users can federate existing external user databases with support for LDAP and Active Directory by using the User Storage SPI. Once you log in, the internal user store searches to find you. If you cannot be found, an iteration over every User Storage provider configured for the realm will be performed until a match is found.

Data from the external store is mapped into a common user model that is consumed by the runtime. This common user model can then be mapped to OIDC token claims and SAML assertion attributes.



To add a storage provider:

1. Click on **User Federation** in the left menu.
2. Click in the **Add provider** box and choose the desired provider. The configuration page of that provider will open.

Configuring an LDAP

The user management console comes with a built-in LDAP/AD provider. It is possible to federate multiple different LDAP servers in the same user realm where you can map LDAP user attributes into the common user model. By default, it maps user name, e-mail, first name, and last name, but you are free to configure additional mappings. The LDAP provider also supports password validation via LDAP/AD protocols and different storage, edit, and synchronization modes.

To configure the LDAP:

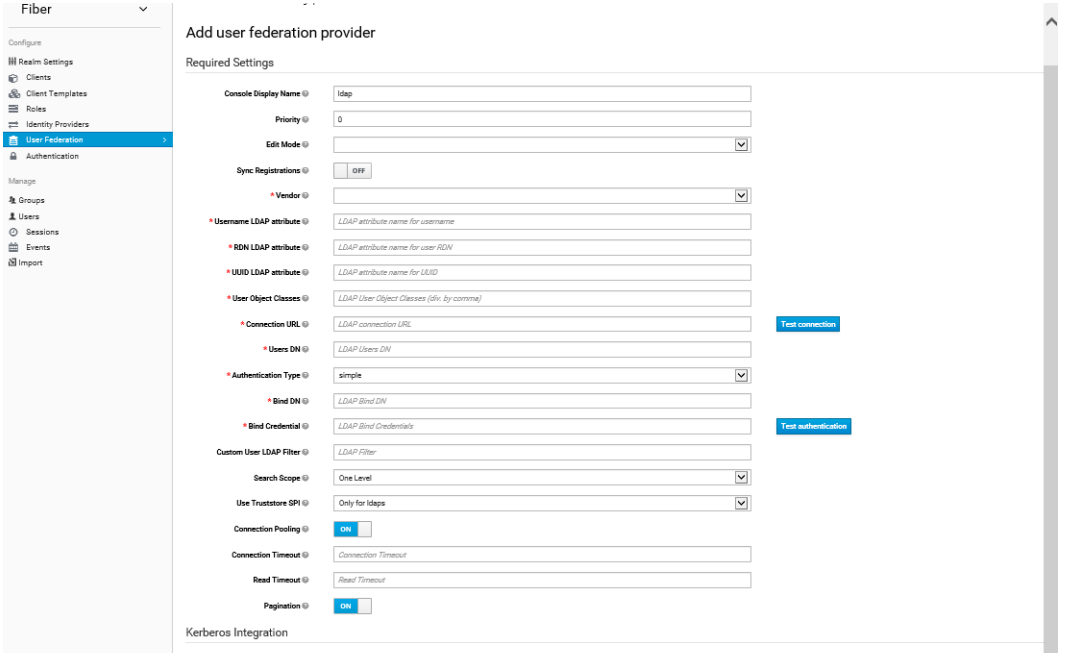
1. From the main window, select **User Federation** then select LDAP as the desired provider.
2. Enter the information as required:
   - **Console Display Name** is used when this provider is referenced in the admin console.
   - **Priority** denotes the priority of this provider when looking up users or for adding registrations.
   - **Edit Mode** allows users, through the User Account Service, and admins, through the Admin Console, to have the ability to modify user metadata. Depending on your setup you may or may not have LDAP update privileges. The Edit Mode configuration option defines the edit policy you have with User Documentation LDAP/AD Integration 314 in your LDAP store.

     READ_ONLY does not allow changes to username, email, first name, last name, and other mapped attributes. An error will be displayed anytime anybody tries to update these fields. Also, password updates will not be supported.

     WRITABLE allows for updates to username, email, first name, last name, other mapped attributes and passwords. All will be synchronized automatically with your LDAP store.

UNSYNCED allows any changes to username, email, first name, last name, and passwords to be stored in the user local storage. It is up to you to figure out how to synchronize back to LDAP. This allows user deployments to support updates of user metadata on a read-only LDAP server. This option only applies when you are importing users from LDAP into the local user database.

➤ **Sync Registrations** enables/disables your LDAP adding new users. Click **ON** if you want new users created in the admin console or the registration page to be added to LDAP.

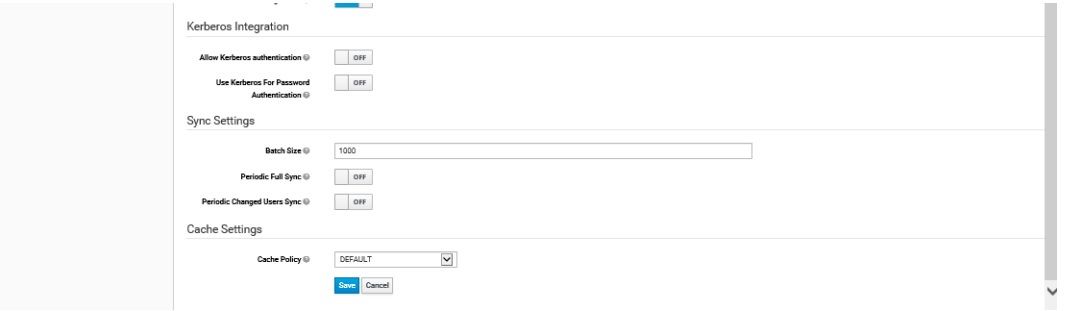


- **Allow Kerberos authentication** allows you to select **ON**/**OFF** for Kerberos/SPNEGO authentication in realm with users data provisioned from LDAP.
- **Sync Settings** allows you to sync all LDAP users into the user database, by configuring and enabling the following settings:

  Batch Size is the number of LDAP users to be imported from LDAP in a single transaction.

  Periodic Full Sync will synchronize all LDAP users when **ON** is selected. Those LDAP users, which already exist and were changed in LDAP directly will be updated.

  Periodic Changed Users Sync will update and/or import only those users that were created or updated after the last sync, when **ON** is selected.



Selecting a Storage Mode for LDAPs

By default, users from LDAP will be imported into the local user database. This copy of the user is either synchronized on demand, or through a periodic background task. The one exception to this is passwords. They are not imported and password validation is delegated to the LDAP server. The benefits to this approach is that all features will work, while any extra per-user data that is needed can be stored locally. This approach also reduces load on the LDAP server as uncached users are loaded from the user database the second time they are accessed. The only load your LDAP server will have is password validation. The downside is that when a user is first queried, this will require a user database insert. The import will also have to be synchronized with your LDAP server as needed.

Alternatively, you can choose not to import users into the user database. In this case, the common user model that the runtime uses is backed only by the LDAP server. This means that if LDAP doesn't support a piece of data that a feature needs, that feature will not work. The benefit to this approach is that there is no overhead of importing and synchronizing a copy of the LDAP user into the user database.

4 Configuring the FMS Topology

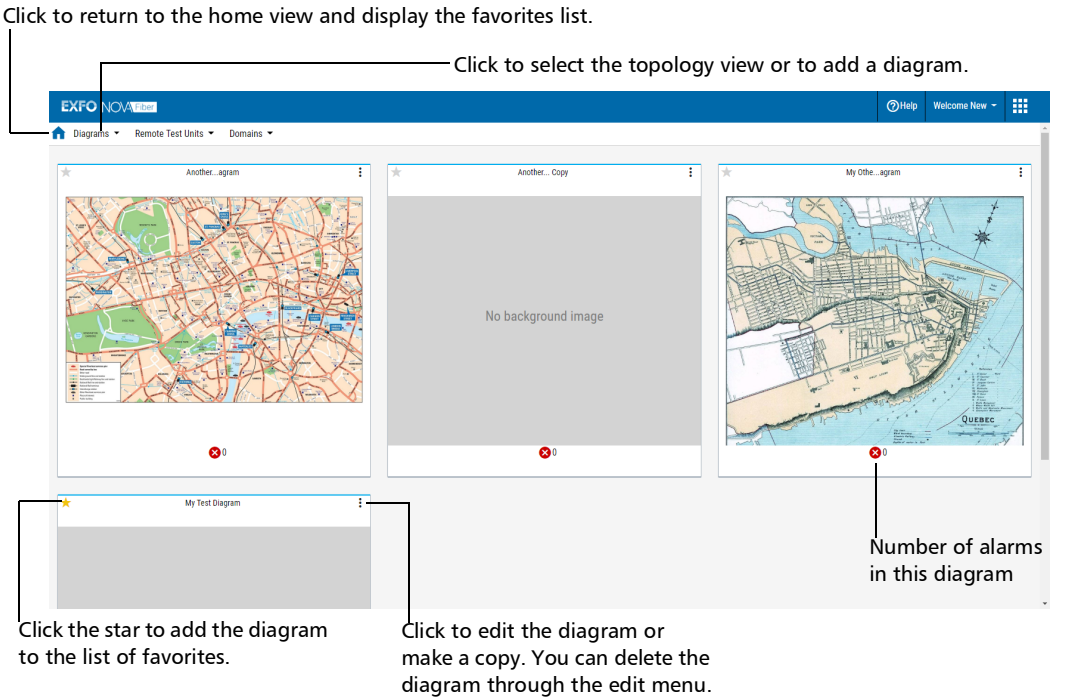
The main window of FMS includes a view of the set topologies, or diagrams, and a section where you can see the complete list of RTUs and their current statuses (whether they are attached to a network or not).

Diagrams allow you to map RTUs as a logical network displaying their relations through optical routes. With diagrams, you can edit test configurations for both iOLM and OTDR.

RTUs located within the topology can be accessed based on their location. Optical devices located in a site are listed below cable segments and optical routes.

Working With the Topology Dashboard

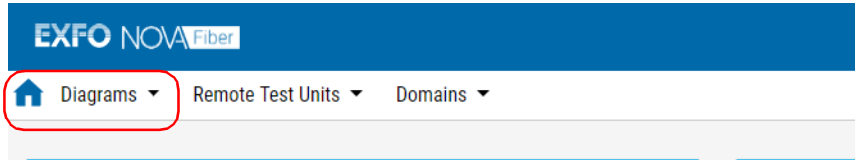
The topology dashboard allows you to see at a glance all of the diagrams available. You can see a complete list, or set up a list of favorite diagrams that you use more often for easier management and viewing. As you add diagrams to your dashboard or your favorites list, they are automatically shown in alphabetical order.



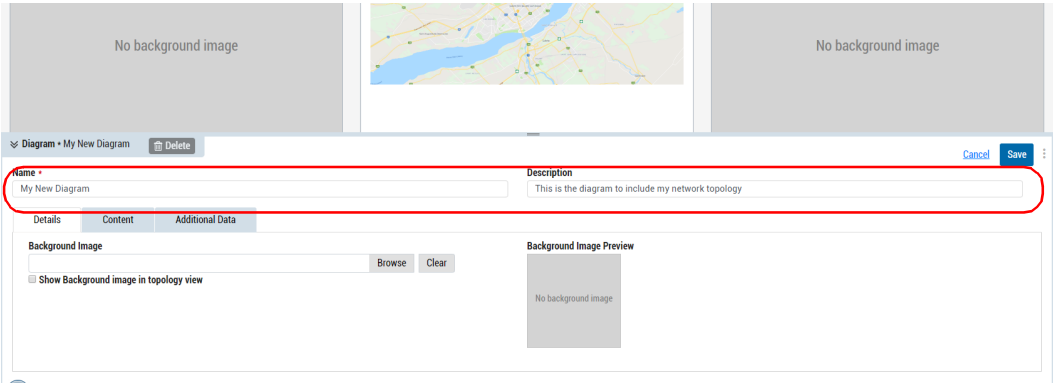
You can include a background image in the diagram so sites can be viewed within a regional context. Images are limited to a maximum of 5000 pixels for either width or height and you will be warned about longer diagram loading times when the uploaded image is larger than 500 kb.

To create a diagram:

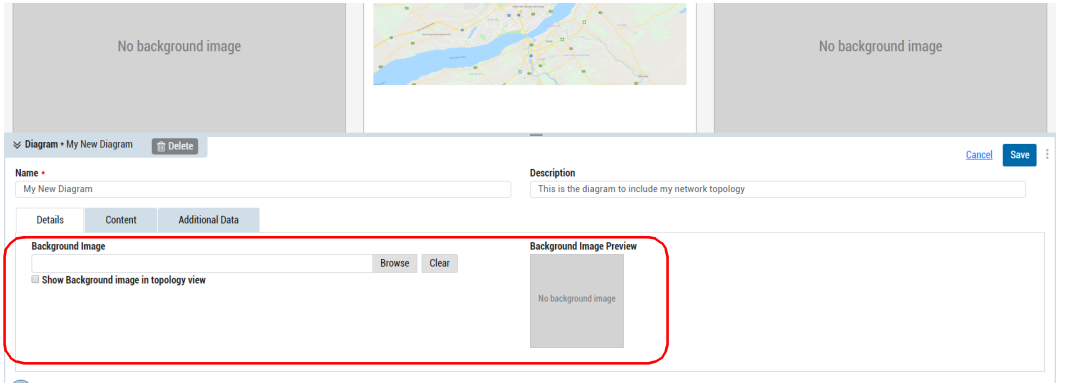
1. From the Topology view select **Diagrams**, then **Add**.



2. Enter a name for your diagram. If you want to add a description, you can do so as well.



3. If you want to add a map or picture reference for your diagram, browse to the desired location and select your picture file. You can select whether the picture will appear in the topology view only or both the topology and detailed view by selecting the corresponding option.



4. Click **Save**.

Note: *The diagram edition window will remain open. You can click* ⌄⌄ *to send it to the bottom of your window, or click* ***Cancel*** *to close it.*

Editing Network Diagrams

Only users having the fg-topology-master role can modify diagrams. Changes to the content of a diagram, such as a topology object, its position on the canvas, and the visual properties of the links, are automatically saved. Edits are saved immediately, limiting the chances of a concurrency validation failure.

Concurrent changes from multiple users are identified by a version indicator, where a higher version suggests that the diagram was modified by another user. Prior to saving changes, the concurrency validation elects a winner and loser where the winner has a higher version indicator, so when a diagram is saved and that action is concurrent to another save action, the loser is shown a message indicating that the last changes made on the diagram were lost.

Background diagram updates are implemented as soon as there are changes performed by another user. When you begin editing the diagram, no updates are implemented until they are saved and pending (or not yet processed) updates are cancelled. When you discard changes while editing (for example, cancelling a site), the diagram is updated immediately.

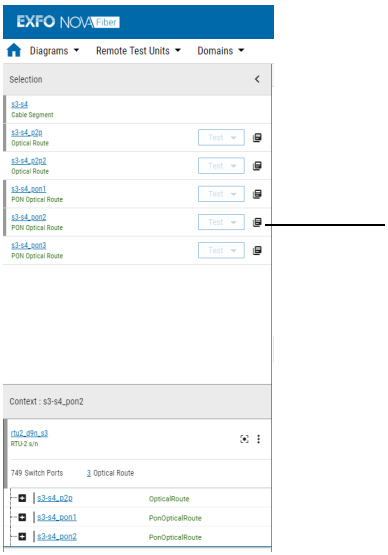
The topology object name and properties remain as is unless a diagram update provides new objects where only unknown objects are obtained. A manual update will update the diagram itself and all its contained topology object properties.

Managing Sites and Links

The diagram view works with a system of layers, where you can add and manage specific items:

- None: This layer is used to move around your view by clicking and dragging the view to the desired location.
- Sites: This is to add locations, or sites, on your diagram.
- Cable segment: This is to link sites together as per the cable connections between them. You can add bends to the segments for better visibility or to follow an actual path on a map.
- Optical route: This is to determine the optical routes linking your sites and devices.

When you click on an item, a menu will open on the left side of the window. If there are more than one items (for example, cable segments or optical routes), you will see a list of them in the menu. Click the desired item to open its corresponding edition window.



Opens the RTU view at the bottom of the menu, with the corresponding optical routes.

Note: *You can access and edit the various items regardless of which layer you are working on, but you must be on the layer specific to the item you are working with if you want to add items or modify the general look or links.*

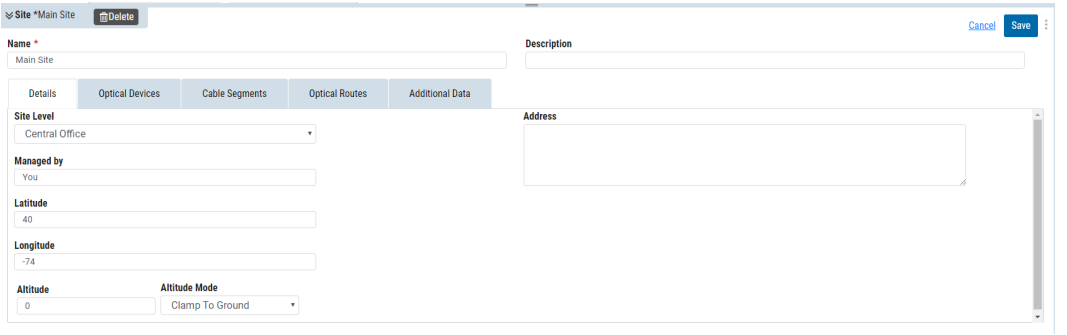
To add a site:

1. Within your chosen diagram, select **Sites**.
2. Click anywhere in the view to add a first site, then name it. Press Enter once you are done to create it.

Note: *If you type a name, then click elsewhere without pressing Enter first, the site* will not *be created and you have to start over.*

At this point, you can continue adding sites as needed for your topology by repeating step 2 or you can edit the current site information as explained in step 3 onwards.

3. Click site you want to modify, then select it on the menu to the left to open the corresponding **Details** tab.



4. Select the type of site:
   - ➤ Central office: The primary point to connect customers to the network.
   - ➤ Cross-connect: A physical, hard-wired cable that provides a direct connection between two different termination locations.
   - ➤ Point of presence: A point at which the line enters the facility.
   - ➤ Access point: A location where the fiber is accessible (a manhole for instance).
5. Change the other information for the site as needed.

Note: *Both latitude and longitude values are needed if you enter a number in either boxes. When both latitude and longitude are filled, the default value for altitude will be 0 and the altitude mode is automatically set to Clamp to ground.*

6. Once you are done editing the site information, click **Save** to confirm the changes.

IMPORTANT

If you click on another item in the topology, the details window will still be the one of the item you had previously modified until you select this new item in the menu to the left to open its edition window.

To link sites with cable segments:

1. Within your chosen diagram, select **Cable Segment**.
2. Draw a line between the two sites you want to link together, then enter a name for your cable. Confirm it by pressing Enter.
3. If you need to add bends to the link, simply click on the link, then drag the bend to the desired location. To revert the link to its original straight form, click ⋮, then select **Reset**.

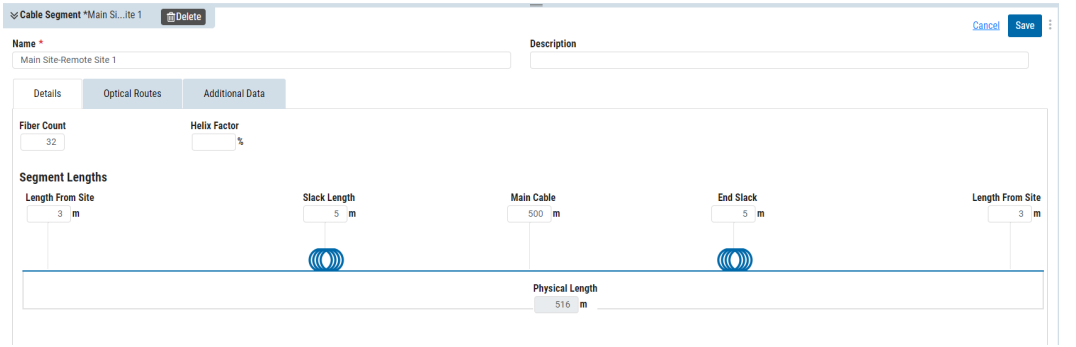
   At this point, you can continue linking sites as needed for your topology by repeating step 2 or you can edit the current site information as explained in step 4 onwards.

Note: *You can have more than one link between sites.*

4. Click segment you want to modify, then select it on the menu to the left to open the corresponding **Details** tab.

Note: *If you have created an optical route, you can access the edit window by first selecting the link, then selecting the* ***Cable Segment*** *tab in the details window.*

5. Enter the cable information as needed.



6. Once you are done editing the link information, click **Save** to confirm the changes.

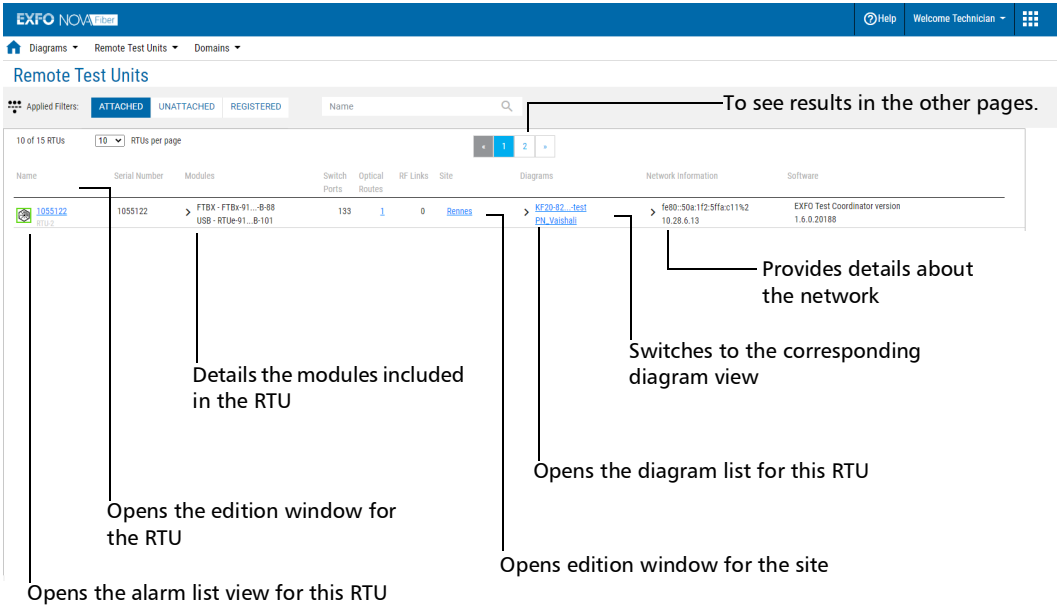
IMPORTANT

If you click on another item in the topology, the details window will still be the one of the item you had previously modified until you select this new item in the menu to the left to open its edition window.

Working With the RTU Lists

The RTU lists let you see all of the RTU in the system in one glance. The lists are divided into the following categories:

- Attached: The RTU is available to be centrally configured and ready to perform testing.
- Unattached: The RTU and its configuration are defined but not applied to a device. You will need to provide a serial number and use the attach feature before tests can be performed.
- Registered: The RTU is communicating with the FMS and has provided its hardware and network characteristics. An attached and available RTU will appear in this list.



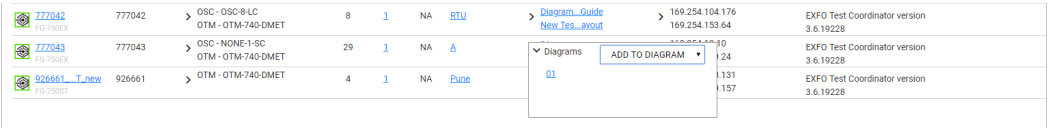
You can add RTUs to diagrams directly in the list (an RTU can be in more than one diagram at a time). In the case of FG-750 units, you can also use the dashboard to add an optical route visually in a diagram when the optical routes were created prior to attaching the RTU.

To access the RTU lists:

From the main window, select **Remote Test Units**, then **List All**.

To add an RTU to a diagram:

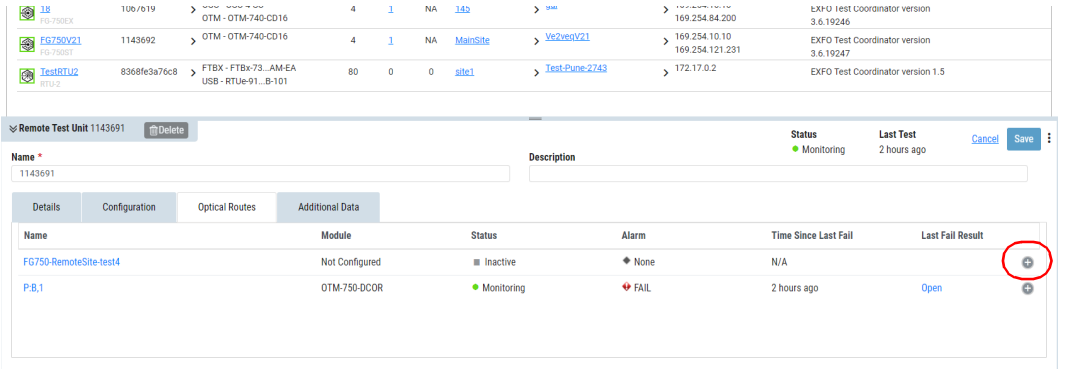
1. Once in the RTU lists, select either the **Attached** or **Unattached** tabs, depending on where your RTU is located.
2. In the row corresponding to the RTU, select the arrow under the **Diagrams** column to open the list view.



3. Use the **ADD TO DIAGRAM** button to select the diagram you want. The view will switch to the corresponding diagram and you will notice that the RTU is now there with all the corresponding information.

To add existing optical routes from an RTU to a diagram:

1. After you have added the RTU to a diagram using the list, open the RTU edition window and select the **Optical Routes** tab.
2. Add the route to the diagram using the ⊕ button. Repeat for the other routes as needed.



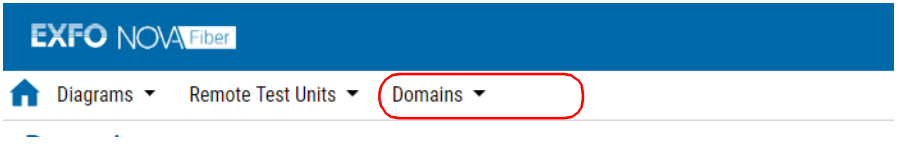
Working With Domains

You can create domains to regroup users with optical routes to optimize alarm notifications. This will allow you to quickly change settings or permissions.

Note: *When working in the domains edition tabs, any newly added or modified item will be highlighted in yellow to indicate that they are not saved yet in the configuration. In the same manner, any item that you delete are highlighted in gray until you confirm your action by saving the changes.*

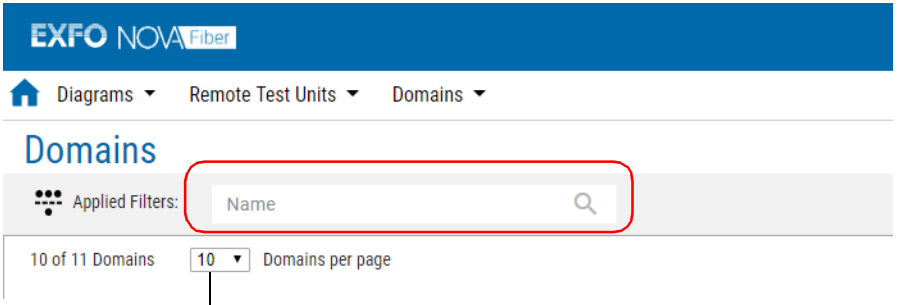
To view the list of available domains:

From the main window, select **Domains**, then **List All**.



To search for domains:

Once in the list, use the search box at the top.

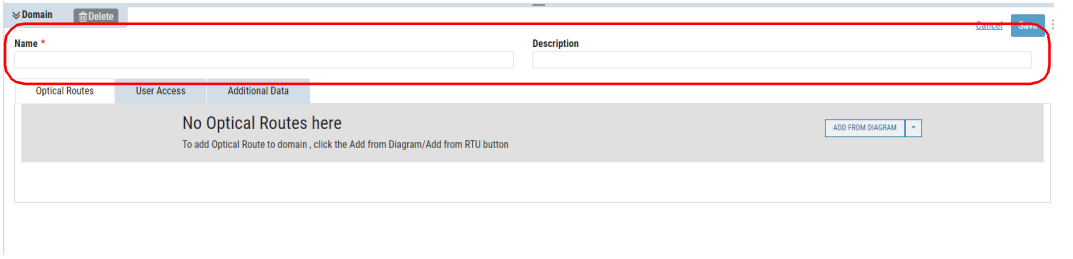


You can select how many items are displayed in the list by selecting the desired value.

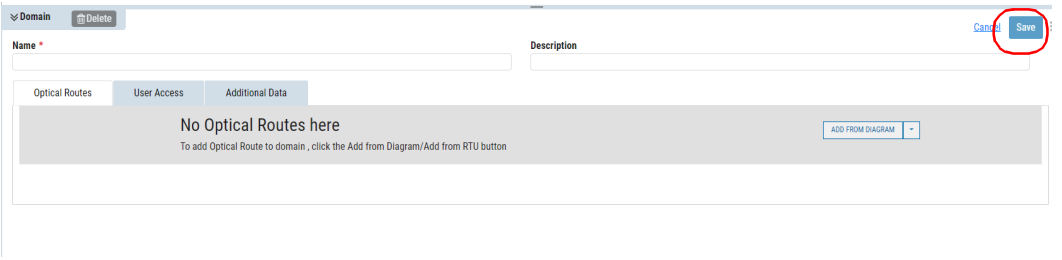
To add a domain to the list:

1. From the main window, select **Domains**, then **Add New**.

2. Enter a name for the domain, plus a description if needed.

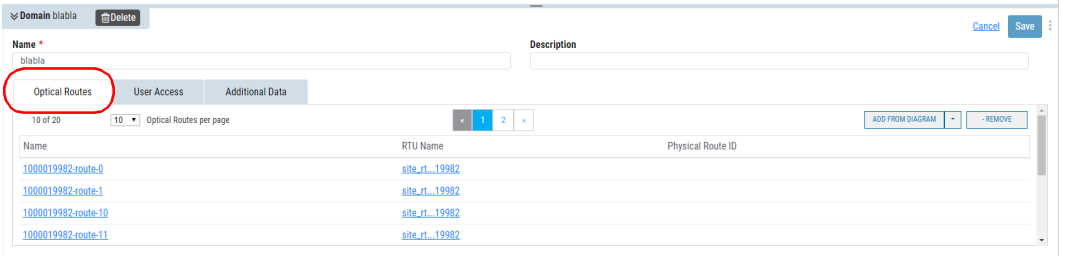


3. Click **Save**.

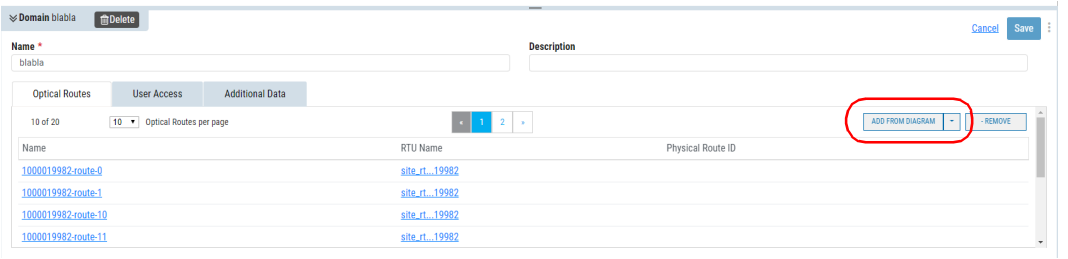


To add optical routes to a domain:

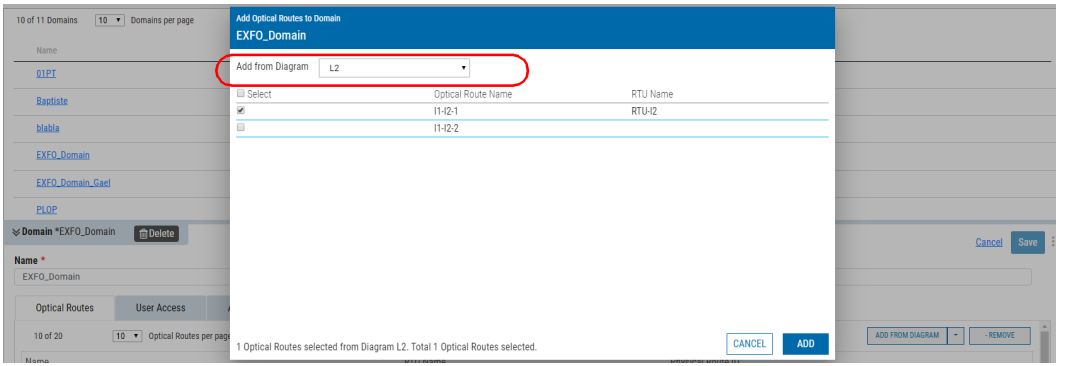
1. Once in the domains list, select the **Optical Routes** tab.



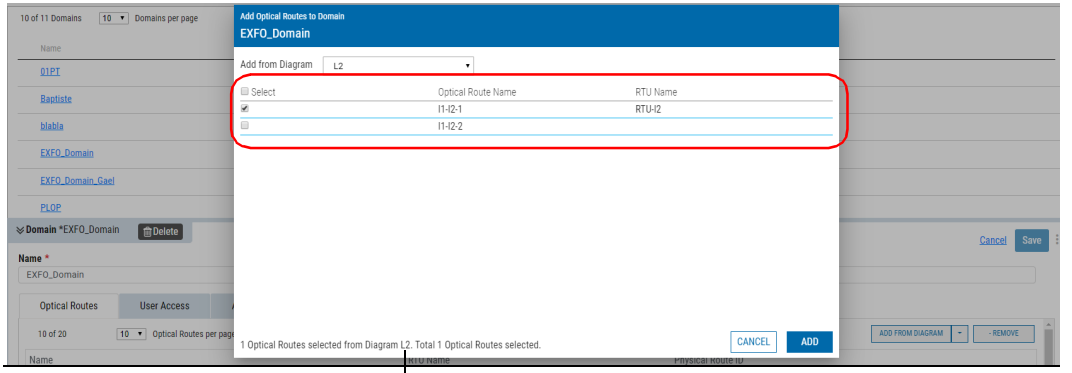
2. Depending if you want to add the route from a diagram or connected RTU, select the corresponding option.



3. Select the diagram or RTU in the list.



4. Select the route or routes you want to add, then click **Add**.

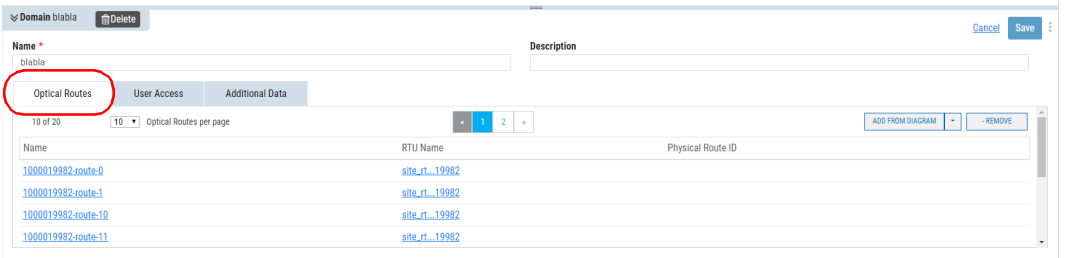


You can see which route is selected in the current diagram and how many routes you have selected to add.

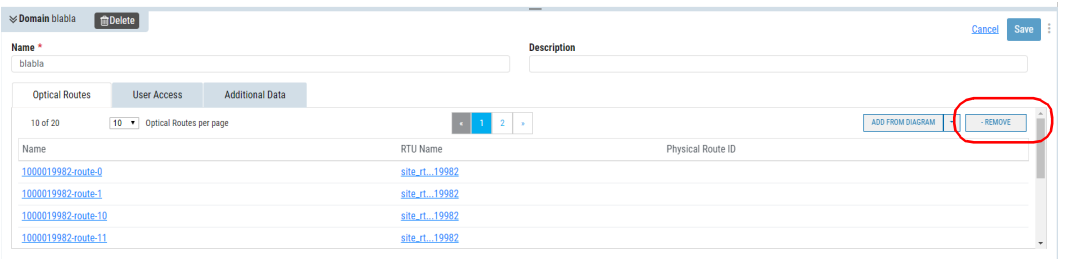
5. Click **Save** to apply the changes.

To remove an optical route from a domain:

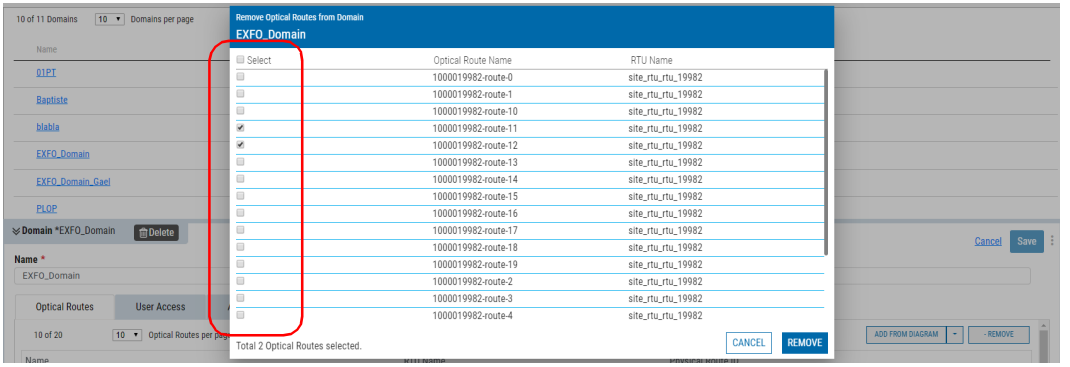
1. Once in the domains list, select the **Optical Routes** tab.



2. Click **Remove**.



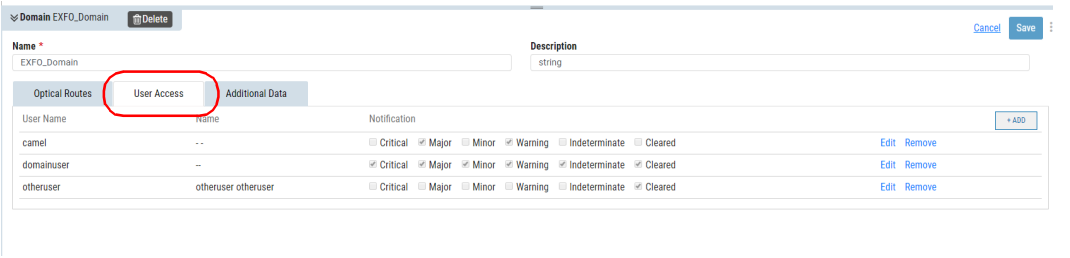
3. Select the route or routes you want to delete, then click **Remove**.



4. Click **Save** to apply the changes.

To add users to a domain:

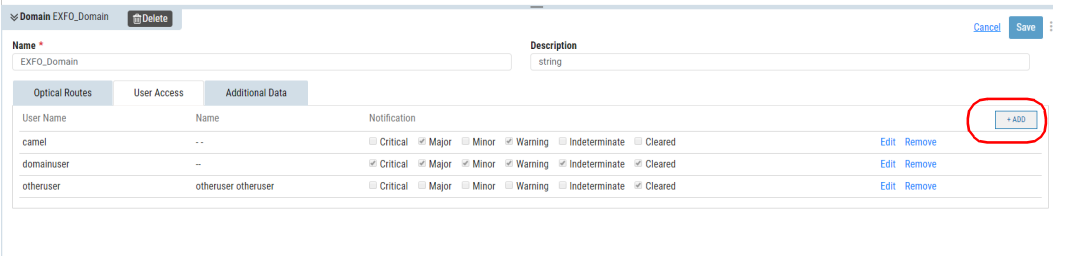
1. Once in the domains list, select the **User Access** tab.



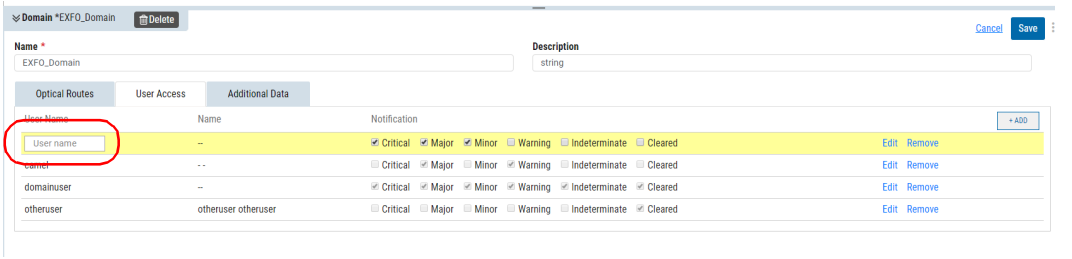
2. If there are no users in the list, click the + button

   OR

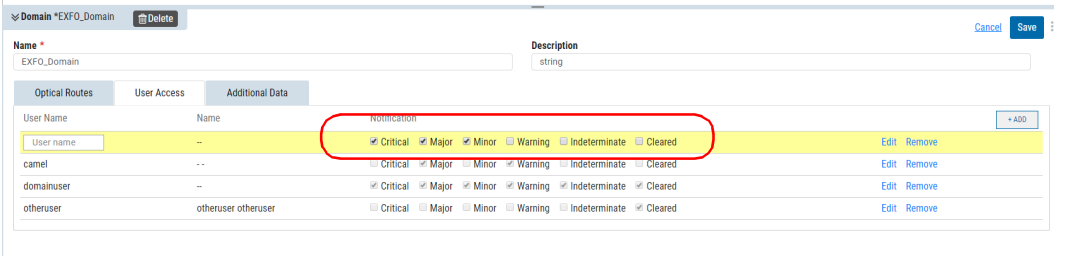
   If there is at least one user in the list, click **Add.**



3. Select a user name in the list of available choices.



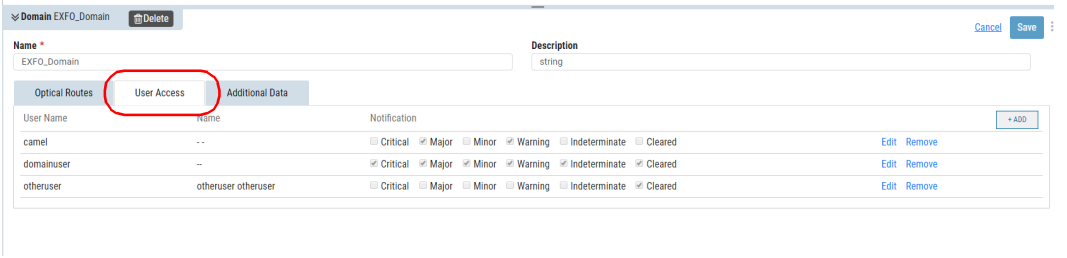
4. Select alarm severity level or levels that this user will be notified about in the current domain.



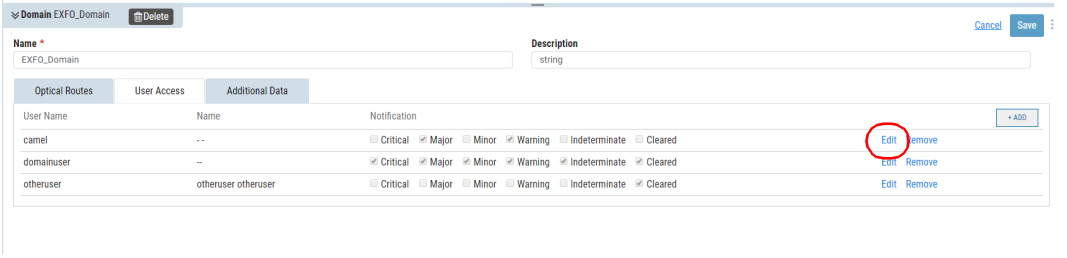
5. Click **Save** to confirm the addition.

To change user notifications in a domain:

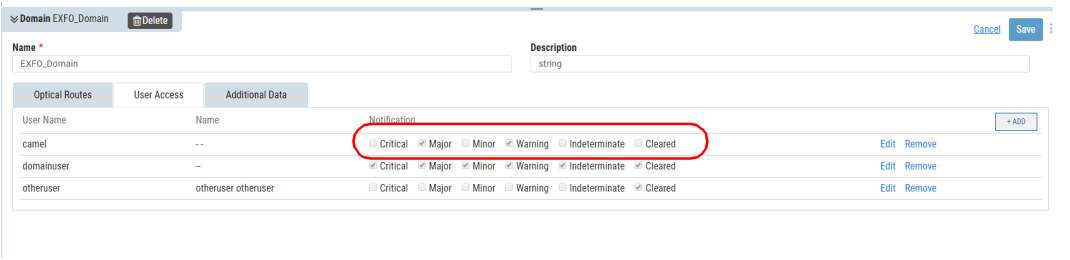
1. Once in the domains list, select the **User Access** tab.



2. On the line for the user whose notification details you want to modify, click **Edit**.



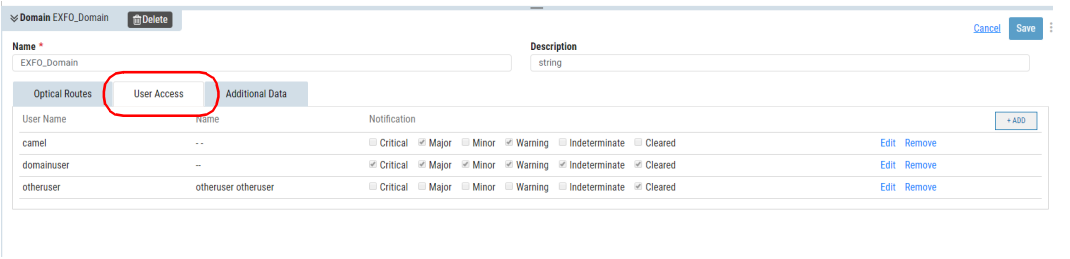
3. Change the values as needed.



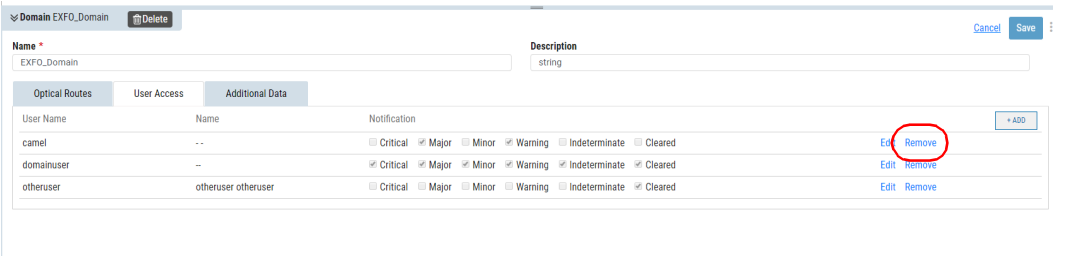
4. Click **Save** to confirm the modification.

To remove a user from a domain:

1. Once in the domains list, select the **User Access** tab.



2. Click **Remove**.



3. Click **Save** to apply the changes.

Note: *If a user associated with the domain is deleted from Keycloak (IAM), they will still appear in the **User Access** tab and will have to be removed manually. However, once the user is deleted, they will not receive any notifications.*

5 Managing Alarms

The FMS associates deviation verdicts received from the RTU with the optical route alarm in the topology. The following monitoring states are supported for an optical route:

State	Details
N/A	No monitoring performed.
Actively monitoring without deviation	Last measurement gave a deviation verdict of PASS.
Actively monitoring with deviation	Last measurement gave a deviation verdict of FAIL.

The optical routes are updated by performing a monitoring test or a test on demand. The status and alarms are supported on linked objects such as an optical route or alarm applied to linked cable segments.

You can view the listed alarms according to filters you select to help you in your search. Moreover, you can change the alarm status to escalate it and acknowledge it once you have solved the related problem.

To access the alarm viewer page:

From the main window, click  , then 

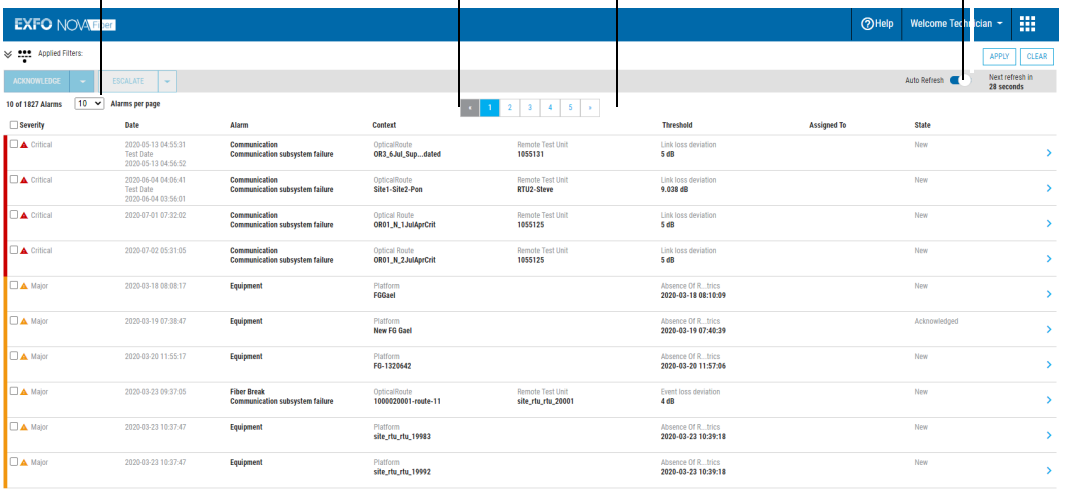
.

The unfiltered alarms page appears. Click on one of the headers to sort the list according to the desired criteria.

To set how many results to view per page.

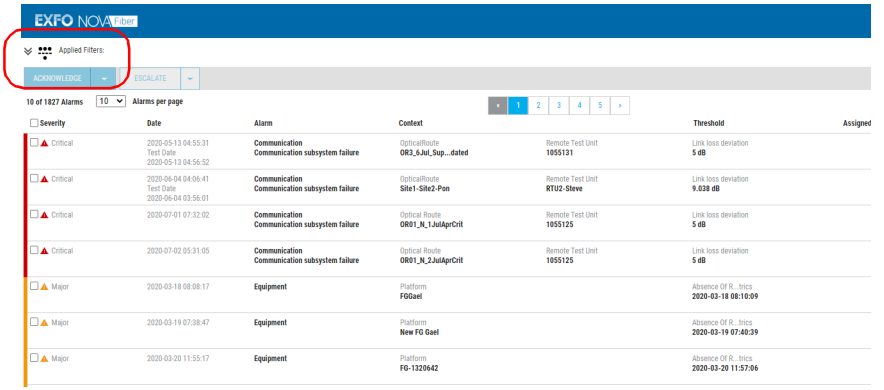
To update the alarm list automatically or not.

To navigate in the result pages.

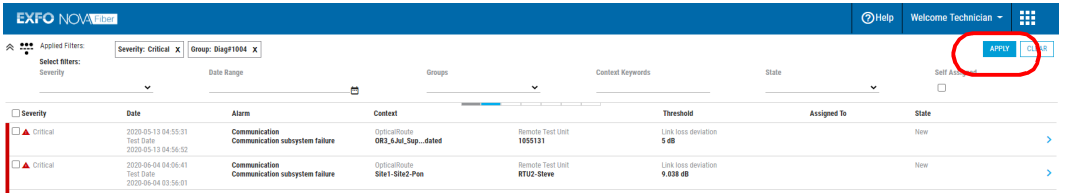


To filter search results:

1. Access the alarm viewer page.
2. Display the filter selector by clicking the corresponding option.



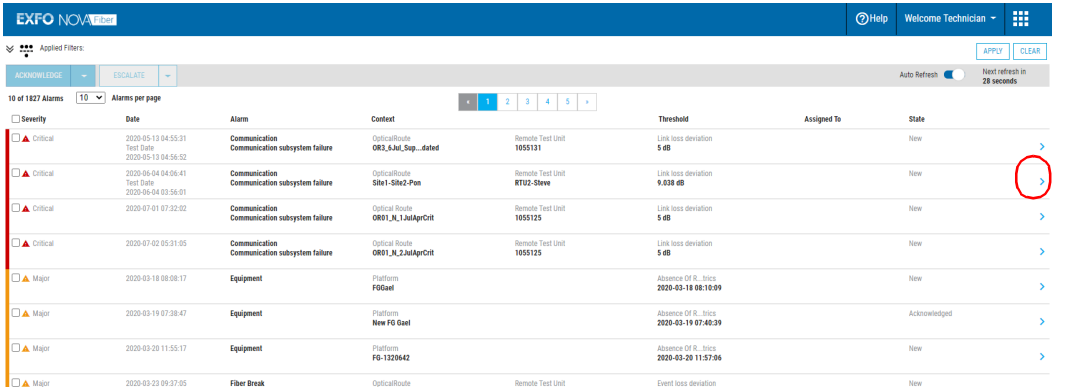
3. Use the filter types to help you in your search. You can use more than one type of filters, but you can only select one in each of the severity, groups and state filters.
4. Once you have added your filters, click **Apply** to refresh the list accordingly



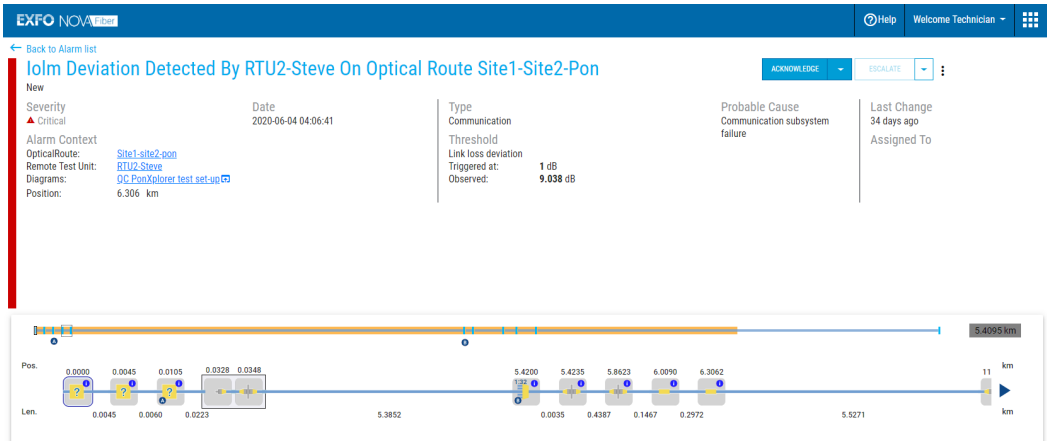
To remove filters individually, click the **X** next to the corresponding filter. To remove all of the filters at once, click **Clear**.

To view alarm details:

From the alarm window, select the one for which you want to view details, then click ›.

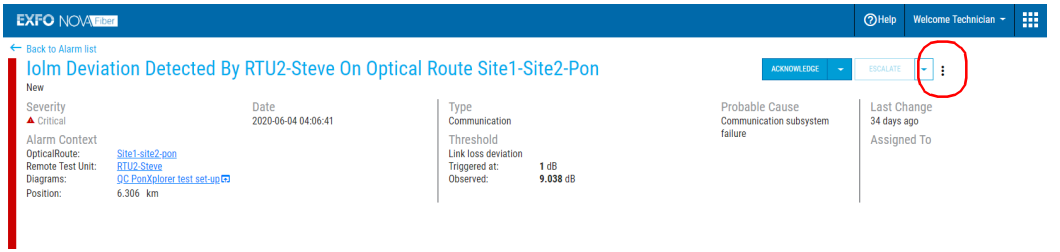


The alarm detail page features useful information such as the context, source and probable cause. Links are active in the alarm context and source sections to let you access the relevant pages quickly. If a view from the OpticalRF, OTDR or iOLM viewers is available, you can access it from here as well.



To unassign an alarm:

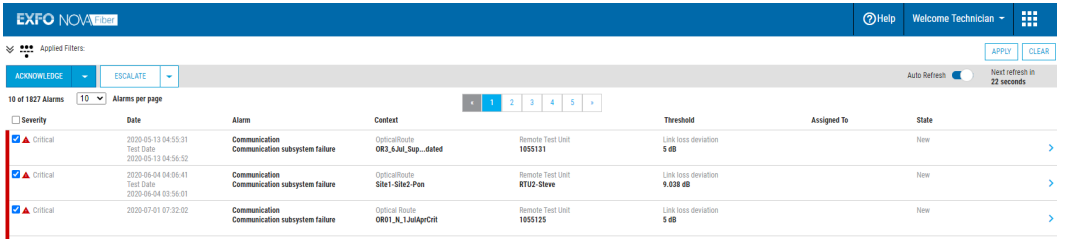
Once in the detailed view, click ⋮, then select **Unassign Alarm**.



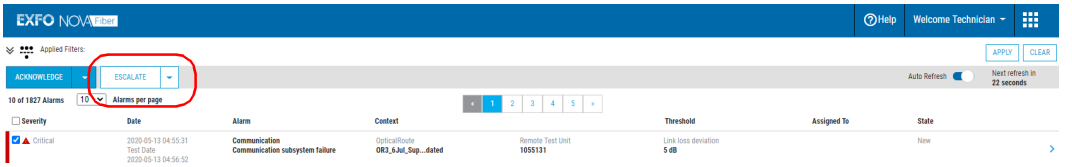
To change the status of an alarm:

1. Select the alarm for which you want to change the status in the list.

Note: *You can select more than one alarm at a time.*



2. Click **Escalate** to put the alarm on the next level up or use the down arrow to select **De-escalate** to put the alarm on the next level down.



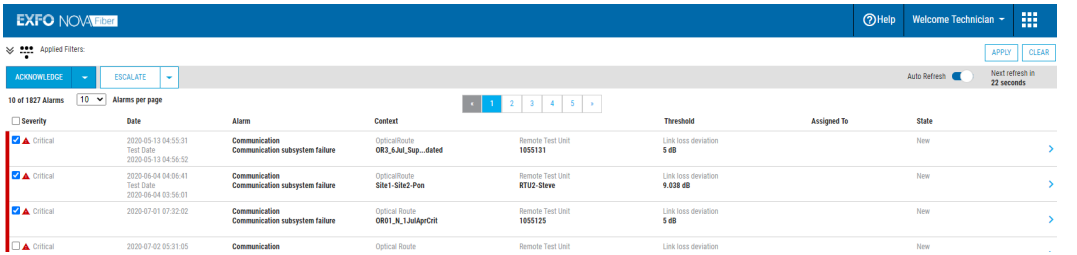
The status is updated automatically.

Note: *You can also escalate the alarm when in the detailed view.*

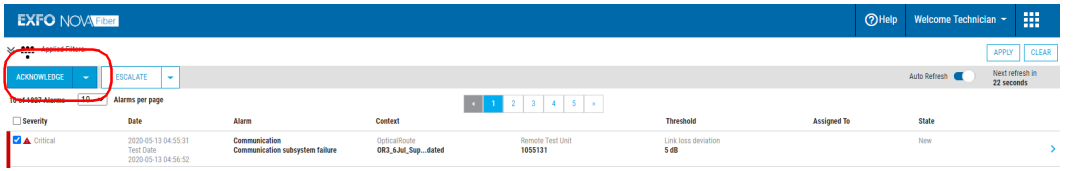
To acknowledge (close) an alarm:

1. Select the alarm that you want to close in the list.

Note: *You can select more than one alarm at a time.*



2. Click **Acknowledge**, then select **Close**.



Note: *You can also acknowledge the alarm when in the detailed view.*

The alarm is removed from the list. You can view the closed alarmed by applying the corresponding filter in the list.

6 Configuring RTU-2s and Setting up Test Routes

The main window of FMS includes a view of the set topologies, or diagrams, and a section where you can see the complete list of RTUs and their current statuses (whether they are attached to a network or not).

Diagrams allow you to map RTUs as a logical network displaying their relations through optical routes. With diagrams, you can edit test configurations for your iOLMs.

RTUs located within the topology can be accessed based on their location. Optical devices located in a site are listed below cable segments and optical routes.

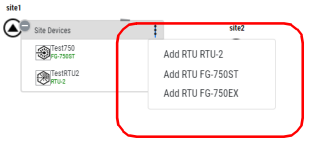
Managing RTUs

The FMS allows you to specify where RTUs are located in order to position the monitoring point of origin. You can add an RTU by name in the topology directly from the selected site where the RTU is located.

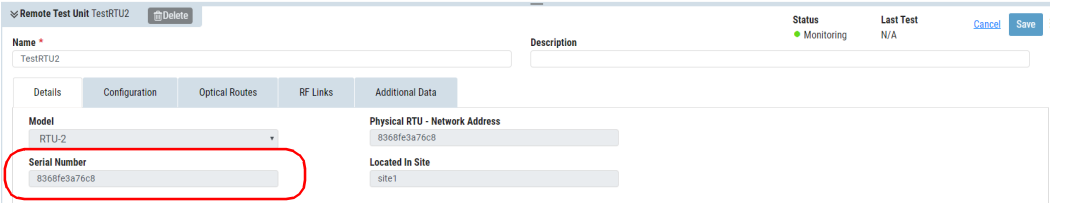
Once you have added the RTUs to the network, you can attach them to match your created item to the unit with the corresponding serial number. An RTU is considered to be attached when both the RTU and the link (optical route) are attached.

To add an RTU:

1. In your diagram, select the site to which you want to add an RTU, then click **+** to open the site devices menu.
2. Click ⋮, then select the type of RTU you want to add in the list.



3. Enter a name for your RTU, then press Enter.
4. Click on the RTU you have just created to select it, then **Edit** to open the modification window.
5. Under the **Details** tab, enter the serial number for this RTU. You must enter the serial number correctly, otherwise you will not be able to attach the unit to the link.



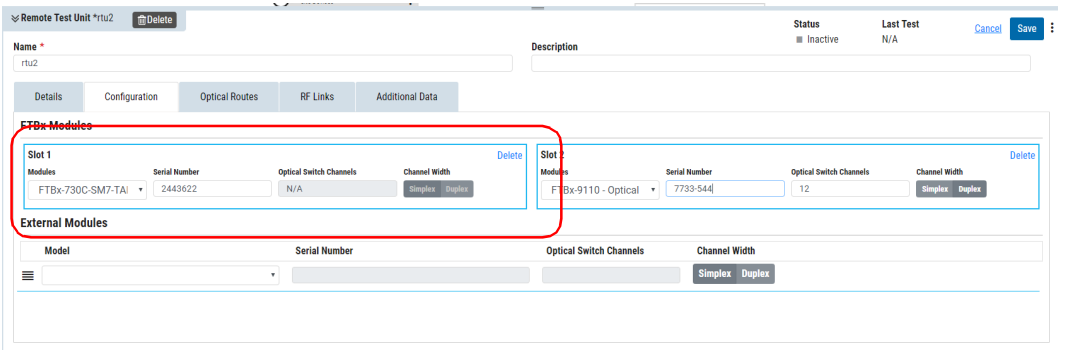
6. Click **Save** to confirm your choice.

   At this point you can attach the RTU as explained on page 65. The hardware configuration will automatically be added to the configuration as the link is established. If you need to manually configure the RTU, follow the instruction below.

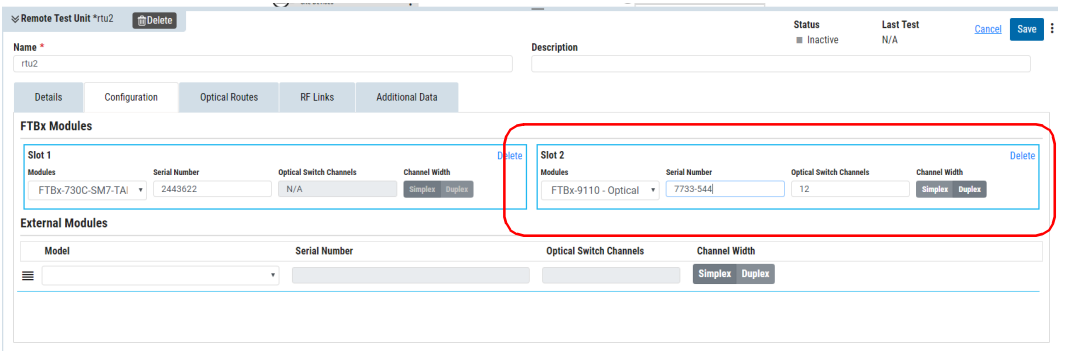
To manually configure the RTU:

1. When in the selected RTU edition window, select the **Configuration** tab.

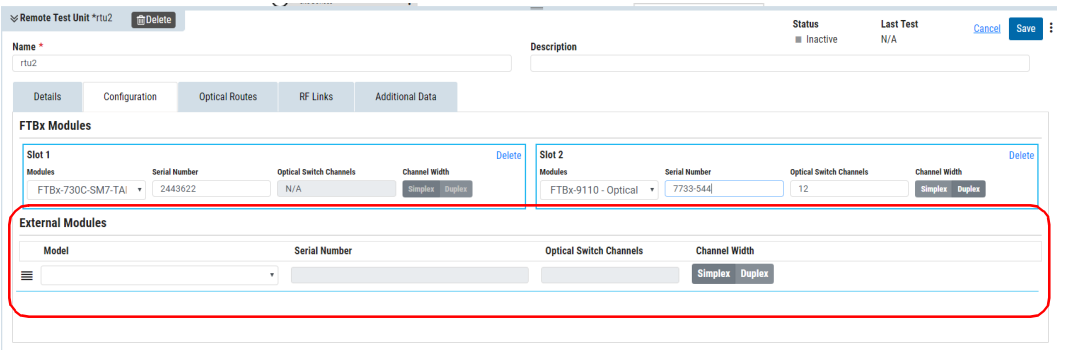
2. Select the module to be used in slot 1 in the list of available choices. If this is an iOLM module, you can enter the serial number for it in the corresponding box.



3. If you have an additional module (for example a switch), select it in the **Slot 2** section. Change the number of channels as needed and select whether the width is simplex or duplex.



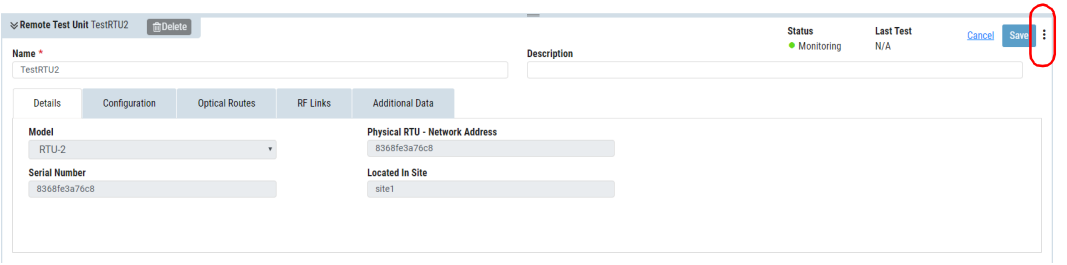
4. If you have an external switch, select it in the corresponding list, then change the number of channels as needed and select whether the width is simplex or duplex.



5. Click **OK** to confirm your changes, then **Save** to update the RTU information.

To attach an RTU to a link:

While in the RTU edition window, click ⋮ and select **Attach Remote Test Unit**. A confirmation message will indicate that the RTU is attached and once complete, the process will have imported all non-ROTAU linked optical routes in FMS along with their test setups.



IMPORTANT

If you detach the RTU from the link, you are also removing all configurations (optical routes, test setups) and results from the RTU-2. They will still be stored in FMS and you can apply them again, but new references will be acquired; use caution when detaching an RTU.

To detach the RTU:

While in the RTU edition window, click ⋮ and select **Detach Remote Test Unit**. Once you confirm the action, all of the references, configurations and results associated with this unit are removed.

To force an RTU detach:

If there is a communication loss and you must detach the RTU regardless, while in the RTU edition window, click ⋮ and select **Force Detach / Replace**. This feature is not available if the RTU is currently attaching.

Managing Optical Routes

Once you have set up your links and associated the RTUs in your network, you can create optical routes and set up monitoring tests for them.

Defining Optical Routes

The optical routes are represented as lines in the topology diagrams and can be set to the following monitoring types:

- Dark: when no light is emitted through the link from active network equipment.
- Live/TAM: when measuring through a filtered test access module (TAM).
- Live/TAP: when measuring live fiber without a filtered TAP.

The status of an optical route can be:

- Inactive: when unattached to an RTU.
- Not monitoring: when attached to an RTU but no test setup is enabled to monitor.
- Monitoring: when attached to an RTU and at least one test setup is enabled to monitor.

When linking an optical route, the system determines the shortest path with the fewest cable segments between first and last sites. If no path exists, the FMS will create the missing cable segment.

To create an optical route between sites:

1. Within your chosen diagram, select **Optical Route**.
2. Draw a line between the two sites you want to link together, then enter a name for your route. Select that type of rout it is, either point to point or PON, then create the routeit by pressing Enter.

If you are creating an optical route where there already is a cable segment and this link has bends, the route will also follow the bends. If you are creating an optical route before creating a cable segment and you need to add bends to the link, simply click on the link, then drag the bend to the desired location. To revert the link to its original straight form, click ⋮, then select **Reset**.

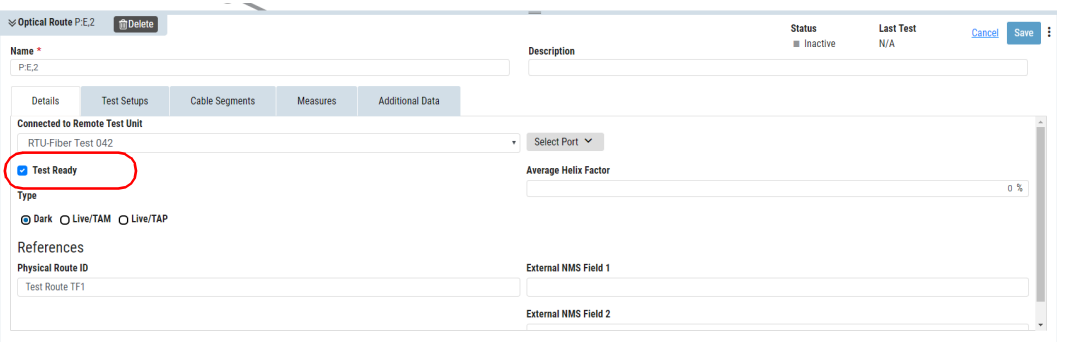
At this point, you can continue linking sites as needed for your topology by repeating step 2 or you can edit the current site information as explained in step 3 onwards.

Note: *You can have more than one route between sites. The number of optical routes will be indicated on the link.*

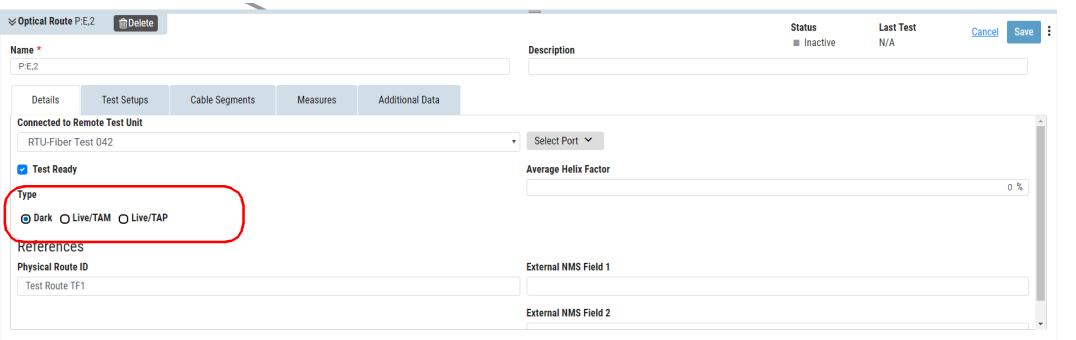
3. Click the cable to open the menu on the left, hen select the route to open the corresponding **Details** tab.

Note: *If you have created a cable segment, you can access the edit window by first selecting the link, then selecting the **Optical Routes** tab in the details pop up window.*

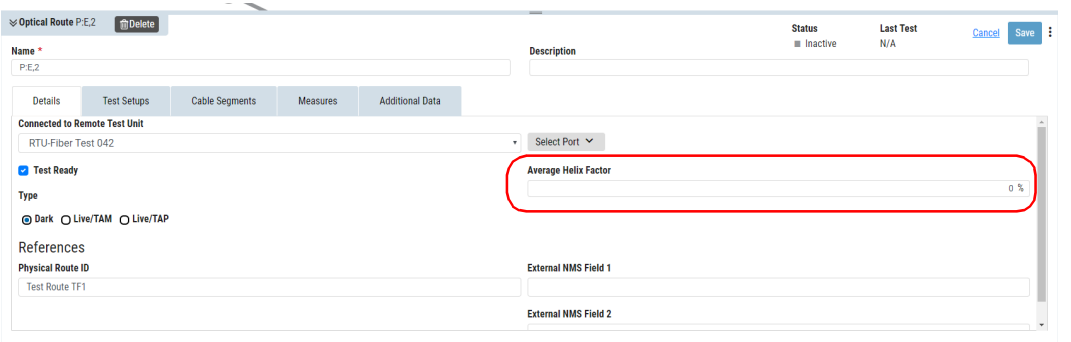
4. If this route is ready to be included in the monitoring tests, select the corresponding option.



5. Select the type of test you want to perform.



6. Include a helix factor as needed.



7. Once you are done editing the link information, click **Save** to confirm the changes.

IMPORTANT

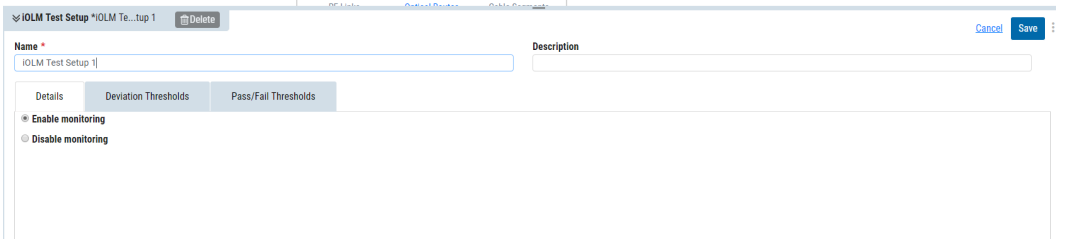
If you click on another item in the topology, the details window will still be the one of the item you had previously modified until you select this new item in the menu to the left to open its edition window.

Setting up Optical Route Tests

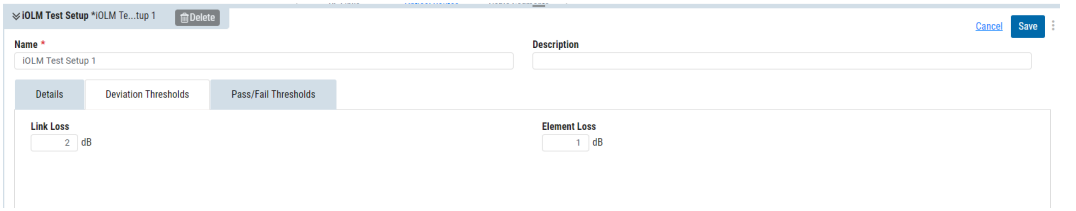
The FMS allows you to define iOLM tests for a specific optical route so that its behavior can be set regarding schedule and test specific settings. A given test setup can be enabled/disabled from round robin monitoring.

To add or edit an iOLM test setup:

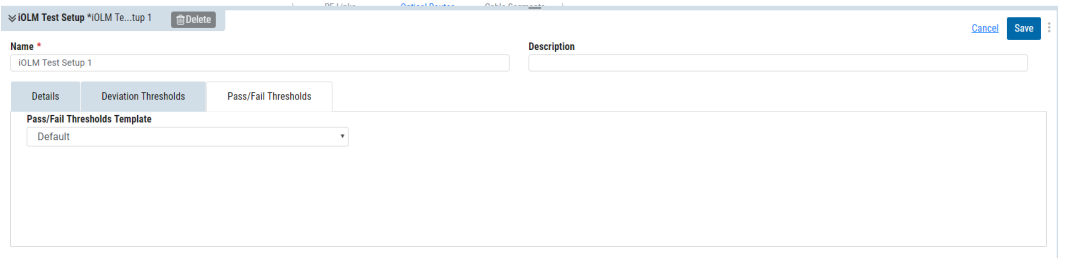
1. Enter the edition window for the desired optical route by selecting the route in the diagram and then selecting the route under the **Optical Routes** tab.
2. Select the **Test Setup** tab.
3. You will see a list of the current tests for this route. If you want to edit one of them, click the corresponding name; otherwise, click ⋮ at the top of the edition window, then select **Add Test Setup**.
4. In the **Details** tab, enable or disable the monitoring.



5. In the **Deviation Thresholds** tab, enter the values for the link and element losses that you want to use in your test.



6. In the **Pass/Fail Thresholds** tab, you can select a template for your test from the list of available choices.



7. Confirm your choices using the **Save** button.

Viewing iOLM Results

Normal monitoring results for optical routes (when no incident is reported) are not saved, as this is not relevant to fault finding. However, you can view a dynamic list of results for your monitoring, starting with the latest event. The results listed will fall into the following categories:

- *Baseline:* This is the reference monitoring measurement that is used to compare faults so that you can see the differences. The baseline is always relevant.
- *Ad hoc test* and *test on demand*: Those are manual tests that will display the results at the date and time that you have performed them.
- *Monitoring with deviation:* A deviation from the usual monitoring results is a fault that you want to investigate. This is what you will compare with the baseline measurements to find and solve the problem.

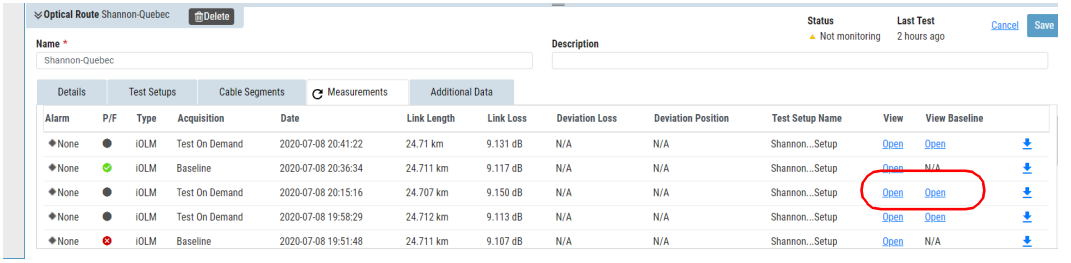
Once you have performed tests on optical routes, you can view them in the corresponding viewer. You can also open the related iOLM baseline when the result category is either test on demand or monitoring.

Note: *See* Viewing Results in the iOLM Viewer *on page 105 for more information on interpreting the results.*

To view iOLM Link results:

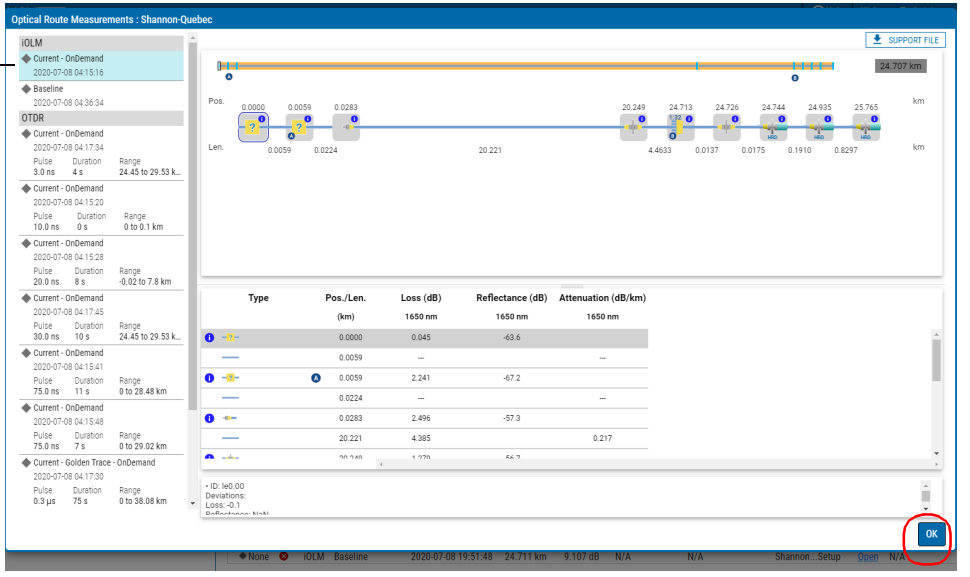
1. From the topology view, click on the desired link to display the menu on the left, then select the link to open the edition window.
2. Select the **Optical Routes** tab, then select the link for which you want to view the measurements.

3. Select the **Measurements** tab, then click either on the corresponding **Open** link under the **View** column or **View Baseline**, depending on which item you need.



4. When you are done looking at the details, click **OK**.

Previous tests are listed here.



7 Configuring FG-750s and Setting up Test Routes

The main window of FMS includes a view of the set topologies, or diagrams, and a section where you can see the complete list of RTUs and their current statuses (whether they are attached to a network or not).

Diagrams allow you to map RTUs as a logical network displaying their relations through and optical routes. With diagrams, you can edit test configurations for your OTDRs.

RTUs located within the topology can be accessed based on their location. Optical devices located in a site are listed below cable segments and optical routes.

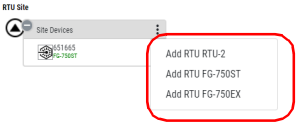
Managing RTUs

The FMS allows you to specify where RTUs are located in order to position the monitoring point of origin. You can add an RTU by name in the topology directly from the selected site where the RTU is located.

Once you have added the RTUs to the network, you can attach them to match your created item to the unit with the corresponding serial number, An RTU is considered to be attached when both the RTU and the link (optical route) are attached.

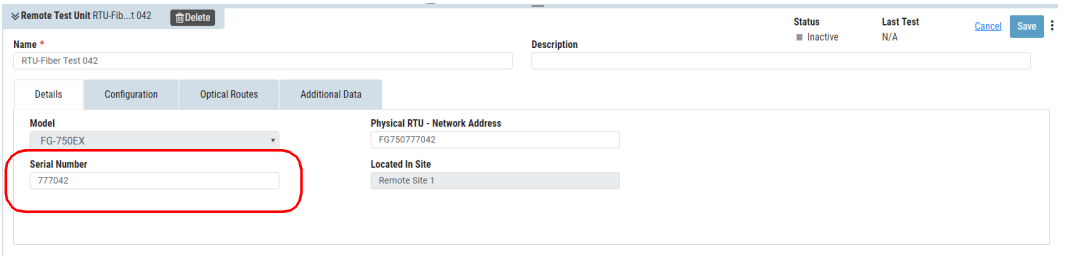
To add an RTU:

1. In your diagram, select the site to which you want to add an RTU, then click **+** to open the site devices menu.
2. Click ⋮ , then select the type of RTU you want to add in the list.



3. Enter a name for your RTU, then press Enter.
4. Click on the RTU you have just created to select it, then **Edit** to open the modification window.

5. Under the **Details** tab, enter the serial number for this RTU. You must enter the serial number correctly, otherwise you will not be able to attach the unit to the link.

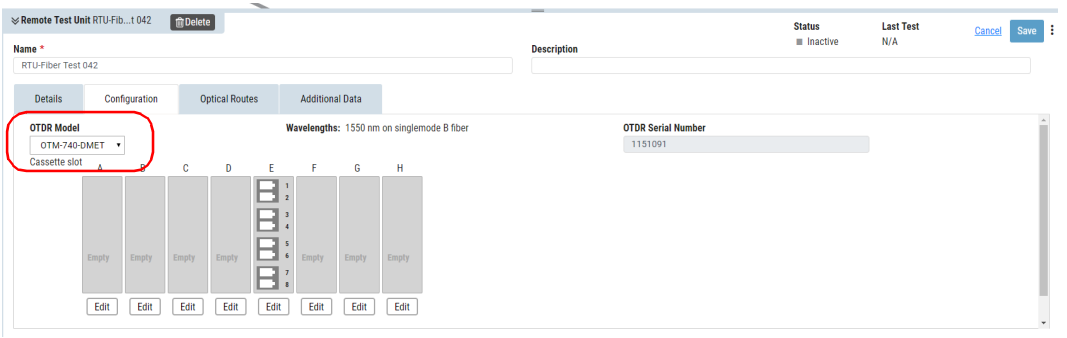


6. Click **Save** to confirm your choice.

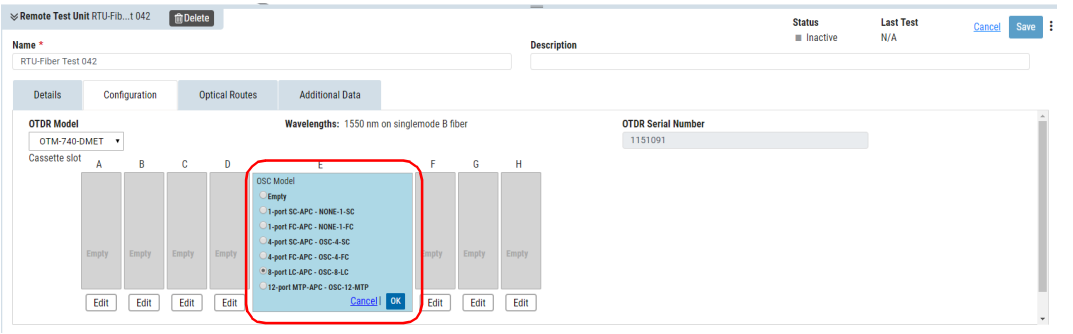
   At this point you can attach the RTU as explained on page 79. The hardware configuration will automatically be added to the configuration as the link is established. If you need to manually configure the RTU, follow the instruction below.

To manually configure the RTU:

1. When in the selected RTU edition window, select the **Configuration** tab.
2. Select the OTDR type for your RTU in the list of available choices.



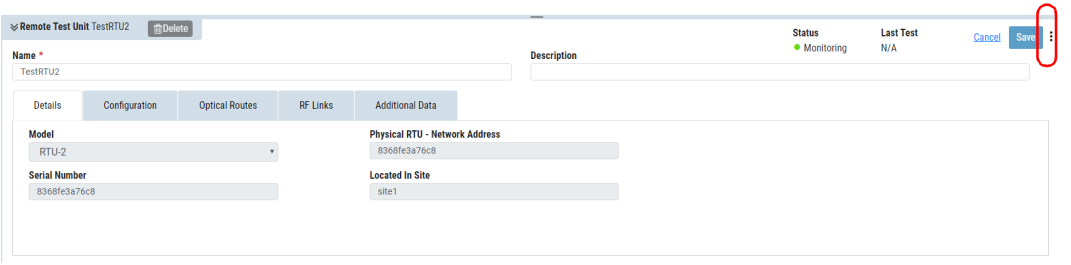
3. Select the OSC model that will be used in your link by first clicking **Edit** under the letter corresponding to where your cassette is located, then clicking on the desired configuration.



4. Click **OK** to confirm your changes, then **Save** to update the RTU information.

To attach an RTU to a link:

While in the RTU edition window, click ⋮ and select **Attach Remote Test Unit**. A confirmation message will indicate that the RTU is attached and once complete, the process will have imported all non-ROTAU linked optical routes in FMS along with their test setups.



IMPORTANT

If you detach the RTU from the link, you are also removing all configurations (optical routes, test setups) and results from the FG-750. They will still be stored in FMS and you can apply them again, but new references will be acquired; use caution when detaching an RTU.

Managing Optical Routes

Once you have set up your links and associated the RTUs in your network, you can create optical routes and set up monitoring tests for them.

Defining Optical Routes

The optical routes are represented as lines in the topology diagrams and can be set to the following monitoring types:

- Dark: when no light is emitted through the link from active network equipment.
- Live/TAM: when measuring through a filtered test access module (TAM).
- Live/TAP: when measuring live fiber without a filtered TAP.

The status of an optical route can be:

- Inactive: when unattached to an RTU.
- Not monitoring: when attached to an RTU but no test setup is enabled to monitor.
- Monitoring: when attached to an RTU and at least one test setup is enabled to monitor.

When linking an optical route, the system determines the shortest path with the fewest cable segments between first and last sites. If no path exists, the FMS will create the missing cable segment.

To create an optical route between sites:

1. Within your chosen diagram, select **Optical Route**.
2. Draw a line between the two sites you want to link together, then enter a name for your route. Select that type of rout it is, either point to point or PON, then create the routeit by pressing Enter.

If you are creating an optical route where there already is a cable segment and this link has bends, the route will also follow the bends. If you are creating an optical route before creating a cable segment and you need to add bends to the link, simply click on the link, then drag the bend to the desired location. To revert the link to its original straight form, click ⋮, then select **Reset**.

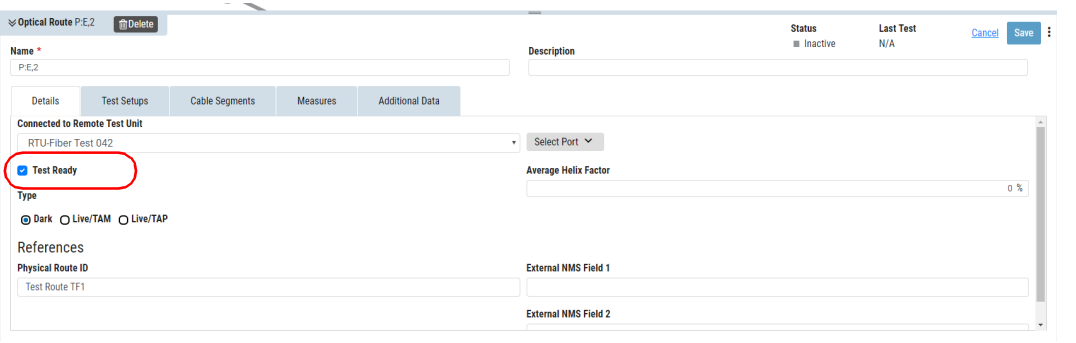
At this point, you can continue linking sites as needed for your topology by repeating step 2 or you can edit the current site information as explained in step 3 onwards.

Note: *You can have more than one route between sites. The number of optical routes will be indicated on the link.*

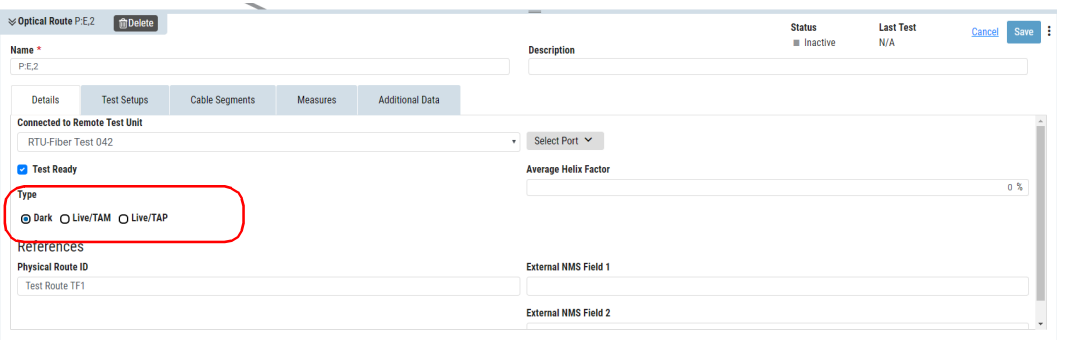
3. Click the cable to open the menu on the left, hen select the route to open the corresponding **Details** tab.

Note: *If you have created a cable segment, you can access the edit window by first selecting the link, then selecting the **Optical Routes** tab in the details pop up window.*

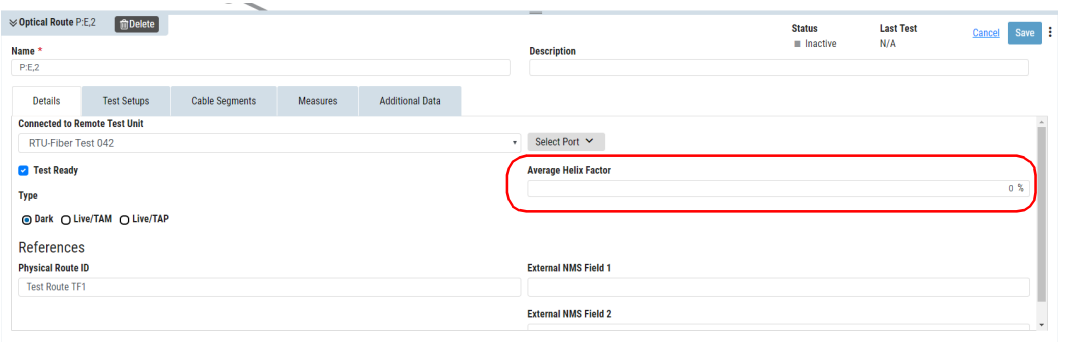
4. If this route is ready to be included in the monitoring tests, select the corresponding option.



5. Select the type of test you want to perform.



6. Include a helix factor as needed.



7. Once you are done editing the link information, click **Save** to confirm the changes.

IMPORTANT

If you click on another item in the topology, the details window will still be the one of the item you had previously modified until you select this new item in the menu to the left to open its edition window.

Setting up Optical Route Tests

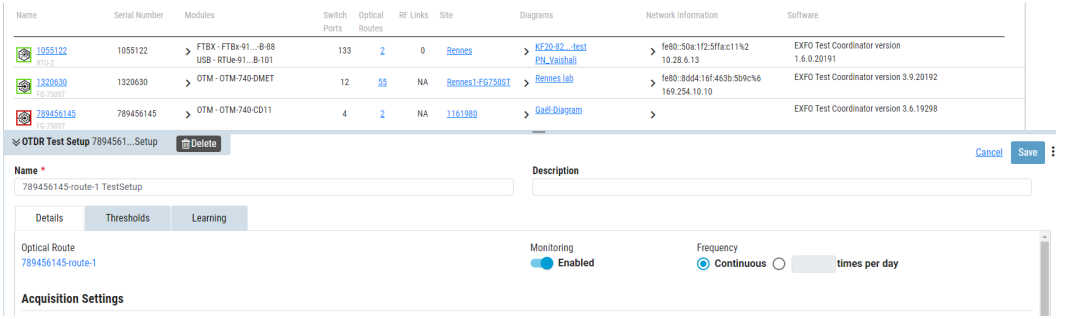
The FMS allows you to define OTDR tests for a specific optical route so that its behavior can be set regarding schedule and test specific settings. A given test setup can be enabled/disabled from round robin monitoring.

When creating your test setup, you can specify learning cycle and count values. Learning cycles are additional measurements performed periodically (every 14 days by default) to adjust statistics on the trace shape and “teach” the system so that it does not trigger false positive alarms when monitoring. The system starts by taking some traces to obtain the min., max. and average values. Then, each trace taken afterwards will be compared to those values to define if there is a problem or not.

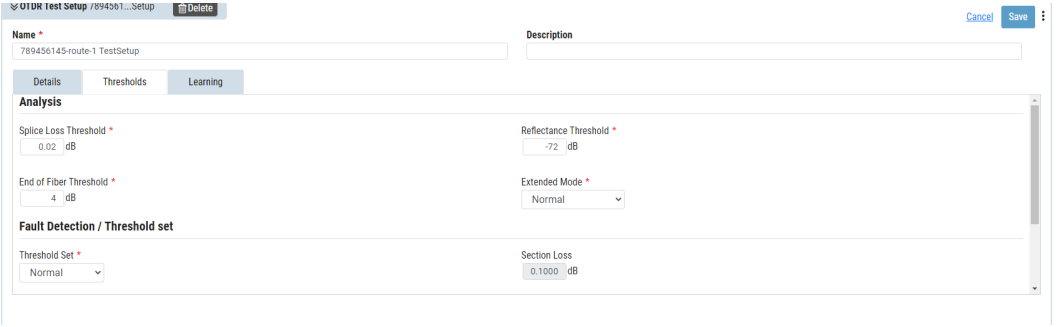
After some time, you can modify the min., max. and average values by having other learning cycles.

To add or edit an OTDR test setup:

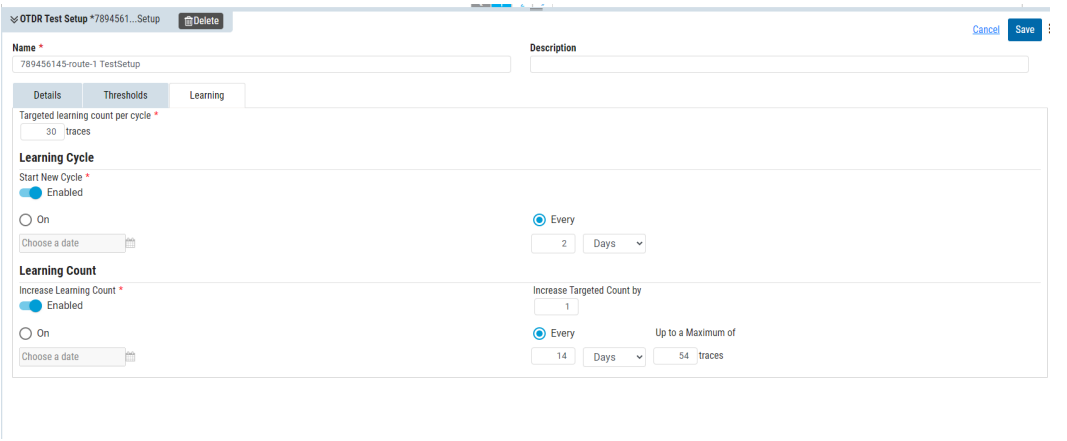
1. Enter the edition window for the desired optical route.
2. Select the **Test Setup** tab.
3. You will see a list of the current tests for this route. If you want to edit one of them, click the corresponding name; otherwise, click ⋮ at the top of the edition window, then select **Add Test Setup**.
4. In the **Details** tab, set the basic setup for the test:
   - ➤ Determine if the monitoring for this test is enabled and whether it will be done continuously or for a set number of times per day.
   - ➤ Select the wavelength used for monitoring and whether you are using automatic OTDR settings or not. If you select manual settings, you can enter a range, duration and pulse value for the test.
   - ➤ Select the resolution between normal and high. Remember that a higher resolution might have an impact on bandwidth requirements.



5. In the **Thresholds** tab, select the values and threshold set that you want to use in your test.



6. In the **Learning** tab, if you want to set a learning cycle in your test setup, you can specify values for the cycle and for how long you want to add traces to it, either as a duration or a specific number of traces. Enable the cycle and count options as needed, then enter the desired information.



7. Confirm your choices using the **Save** button.

Viewing OTDR Results

Normal monitoring results for optical routes (when no incident is reported) are not saved, as this is not relevant to fault finding. However, you can view a dynamic list of results for your monitoring, starting with the latest event. The results listed will fall into the following categories:

- *Baseline:* This is the reference monitoring measurement that is used to compare faults so that you can see the differences. The baseline is always relevant.
- *Ad hoc test* and *test on demand*: Those are manual tests that will display the results at the date and time that you have performed them.
- *Monitoring with deviation:* A deviation from the usual monitoring results is a fault that you want to investigate. This is what you will compare with the baseline measurements to find and solve the problem.

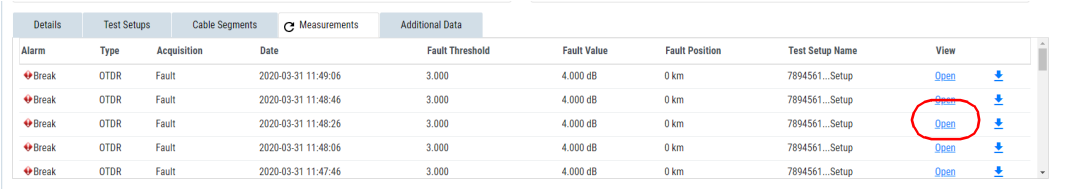
Once you have performed tests on optical routes, you can view them in the corresponding viewer. You can also open the related OTDR baseline when the result category is either test on demand or monitoring.

Note: *See* Viewing Results in the OTDR Viewer *on page 97 for more information on interpreting the results.*

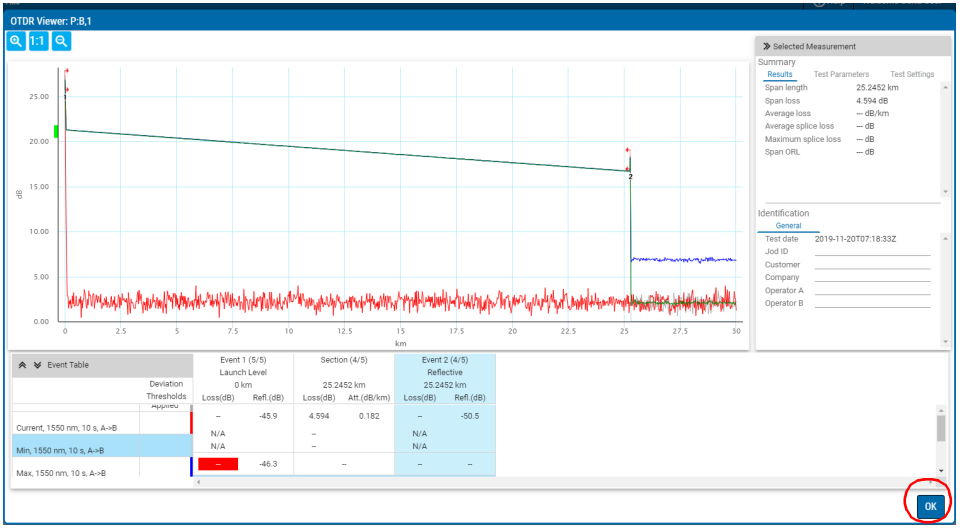
To view OTDR Link results:

1. From the topology view, click on the desired link to display the menu on the left, then select the link to open the edition window.
2. Select the **Optical Routes** tab, then select the link for which you want to view the measurements.
3. Select the **Measurements** tab, then click either on the corresponding **Open** link under the **View** column or **View Baseline**, depending on which item you need.

4. Select the **Measurements** tab, then click either on the corresponding **Open** link under the **View** column.



5. When you are done looking at the details, click **OK**.



8 Testing Network Elements

You can test the network elements through the following types of tests:

- On demand: This is a test that you start manually to validate a link or element and obtain the current status.
- Ad hoc: This is a test that you start manually to validate the link with a different setting than the usual monitoring values (for example, a different pulse value).

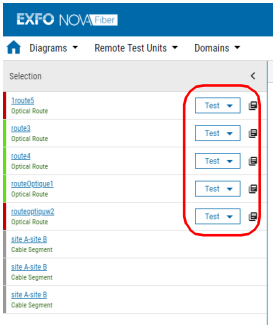
Performing a Test on Demand

Once you have created test setups, you can run tests on demand on optical routes. Tests on demand are useful if you want to validate a specific problem resolution or have immediate information about a route.

Each test is tracked and a notification is sent to the specific user once the test has completed or the request has failed. All results produced by the RTU is kept in the result storage location.

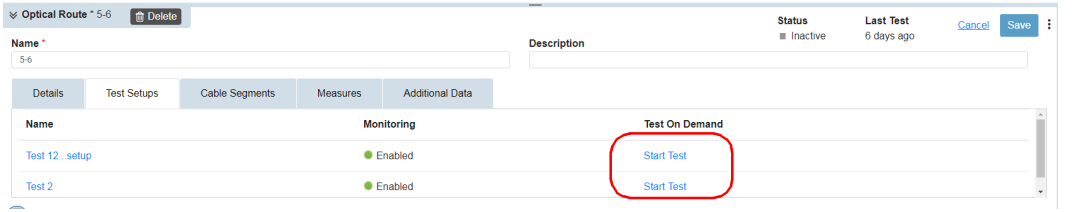
To perform a test on demand:

1. From the topology view, select a segment containing an optical route, then click on the route to display the menu on the left.
2. Click the **Test** button next to the route you want, then select **Test on demand**.



OR

Select route to open its edition window, then the **Test Setups** tab. Scroll down the list of available tests. Click on the corresponding **Start Test** to proceed.



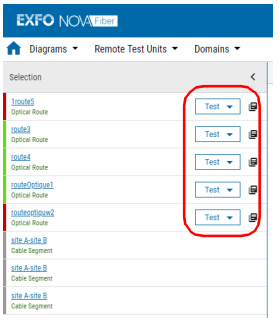
A notification appears on-screen to let you know that the test is started. You will be notified again when the test is completed. The results will be available in the **Measures** tab.

Performing an Ad Hoc Test

Ad Hoc tests are useful for when you need to verify a situation different from the current monitoring (for example, if you want to test a closer range with a different pulse value).

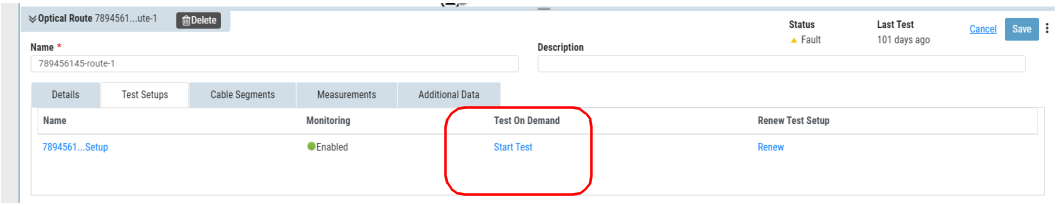
To perform an ad hoc test:

1. From the topology view, select a segment containing an optical route, then click on the route to display the menu on the left.
2. Click the **Test** button next to the route you want, then select **Ad Hoc Test**.



OR

Select route to open its edition window, then the **Test Setups** tab. Scroll down the list of available tests. Click on the corresponding **Start Test** to proceed.



Once the request is accepted by the RTU, you will be informed of its status.

9 Maintenance and Troubleshooting

Updating your Software

By registering your new EXFO products either online or directly from your unit (if it is connected to the Internet), you will always be notified if a new version is available. Refer to the RTU-2 Platform and FG-750 Platform user guides for more information on product registration and application updates.

Contacting the Technical Support Group

To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

Technical Support Group
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

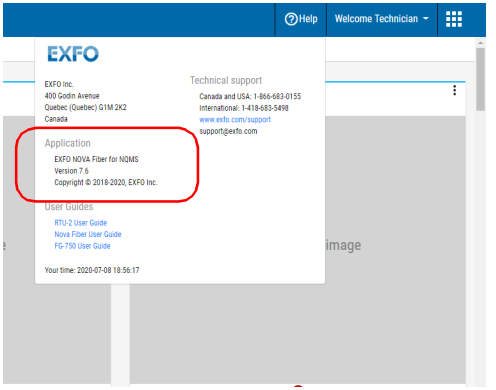
1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

For detailed information about technical support, and for a list of other worldwide locations, visit the EXFO Web site at www.exfo.com.

If you have comments or suggestions about this user documentation, you can send them to customer.feedback.manual@exfo.com.

To view the version number of your application:

From the main window select **Help**, then under **Application**, you can view the relevant information.



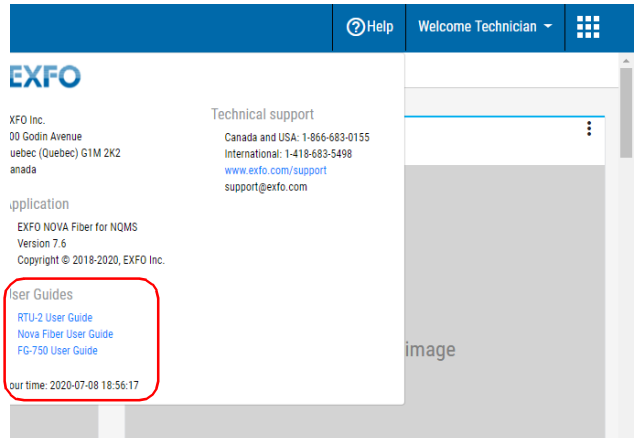
Viewing User Documentation

Help on using the features in the FMS is available in PDF format.

Note: *If you do not already have Adobe Acrobat Reader to view the PDF documents, or if you have an older version installed, you can download it directly from the Adobe web site.*

To view the user guides:

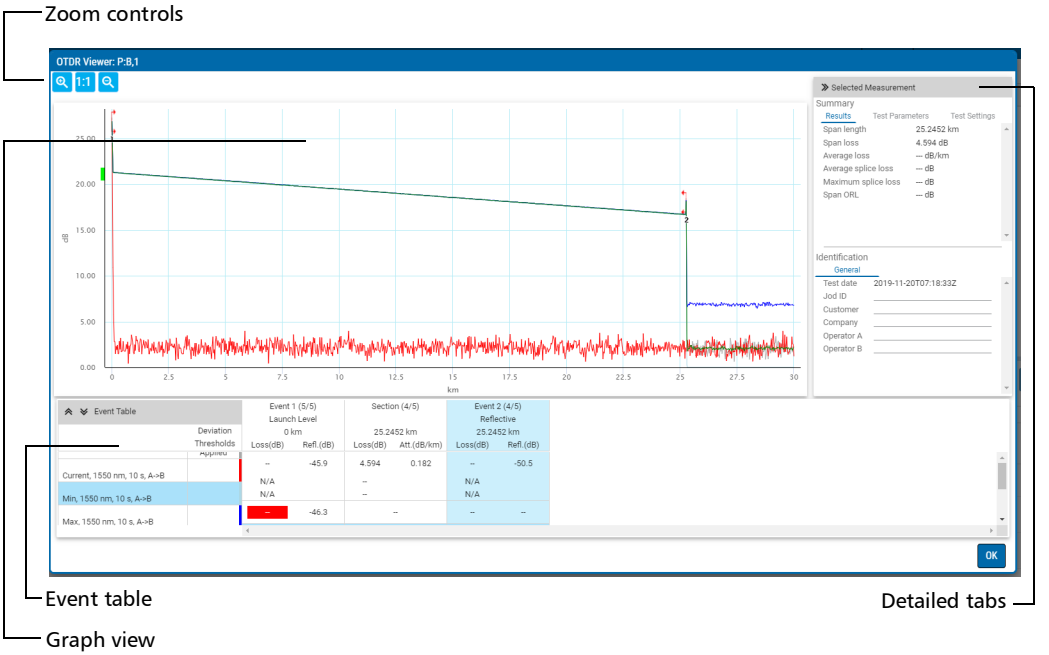
From the main window select **Help**, then under **User Guides**, select which PDF corresponds to your needs.



A Viewing Results in the OTDR Viewer

The OTDR Viewer allows you to view measurement results and values, at a glance, in three different views:

- Graph view
- Event table
- Detailed tabs



When you navigate between the elements in one of the three views available, the two other views display the results accordingly.

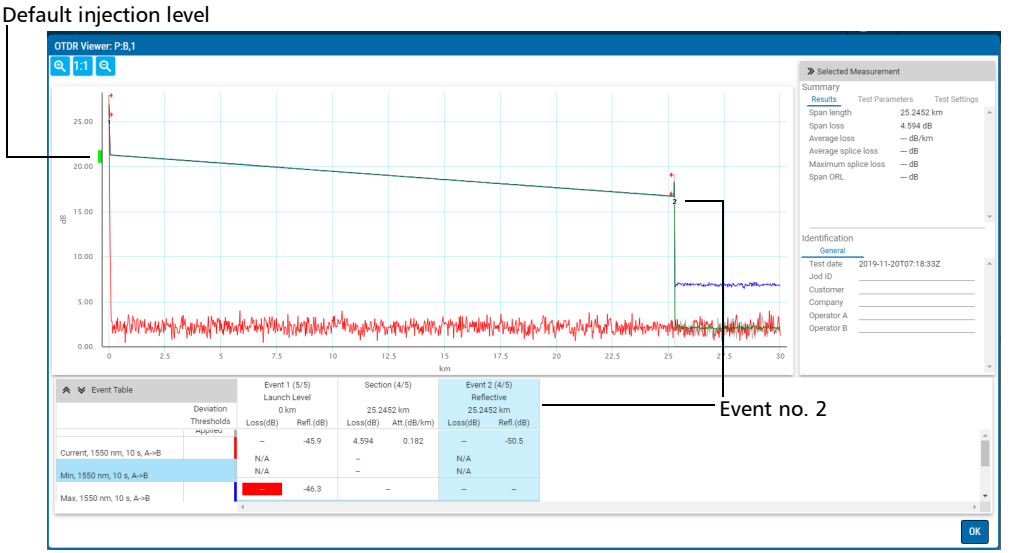
Note: *Your screen display may differ slightly from the illustrations presented in this user guide.*

You can see the results of your measurement at a glance in the main window; you can also change the layout or zoom in on a trace.

Viewing Results in the Graph View

To select the trace for which you want to see the results if there is more than one in the graph, simply click on it. The events are marked by numbers along the displayed trace and correspond to rows in the event table. Clicking on an event will update the event table and detailed views accordingly to display or highlight it.

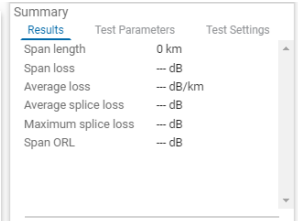
The green rectangle on the Y axis (relative power) indicates the proper injection level range for the defined test pulse.

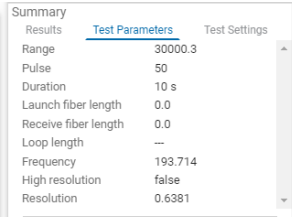


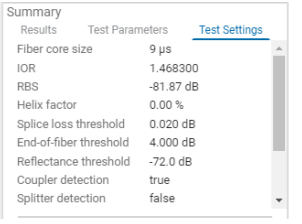
Viewing Result Summary

For each wavelength, the **Summary** tabs give more detailed information about results, the test parameters and the test settings. The span length (distance between span start and span end) is also displayed.

To see the different tabs and the relevant information, simply click on them.

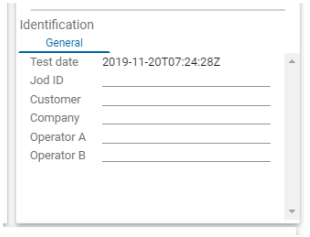






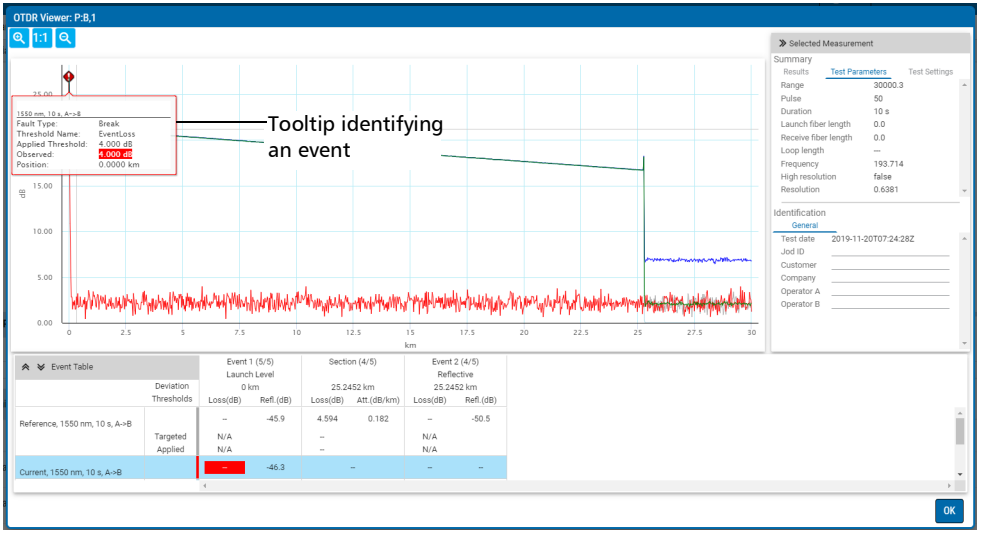
Viewing Measurement Identification

The **Identification** tab will provide information about the file your are viewing, including information about the job and operators.



Viewing Results in the Events Table

The table of events lists all the events detected on the fiber. An event can be defined as the point at which a change in the transmission properties of light can be measured. Events can consist of losses due to transmission, splices, connectors or breaks. If the event is not within the established thresholds, its status will be set to “fail”.



If you hover with your mouse over an event for a few seconds, the application will display a tooltip identifying the item (for example, non-reflective fault). In the case of a merged event, you will also see details about the “sub-events”. You can expand or collapse merged events in the table.

For each item listed in the table of events, information is displayed:

- Event/Section x: the event number (a sequential number assigned by the Fiber Monitoring System application) or, in parentheses, the length of a fiber section (the distance between two events).

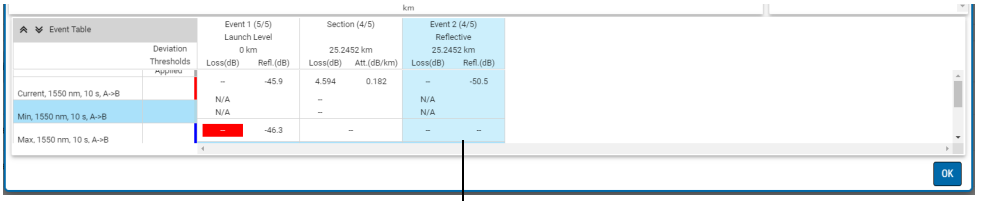
- Description of the event: a quick indication of the event type (for example, reflective, launch level, microbend).
- Position or length: the distance between the OTDR and the measured event or between the event and the beginning of the fiber span.
- Loss: the loss in dB for each event or fiber section (calculated by the application).
- Reflectance: the reflectance measured at each reflective event along the fiber.
- Att.: the attenuation (loss/distance) measured for each fiber section.

Note: *The attenuation value is always presented in dB per kilometers, even if the distance units you selected are not the kilometers. This follows the standards of the fiber-optic industry that provides the attenuation values in dB per kilometers.*

To quickly locate an event:

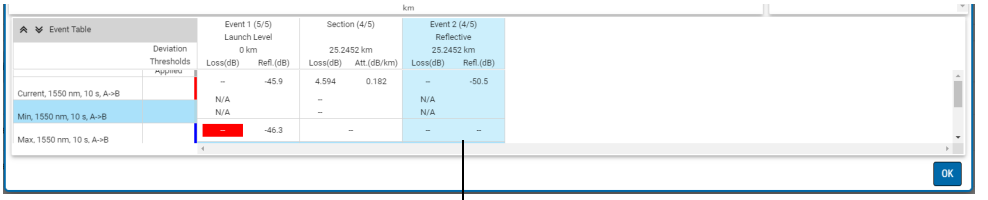
1. From the main window, go to the **Events** table.
2. Select the event on the trace.

   The list scrolls automatically to the event you selected.



To expand or collapse a merged event:

In the table, use the using the **+** and **–** buttons on the event to change the view.



Selected event

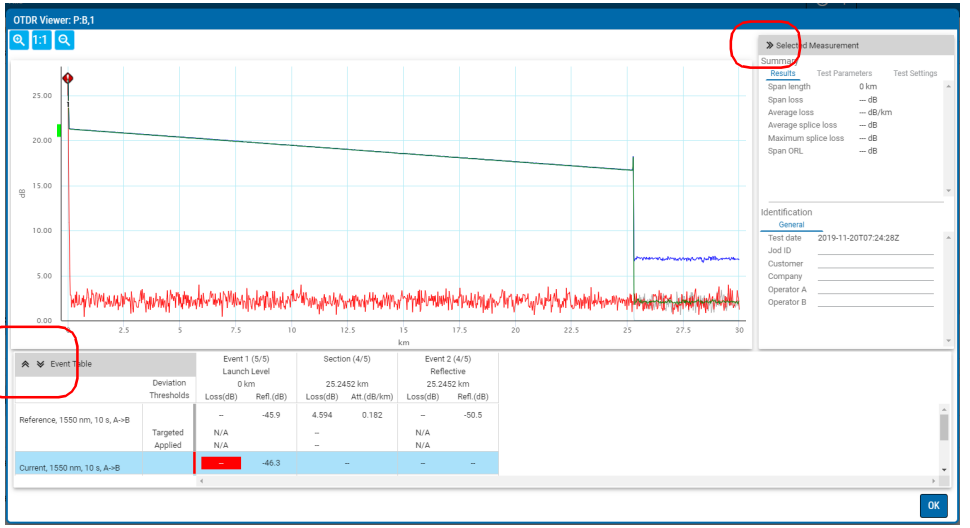
Customizing Views

You can change the way the information is displayed if you want to hide or enlarge some parts of the window.

As soon as a trace is displayed (new acquisition or existing file), zoom controls are available (see *Using Zoom Controls* on page 104 for details).

To change the views:

Use the arrows to collapse or enlarge the desired area.



Using Zoom Controls

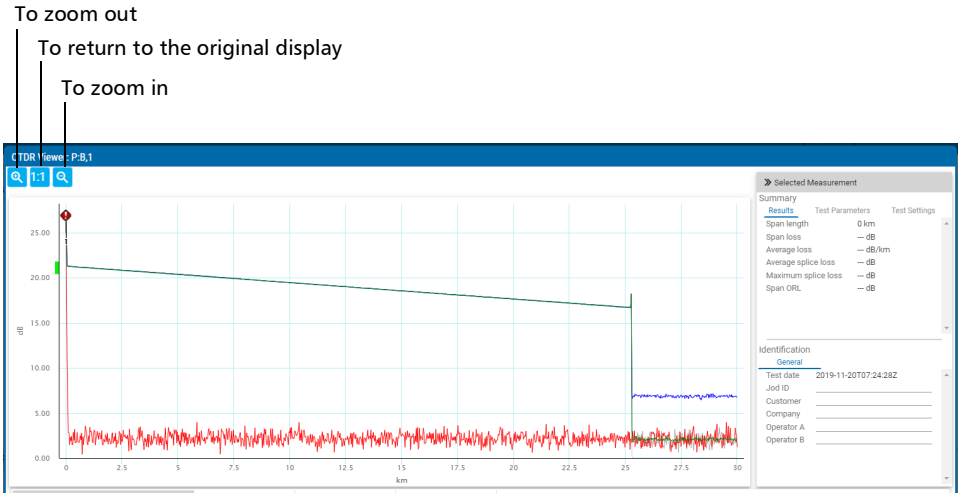
You can zoom in areas of the graphs to change the scale of the trace display.

To zoom in and out of the graph:

Use one of the following methods:

- Use the on-screen zoom buttons.
- Use the wheel on your mouse.
- Press the Ctrl key and drag a rectangle to zoom in horizontally and vertically.
- Press the Ctrl and Alt keys and drag a rectangle to zoom in horizontally.
- Press the Ctrl and Shift keys and drag a rectangle to zoom in vertically.

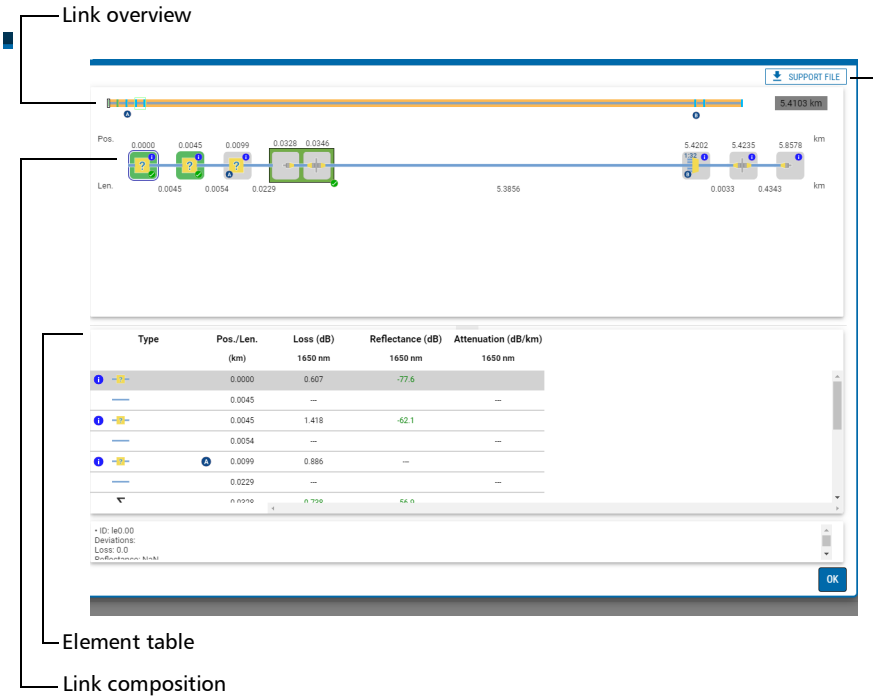
When you have zoomed into the trace, you can click and drag the graph to the location you want to see.



B Viewing Results in the iOLM Viewer

The iOLM Viewer allows you to view measurement results and values, at a glance, in three different views:

- Link overview
- Link composition
- Element table



When you navigate between the elements in one of the three views available, the two other views display the results accordingly.

Note: *Your screen display may differ slightly from the illustrations presented in this user guide.*

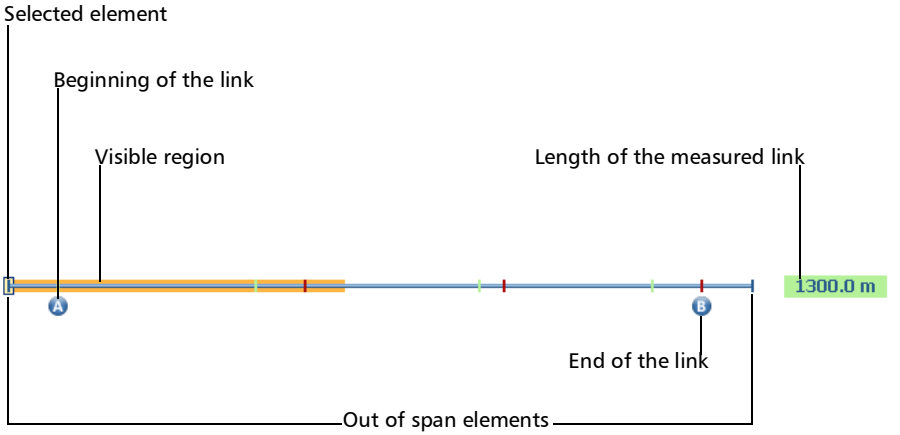
Viewing Results in the Link Overview

The link overview displays the entire link from the beginning of the link under test to the end.

The following color codes are used for the elements composing the link overview.

- Red: The status of the element is fail.
- Green: The status of the element is pass.
- Blue: The element is not tested for pass/fail or the status of the element is unknown.

The link overview representing all the elements found on the link is described below.



- Selected element: The rectangle indicates the position of the selected element.
- Beginning of the link: The letter A (launch fiber) indicates the beginning of the link under test.
- Visible region: The colored background represents the visible region in the link composition view.
- End of the link: The letter B (receive fiber) indicates the end of the link under test.
- Length of the measured link: This value excludes the launch and receive fiber.

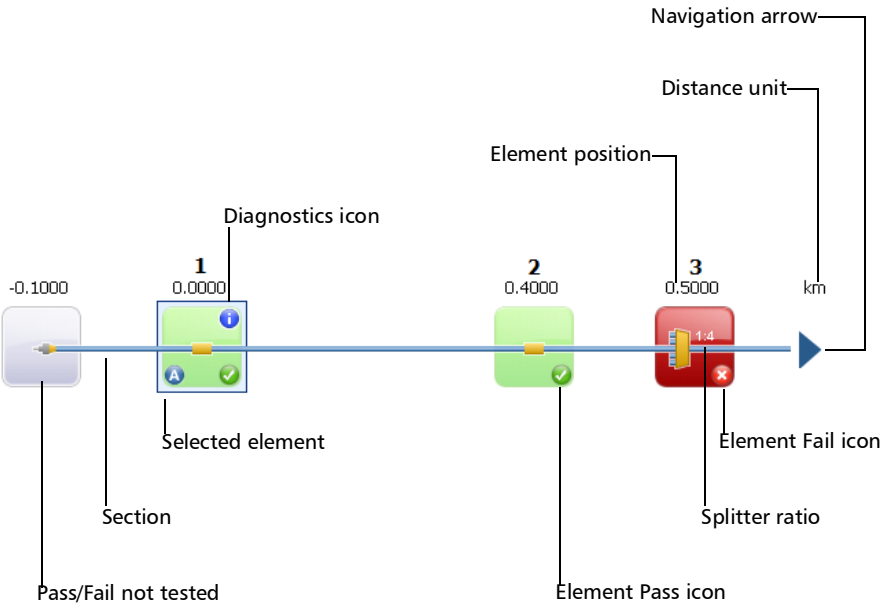
Elements before A and after B are referred to as *out of span* elements. These elements are not tested for pass/fail status, but can have diagnostics on them. If no receive fiber is defined, the element marked as "B" will not be tested for pass/fail.

Viewing Results in the Link Composition

The number of items displayed in the link composition varies according to the available space, number of elements, and section size. When the link length is too long, you may need to scroll on the link using the navigation arrow. You can also select an element and while keeping this element selected, move from left to right, or vice versa.

Note: *The distance between the elements is not 100 % proportional. To have a proportional representation of the element, see* Viewing Results in the Link Overview *on page 106.*

The link composition displays every element present on the link.



- Diagnostics icon : This icon specifies that some diagnostics are present on the element to provide additional information about detected problems or ambiguous measurement situations. See *Understanding Diagnostics* on page 115 for more details.
- Element position: This value represents the distance of the element from the beginning of the link under test.
- Pass/Fail not tested: The gray background indicates that the status of the element is unknown or it has not been evaluated because this element is not part of the link (out of span). If there is no pass or fail icon in the right side corner, it means that thresholds are not applied on this element and it is not tested for a pass or fail status. The element status remains unknown in the following scenarios:
  - If any element is followed by a 2:N splitter in the link, then the element's loss pass/fail status is displayed as unknown.

- If the element has a reflectance value and it is placed after the 2:N splitter element, then the element's reflectance pass/fail status is displayed as unknown.
- If the 2:N splitter is in a group of elements and an element follows the 2:N splitter in the group, then the pass/fail status of the group is displayed as unknown.

- Selected element: The element outlined in blue indicates that it is currently selected.
- Section: A fiber section is delimited by two elements.
- Element Pass icon : Green is associated with a pass status.
- Element Fail icon : Red is associated with a fail status.
- Splitter ratio: The value displayed on the element corresponds to the splitter ratio.
- Distance unit: Indicates the unit of measurement currently used in the Fiber Monitoring System.
- Navigation arrow: When more items are available on a particular side, it indicates that you have to scroll to view those items.

Note: *An arrow ( ) icon is displayed on the element when the start and the end of the link are represented by the same element.*

In addition, you can have elements represented by specific icons.

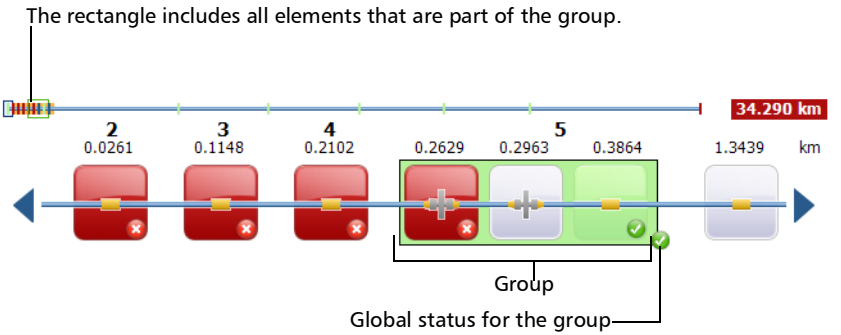
Element Name	Element Icon	Element Description
Macrobends		Macrobends can be displayed in the link composition when more than one wavelength is present in the measurement. ***Note:*** *The macrobend will always be displayed as a failed element.*
Out of Range		The out of range element is displayed when the end of fiber could not be detected by the module because of insufficient dynamic range.
Splitter		The splitter is a passive fiber optic coupler that divides light from a single fiber into two or more fiber channels. The splitter ratio is displayed beside the icon.
2:N Splitter		2:N splitter can be used to create network redundancy. If a network break occurs, the operator can connect through the other network branch.
Splice		The splice can indicate the junction of two fiber sections, the presence of a macrobend, or a microbend in the fiber.
Connector		The connector is used to join two fibers.

Element Name	Element Icon	Element Description
Switch		Indicates that a switch has been detected.
Fault		The fault icon indicates that a problem occurred during the analysis. For example, when a splitter is on the link, a loss and a section of fiber are expected after the splitter. If no splitter is found on the link but a end of fiber is detected, the fault icon is displayed instead of the end of fiber to indicate there is a problem.
Coupler		A coupler port is an optical fiber device with one or more input fibers and one or several output fibers. This device is associated with a minimum loss value; for example, a 1 1x2 coupler has a loss of 3 dB.

Sometimes, when the analysis detects several link elements that are too close to one another to be independently characterized, the link elements will be displayed as groups. When this occurs, as much information as possible will be displayed for each individual sub-element. The pass/fail status is applied to each sub-element whenever possible, and a global status is also displayed for the group.

Groups can also be displayed when a link element (such as a splitter) is found to have wavelength dependent loss. In that case, the link element is grouped with a macrobend element. In this particular case, there might not be a physical macrobend next to the link element, but the macrobend icon is used to highlight the presence of the wavelength dependent loss.

When elements are grouped, the group loss and group reflectance values are also displayed in the **Element Table**.



Note: *If some elements are grouped, the total group loss value is compared with the sum of the thresholds defined for the individual elements in a group. If the total group loss value is greater than the sum of the thresholds defined for the individual elements in a group, the element will show a fail status.*

You can select grouped elements individually as you would do with any other standalone element.

When elements are grouped at the beginning of the link, icon A is displayed on one of the sub-elements.

When elements are grouped at the end of the link, icon B is displayed on one of the sub-elements.

Viewing Elements and Fiber Section Details

When an element or fiber section is selected in the link overview or link composition, the details of the corresponding selection are automatically displayed in the **Element Table**.

The loss and reflectance results are displayed with appropriate coloring based on the pass/fail status of each value.

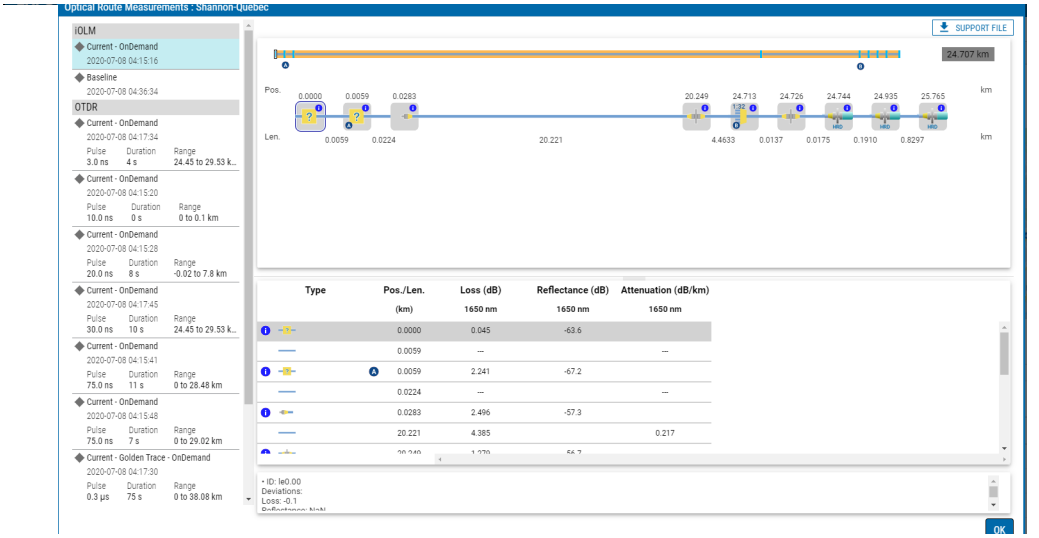
The loss or reflectance value may be underestimated if the noise level is too high (for instance, after a lot of loss on the link, the noise levels increase). In that case, it is possible for the signal processing algorithms to detect an element and estimate the loss/reflectance values, but since the measured signal does not completely clear the noise floor, the loss or reflectance/attenuation values are likely to be underestimated. Underestimated loss, reflectance, and attenuation values are displayed with a > symbol.

Note: *If the loss or reflectance value is saturated, it is displayed with a > symbol. The application will be able to specify a fail status if the value is fail, but in all other cases, the application will set the status to unknown.*

The 0.0 value is set on the first element when the launch fiber is present.

To view elements or section details in the element table:

From the link overview or the link composition view, select the desired element or fiber section.



The details of your selection, including diagnostics if there are any, are automatically displayed in the element table.

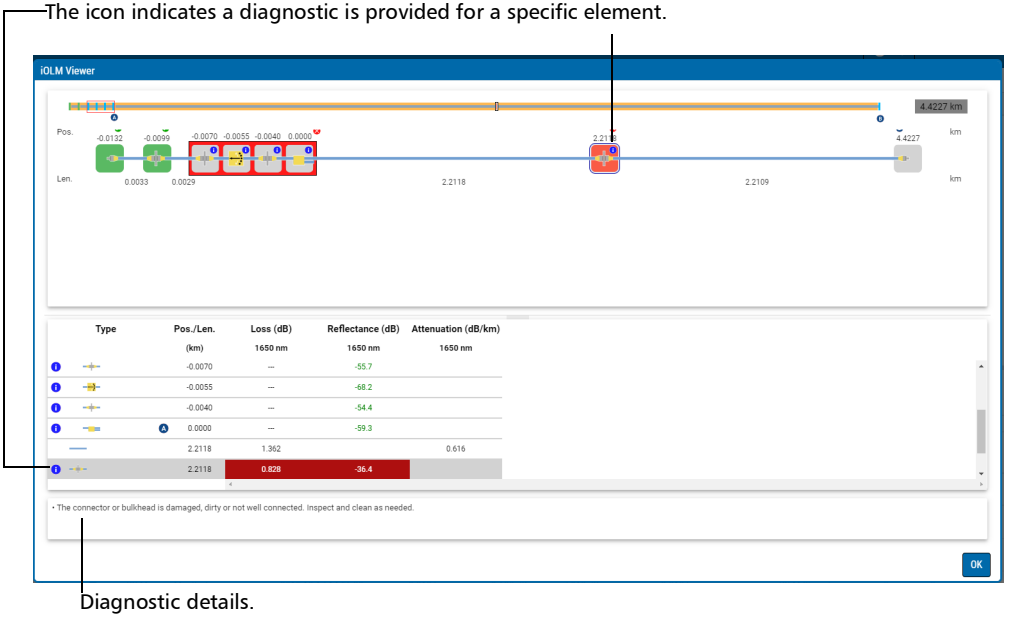
Understanding Diagnostics

Diagnostics are used to provide additional information about detected problems or ambiguous measurement situations, such as root cause possibilities for the fail status of a link element. The diagnostics provide help to troubleshoot faulty connectors, understand why link elements are tagged as fail or unknown, indicate unexpected instrument or test conditions, and so forth. More than one diagnostic can be associated with any given element.

Elements diagnostics are associated with specific link elements issues. Each failed link element will have associated diagnostics to assist in troubleshooting. Some elements, such as macrobends, will have associated diagnostics even with a pass status.

To view the diagnostics:

From the link composition view or the **Element Table**, click the icon.



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