VeSion™ RFTS User Manual

P/N D07-00-134P Rev. C01

Please direct all questions to your local VeEX® Sales Office, Representative, or Distributor. Or, contact VeEX technical support at www.veexinc.com.

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1.0 General Information

This user manual is suitable for novice, intermediate, and experienced users and is intended to help use the features and capabilities of VeEX products successfully. It is assumed that the user has basic computer experience and skills, and is familiar with telecommunication and other concepts related to VeEX product usage, terminology, and safety.

Every effort was made to ensure that the information contained in this user manual is accurate. Information is subject to change without notice and we accept no responsibility for any errors or omissions. In case of discrepancy, the web version takes precedence over any printed literature. The content in this manual may vary from the software version installed in the unit. For condition of use and permission to use these materials for publication in other than the English language, contact VeEX, Inc.

1.1 Customer Support

For more technical resources, visit www.veexinc.com.

For assistance or questions related to the use of this product, call or e-mail our customer care department for customer support. Before contacting our customer care department, have the product model, serial number, and software version ready. Please locate the serial number on the back of the chassis. Please provide this number when contacting VeEX, Inc. customer care.

Support hours may vary depending on the product.

Product Technical Support

Support is generally available 8:00 AM to 8:00 PM, Eastern Standard Time, Monday to Friday.
Phone: +1 510 651 0500
E-mail: customercare@veexinc.com

MPA Product Technical Support

Support is generally available 8:30 AM to 5:30 PM, Eastern Standard Time, Monday to Friday.
Phone: +1 877 929 4357
International: +1 727 475 1206
E-mail: serviceandsupport@veexinc.com

1.2 Warranty

For warranty information on VeEX products, go to https://www.veexinc.com/Support/Warranty.

To activate the warranty, please register your product at https://www.veexinc.com/Support/ProductRegistration.

1.3 Patent Information

VeEX product hardware and software may be protected by one or more patents on file with the United States Patent Office.

1.4 Documentation Conventions

Icons used in this manual:

	Marks a helpful tip (action or method), which can save time and improve usability of the product.
	Provides important information needed to use this product and avoid missteps.
	Cautions against and action or inactivity, which can hinder productivity.
	Strongly warns against a condition, an action, or inactivity which can lead to a health hazard, injury, equipment damage, data loss, and/or financial losses.
	Stop and read before continuing.

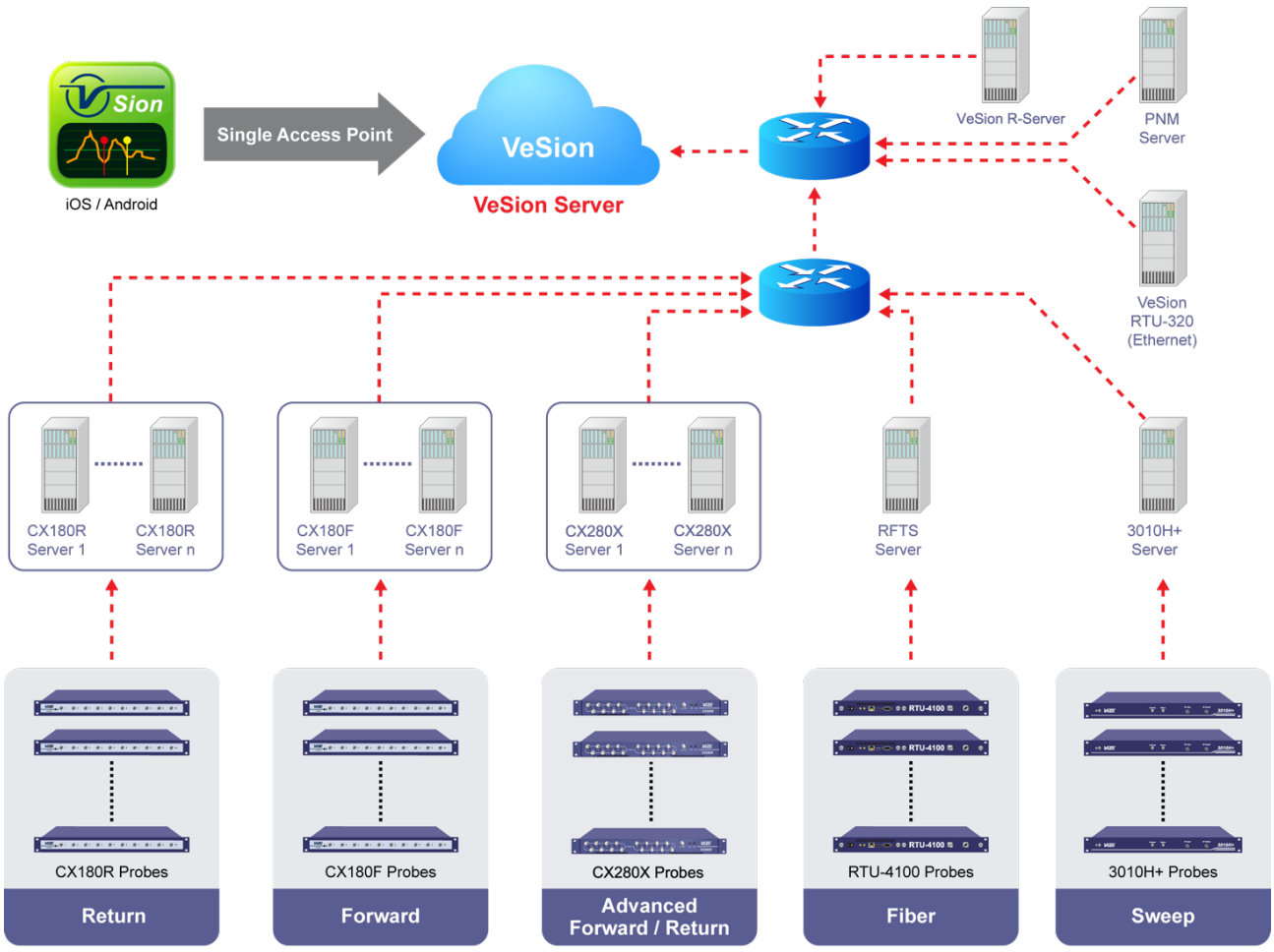
2.0 VeSion Interface

The RTU/RFTS-400 is typically installed at the Central Office, Headend or Sub-Hub, or Co-location sites to support centralized fiber monitoring and analysis, as well as data collection. Optical switches (OXA4000/OXC4000) can be used to expand the number of fibers that can be monitored by a single RTU/RFTS-400 probe.

2.1 About VeSion

VeEX's VeSion cloud-based one system platform integrates VeEX's Preventive RF monitoring (Return and Forward), Fiber, MPEG, Fiber monitoring (RFTS), Ethernet, Advanced DOCSIS Monitoring, DOCSIS Burst Demodulation, Sweep, PNM (Return and Forward), Workflow and Asset Management (R-Server) all in one modular architecture. This provides MSO's complete network visibility (VeSion) and reduces unnecessary Truck Rolls by alerting key personnel via SMS and/or emails to alarm conditions and location. In addition, VeSion links directly with an MSO's billing system, allowing them to pin-point the exact location of the DOCSIS cable modem problem.

Using the Internet, or mobile applications to VeSion, access to results can be made anywhere, anytime and at any location.



VeSion Platform

Using VeSion with the RXT-4100 optical test probe, you can:

- Configure probes, including:
  - Alarm profiles
  - Monitoring profiles
  - System defaults
- Map geographical locations
- View probe data logs
- View probe alarms in real-time

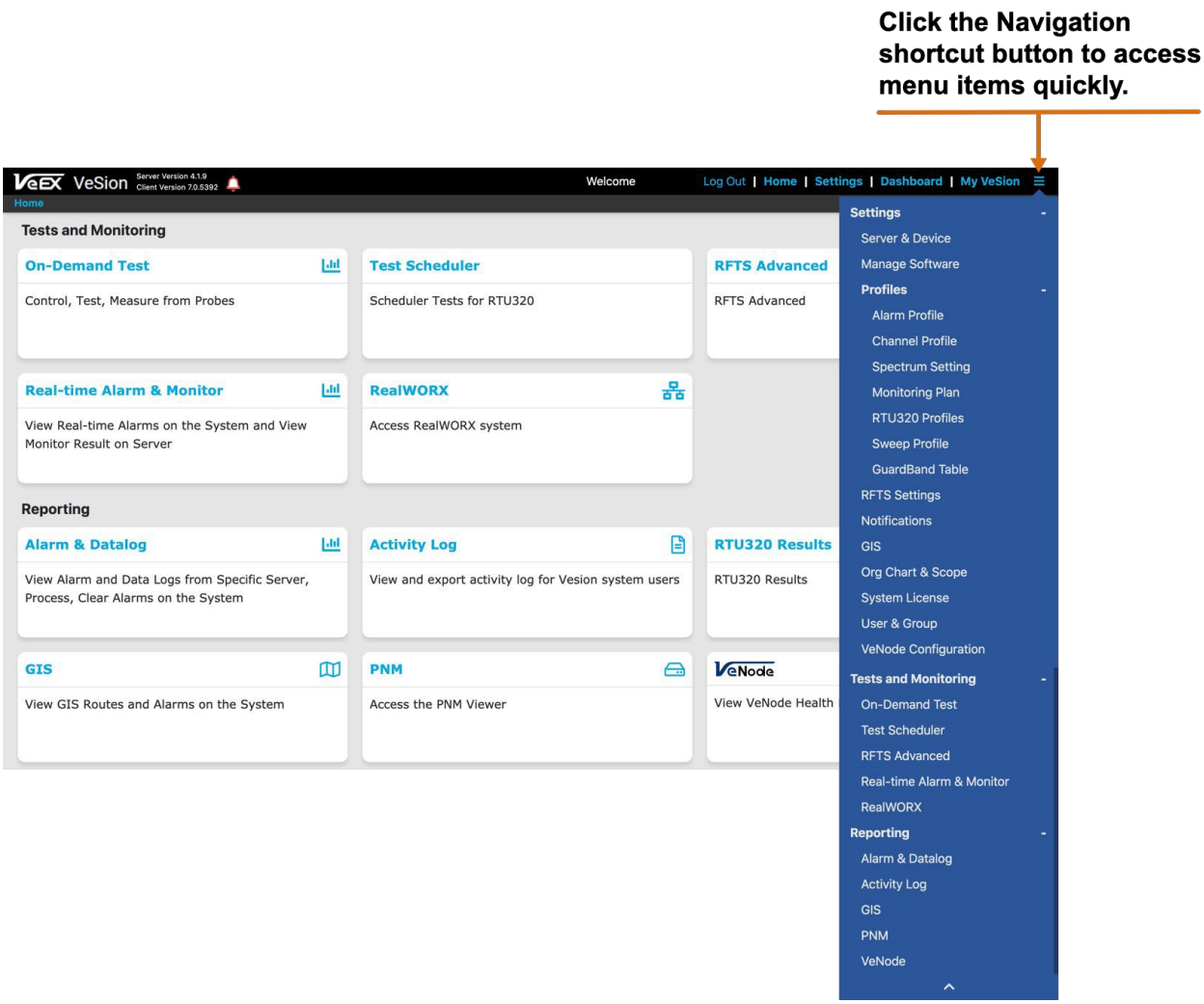
2.1.1 Platform Highlights

- Complete web-based solution compatible with any web browser
- Flexible distributed architecture
- Email, SMS, SNMP, Syslog notifications
- Secured IP connection for access from any location with Internet connection via Android and iOS mobile devices, web access
- Options include:
  - Workflow, configuration, Asset and Test Data Management, Dispatch and Data enrichment system using R-Server
  - GIS support to capture, store, manipulate, analyze, and manage geographic data
  - PNM (Return and Forward)

2.1.2 General Settings

The VeSion System IP address and login information can be provided by the System Administrator.

After logging in, the **Home** page appears. A description for each function item is provided on the screen. Use the shortcut **Navigate** button ☰ on the top right menu bar to select screens options.



VeSion: Screen Navigation

2.1.3 User Permissions and Groups

User permissions are determined by their Group. User Groups are preconfigured by VeEX. Each group is assigned specific permissions depending on their role (e.g. District Supervisor, Region Manager, NOC Operator). The maximum number of users that can be assigned to each group can be updated, as needed.

To view the groups and permissions or update the maximum number of users allowed for a group, go to **Settings** > **User & Group** > **Group.**

Contact Customer Care if additional updating of User Groups is needed.

To set up or edit users:

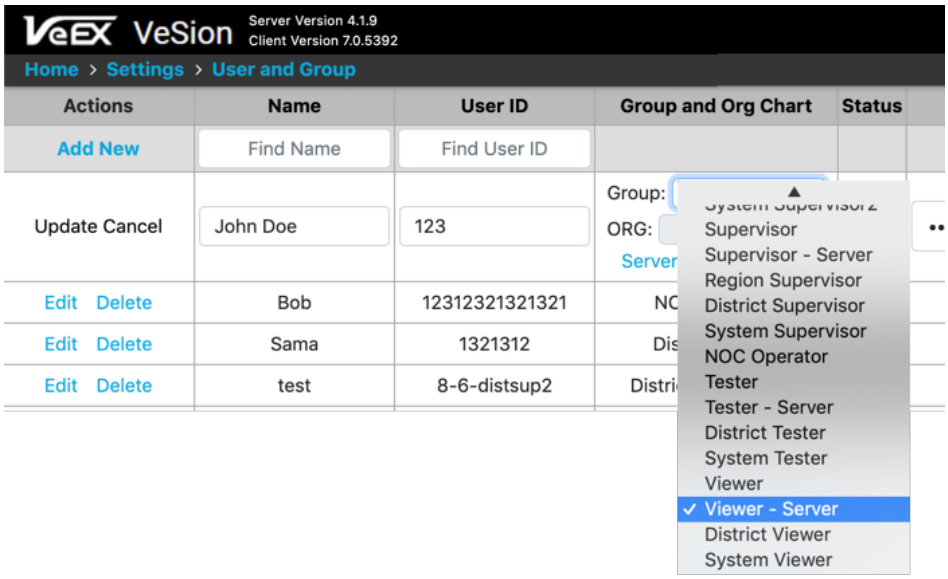
1. Go to **Settings** > **User & Group** > **User**. A table displaying all users appears.
2. Select **Add New** on the top blank row of the user table. Enter the following information.
    - **Name**: Employee name of user
    - **User ID**: ID used to log into VeSion

- **Group and Org Chart**: Assigns permissions by adding the user to a Group. Depending on the Group, an Org (Organization) and Server may also be assigned.
- **Status**: Checkbox to indicate if the user is active and allowed to access VeSion.
- **Password**: Password used to log into VeSion.
- **Email**: User's email. Notifications will be sent to this email address if enabled.
- **Employee ID**: Employee ID of user.
- **Phone Number**: User's phone number. If enabled, text notifications will be sent via the SMS Provider to this number.
- **SMS Provider**: User's SMS provider.

3. Select **Create**. The new user is created and can now log into VeSion (if marked as active during setup). To cancel the creation of the new user, select **Cancel**.

To assign a user to a specific probe:

1. Go to **Settings**> **User & Group** > **User**. A table displaying all users appears.
2. Select **Edit** next to the user to assign to the probe.
3. In the **Group and Org Chart** column, select a group that has *"-Server*" appended to the name. This activates the **Server Assignment** link.



VeSion: Assigning Users

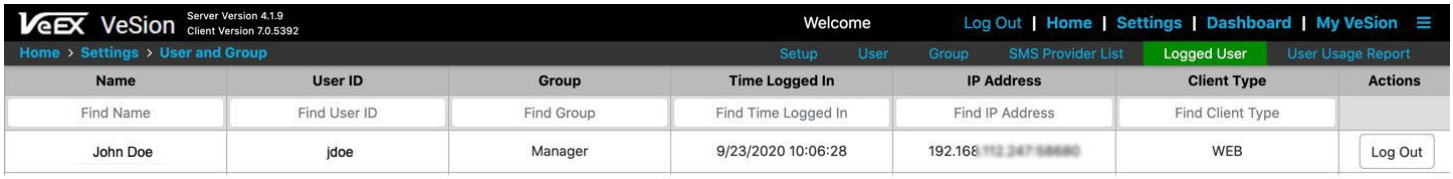
4. Select the **Server Assignment** link. The **Server Assignment** box appears.
5. Select the checkbox to place a checkmark next to the probe to assign to the user and close the box.

VeSion: Server Assignment

6. Select **Update**. The user is assigned to the designated probe.

2.1.4 User Reports

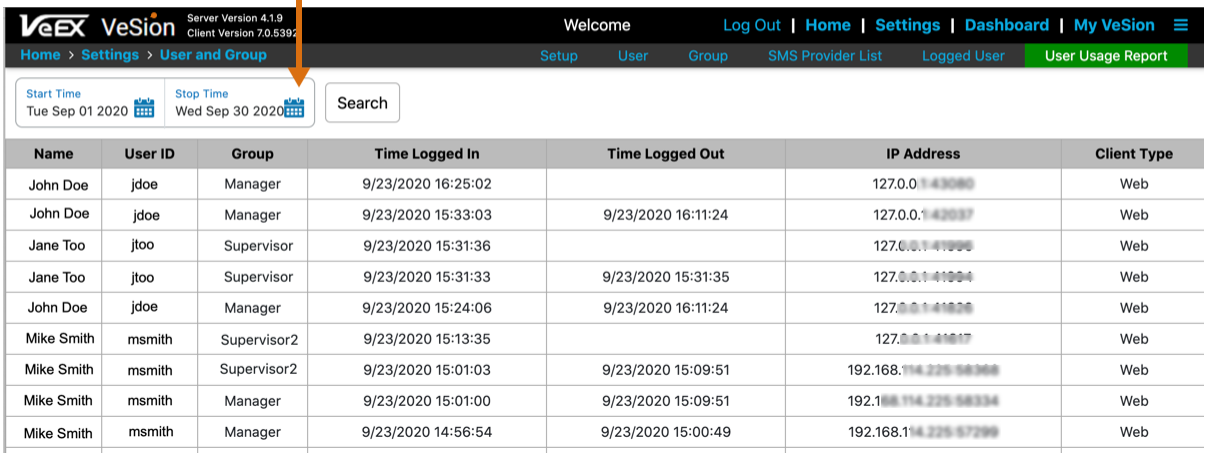
System administrators configured with “Manager” permissions can see who is logged onto the VeSion system.



Logged User screen

Managers can also view usage reports to see access history.

Click the calendar icons to select the date range, then click Search.

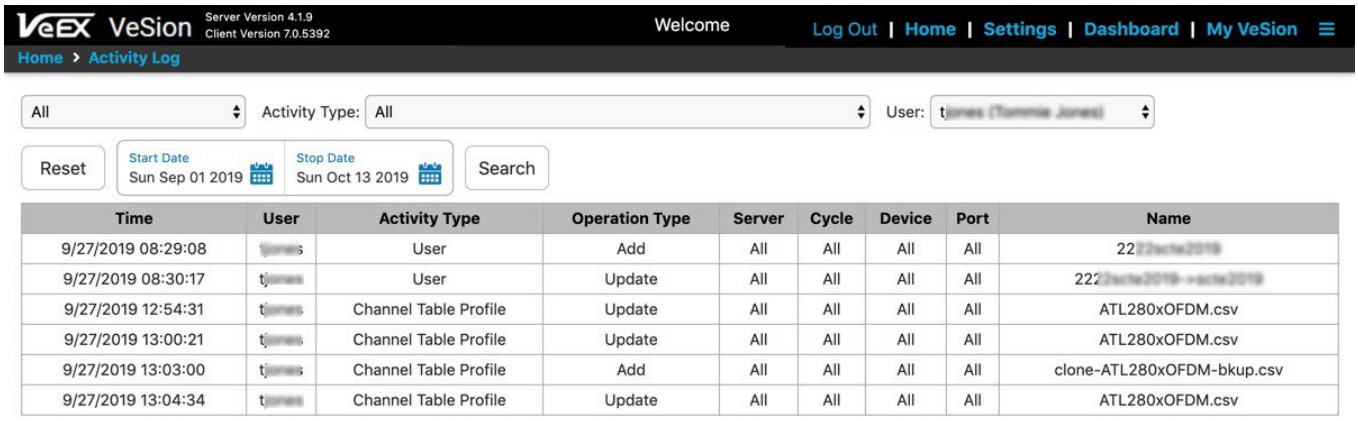


Usage Report

2.1.5 Activity Logs

While the User Usage Report shows only when the user logs in and out of the system, the Activity Log gives more specific information about what the user performs in the system. It can also show information about all users in one report.

To access the log, go to **Home** > **Activity Log**. Select the server, profile, activity type, user, and date range, and then select **Search**.



Time	User	Activity Type	Operation Type	Server	Cycle	Device	Port	Name
9/27/2019 08:29:08		User	Add	All	All	All	All	
9/27/2019 08:30:17		User	Update	All	All	All	All	
9/27/2019 12:54:31		Channel Table Profile	Update	All	All	All	All	ATL280xOFDM.csv
9/27/2019 13:00:21		Channel Table Profile	Update	All	All	All	All	ATL280xOFDM.csv
9/27/2019 13:03:00		Channel Table Profile	Add	All	All	All	All	clone-ATL280xOFDM-bkup.csv
9/27/2019 13:04:34		Channel Table Profile	Update	All	All	All	All	ATL280xOFDM.csv

User Activity Log

2.1.6 SMS Providers

SMS Provider information must be configured in VeSion for users to receive SMS text notifications.

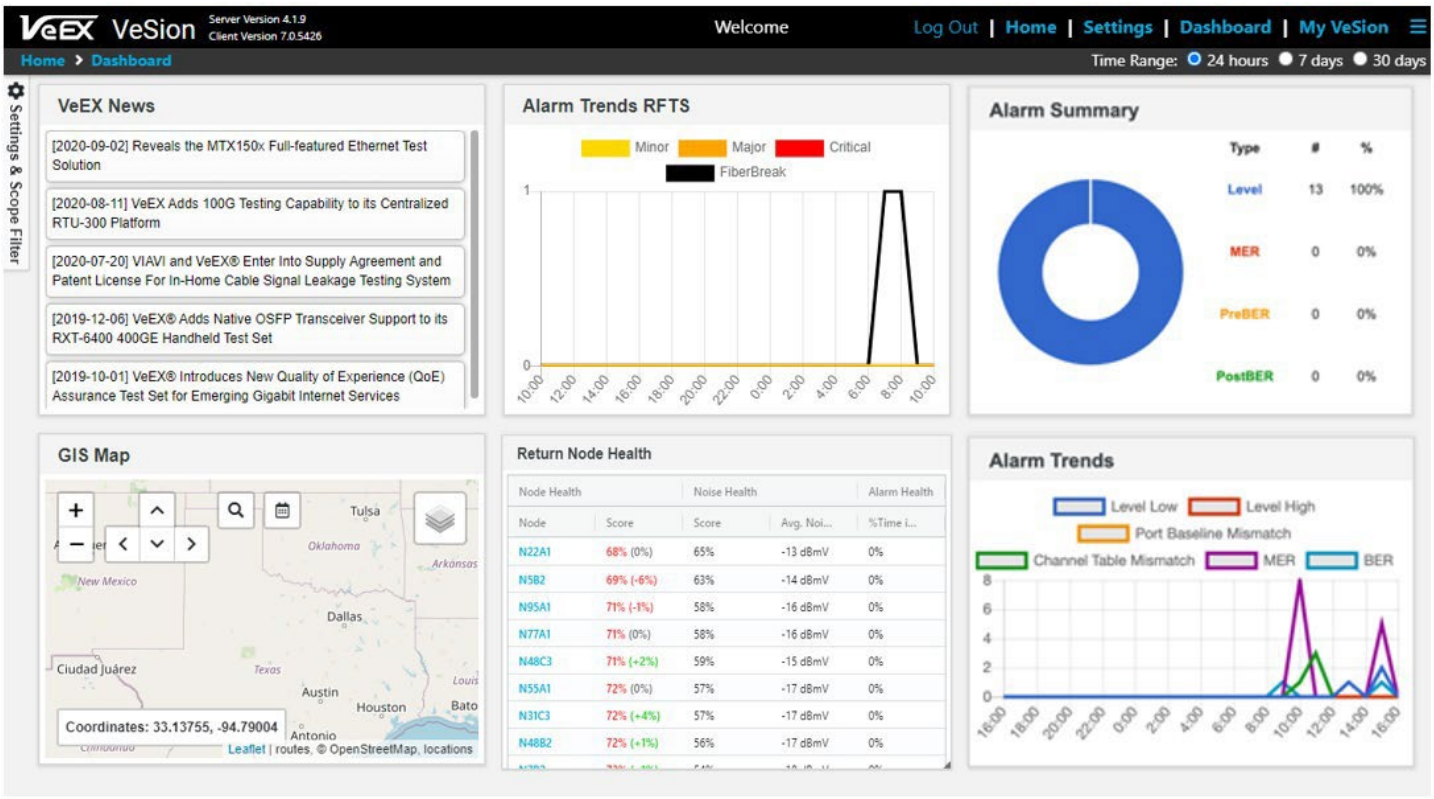
Actions	Name	Email Root
Add New	Find Name	Find Email Root
Edit Delete	Sam	12abc
Edit Delete	Test	apple
Edit Delete	Docomoe	docomo.ne.jp
	US Cellular	email.uscc.net
	Alltel	message.alltel.com
	CenturyTel	messaging.centurytel.net
	Sprint	messaging.sprintpcs.com
	Cellular One	mobile.celloneusa.com

SMS Providers

2.1.7 VeSion Dashboard

The Dashboard captures data at a glance. It displays each category as a data block that can be moved around the screen (if not anchored).

Access the Dashboard by clicking the **Dashboard** link on the top menu bar.



VeSion Dashboard

It can be configured also by selecting **Settings & Scope Filter** on the far left.

To customize the Dashboard:

1. On the top menu bar, click the **Dashboard** link.
2. On the left edge of the screen, click **Settings & Scope Filter**. The **Settings/Scope Filter** left panel displays.
3. Select the configuration options, click the red X to close the left panel.

Scope Filter

Select the Region and District for which to show data.

Settings

- **Small/Medium/Large**: Select the size of the data block for the dashboard. The size can also be adjusted by clicking an edge of a data block and dragging it.
- **Widgets Unlocked/Locked**: Click the padlock icon to lock or unlock the widgets. When locked, they cannot be resized.

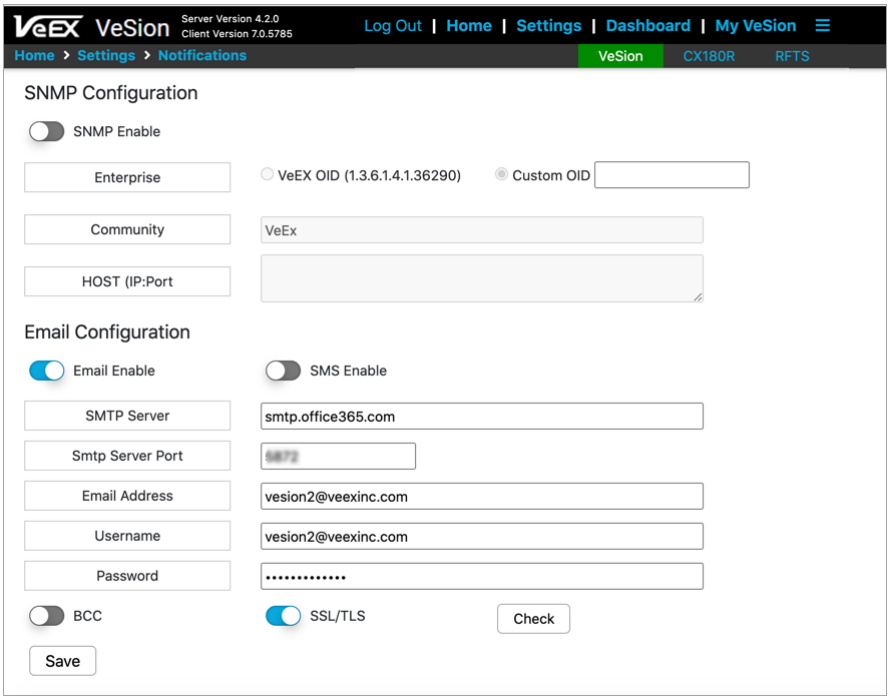
2.2 System Notifications

Use the **Notifications** page to configure global notification settings applicable to ALL probes (even those other than the RFTS) for SNMP and Email. These settings apply when a Probe Server goes online/offline. Access the **Notifications** page by clicking **Settings** on the top menu bar, then selecting **Notifications**.

Before setting up notifications, assign each mobile carrier in the **SMS Provider List** tab by clicking **Settings>User and Group>SMS Provider List**. See *2.1.6 SMS Providers* for more information.

*To configure notifications for only RFTS probe servers and all RFTS probes at once, go toe **Settings>Notifications | RFTS**. For more information, see 10.0 RFTS Notifications.*

*To configure notifications for a specific RFTS Probe Server and RFTS probes associated with that server, go to the **RFTS Probe Server Settings** page. For more information, see 3.2 SNMP Configuration and 3.3 Email Configuration.*



VeSion System Notifications screen.

SNMP Configuration

- **SNMP Enable:** Turns on to enable SNMP alarms.
- **Enterprise:** Select the OID used to report the alarm.
- **Community:** Enter the community string/password for the SNMP. The default is public.
- **HOST (IP:Port; IP:Port):** Enter the host IP address and port for each SNMP trap receiver. Separate multiple addresses by semi-colons.

Email Configuration

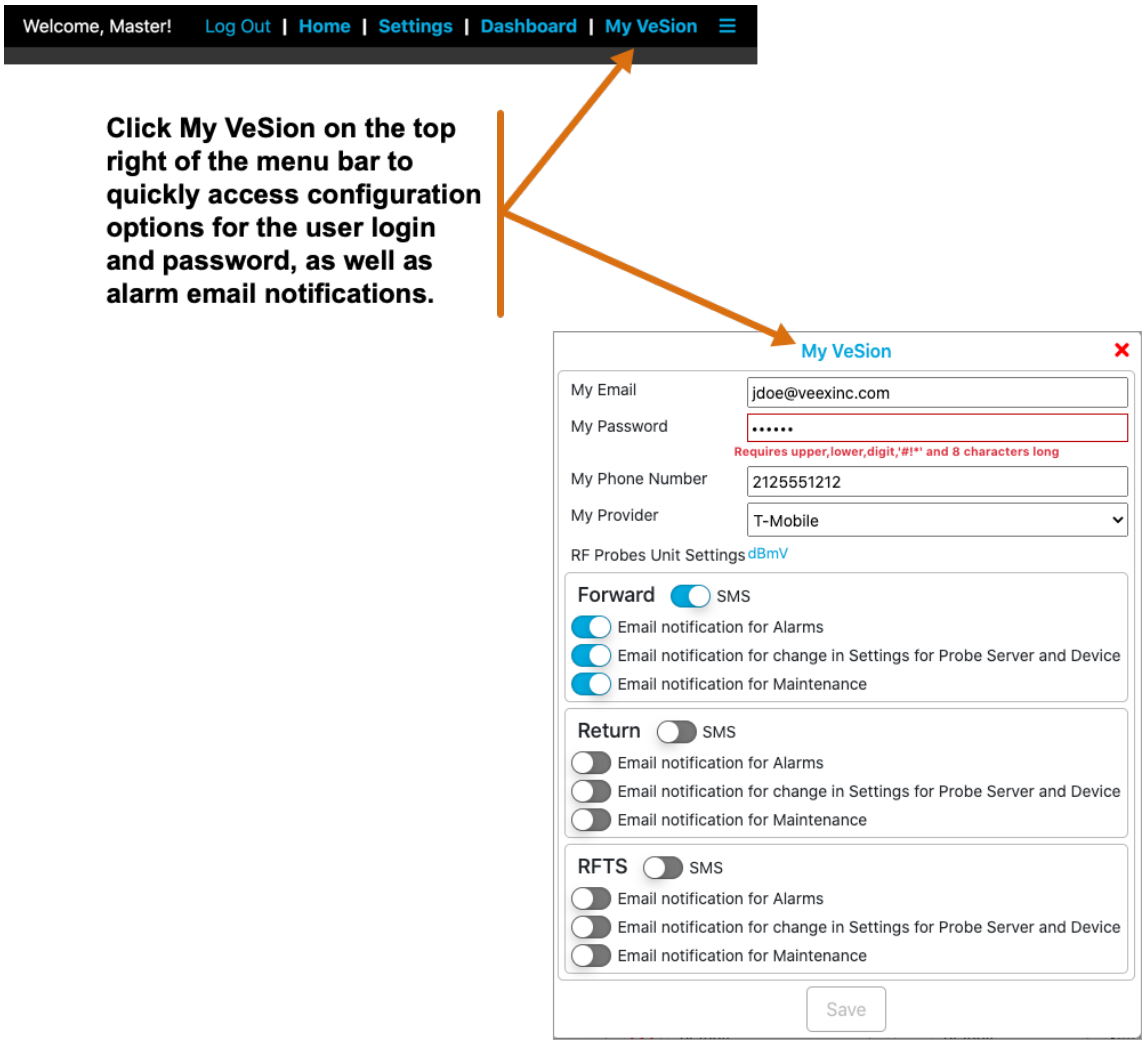
- **Email Enable:** To enable email alarm notifications from probe server if option was selected in My VeSion and email provided.
- **SMS Enable:** To enable mobile device alarm notifications if option was selected in My VeSion and phone number/mobile provider selected.
- **Smtp Server:** Enter server that VeSion accesses to send email notifications.
- **Smtp Server Port:** Enter server SMTP port that VeSion accesses to send email notifications.
- **Email Address:** Email address from which notifications are received.
- **Username:** Username VeSion uses to connect to the SMTP Server.
- **Password:** Password VeSion uses to connect to the SMTP Server
- **BCC:** Email addresses to which blind copies of notifications are sent.
- **SSL/TLS:** Security protocol used to connect to the SMTP Server.
- **Check:** Runs a test with the current configuration settings to validate they are correct.

Use the **Check** button to run a test and validate the current configuration settings are correct.

Global SysLog configurations are not needed, as the VeSion Server maintains a usage System Log automatically. To access this log, a third party tool compatible with the OS is needed. For more information, contact VeEX Customer Care.

2.3 Alarm Notifications (My VeSion)

Assign user permissions to receive alarm email notifications in the My VeSion window. To access My VeSion, select **My VeSion** in the top right menu bar.



My VeSion: menu and screen

In addition to configuring user permissions for alarm notifications, user information can also be quickly set without going to **Settings** > **User & Group** > **User**.

- **My Email:** View or change the email address for notifications.
- **My Password:** Change the login password.
- **My Phone Number:** View or change the telephone number for SMS text notifications.
- **My Provider:** View or select the mobile provider for SMS text notifications.
- **RF Probes Unit Settings:** View or change the measurement units by selecting the link, dBmV or dBuV.

Forward/Return/RFTS notification settings

For each section (Forward/Return/RFTS), select the radio button to turn ON/OFF alarm notifications for the user.

After making changes, select **Save** at the bottom of the screen to save changes.

3.0 Probe Servers

Probes are uniquely identified by static IP addresses, as is the probe server.

To access probes in VeSion:

1. From the **VeSion top menu bar**, click **Settings**, and then select **Server & Device**. The **Server & Device** page appears showing tabs for each probe installed. The **RFTS** tab appears at the top, indicating a successful installation and connection to the probe.
2. Select the **RFTS** tab. On the left panel, click the probe server icon  to view all probes associated with that probe server. Probes appearing in red indicate they are currently offline.

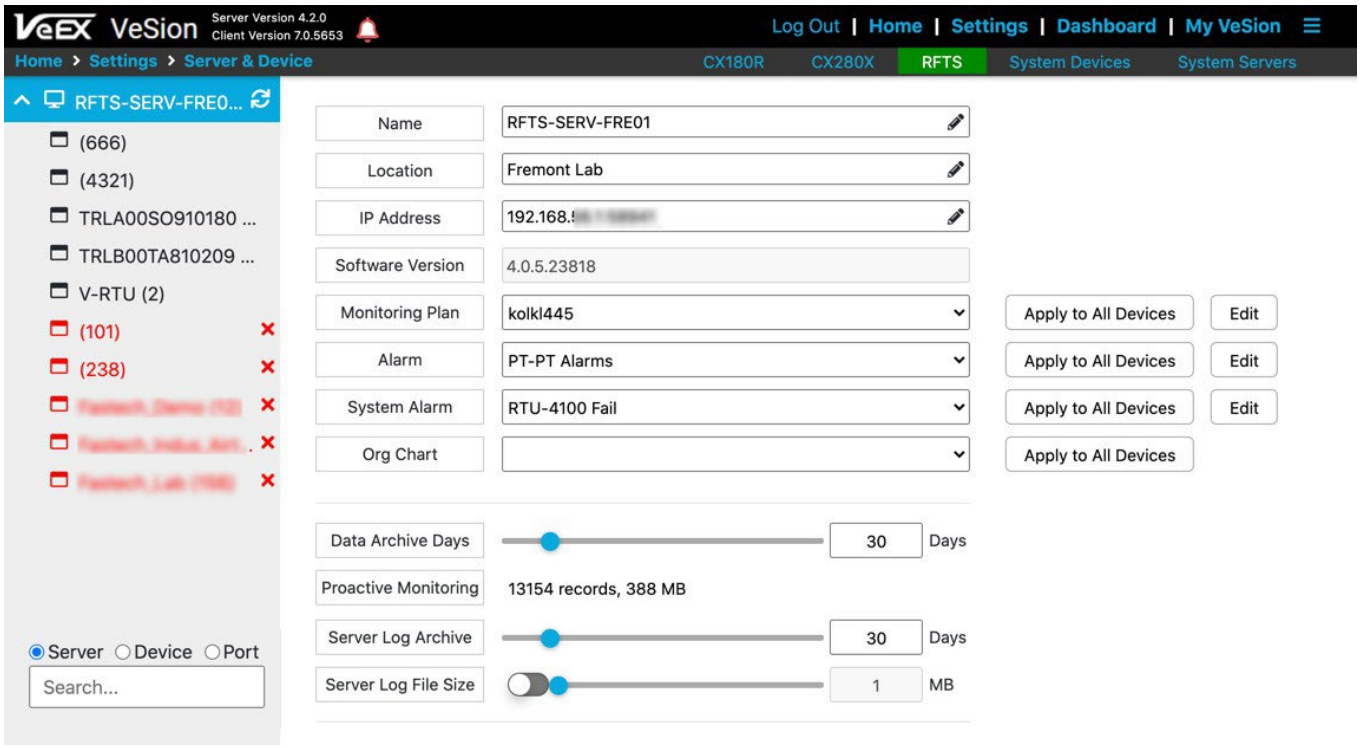
*The probe server names contain the model name by default. Probe numbers are designated when the probes are installed and cannot be changed. Change probe and probe server names using the **Name** field in the right panel.*

3. Click the probe icon  to view details about that probe.

Click the Refresh icon  to update measurement data for all probes associated with the probe server.

On the **Probe Server** details page, view details for the probe installed, assign default profiles, enable messaging, and configure the log.

3.1 RFTS Server Settings



RFTS Probe Server details

- **Name**: Enter the name of the server (up to 99 characters).

  It is recommended the probes names correspond to the Hub/Headend that it resides in.

- **Location**: Enter the physical location of the server (up to 199 characters).
- **IP Address**: Enter the IP address of the server.
- **Software Version**: Displays software version installed on probe.
- **Monitoring Plan**: Assigns default Monitoring Plan to probe. To apply this Monitoring Plan to all probes associated with the Probe Server, click **Apply to All Devices**. To edit the plan, click **Edit**.
- **Alarm**: Assigns default Alarm Profile to probe. To apply this Alarm Profile to all probes associated with the Probe Server, click **Apply to All Devices**. To edit the profile, click **Edit**.
- **System Alarm**: Assigns default System Alarm Profile to probe (probe, server, and/or network failure). To apply this System Alarm Profile to all probes associated with the Probe Server, click **Apply to All Devices**. To edit the profile, click **Edit**.
- **Org Chart**: Assigns the organization (e.g. hub, district) to which the probe server belongs. To apply this Org Chart to all probes associated with the Probe Server, click

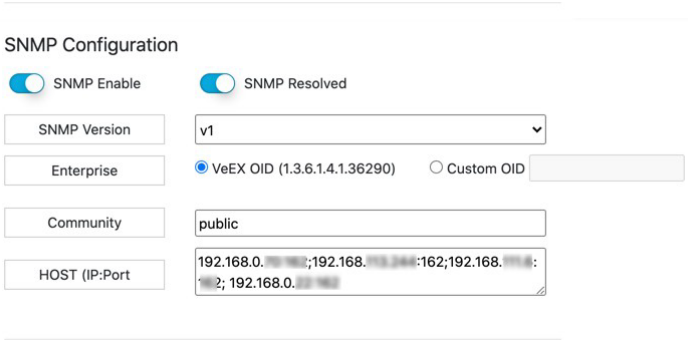
Apply to All Devices. To set up and configure Org Charts, go to **Settings>Org Chart & Scope**.

- **Data Archive Days**: Designates the number of days (5 – 200) to keep historical measurement data.
- **Server Log Archive**: Designates the number of days (5 – 200) to keep a historical log record of system events, such probes going on or offline.
- **Server Log File Size Alert Threshold**: Designates the amount of data (1 – 99 MB) kept in the log before an alert is triggered. If no alert is needed, toggle the radio button to the left.

The Log File Alert is useful because the log file may increase in size quickly and send alerts unnecessarily. Incorporating the standard operating procedure of Resolving/Deleting Alarms, thus emptying the data log, at certain intervals should be considered.

- **Apply to All Devices**: Applies the selected measurements and on-demand testing to all probes associated with the probe server.

3.2 SNMP Configuration



SNMP Configuration

- **SNMP Enable**: Turn ON to enable SNMP alarms.
- **SNMP Resolved**: Turn ON to enable resolved SNMP alarms.
- **SNMP Version**: Select the version of SNMP to use; v1 is selected by default.
- **Enterprise**: Select the OID used to report the alarm.
- **Community**: Enter the community string/password for the SNMP. The default is public.
- **HOST (IP:Port; IP:Port)**: Enter the host IP address and port for each SNMP trap receiver. Separate multiple addresses by semi-colons.

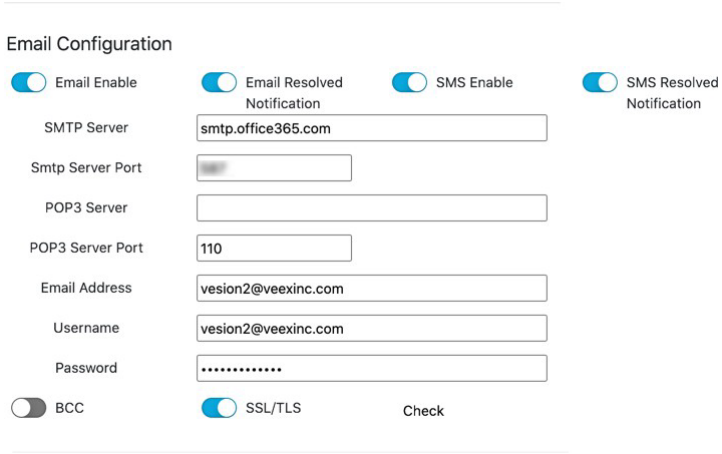
To configure notifications for only RFTS probe servers and all RFTS probes at once, go toe ***Settings>Notifications | RFTS****. For more information, see 12.0 RFTS Notifications.*

Global notifications for ALL probe servers and probes (not only RFTS probes) can be configured in **Settings>Notification | VeSion**. For more information, see *2.3 Alarm Notifications (My VeSion)*.

3.3 Email Configuration

Use this section to configure settings for email alarms. This applies to ALL probes associated with the RFTS Probe Server.

The emails will be sent to the email provided in **My VeSion**. To access the **My VeSion** screen, click the My VeSion icon on the menu bar at the top right. For more details on My VeSion, see *Section 2.3 Alarm Notifications (My VeSion)*.



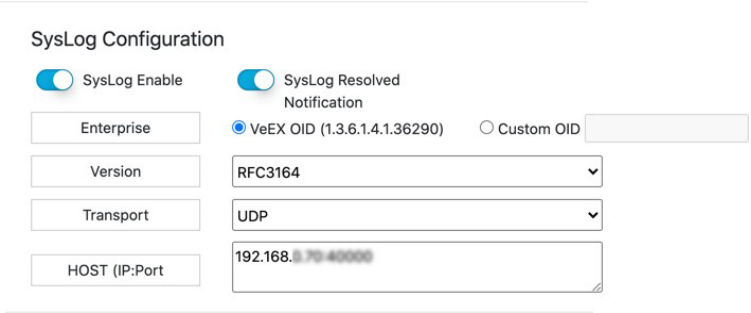
Email Configuration

- **Email Enable**: To enable email alarm notifications from probe server if option was selected in My VeSion and email provided.
- **Email Resolved Notification:** To enable email alarm resolved notifications if option was selected in My VeSion and email provided.
- **SMS Enable**: To enable mobile device alarm notifications if option was selected in My VeSion and phone number/mobile provider selected.
- **SMS Resolved Notification**: Sends mobile device alarm resolved notifications if option was selected in My VeSion and phone number/mobile provider selected.
- **SMTP Server**: Enter server that VeSion accesses to send email notifications.
- **SMTP Server Port**: Enter server SMTP port that VeSion accesses to send email notifications.
- **Email Address**: Email address from which notifications are received.
- **Username**: Username VeSion uses to connect to the SMTP Server.
- **Password**: Password VeSion uses to connect to the SMTP Server

- **BCC**: Email addresses to which blind copies of notifications are sent.
- **SSL/TLS**: Security protocol used to connect to the SMTP Server.
- **Check**: Runs a test with the current configuration settings to validate they are correct.

3.4 System Log Configuration

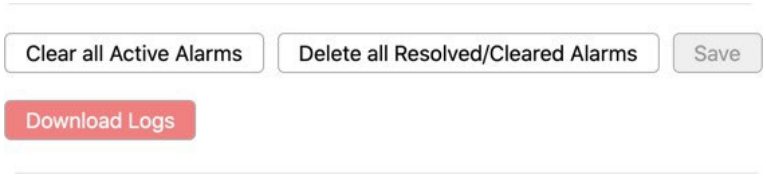
Use this section to configure how alarms are sent to the system server's log.



SysLog Configuration

- **SysLog Enable**: Turn on to write alarm messages to the SysLog.
- **SysLog Resolved Notification**: Turn on to write resolved alarm messages to the SysLog.
- **Enterprise**: Select the SysLog software: VeEX or Custom.
- **Version**: Select the version of the SysLog protocol.
- **Transport**: Select the type of data packet sent to the SysLog.
- **HOST (IP:Port; IP:Port):** Enter the host IP address and port for each SysLog server. Separate multiple addresses by semi-colons.

3.5 Save Settings/Clear Alarms



Saving/Clearing Alarms

- **Clear all Active Alarms**: Click to clear active alarms on ALL probes associated with the probe server.

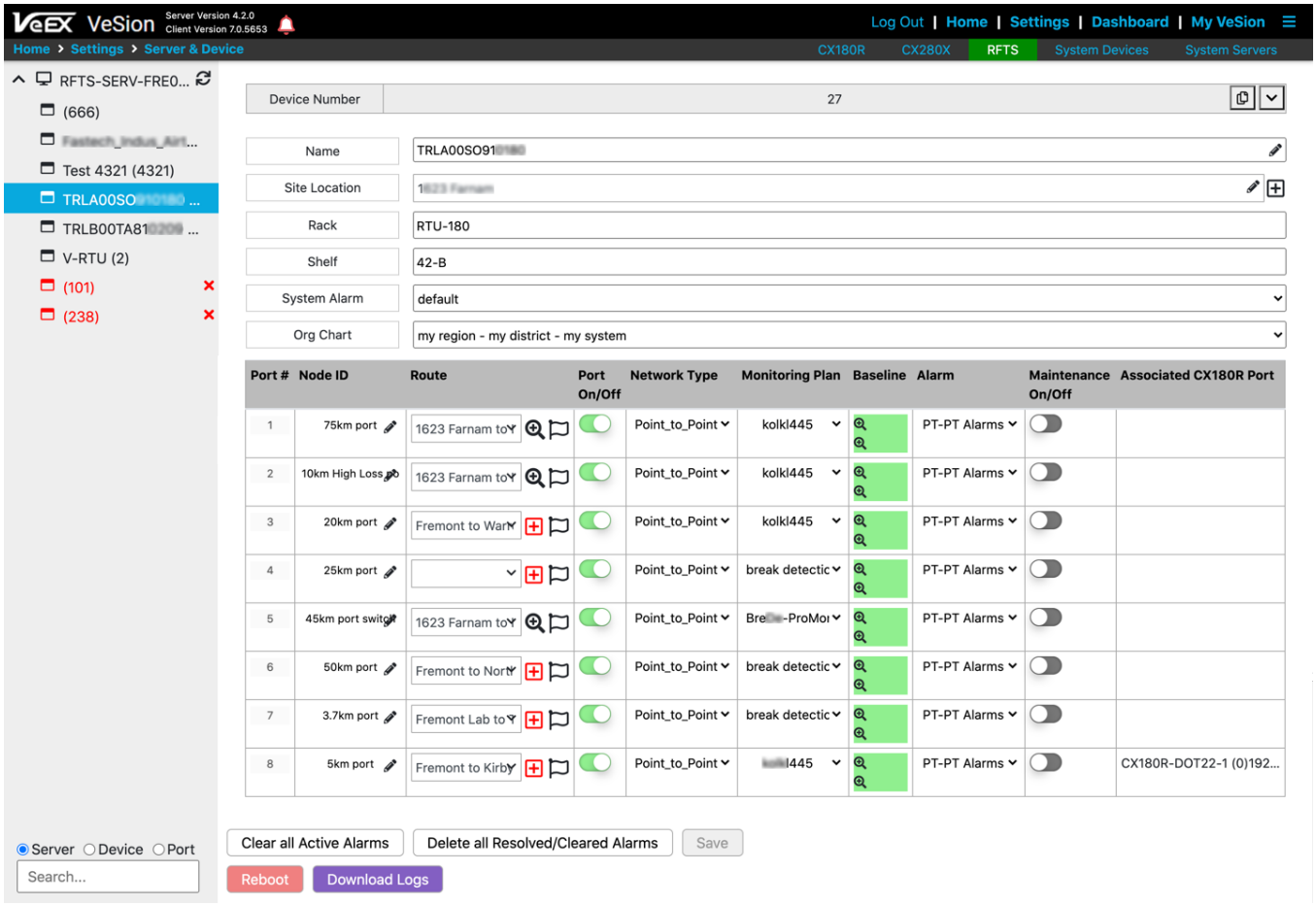
- **Delete all Resolved/Cleared Alarms**: Click to resolve/delete alarms on ALL probes associated with the probe server.
- **Save**: Click to save all configuration settings on this page.
- **Download Logs**: Click to download all monitoring and error logs for ALL probes associated with the probe server for a selected time range.

4.0 RFTS Probe Settings

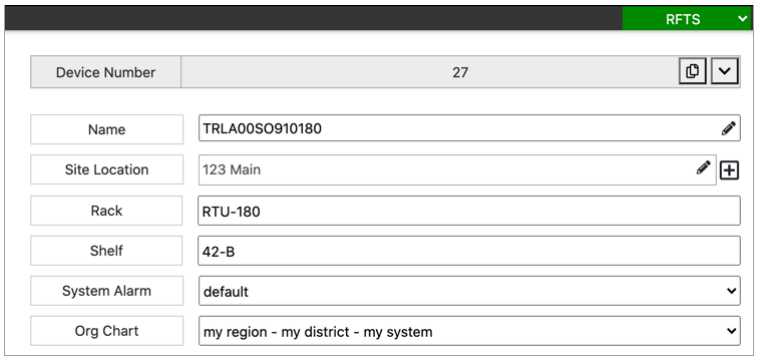
Probes are uniquely identified by static IP addresses. One or more Probes can be assigned to a Probe Server.

On the **Probe** details page, view details for the probe installed, assign default monitoring plans, enable messaging, and configure the log. Access a probe's settings by selecting the probe under the probe server in the left panel.

Create Monitoring Plans and Alarm Profiles in **Settings**.



RFTS Optical Probe Settings



RFTS Optical Probe: General/Alarm Information

- **Device Number:** Displays device number; configured in probe configuration tool. Click the drop-down arrow to view technical configuration information for the probe. Click the **Copy** icon to copy the information.

RFTS Optical Probe: Device Information

- **Name:** Enter name for probe.
- **Site Location**: Enter the physical location of the probe or click the plus icon to add a new location with geographical coordinates and information.
- **Rack**: Enter the name of the rack on which the probe is located.
- **Shelf**: Enter the name of shelf on which the probe is located.
- **System Alarm:** Assigns the default system alarm profile to probe.
- **Org Chart**: Assigns the organization (e.g. hub, district) to which the probe belongs. To set up and configure Org Charts, go to **Settings>Org Chart & Scope**.

4.1 RFTS Port Table

Each CX280X has 16 ports and can be associated with a node.

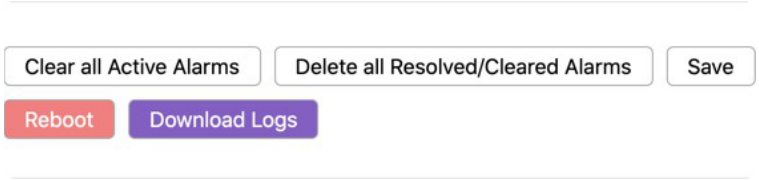
Port #	Node ID	Route	Port On/Off	Network Type	Monitoring Plan	Baseline	Alarm	Maintenance On/Off	Associated CX180R Port
1	75km port	1623 Far toY		Point_to_Point	kol 45		PT-PT Alarms		
2	10km High Loss	1623 Far toY		Point_to_Point	kol 45		PT-PT Alarms		
3	20km port	Fremont to War		Point_to_Point	kol 45		PT-PT Alarms		
4	25km port			Point_to_Point	break detectic		PT-PT Alarms		
5	45km port switch	1623 Far toY		Point_to_Point	Bre -ProMor		PT-PT Alarms		
6	50km port	Fremont to Nort		Point_to_Point	break detectic		PT-PT Alarms		
7	3.7km port	Fremont Lab to		Point_to_Point	break detectic		PT-PT Alarms		
8	5km port	Fremont to Kirb		Point_to_Point	kol 45		PT-PT Alarms		CX180R-DOT22-1 (0)192...

Probe Port Table

- **Node ID**: Type the node to associate with the port.
- **Route**: Associate other data test ports through routing If using the VeSion GIS Mapping option, select a node from the drop-down box. Click the icon to view the node information or to create a new node. Click the icon to view the **Landmark Location** screen.
- **Port On/Off**: Turns ON/OFF port measurements. After alarm threshold configuration is defined and baseline reference trace has been established, turn the setting to On to start the monitoring cycle for the port.
- **Network Type**: Select the network type (PON, xWDM MUX) to assign to the port.
  - **Point_to_Point**
  - **ManualPON**: Point-to-MultiPoint (includes RFoG)
  - **AutoPON**: Point-to-MultiPoint. Uses single pulse per wavelength and assigns splitter types based on event loss.
  - **xWDM**: CWDM, DWDM
  - **AutoPonToOnt**: Ideal for fiber monitoring when connected at OLT site. Recommend 50dB dynamic range.
- **Monitoring Plan**: Select the monitoring plan to assign to the port. Configure monitoring plans in **Settings>Monitoring Plans**.
- **Baseline**: Click the icon to perform a baseline trace. For more information on how to take a baseline, see *8.0 Reference Baselines*.
- **Alarm**: Select the alarm profile to assign to the port. Configure alarm profiles in **Settings>Alarm Profiles**.

- **Maintenance**: Turn ON to stop measurements temporarily. If maintenance is required or a new reference trace is needed, the monitored port can be put into maintenance mode so no additional alarms will be dispatched. When the fiber is fixed and a new reference trace is acquired, then the port can be put back into active monitoring state.
- **Associated CX180R Port**: (*optional*) Displays the CX180R RF upstream test port that is associated with the optical probe port. The optical probe can be associated in the CX180R probe settings.

4.1.1 Save Settings/Clear Alarms



Saving/Clearing Alarms and All Ports Setting

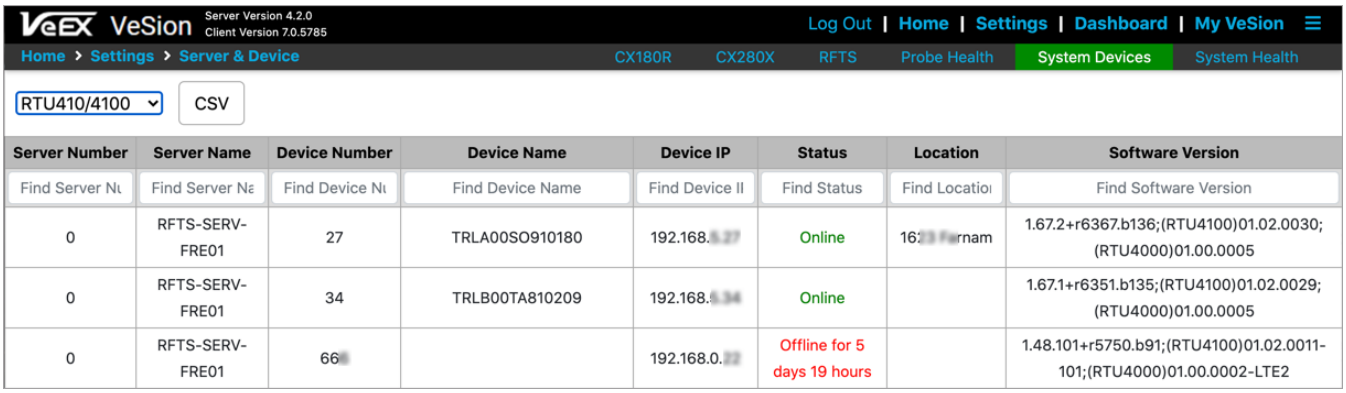
- **Clear all Active Alarms:** Click to clear active alarms on ALL ports associated with the probe.
- **Delete all Resolved/Cleared Alarms:** Click to resolve/delete alarms on ALL ports associated with the probe.
- **Save**: Click to save all configuration settings on this page.
- **Roboot**: Click to reboot the probe.
- **Download Logs:** Click to download probe monitoring and error logs for this probe.

4.2 System Devices

The information of the system including the VeSion probe servers and probes can be viewed in **Home>Settings>Server&Device | System Devices**.

The System Services tab displays a list of the installed probe servers and their details. Select the RTU4100/RFTS400 from the server type drop down list to view the details of the installed RTU4100/RFTS400 server(s).

VeSion System Servers Information



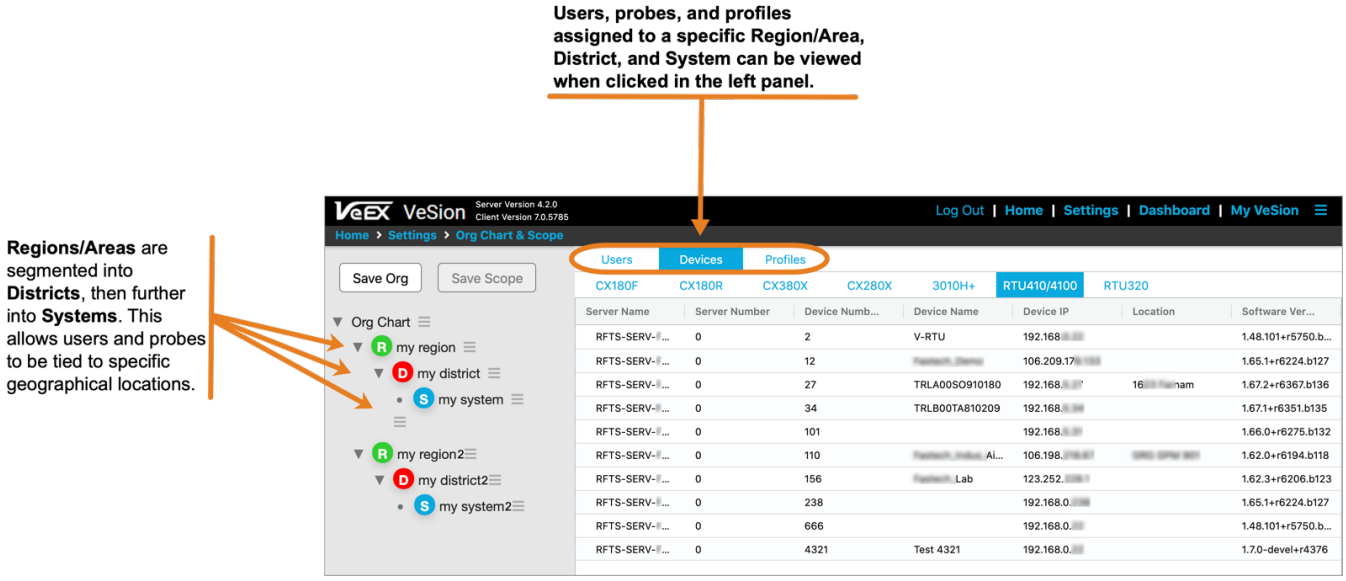
Server Number	Server Name	Device Number	Device Name	Device IP	Status	Location	Software Version
Find Server Nu	Find Server Na	Find Device Nu	Find Device Name	Find Device II	Find Status	Find Locatio	Find Software Version
0	RFTS-SERV-FRE01	27	TRLA00SO910180	192.168.5.27	Online	16[illegible]rnam	1.67.2+r6367.b136;(RTU4100)01.02.0030;(RTU4000)01.00.0005
0	RFTS-SERV-FRE01	34	TRLB00TA810209	192.168.5.34	Online		1.67.1+r6351.b135;(RTU4100)01.02.0029;(RTU4000)01.00.0005
0	RFTS-SERV-FRE01	66[illegible]		192.168.0.[illegible]	Offline for 5 days 19 hours		1.48.101+r5750.b91;(RTU4100)01.02.0011-101;(RTU4000)01.00.0002-LTE2

VeSion System Devices

5.0 Org Chart and Scope

Use Org Charts to segment and organize the cable network into geographical locations in a hierarchal “tree” structure, named Regions/Areas, Districts, and Systems. This organizational chart can be used to segment a traditional network structure and other types of network structures, such as named geographical locations, e.g. Cities, Districts, Neighborhoods.

After setting up the chart, Users, Devices/Probes, and Profiles (Channel and Alarm) can be assigned to each “tree branch” (Region/Area, District, System).



VeSion: Org Chart

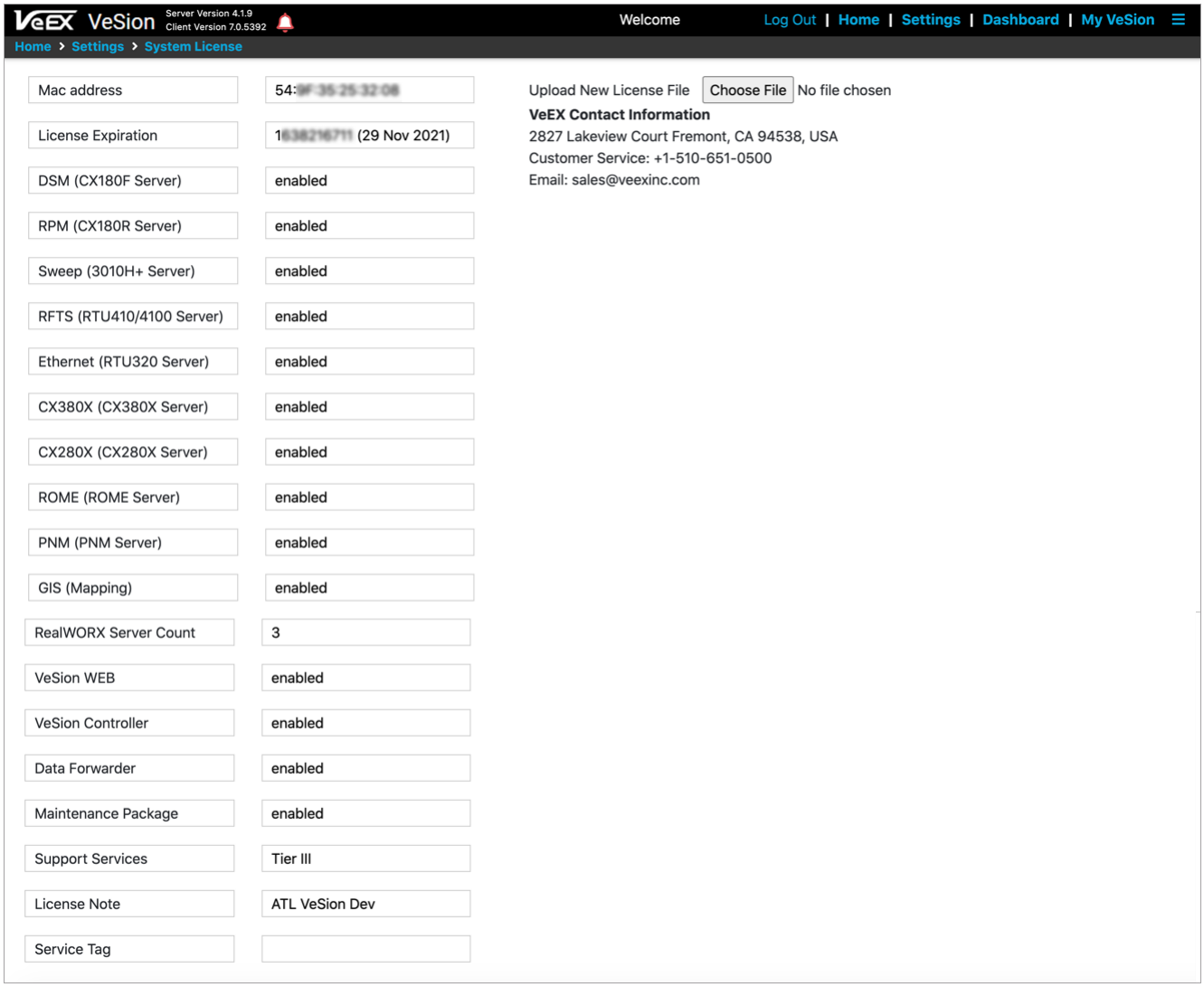
To assign users to an Org Chart, go to **Settings > User & Group > User**. In the **Group and Org Chart** column, select the Org Chart to apply, in the **Org** field.

To assign probes to an Org Chart, select it in the **Org Chart** field on the **Probe Server** details page. Click **Apply to All Devices** to apply the Org Chart to all probes under the Probe Server.

Profiles configured and assigned to the device, will appear in the Org Chart when assigned to the same device.

6.0 System License

To view which probes are enabled in VeSion, go to **Settings > System License**.



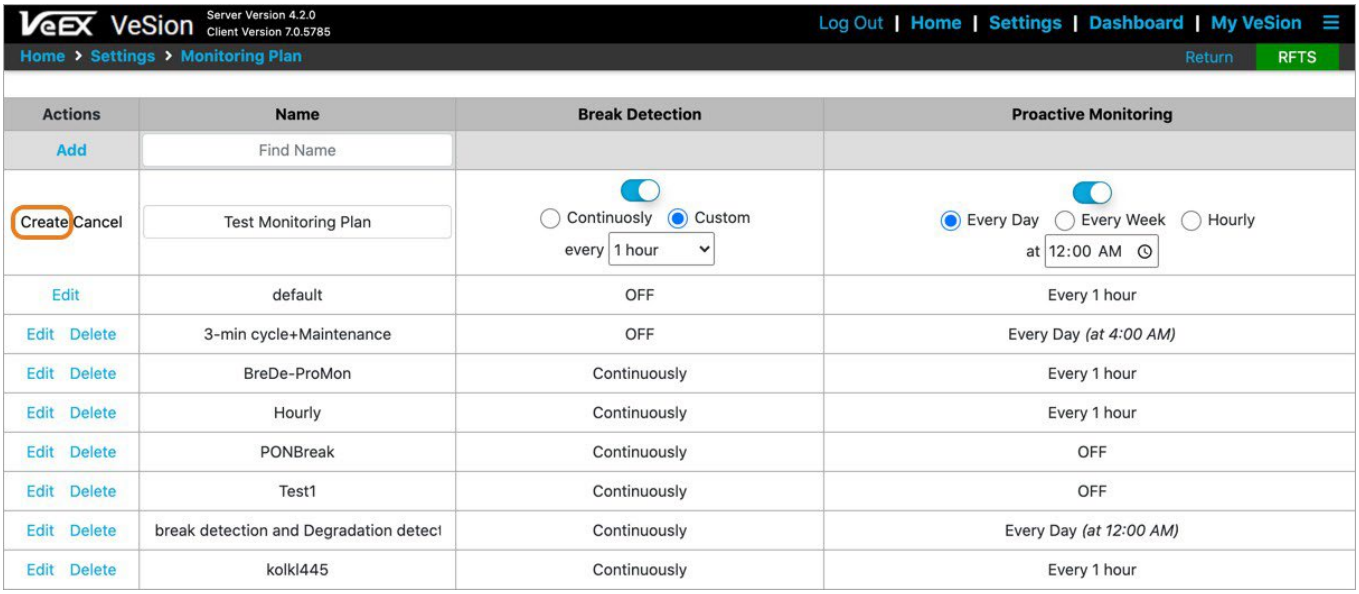
Probe Licensing

Before the probes are active, click **Choose File** to upload the License File received from *VeEX Customer Care*.

7.0 Monitoring Plans

To see the list of monitoring plans, click **System Configuration>Monitoring Plan**, and then click the **RFTS** tab at the top of the page. From this page, you can create, edit, or delete monitoring plans.

VeSion Monitoring Profiles



Monitoring Plans

To change the view of the monitoring plan list, click the heading to filter in ascending or descending order of that field (**Name**, **Break Detection**, **Proactive Monitoring**, **Custom**).

To create a new monitoring plan:

1. Click **Add** then enter the settings for the alarm in the corresponding fields.
    - **Name**: Enter a name for the plan.
    - **Break Detection**
        - **Continuously**: Select to continuously monitor for full break events.
        - **Custom**: Select to periodically monitor for full break events, then select the time interval from the drop-down list.
    - **Proactive Monitoring**: Select for a deeper analysis to detect fiber degradation that may or may not be affecting service.
2. Click **Create**. The new plan is added to the list.

8.0 Reference Baselines

Each active monitoring port requires a unique signal reference baseline to be captured and saved. This saved baseline will allow the break detection alarms to report the condition properly.

If a reference trace has been previously established, the magnifier will be highlighted in green on the **Probe Settings** screen.

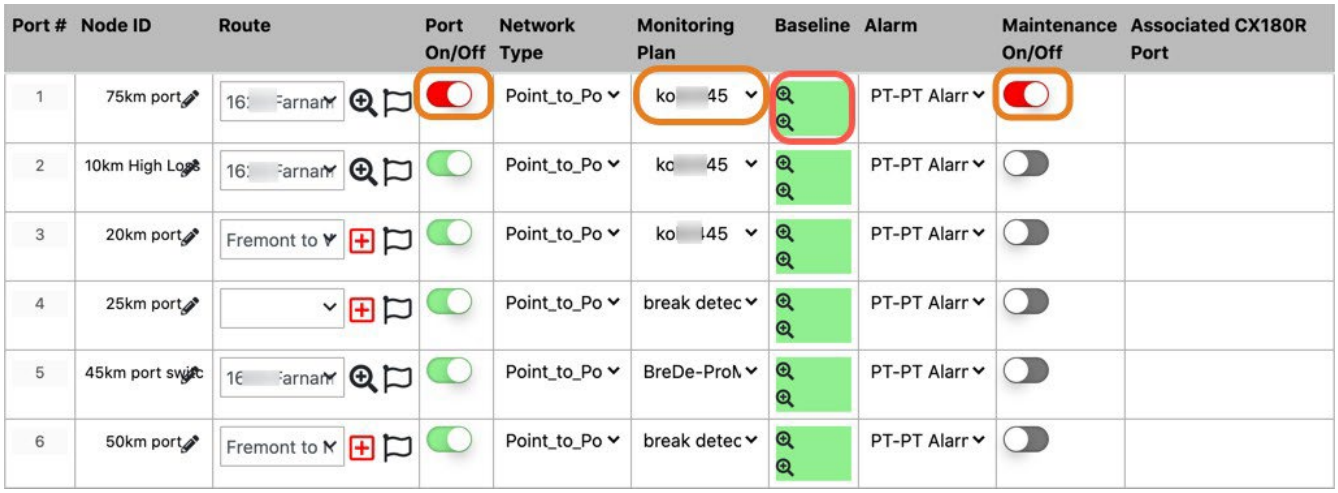
Prior to acquiring a new baseline, put the port in maintenance mode and click **Save** at the bottom of the screen.

*Configure the distance units for the RFTS network in **Home>System Configuration>RFTS Units**.*

8.1 Establishing Baselines

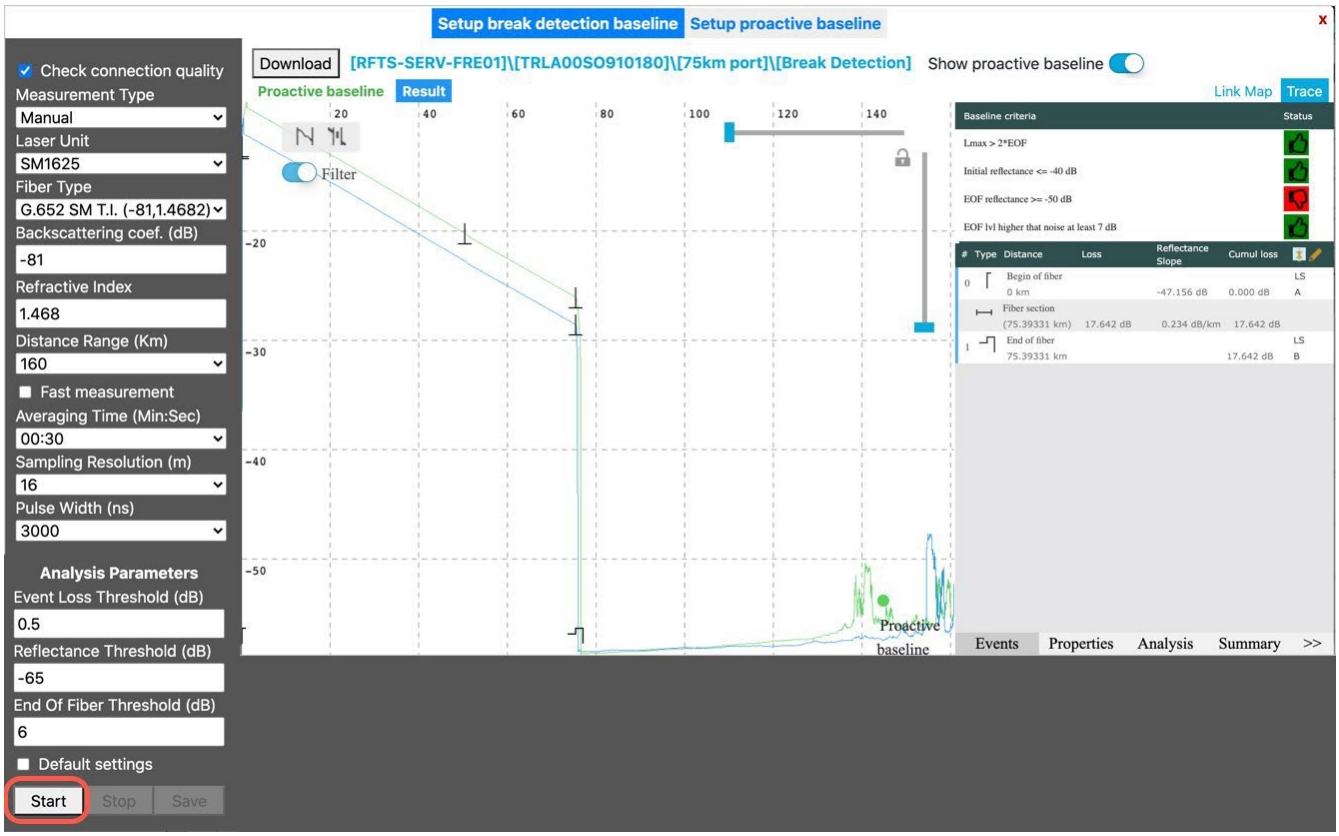
To establish a baseline for break detections:

1. On the **Probe Settings** Port table, click the magnifying glass in the **Baseline** column for the port to establish a baseline.



Probe Settings Port Table: Baseline

The **Trace On-Demand** screen appears.



Trace On Demand Screen: Baseline

To download the reference trace .SOR file for further analysis, click the Download button and type a name for the file.

2. In the left panel, choose **Auto** for the Measurement Type and click **Start** at the bottom. A "*Successfully started*" appears when the trace is in progress. Once the reference trace is complete, the message disappears.

Important note about <u>manually</u> editing a Reference Trace

While an incorrect reference trace will not damage your equipment or optical fiber, it will produce incorrect monitoring results. *It is recommended that you receive adequate training in making TDR measurements and editing event tables before manually editing a Reference Trace.*

3. View the trace and event table to ensure the trace results meet expectations.
4. In the bottom left panel, Click **Save**. A "*Save Succeeded*" message is displayed. Click **OK**.
5. On the **Probe Settings** Port Table, set **Maintenance** to **OFF** and the **Port** to **ON**.
6. At the bottom, click **Save**.

Don’t Forget to Click Save

*If you do not click **Save**, all changes and the new reference trace will not be applied, and the system will revert to previous settings.*

8.2 Redo Baselines

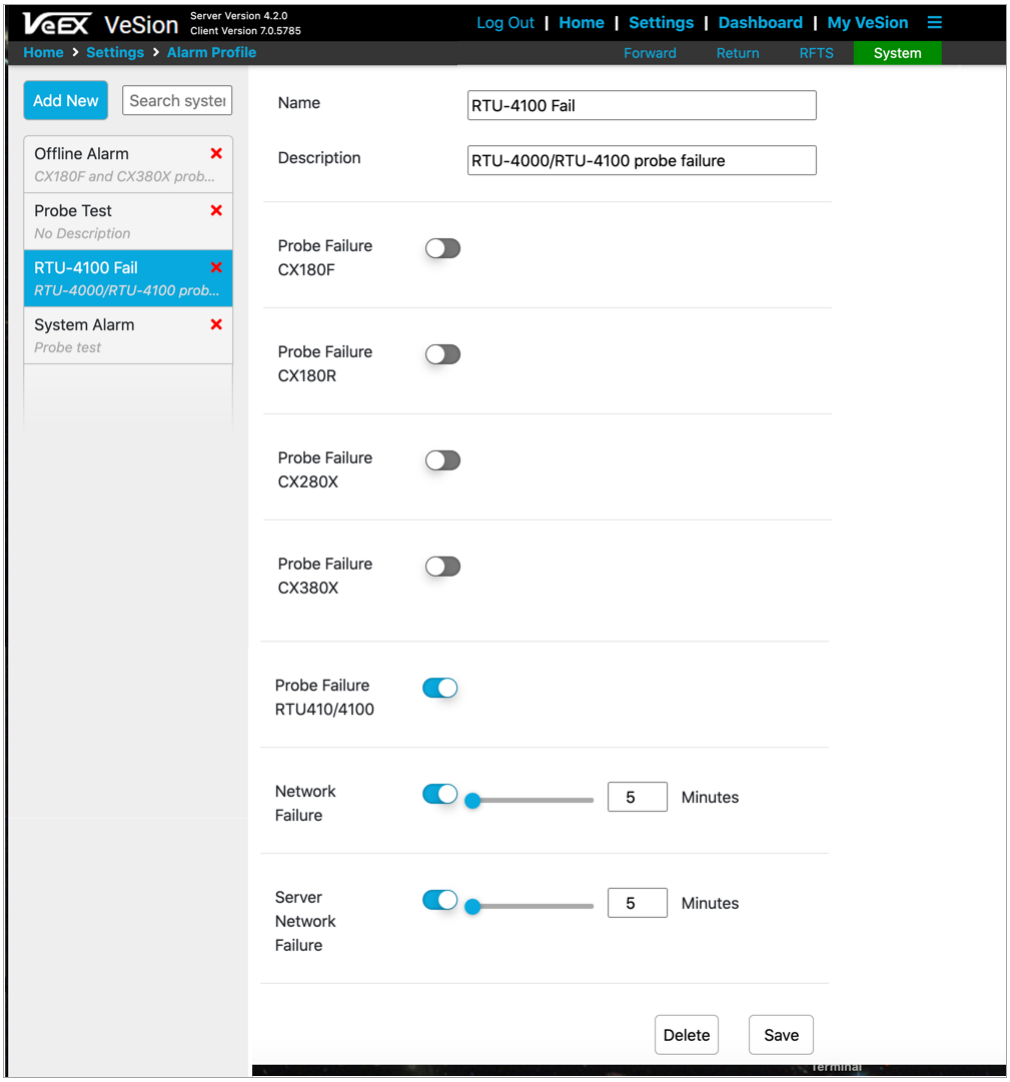
The Reference Baselines should be redone in the following circumstances.

- When a new Monitoring Plan is assigned to a port.
- When changes are made to a Monitoring Plan.
- After equipment maintenance, redo to ensure the reference trace is correct even if the equipment is not supposed to have been impacted by the maintenance.

9.0 Alarm Profiles

9.1 System Alarm Profiles

Configure System Alarms (**Settings > Alarm Profiles | System**) to be notified when a probe goes offline or the network goes down.



System Alarm Profile screen

To configure a new system alarm profile:

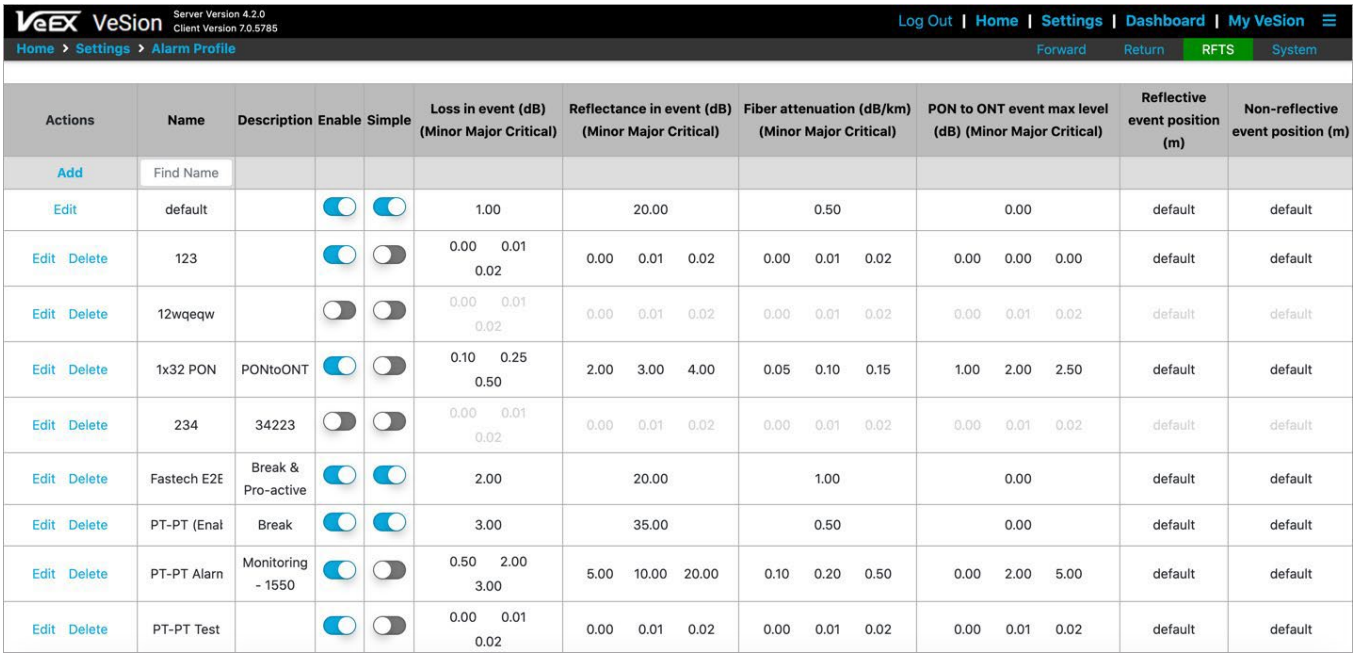
1. Go to **Settings > Alarm Profiles | System**.
2. Click **Add New**.
3. Type a name and description for the alarm, and then select which events that need to be monitored.
    - **Probe Failure** – select to trigger an alarm when the probe goes offline.
    - **Network Failure** – select to trigger an alarm if the entire network goes down. Use the slider or type the number of minutes the network is down before triggering the alarm.
    - **Server Network Failure** – select to trigger an alarm if the server goes down. Use the slider or type the number of minutes the server is down before triggering the alarm.
4. Click **Save** to save the new profile. The new alarm appears in the left panel.

Delete a system profile in two ways:

- *Clicking the profile on the left panel and then clicking the **Delete** button at the bottom.*
- *Clicking*  *next to the profile on the left panel.*

9.2 RFTS Alarms

To create a new RFTS Alarm Profile, click **Add** then enter the settings for the alarm in the corresponding fields.



Actions	Name	Description	Enable	Simple	Loss in event (dB) (Minor Major Critical)	Reflectance in event (dB) (Minor Major Critical)	Fiber attenuation (dB/km) (Minor Major Critical)	PON to ONT event max level (dB) (Minor Major Critical)	Reflective event position (m)	Non-reflective event position (m)
Add	Find Name									
Edit	default		●	●	1.00	20.00	0.50	0.00	default	default
Edit Delete	123		●	○	0.00 0.01 0.02	0.00 0.01 0.02	0.00 0.01 0.02	0.00 0.00 0.00	default	default
Edit Delete	12wqeqw		○	○	0.00 0.01 0.02	0.00 0.01 0.02	0.00 0.01 0.02	0.00 0.01 0.02	default	default
Edit Delete	1x32 PON	PONtoONT	●	○	0.10 0.25 0.50	2.00 3.00 4.00	0.05 0.10 0.15	1.00 2.00 2.50	default	default
Edit Delete	234	34223	○	○	0.00 0.01 0.02	0.00 0.01 0.02	0.00 0.01 0.02	0.00 0.01 0.02	default	default
Edit Delete	Fastech E2E	Break & Pro-active	●	●	2.00	20.00	1.00	0.00	default	default
Edit Delete	PT-PT (Enal	Break	●	●	3.00	35.00	0.50	0.00	default	default
Edit Delete	PT-PT Alarn	Monitoring - 1550	●	○	0.50 2.00 3.00	5.00 10.00 20.00	0.10 0.20 0.50	0.00 2.00 5.00	default	default
Edit Delete	PT-PT Test		●	○	0.00 0.01 0.02	0.00 0.01 0.02	0.00 0.01 0.02	0.00 0.01 0.02	default	default

RFTS Alarm Profile screen

To create a new RFTS alarm profile:

1. Select **Settings > Alarm Profiles | RFTS**.
2. Select **Add New**.
3. Enter the monitoring information needed as described below, and then select **Create** to save the new profile.

    - **Name**: Type a name for the alarm profile.
    - **Description**: Type a description for the alarm profile.
    - **Enable**: Turn ON to enable alarm threshold fields.
    - **Simple**: Turn ON to enable simple threshold entry (one threshold versus three).
    - Enter thresholds (one or Minor, Major, Critical) for:

      Loss in event (dB)

      Fiber attenuation (dB/km)

      PON to ONT event max level (dB)

    - **Reflective event position (m)**: Turn OFF to manually enter the location of the reflective event.
    - **Non-reflective event position (m)**: Turn OFF to manually enter the location of the non-reflective event.

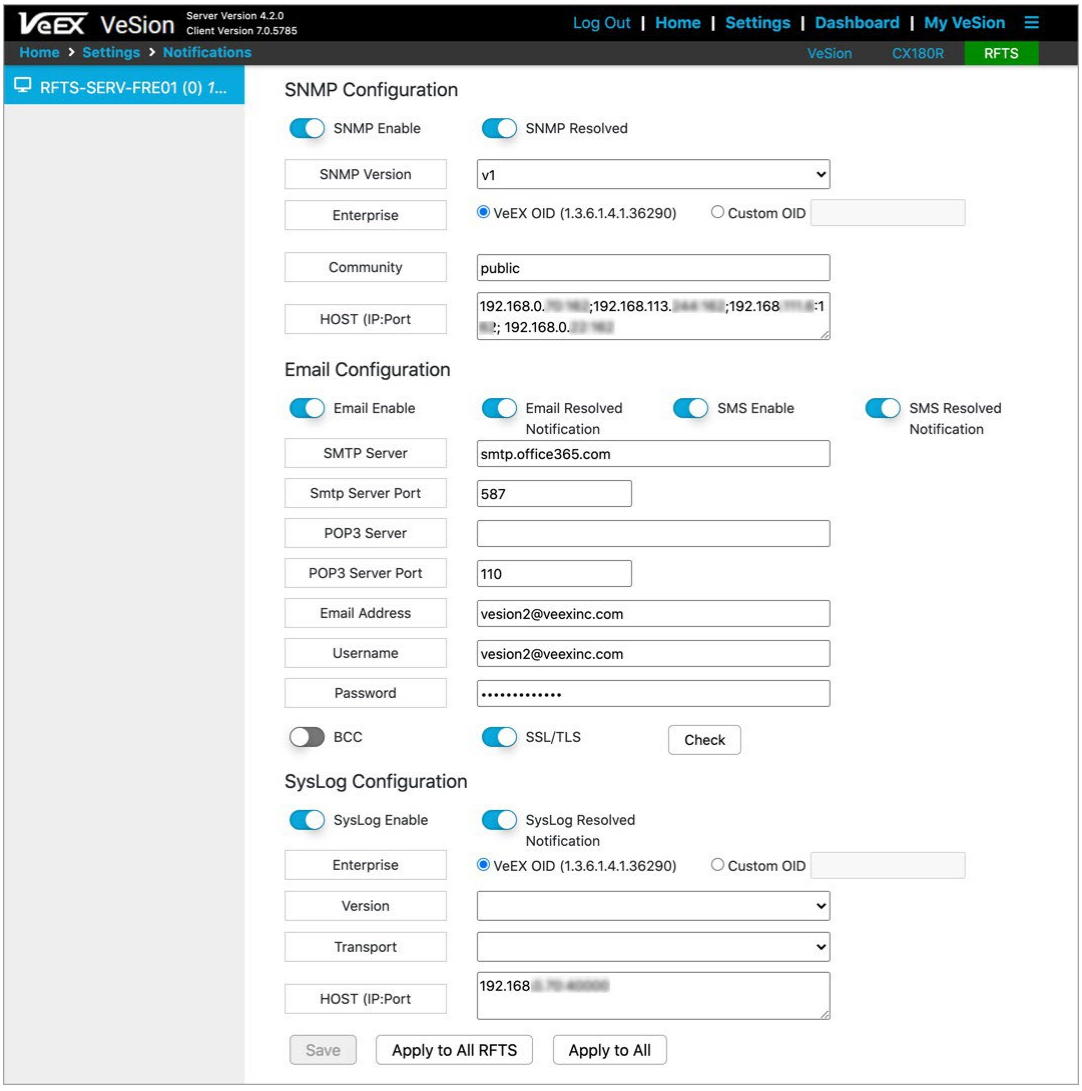
To delete a forward alarm, click **Delete** next to the profile on the left panel.

10.0 RFTS Notifications

Use **Setting>Notifications | RFTS** to configure SNMP and email settings for all RFTS Probe Servers and RFTS probes. Before setting up notifications, assign each mobile carrier in the **SMS Provider List** tab by clicking **Home>System Configuration>User and Group**.

Global notifications for ALL probe servers and probes (not only RFTS probes) can be configured in **Settings>Notification | VeSion**. For more information, see *2.3 Alarm Notifications (My VeSion)*.

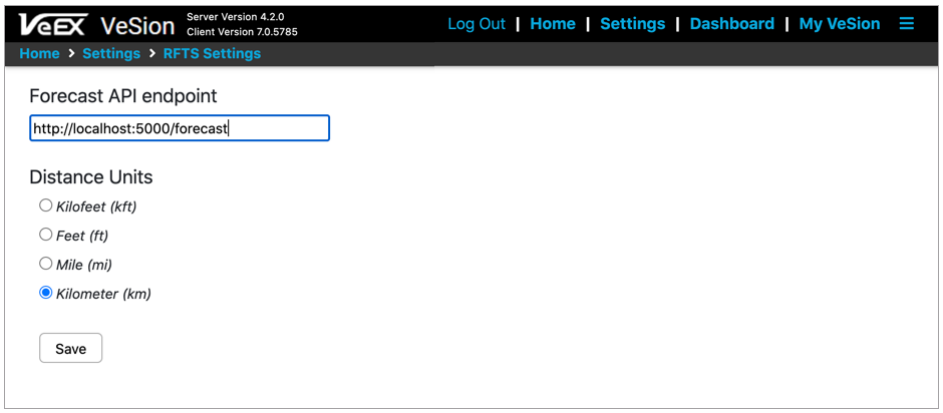
To configure notifications for a specific RFTS Probe Server and RFTS probes associated with that server, go to the **RFTS Probe Server Settings** page. For more information, see *3.2 SNMP Configuration* and *3.3 Email Configuration*.



RFTS Notifications Configuration settings

11.0 RFTS Settings

Configure the settings for Proactive Monitoring and the unit of measurement for fiber in VeSion.

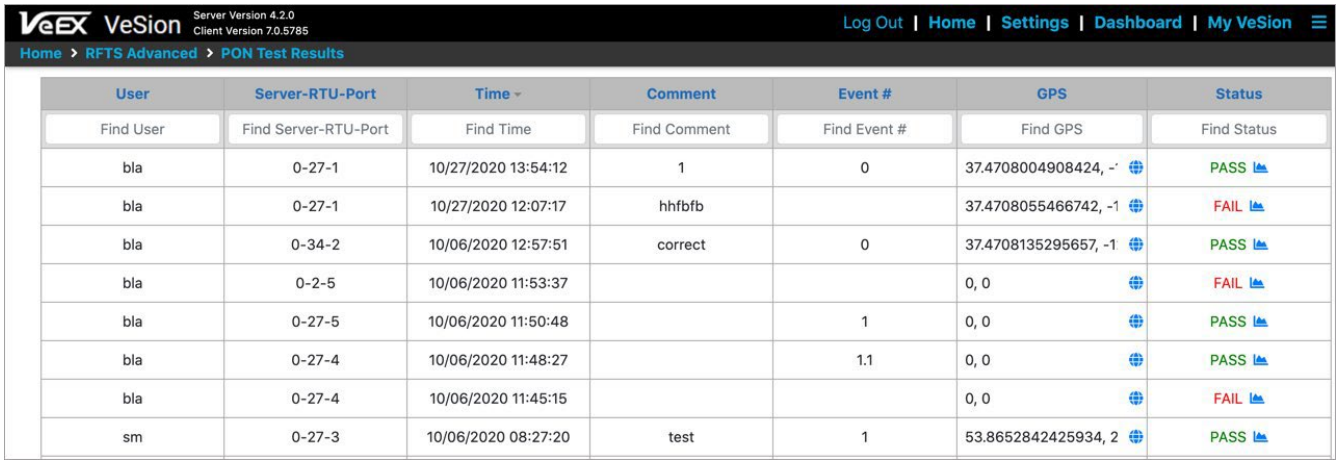


RFTS settings

12.0 RFTS Advanced

12.1 PON Test Results

Use the **RFTS Advanced>PON Test Results** option to view network test results and details for each event.



User	Server-RTU-Port	Time	Comment	Event #	GPS	Status
Find User	Find Server-RTU-Port	Find Time	Find Comment	Find Event #	Find GPS	Find Status
bla	0-27-1	10/27/2020 13:54:12	1	0	37.4708004908424, -'	PASS
bla	0-27-1	10/27/2020 12:07:17	hhfbfb		37.4708055466742, -1	FAIL
bla	0-34-2	10/06/2020 12:57:51	correct	0	37.4708135295657, -1	PASS
bla	0-2-5	10/06/2020 11:53:37			0, 0	FAIL
bla	0-27-5	10/06/2020 11:50:48		1	0, 0	PASS
bla	0-27-4	10/06/2020 11:48:27		1.1	0, 0	PASS
bla	0-27-4	10/06/2020 11:45:15			0, 0	FAIL
sm	0-27-3	10/06/2020 08:27:20	test	1	53.8652842425934, 2	PASS

PON Test Results

In the **GPS** column, click the **Globe** icon to view a map with the location of the event marked.

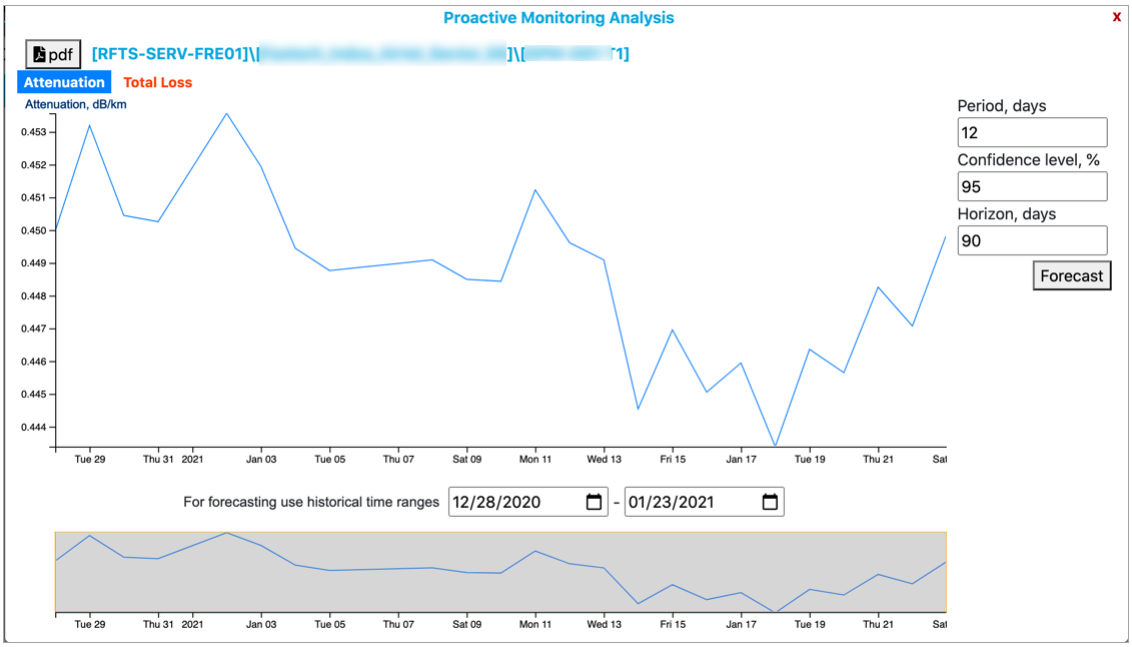
In the **Status** column, click the **Trace** icon to view the trace details for the event.

12.2 Proactive Monitoring Analysis

Use the **RFTS Advanced>Proactive Monitoring Analysis** option to view attenuation history and total loss from each port that has been switched on for proactive monitoring.

Proactive Monitoring Analysis

Click the magnifying glass icon for the port to enlarge the analysis.

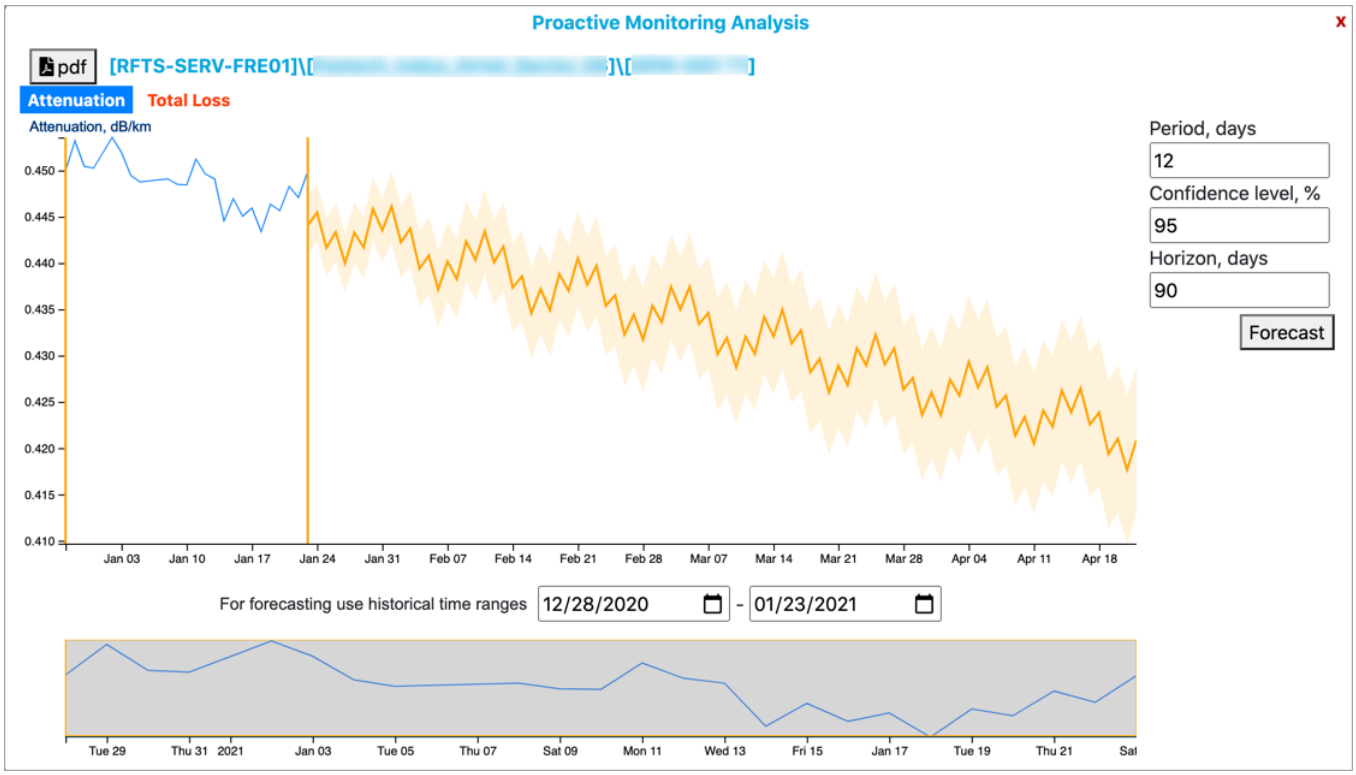


Proactive Monitoring Analysis: Port Details

12.2.1 Forecasting

Enter the following, then click **Forecast** to see a predictive model analysis of the attenuation or total loss based on the recent history.

- **Period:** Enter the number of days (maximum 12) history to use for the forecast.
- **Confidence level, %:** Enter the confidence percentage for the forecast. Generally, increasing the confidence level means accepting a larger variance in signal loss.
- **Horizon, days:** Enter the number of days to forecast.



Proactive Monitoring Analysis: Forecast (Predictive Analysis)

13.0 Geographic Information System (GIS)

Use the GIS option to map routes, categorize nodes, and pinpoint OTDR events.

13.1 Requirements

The VeSion GIS server uses one of the following:

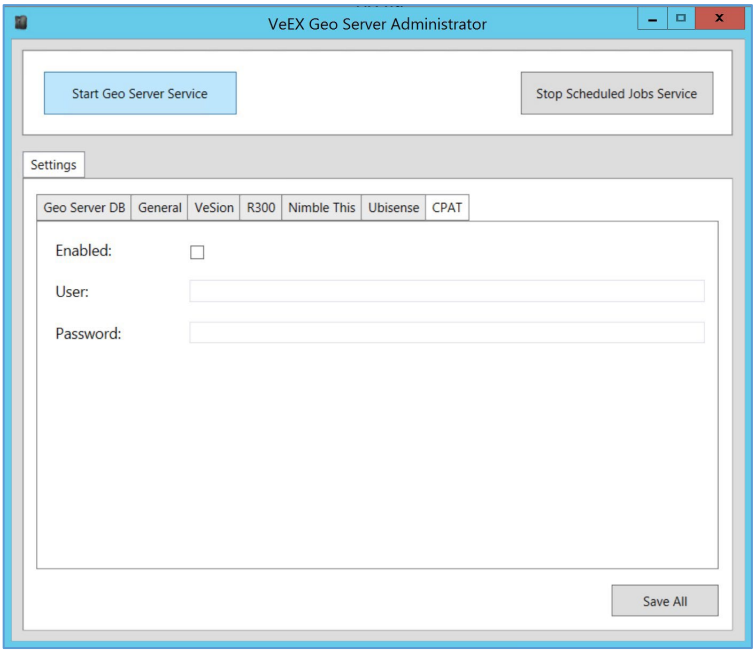
- Windows Server™ 2008 R2
- Windows Server™ 2012
- Windows Server™ 2016

Additional software required include:

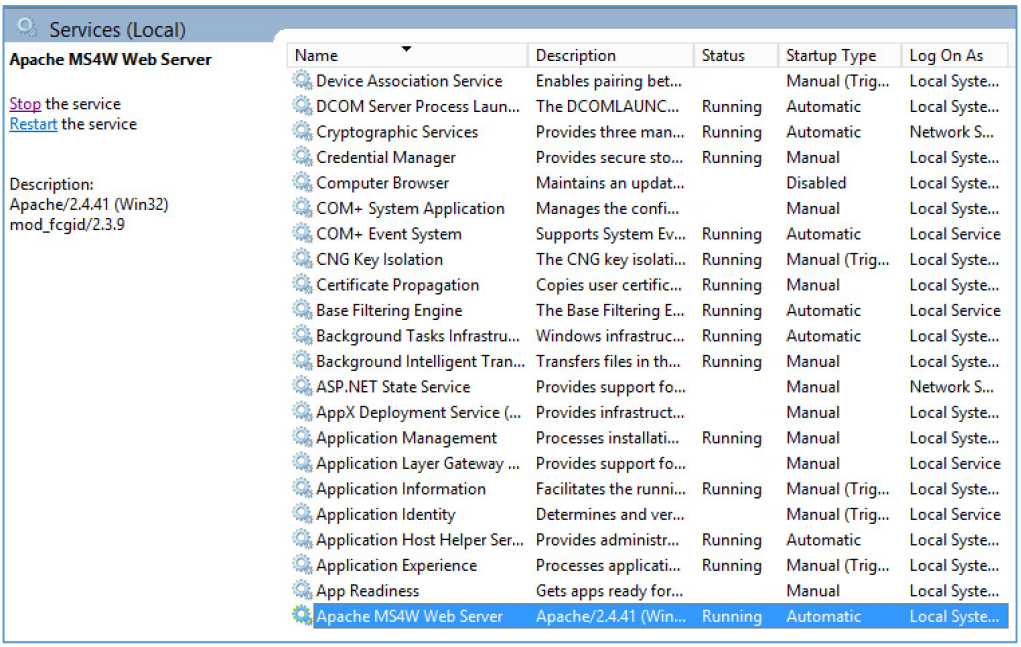
- .NET Framework 4.7+
- PostgreSQL® 10 with PostGIS 2.5 Spatial Extension
- Geo Server Software Installation Package

13.2 Geo Server Service/Apache MS4W Webserver Service

After installing the Geo Server software, start the Geo Server Service. Then, run the Apache MS4W Webserver Service.



Geo Server Service Settings



Apache MS4W Web Server Service

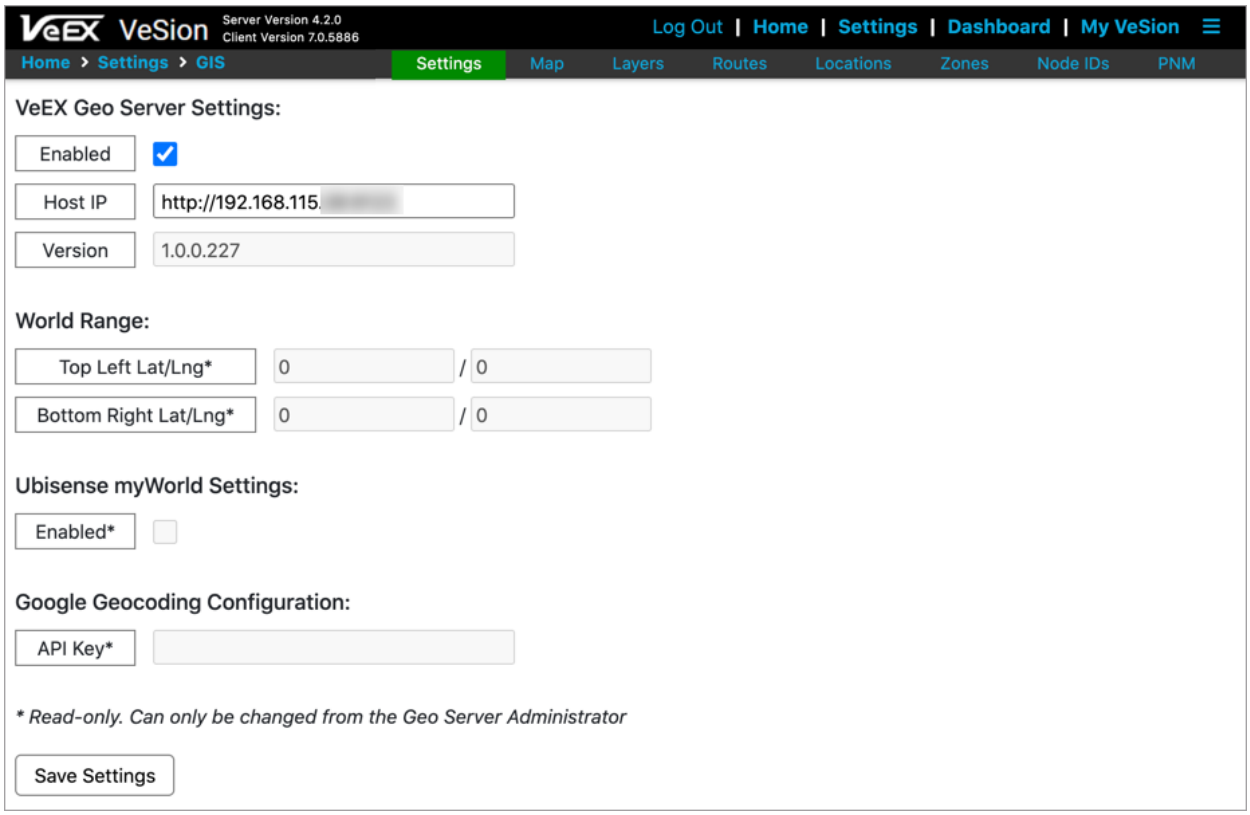
13.3 Getting Started with GIS

Perform the following steps to begin using VeSion GIS:

1. Enable/Configure Geo Server.
2. Add Layers to map.
3. Add Locations on map.
4. Create/Configure Routes on map.
5. Add Landmarks along routes.

13.4 Configure Geo Server

Configure the Geo Server in **Settings>GIS | Settings**. The Geo Server pulls the map data which can then be used for locating fault lines.



GIS Geo Server Settings

- **Enabled**: Activates the Geo Server.
- **Host IP**: IP address of GIS map. *Must enter http:// or https:// before the IP or domain name.
- **Version**: read only field that shows the Geo Server version.
- **World Range**: Locks the map view to rectangular coordinates entered.
- **IQGeo myWorld Settings**: Leave blank if IQGeo account not used.
- **Google Geocoding Configuration**: If you have a google account with geocoding services, enter the API key here.

Click **Save Settings** to save changes.

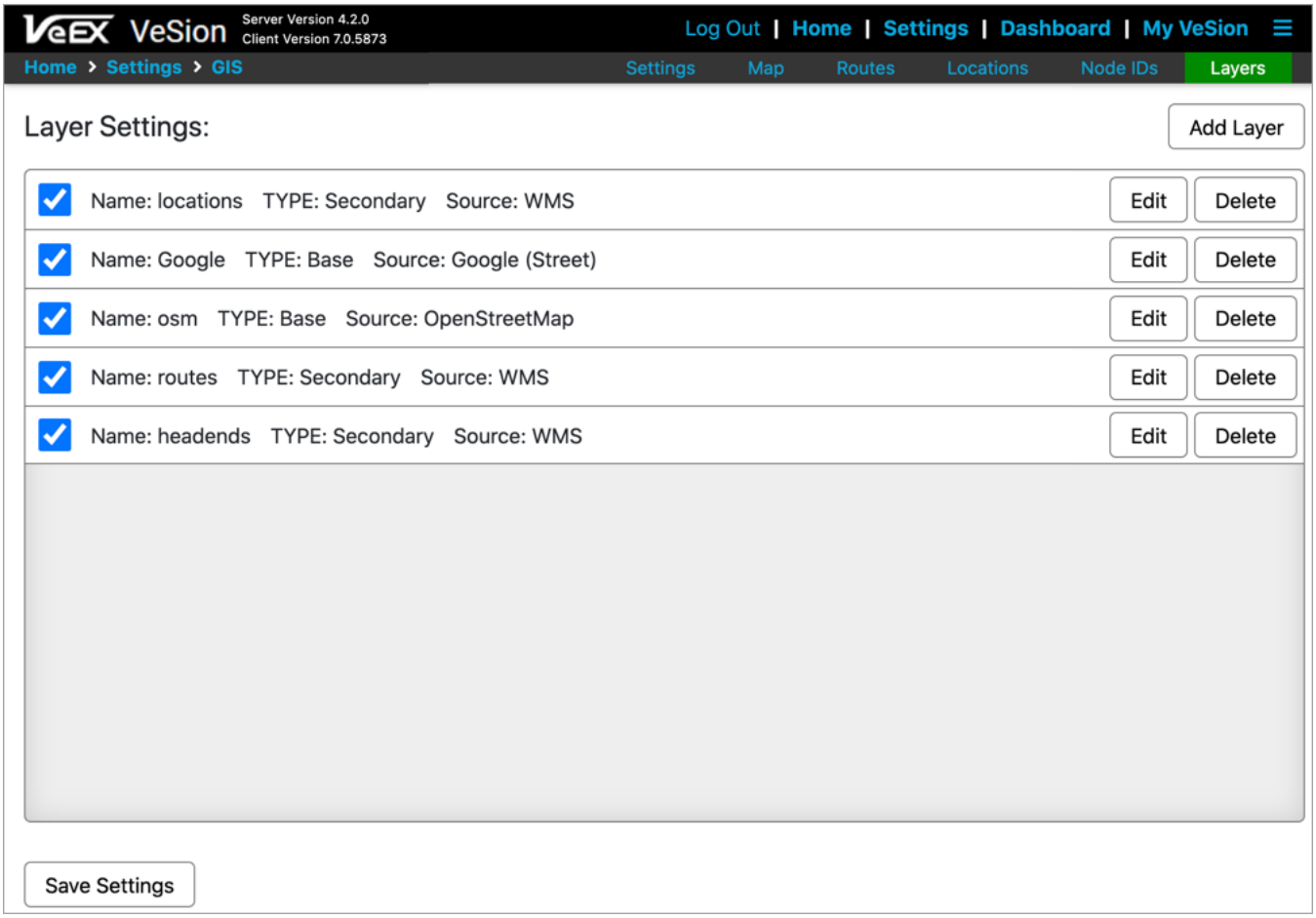
13.5 Layers

The GIS map consists of layers. The “base layer” is the base map that is always visible. Usually, this is a street map or satellite photo map. Only one base layer can be visible at a time and it fills the full screen.

One the base layer/map is established, other “secondary” layers can be created for routes, locations, landmarks, and alarm/faults (default secondary layer). Other examples of secondary layers that can be used if the data is available are weather, google maps, street maps, satellite view maps, utility maps, etc.

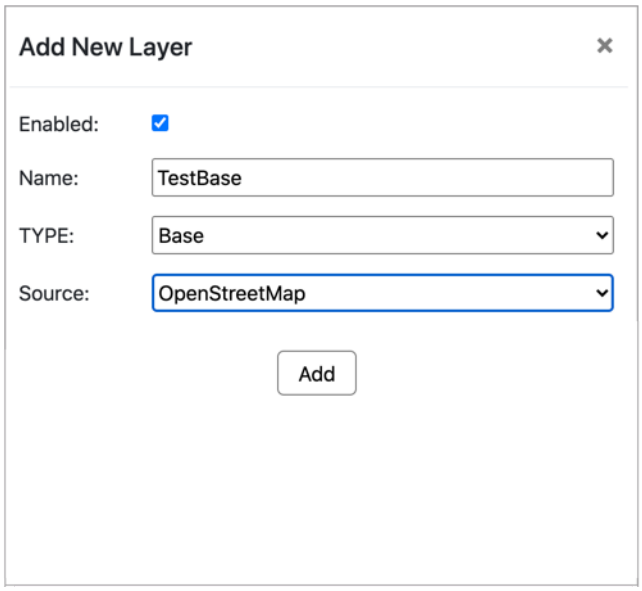
For RFTS, one base layer and at least two secondary layers are required.

Access Layer Settings by going to **Settings>GIS | Layers**.

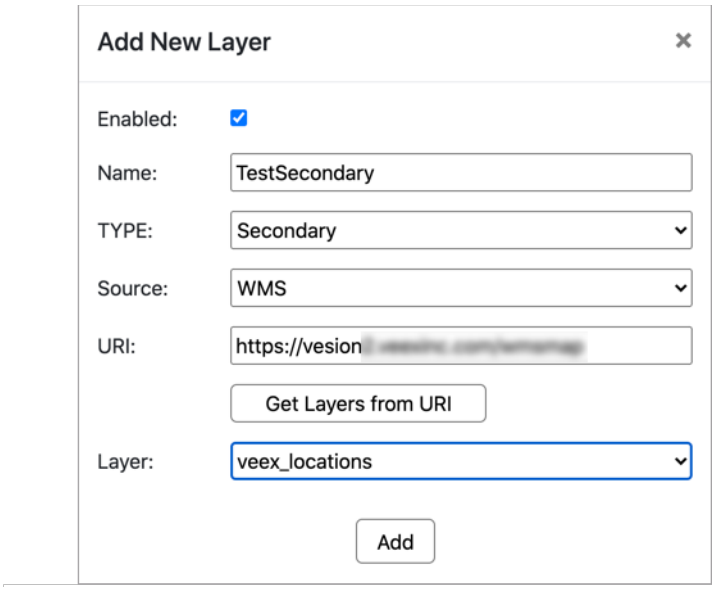


GIS Layer Settings

To add a layer, click **Add Layer**.



Base Layer Settings



Secondary Layer Settings

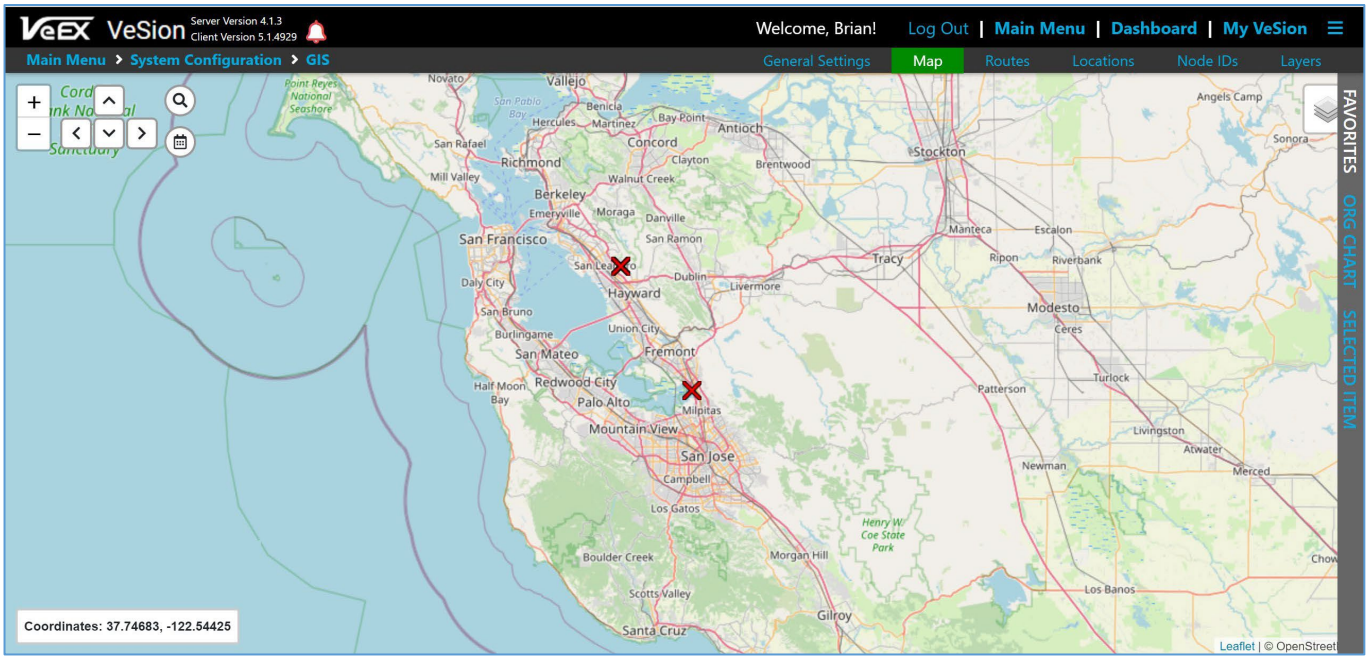
Base/Secondary Layers:

- **Enabled**: Activates layer.
- **Name**: Name for base/secondary layer. *Required.
- **TYPE**: If based layer, select Base. If secondary level, select Secondary.
- **Source**: Select the source for the map data. Available third party data is loaded to the Geo Server e.g. Web Mapping Service (WMS).

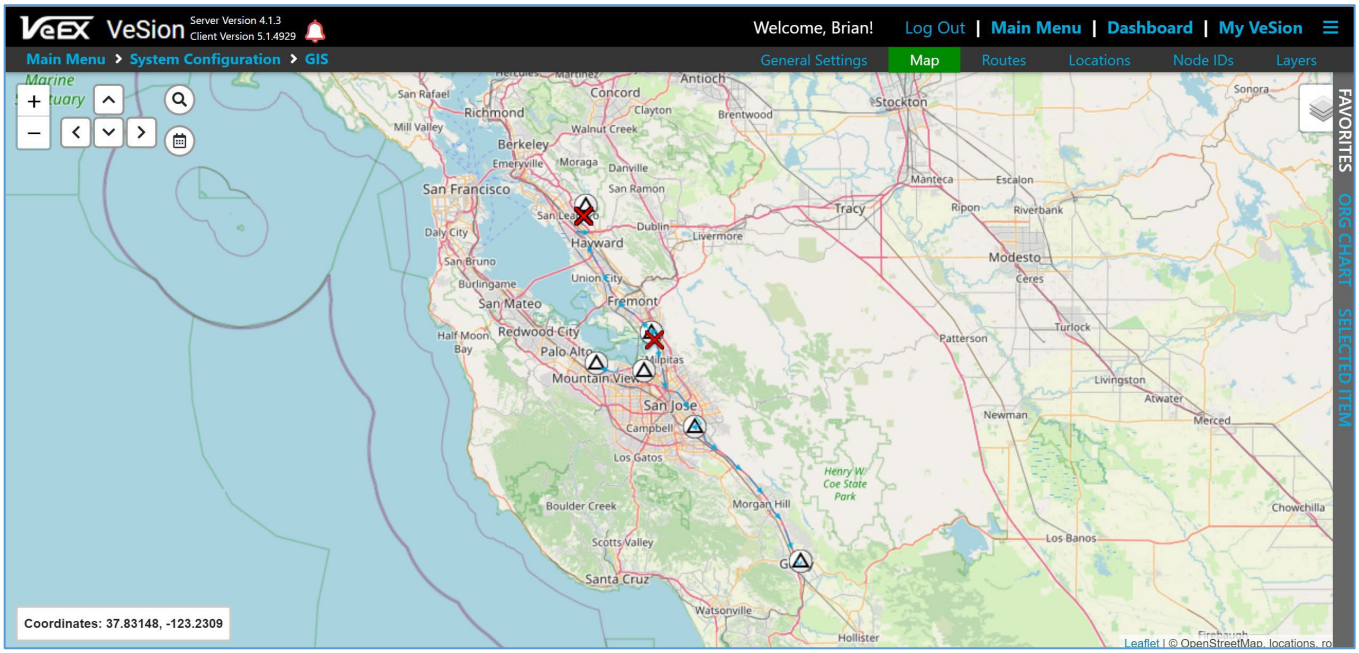
Secondary Layer only

- **URI**: Uniform Resource Identifier. Server address and port for map data. This is normally the same server and port on which Apache Server is running.
- **Get Layers from URI**: Click to access data from that location.
- **Layer**: Select the type of data to display on the layer e.g. routes, locations, landmarks, faults. The **URI** must be entered and **Get Layers from URI** clicked first.

Click **Add**. Then, click **Save Settings**. A *"Layer settings saved successfully"* message is displayed. Click **OK**.



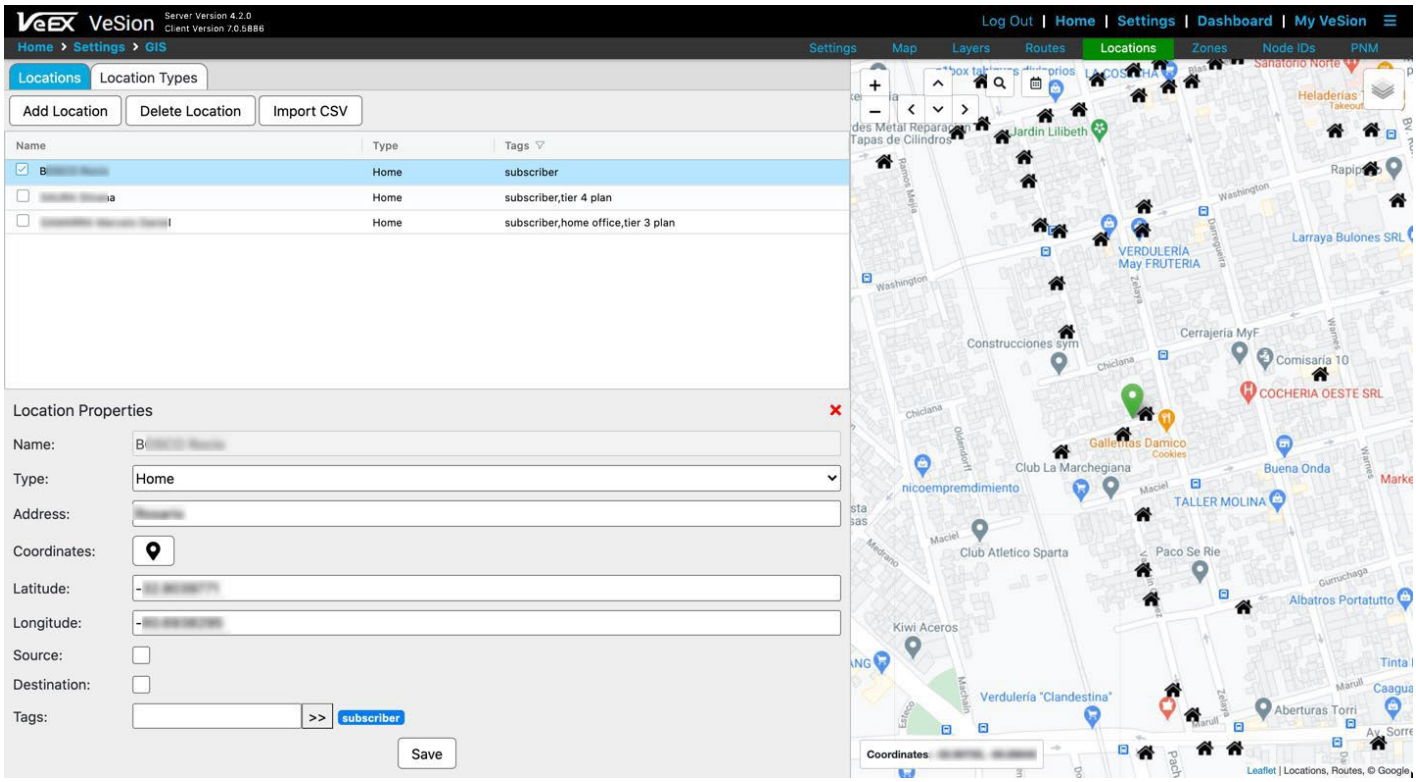
GIS Map – Base Layer only



GIS Map – Base Layer with Secondary Layers overlayed

13.6 Locations

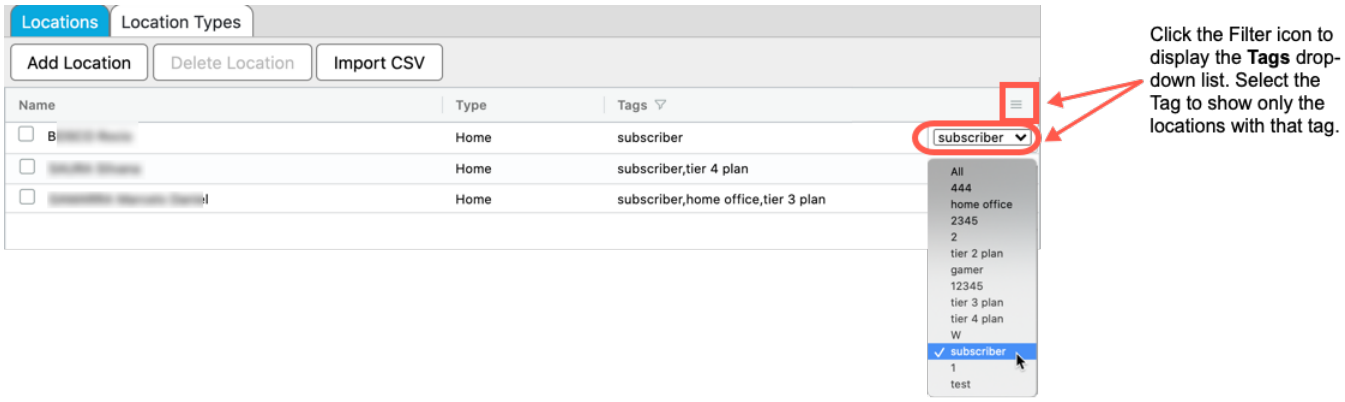
After creating Base and Secondary Layers, add Locations at **Settings>GIS | Locations.**



The coordinates of a map can be set by entry, dragging the green pin or using the current mobile device location by clicking the pin of the form (when https is configured).

13.6.1 Filters

Search by tags by clicking on the **Tags** icon ≡ in the column header and then selecting the Tag in the displayed drop-down list box.



Names and Types can also be searched by clicking the column header.

13.6.2 Adding Locations

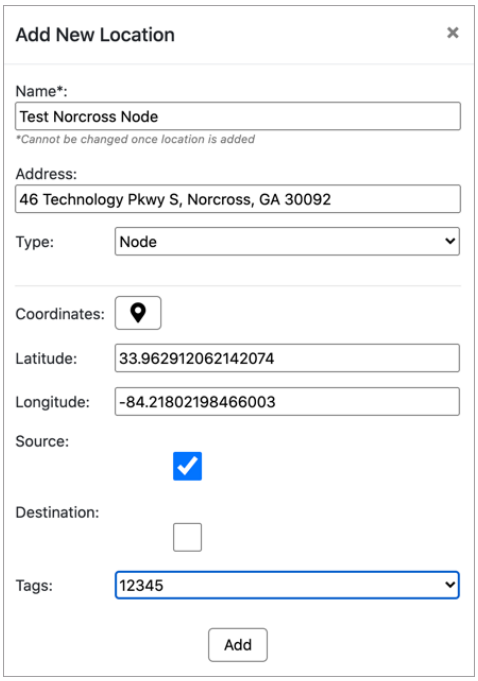
There are two options to add locations.

- Import a CSV file.
- Add each Location manually

Import Locations

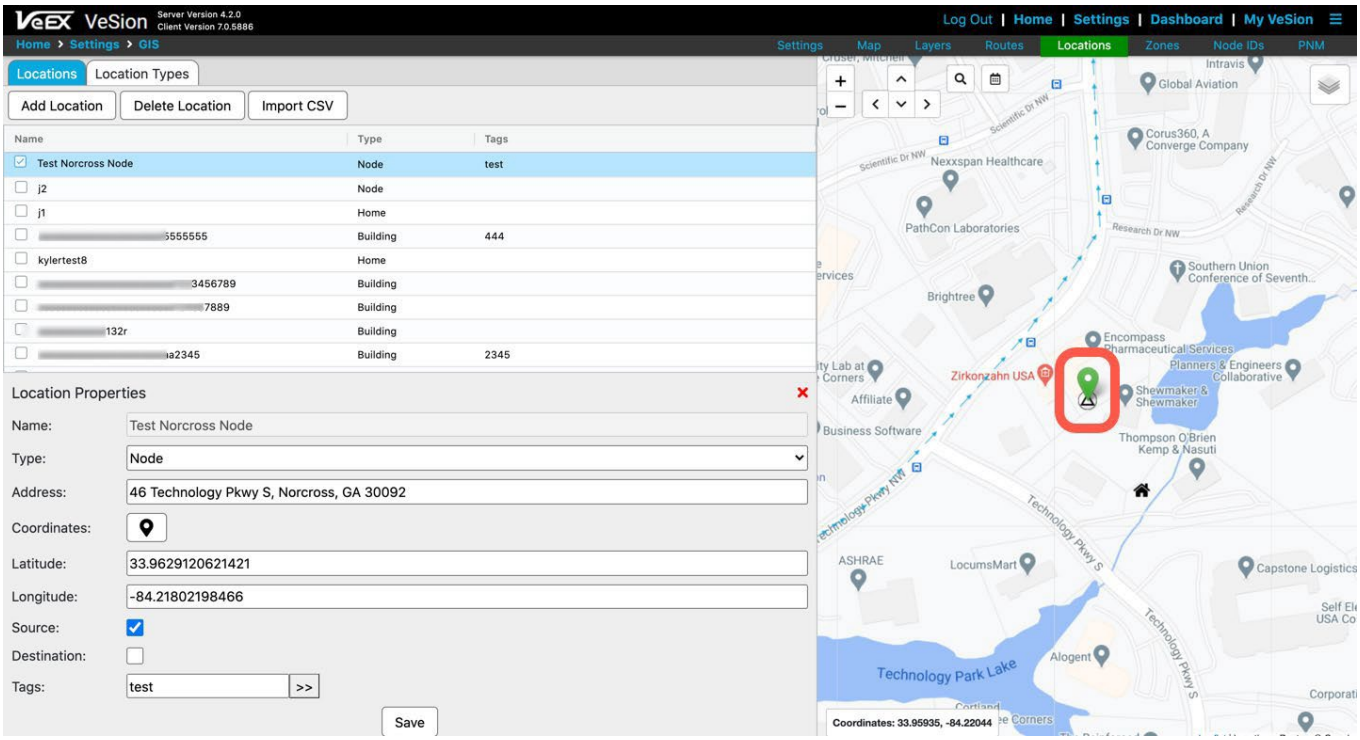
To import locations, click **Import CSV**. Click **Choose File**, select the csv file to import, and click **Open**.

Add Location manually



GIS Map – Add Location

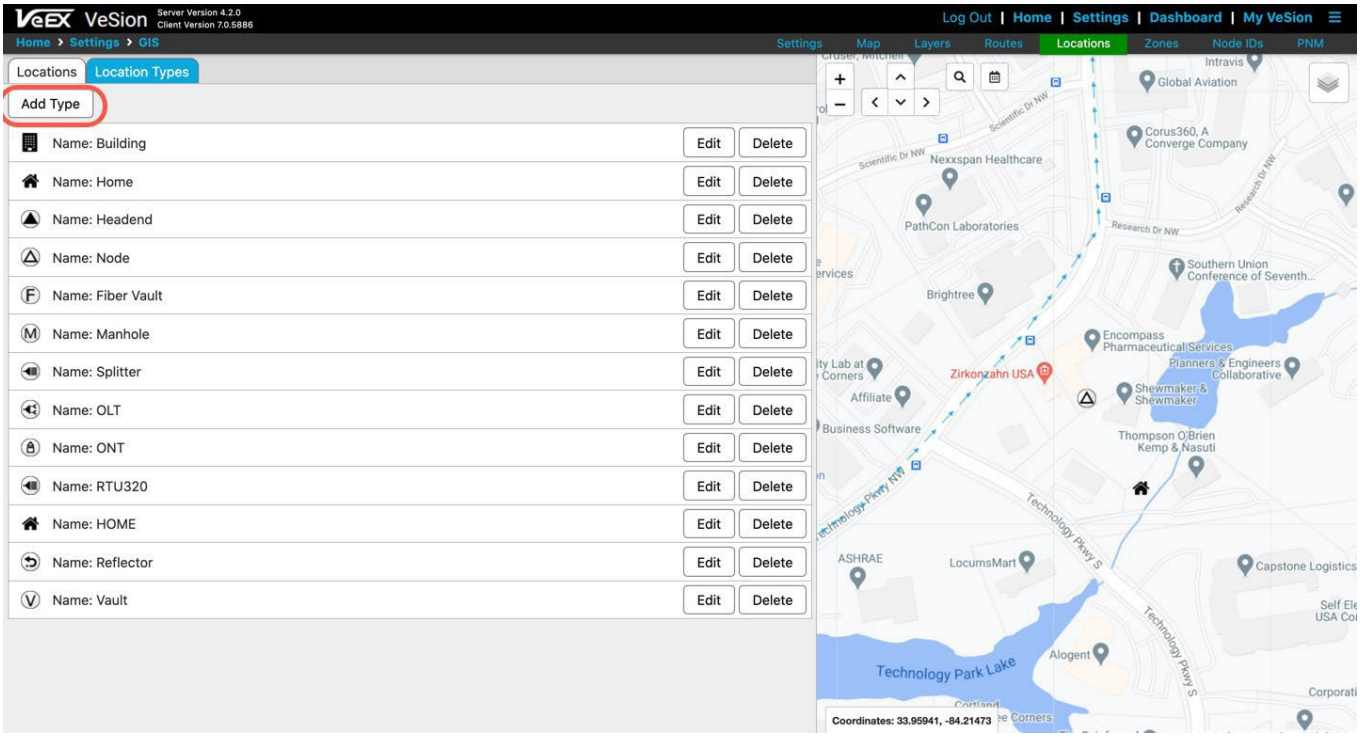
After clicking **Add**, the new Location added appears on the map.



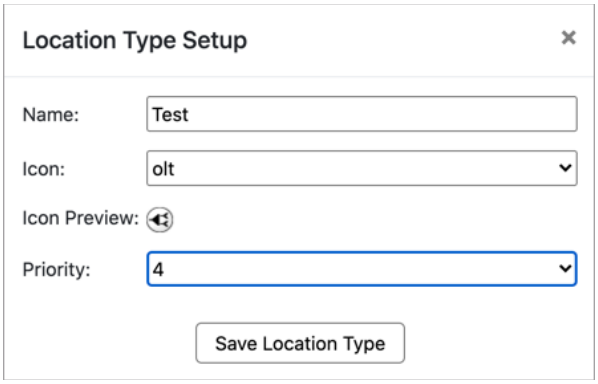
GIS Map –Location Added

13.6.3 Location Types

Locations can be segmented into types. Common types may include Headend, Node, Splitter, Home, Fiber Vault, Manhole, etc. Assign a Location Type to a Location so the Type icon appears on the map.



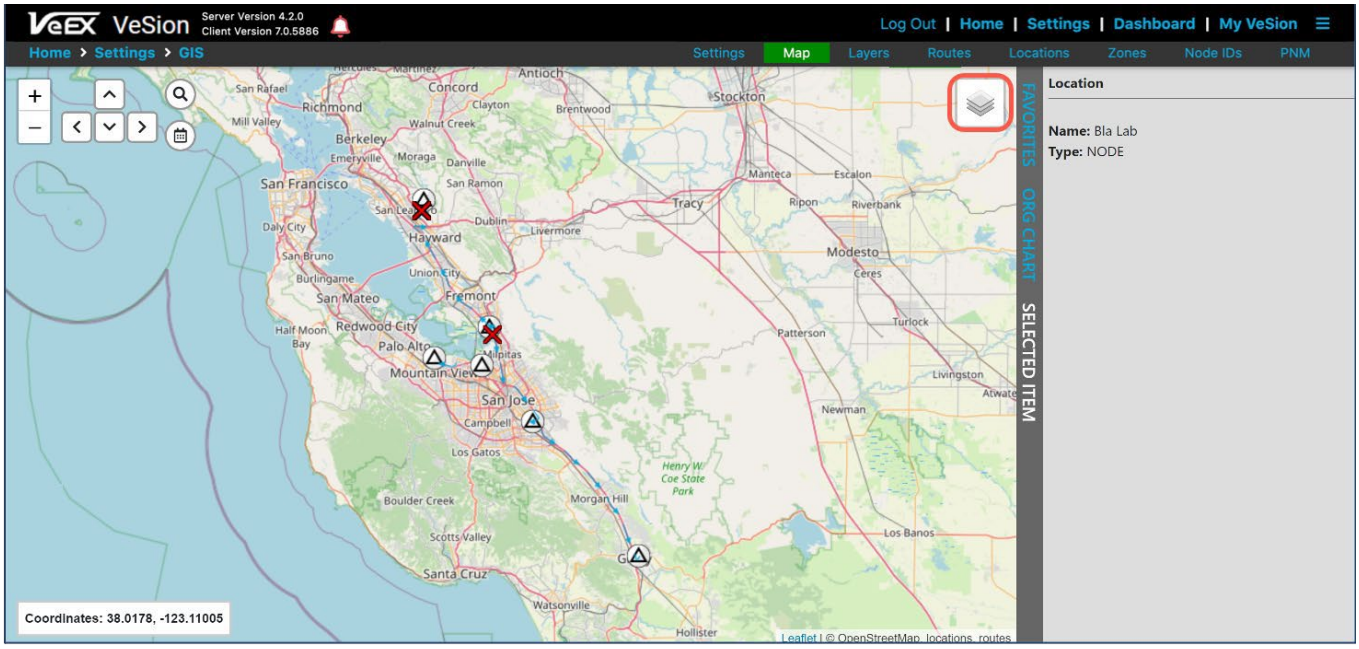
GIS Map –Location Types



GIS Map –Location Type Setup

Important note about Priority

To avoid overlapping icons on the map, the Priority number sets the order in which icons are overlayed. If two icons overlap but are a different priority, the icon with the higher priority will be displayed. For example, if Priority 10 appears to conflict with Priority 5 at a given location, then Priority 10 will be displayed and not Priority 5.

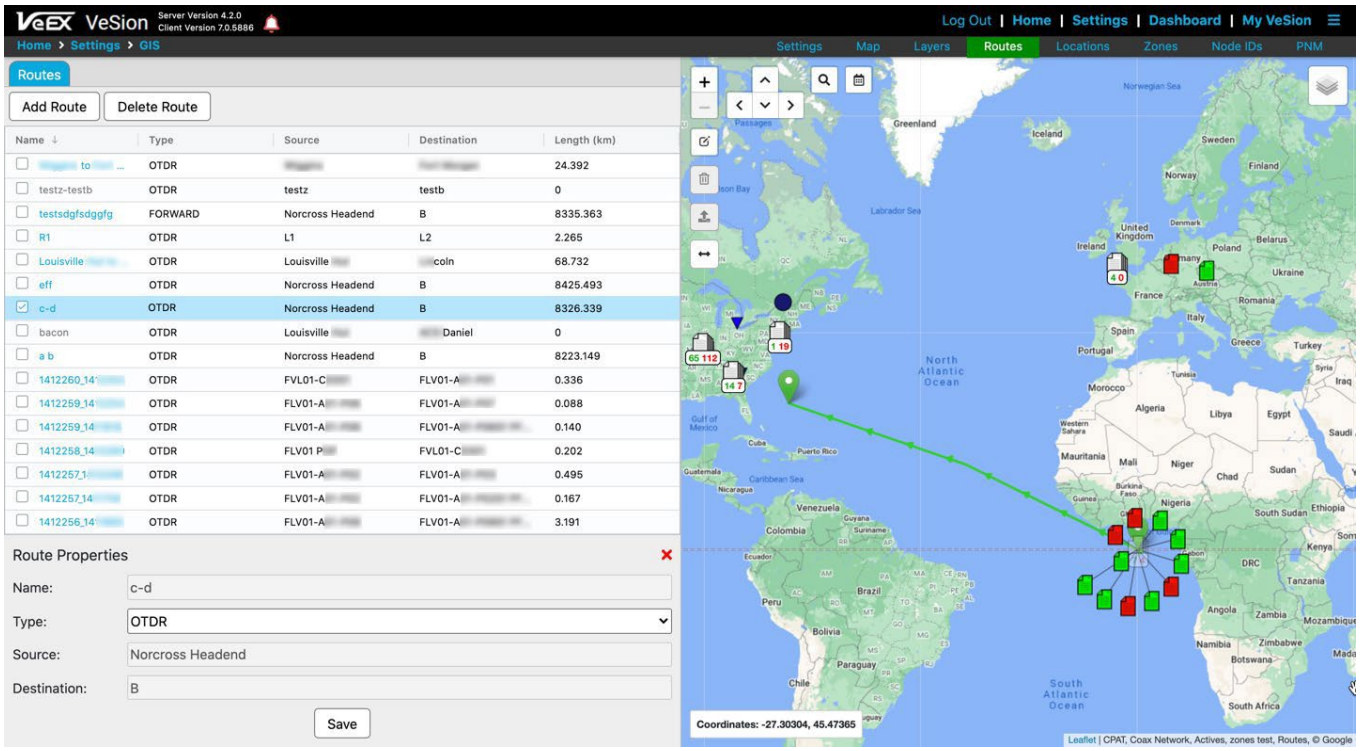


GIS – Example of Fiber Mapping

Customized Location icons can be added. *For more information, contact VeEX Customer Care.*

13.7 Routes

After creating Layers and Locations, add Routes at **Settings>GIS | Locations.**



GIS Map –Routes

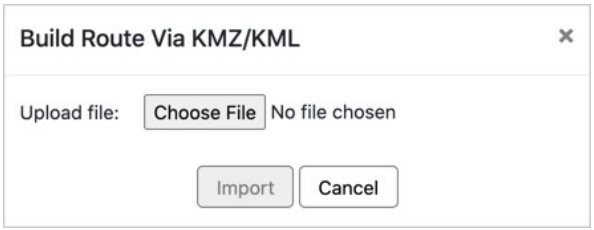
13.7.1 Create Routes

There are two options to add routes.

- Import a KMZ/KML file.
- Add each Route manually

Import Routes

1. On the map, click the **Edit Layers** icon .
2. Click the **Upload Route KMZ/KML** icon .
3. Click **Choose File**, select the file to import and then click **Import**.



Import Route

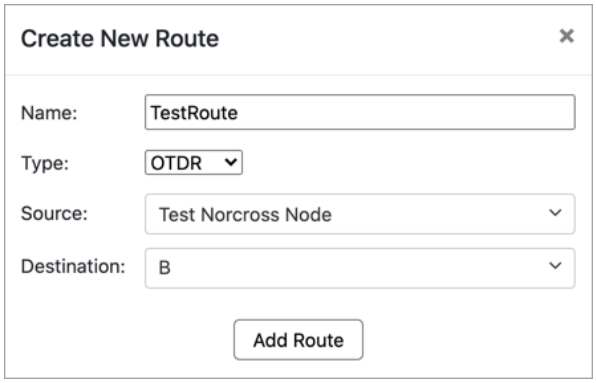
The new route appears on the map automatically.

4. Click **Save**.

*You must click **Save** after importing or creating the route.*

Add Route manually

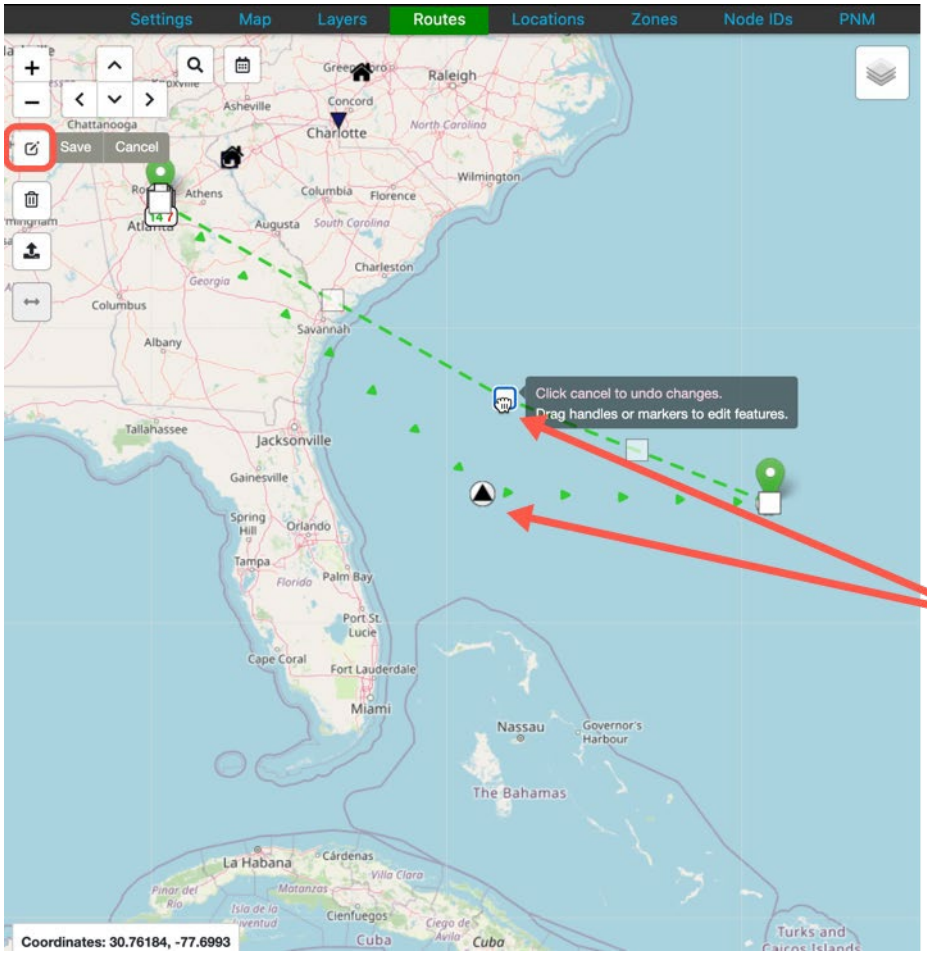
1. In the left panel, click the **Add Route** button. The **Create New Route** box is displayed.



GIS Map –Creating Routes

- **Name**: Name of new route.
- **Type**: Type of route (OTDR, Forward, Return).
- **Source**: Start point of route.
- **Destination**: End point of route.

2. Click **Add Route**. The new route appears on the map automatically.
3. Click the **Edit Layers** icon . The green route line changes from solid to a dash line.
4. Drag and define the route line to the desired location.
5. Click **Save**.



Click the **Edit Layers** icon, then drag and define the route to desired location.

As you drag the route, the old route and new route both appear.

To save changes, click **Save**.

GIS Map –Drag and Define Routes

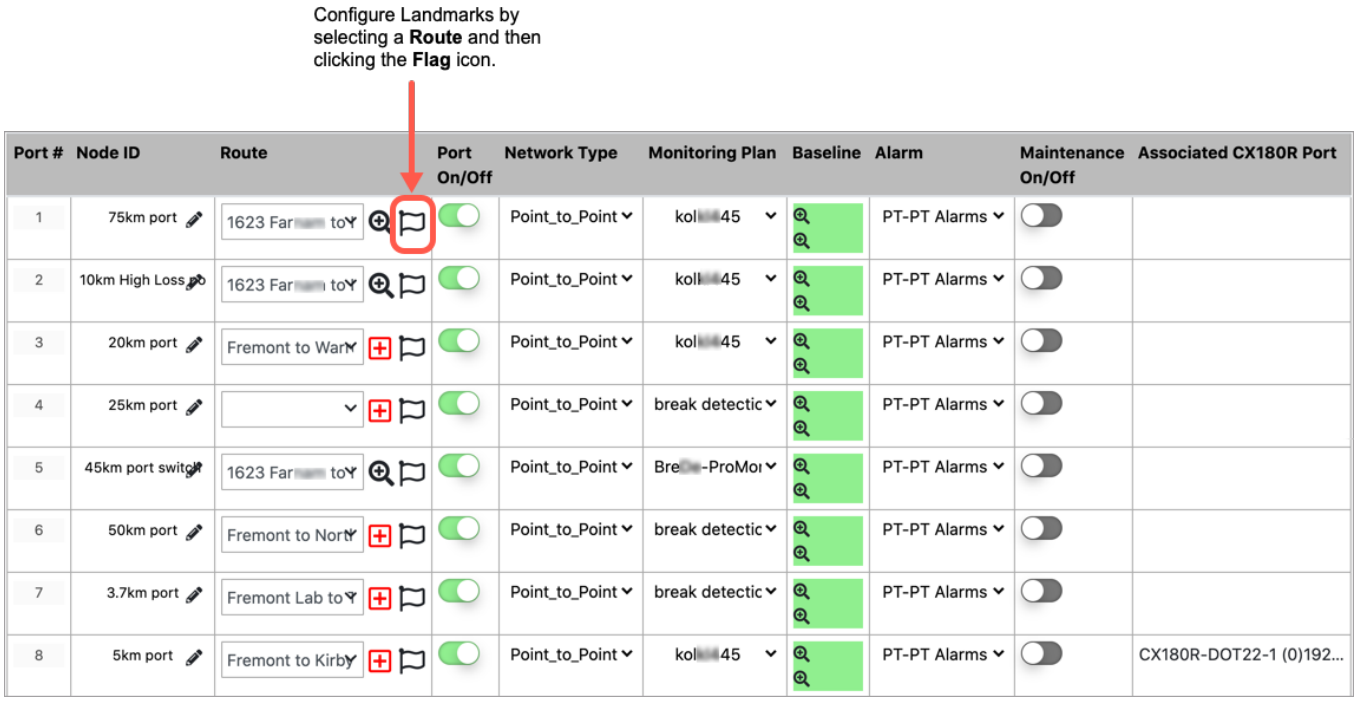
13.8 Landmarks

Landmarks are used to create a transformation function from Optical Distance to Geo Distance. This will improve the accuracy of fiber break alarms.

Baselines should be established before assigning routes.

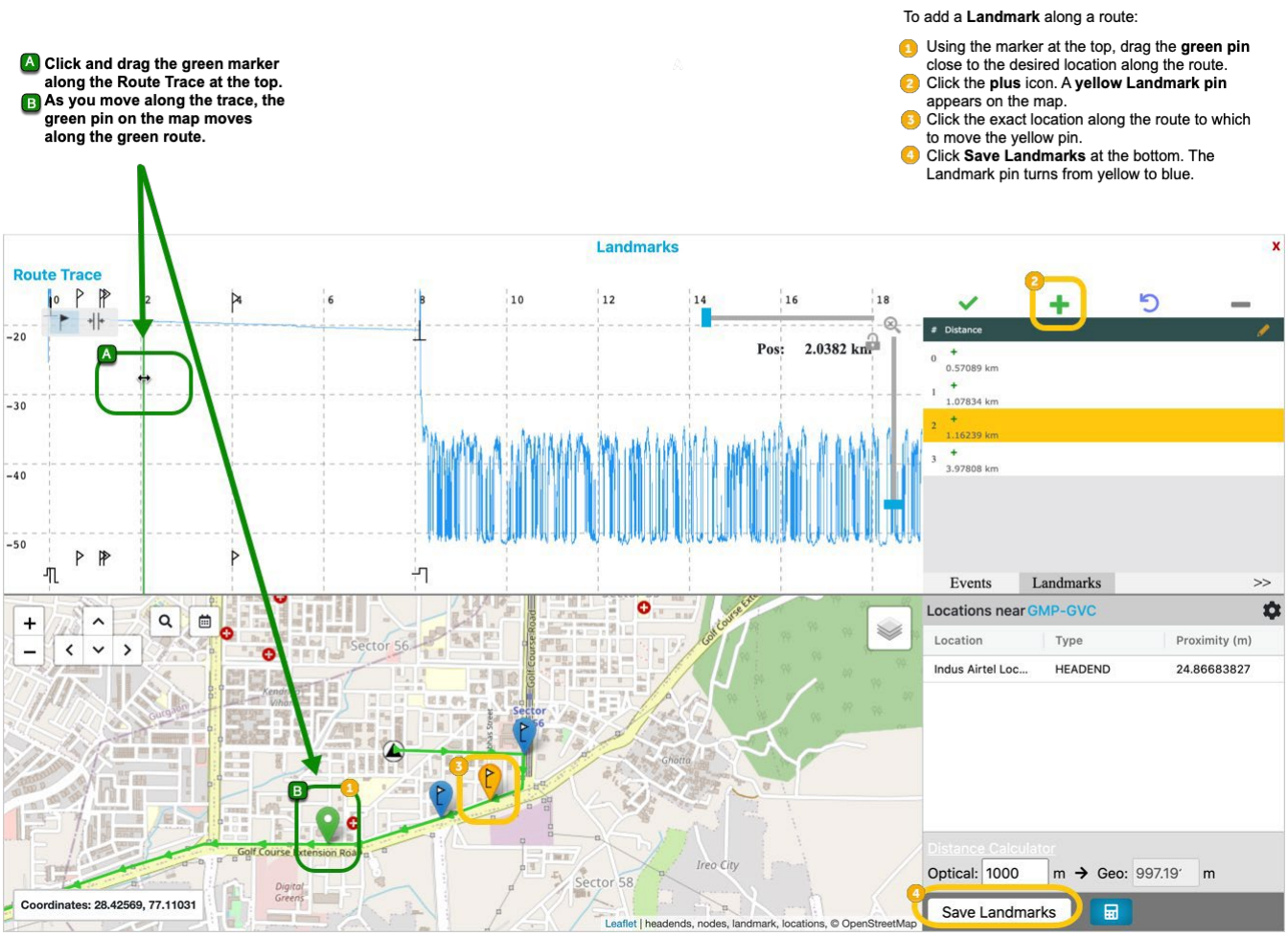
To access the **Landmarks** page, go to **Settings>Server & Device | RFTS** and select the probe in the left panel.

In the **Route** column, select a route to assign to the port and then click the **Flag** icon.



Port Settings –Assign Routes and Configure Landmarks

The **Landmark** page is displayed.



Configure Landmarks

Click and drag the green pin along the trace at the top. As you move along the trace, the green pin on the map moves along the green route.

To add a Landmark:

1. Using the green marker at the top (A), drag the **green pin** close to the desired location along the route (B).
2. Click the **plus** icon ✚. A **yellow Landmark pin** appears on the map.
3. Click the exact location along the route to which to move the yellow pin.
4. Click **Save Landmarks** at the bottom. The Landmark pin turns from yellow (🚩) to blue (🚩).

Landmarks cannot be placed on the route after the end of the trace.

To change a Landmark location:

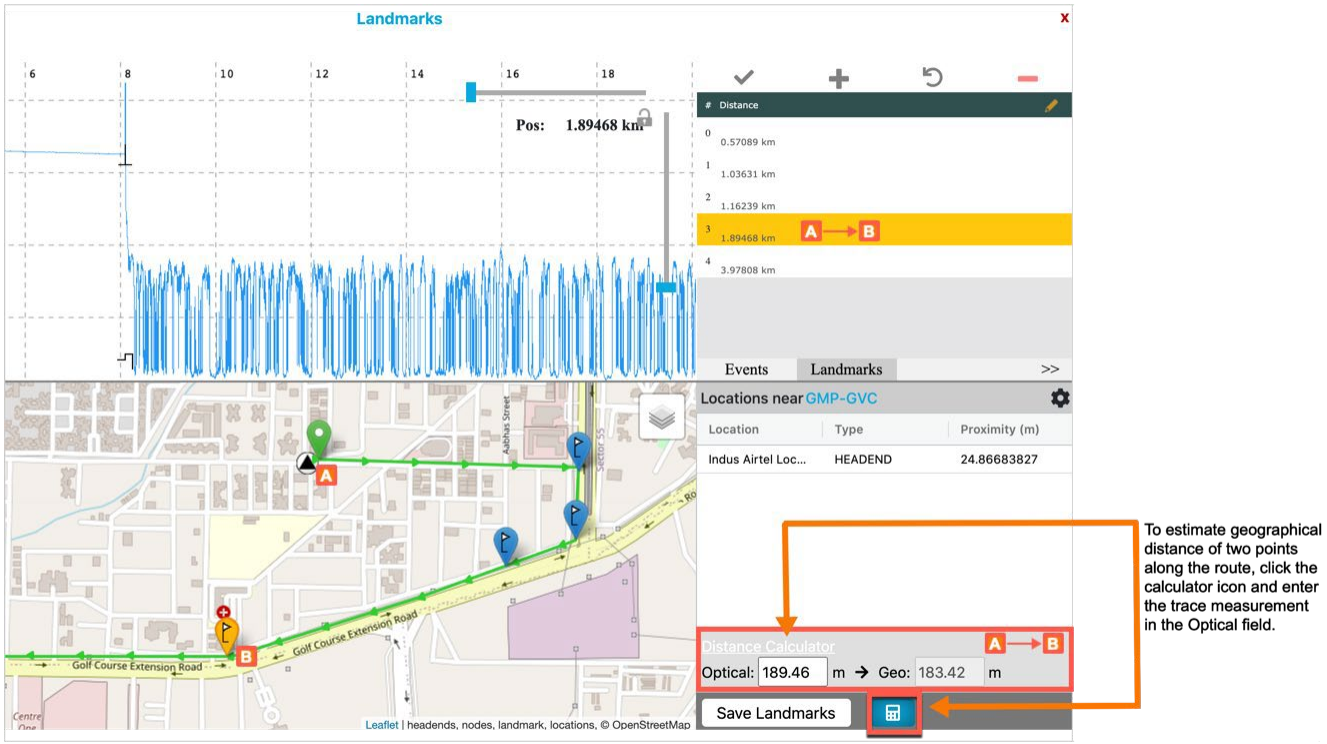
1. Select the landmark in the top right pane. The Landmark pin on the map turns from blue to yellow.
2. Using the green marker at the top (A), drag the **green pin** to the new location along the route (B).
3. Click the **checkmark** icon ✔. The Landmark moves to the new location.
4. Click **Save Landmarks** at the bottom. The Landmark pin turns from yellow ( ) to blue ( ).

To delete a landmark, select it in the top right pane and then click the **minus sign** −. Click **Save Landmarks** at the bottom to save changes.

13.8.1 Distance Calculator

Use the Distance Calculator to show what affect landmarks has on

Click the **calendar icon** at the bottom to access the **Distance Calculator**.



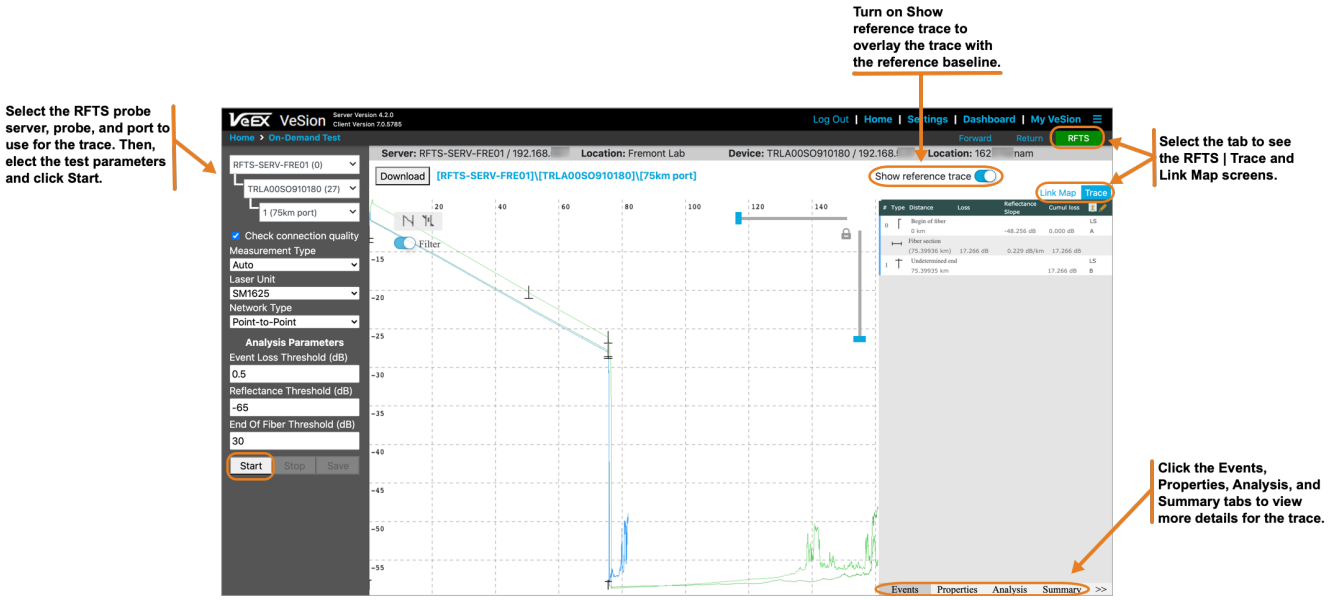
Geographical Distance

In the example above, the calculator is used to estimate the distance between Point A (origin) and Point B along the route. The trace distance is provided in the top right pane. Enter the trace distance in the Optical field (in meters) and the geographical distance will be estimated automatically.

14.0 On-Demand Testing

Use the **Home>On-Demand Test** option to take control of the device to perform traces. These tests are performed without waiting on the monitoring to cycle to the desired port.

Select test parameters and result thresholds, then click **Start**.



Select the **Show reference trace** radio button to overlay the reference trace.

Click **Save** to save the trace as a SOR file.

The available setup fields vary depending on the type of **Measurement Mode** selected (Auto Manual, V-Scout).

Important note about Manual mode

*Improper setting of the above parameters can result in erroneous test results. It is recommended that you receive adequate training in making OTDR measurements before using the **Manual** mode.*

After clicking **Start**, the measuring process can take up to 3 minutes, depending on the settings. After the test is complete, an OTDR trace will appear.

Click the **LinkMap** tab to view a link map of the events. Use the tabs on the bottom right of the screen to view the additional details, such as analysis and splitter thresholds, and span information. Click **Download** to download the results.

15.0 Real-time Alarm & Monitoring

Using VeSion, optical probes and switches can be viewed in real-time.

15.1 Monitoring Dashboard

To view the probe dashboard and monitor the sweep tables being downloaded, go to **Home > Real-time Alarm & Monitor | RFTS**.

In the left pane, click the RFTS probe server to view probes/switches assigned to that server and their details. The status of each port is indicated by color:

- Non-active port.
- Active port. NO ALARM.
- Active port. MINOR/MAJOR ALARM.
- Active port. CRITICAL ALARM.

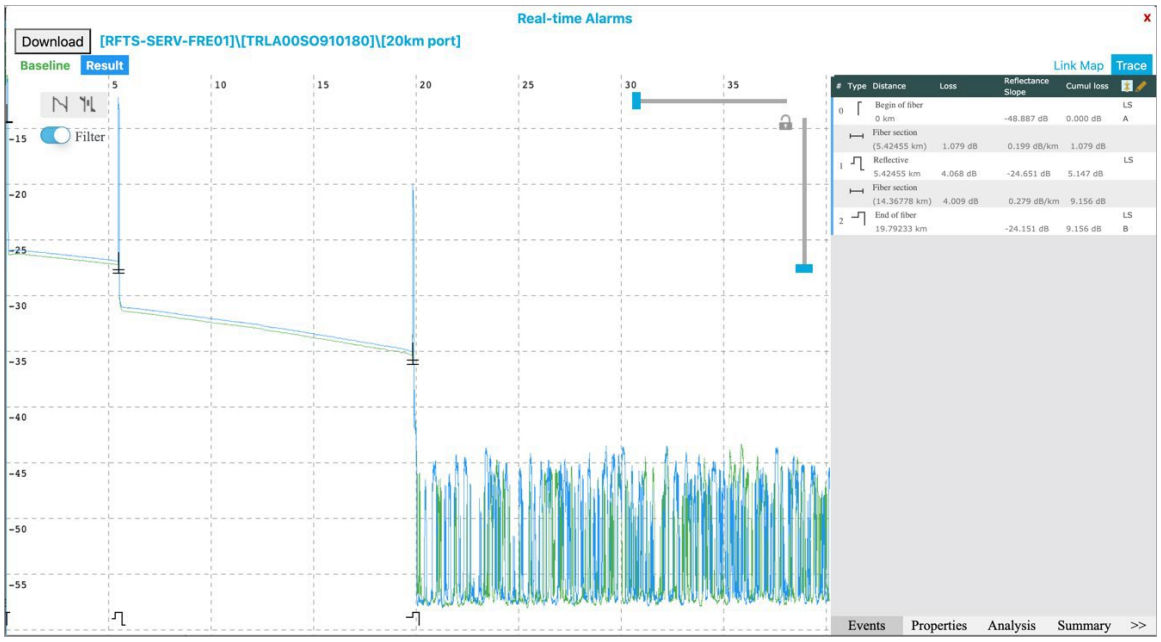
RFTS Monitoring Dashboard

15.2 Probe Monitoring

To monitor a probe:

1. On the **Real-time Alarm & Monitor** page, select the Probe Server tab on the left to view probes for that server.
2. Select the box for the probe you want to monitor in the right panel. The Monitoring page appears.

To view the reference trace, click **Baseline**.



VeSion-RTU4100/RFTS400 Optical Switch Port Monitoring

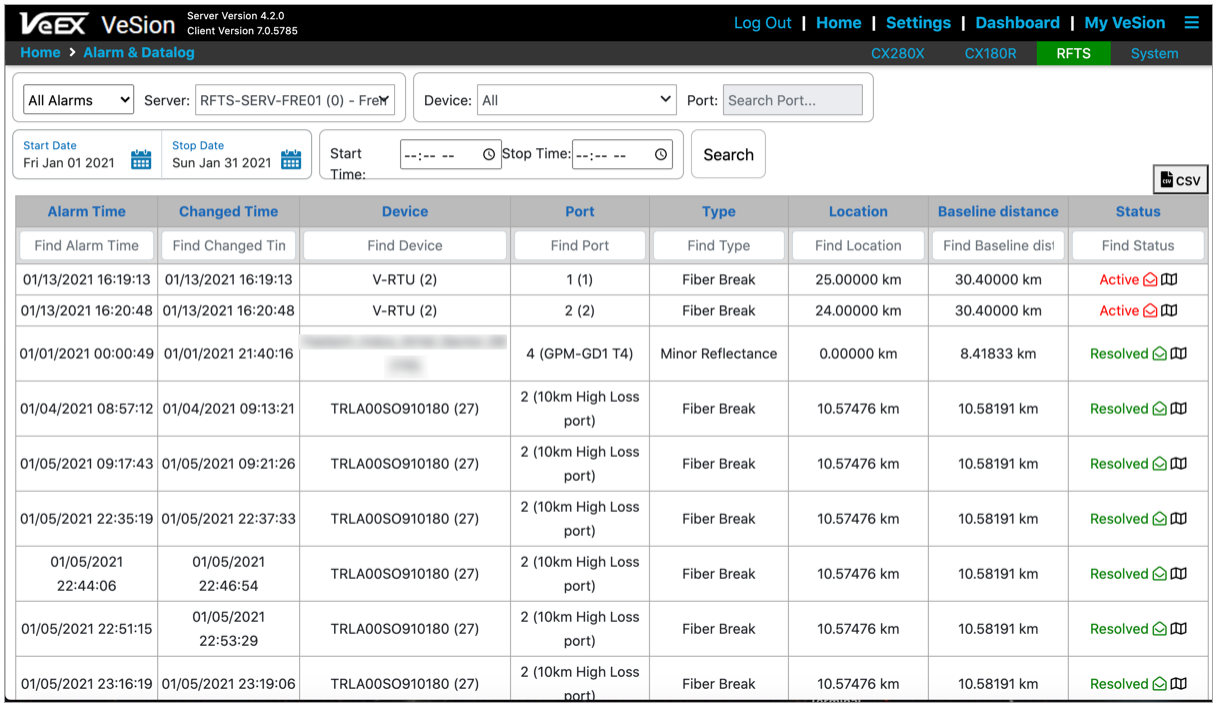
Mouse over the trace and click ● Result or ● Baseline to drag the trace.

To export Reference and Result trace files for offline review, click **Download**.

15.2.1 Alarms and Data Logs

To view a data log of alarms, go to **Home>Alarm & Datalog** and click the **RFTS** tab.

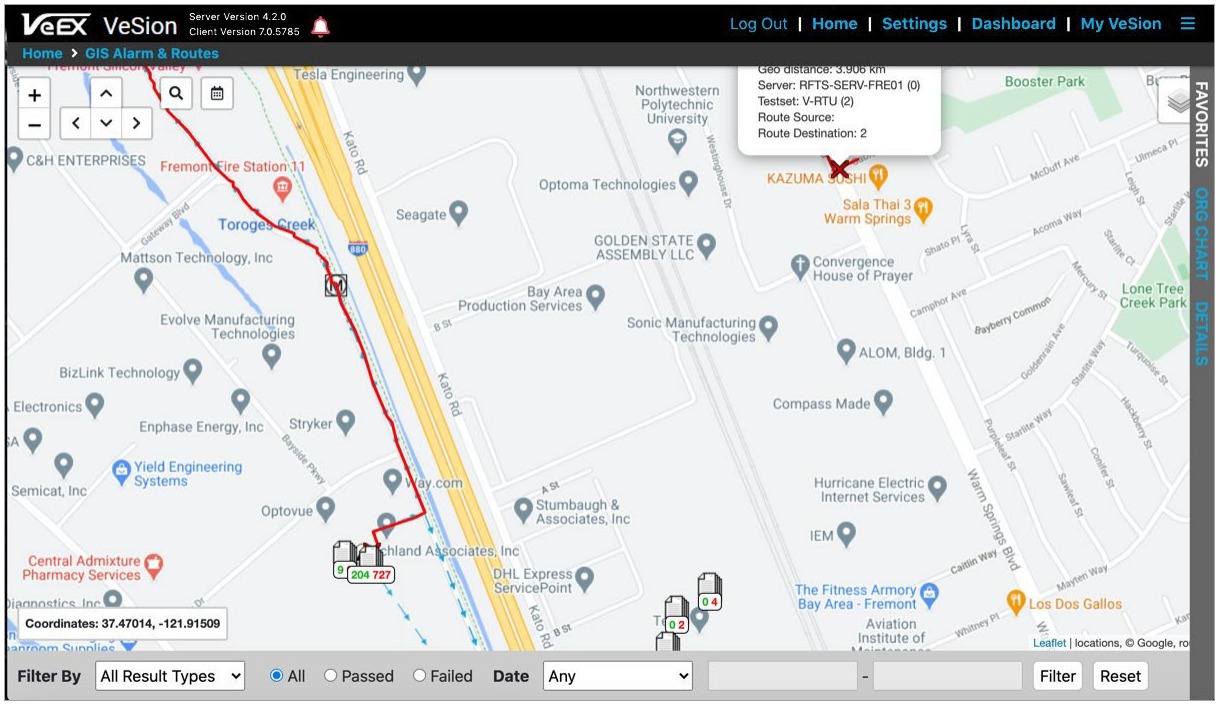
Select the time period and then click **Search**. Narrow the date range as needed to decrease the time it takes to generate the log.



Alarm Time	Changed Time	Device	Port	Type	Location	Baseline distance	Status
Find Alarm Time	Find Changed Tin	Find Device	Find Port	Find Type	Find Location	Find Baseline dist	Find Status
01/13/2021 16:19:13	01/13/2021 16:19:13	V-RTU (2)	1 (1)	Fiber Break	25.00000 km	30.40000 km	Active
01/13/2021 16:20:48	01/13/2021 16:20:48	V-RTU (2)	2 (2)	Fiber Break	24.00000 km	30.40000 km	Active
01/01/2021 00:00:49	01/01/2021 21:40:16	[redacted]	4 (GPM-GD1 T4)	Minor Reflectance	0.00000 km	8.41833 km	Resolved
01/04/2021 08:57:12	01/04/2021 09:13:21	TRLA00SO910180 (27)	2 (10km High Loss port)	Fiber Break	10.57476 km	10.58191 km	Resolved
01/05/2021 09:17:43	01/05/2021 09:21:26	TRLA00SO910180 (27)	2 (10km High Loss port)	Fiber Break	10.57476 km	10.58191 km	Resolved
01/05/2021 22:35:19	01/05/2021 22:37:33	TRLA00SO910180 (27)	2 (10km High Loss port)	Fiber Break	10.57476 km	10.58191 km	Resolved
01/05/2021 22:44:06	01/05/2021 22:46:54	TRLA00SO910180 (27)	2 (10km High Loss port)	Fiber Break	10.57476 km	10.58191 km	Resolved
01/05/2021 22:51:15	01/05/2021 22:53:29	TRLA00SO910180 (27)	2 (10km High Loss port)	Fiber Break	10.57476 km	10.58191 km	Resolved
01/05/2021 23:16:19	01/05/2021 23:19:06	TRLA00SO910180 (27)	2 (10km High Loss port)	Fiber Break	10.57476 km	10.58191 km	Resolved

RFTS Alarms log

Click the map icon to view the alarm location on a geographical map.



RFTS Alarm map

16.0 Certifications and Declarations

Declaration of Conformity

What is CE?

The CE marking is a mandatory European marking for certain product groups to indicate conformity with the essential health and safety requirements set out in European Directives. To permit the use of a CE mark on a product, proof that the item meets the relevant requirements must be documented.

Use of this logo implies that the unit conforms to requirements of European Union and European Free Trade Association (EFTA). EN61010-1

For a copy of the CE Declaration of Conformity relating to VeEX products, please contact VeEX customer service.

ROHS Statement

RoHS Compliance

VeEX QUALITY AND ENVIRONMENTAL POLICY

Our quality and environmental policy is to limit and progressively eliminate the use of hazardous substances and chemicals in the design and manufacture of our products.

VeEX products are classified as Monitoring and Control Instruments under Article 2, Section (1), Category 9 of the WEEE 2002/96/EC Directive.

RoHS and WEEE Position Statement

The Council of the European Union and the European Parliament adopted Directive 2002/95/EC (January 27, 2003), to Reduce the use of certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment, and Directive 2002/96/EC on Waste Electrical and Electronics Equipment (WEEE), with the purpose of reducing the environmental impact of waste electrical and electronic equipment. Both were later recast by Directives 2011/65/EU and 2012/19/EU respectively. All VeEX products being placed on the EU market conform with these directives.

Additional RoHS substance restrictions for the Monitoring and Control Instruments were adopted by EU Directive 2015/863 (March 31, 2015). These new restrictions will take effect from July 22, 2021. VeEX has established a program to ensure that from July 22, 2021, all its products to be sold and shipped into the EU market will conform with (EU) 2015/863.

VeEX Inc. is committed to comply with RoHS and WEEE Directives to minimize the environmental impact of our products.

For more information about RoHS as it relates to VeEX Inc, go to the VeEX web site at http://www.veexinc.com/company/rohscompliance.

17.0 About VeEX

VeEX Inc., a customer-oriented communications test and measurement company, develops innovative test and monitoring solutions for next generation telecommunication networks and services. With a blend of advanced technologies and vast technical expertise, VeEX products address all stages of network deployment, maintenance, field service turn-up, and integrate service verification features across copper, fiber optics, CATV/DOCSIS, mobile 4G/5G backhaul and fronthaul, next generation transport network, Fibre Channel, carrier & metro Ethernet technologies, WLAN and synchronization.

Visit us online at www.veexinc.com for the latest updates and additional documentation.

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