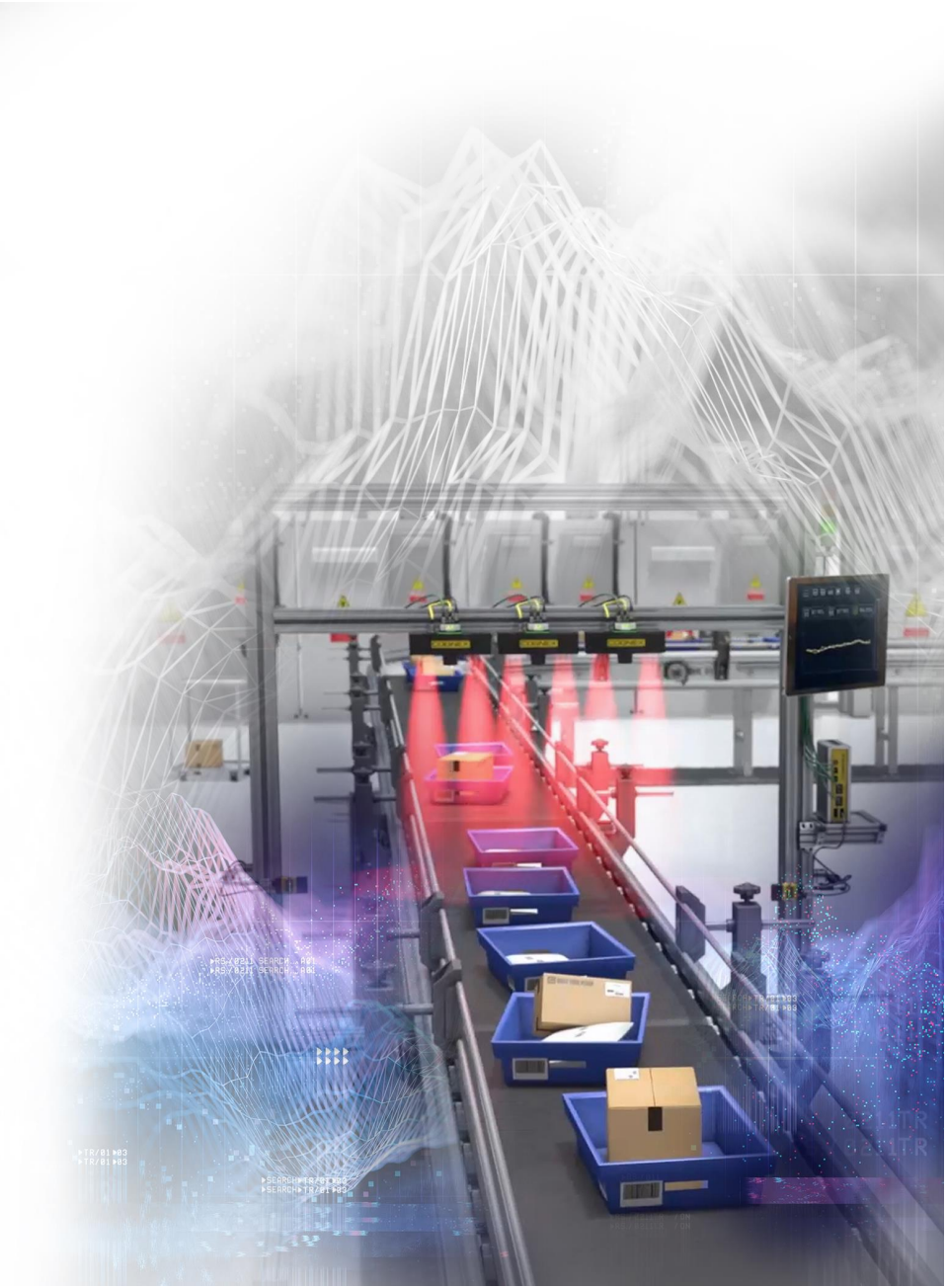
COGNEX

Advanced machine vision made easy

EI Tunnel Manager

Reference Manual



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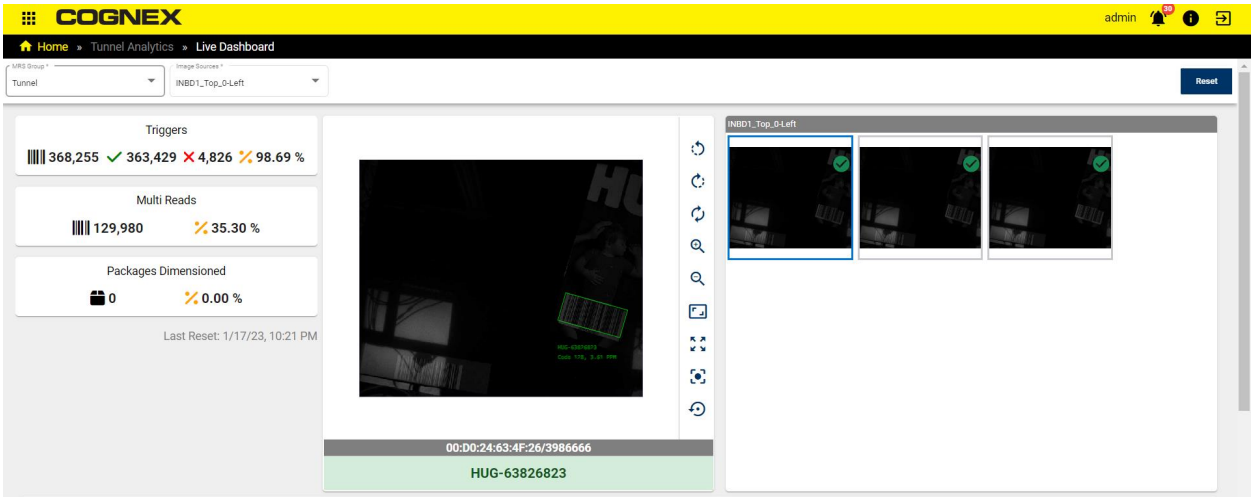
Getting Started

Tunnel Manager is a software that runs inside of an Industrial PC that manages the following processes between a Modular Vision Tunnel (MVT) and Cognex devices, for example, DataMan readers:

- Communication
- Data forwarding
- Image collection
- Device management
- Device setup

Tunnel Manager provides services through a simple web-based user interface, such as the following:

- Tunnel Analytics
- Data Analytics
- Performance Analytics
- Commissioning applications



The EI Tunnel Manager is a web-based software that allows you to manage your tunnel assets with some key features as below:

Main Features	Key elements
Device Management	Large storage for multi-day images and results
	Network Address Translation (NAT)
	Time Synchronization
Compatibility with DataMan Readers	Configurations, firmware, feature keys
	Multi-Reader Sync group setup
	DataMan WebHMI to configure readers

Main Features	Key elements
Flexible and scalable solution: Integration with Industrial Analytics	Reader results and metadata
	Built-in MQTT protocol
	Turnkey data connectivity to cloud-based systems (AWS, Azure)
Powerful Performance Monitoring tools	Real time performance with live dashboard
	Browse tunnel trigger results and images
	Device configuration changes

About this Release

Tunnel Manager 2.4 includes the following enhancements and changes:

- Removed case sensitivity when the file name is checked in the license update file.
- Fixed the handling of hybrid switch firmware updates so the firmware update finishes consistently and successfully.
- Bugfixes and stability improvements.

Release History

This section describes the changes in previous versions of Tunnel Manager.

Tunnel Manager 2.3.1

This version added the following fixes:

- Corrected the way error values were computed in 3D Field Calibration for cropped sensors. This prevented automatically loading the calibration results to devices, which required manual intervention from a skilled user.
- Fixed an issue where upgrading to Tunnel Manager 2.3 added multiple instances of the Performance Viewer app with **Unhealthy** status.
- Fixed an issue where the padding parameter was missing from the Stitcher tool.

Tunnel Manager 2.3

This version added the following new feature:

- No-read feedback results are now available on Tunnel Manager devices. This feature provides the following functions:
    - The Result Browser page highlights images with barcodes that were not successfully decoded.
    - The page provides detailed information about each no-read, including the reason for the failure.
    - The page also offers new customization options to add, remove, or rearrange elements on the page.

This version added the following enhancements and changes:

- Connections on the Other Devices page now automatically close after 30 minutes to improve security. When upgrading to this version, existing connections in the Other Devices page are closed.
- You can now snooze notifications in the Notification Center for ten minutes at a time. This feature is helpful during system commissioning.

- Tunnel Manager now supports more Modular Vision Tunnel variants for 3D-calibrated features, including Barcode Assignment and Image Stitching. Additional licenses are required. Image Stitching is only available on select hardware.

Tunnel Manager 2.2.1

This version added the following new features and enhancements:

- Added a new Hybrid Switches page for managing hybrid switches.
- The Data Forwarding page now supports Azure Storage Blob and REST connections.

Tunnel Manager 2.2

This version added the following new features:

- Support for the new EI-A3-TUNMGR- and EI-A9-TUNMGR-series devices.
- Image stitching across devices to allow single-image per side output on premium systems (add-on license).
- Pass-through access to web HMIs, including:
    - DataMan readers
    - 3D-A1000 dimensioning units
    - Mettler-Toledo TLD-950 dimensioning units
    - Remote Desktop

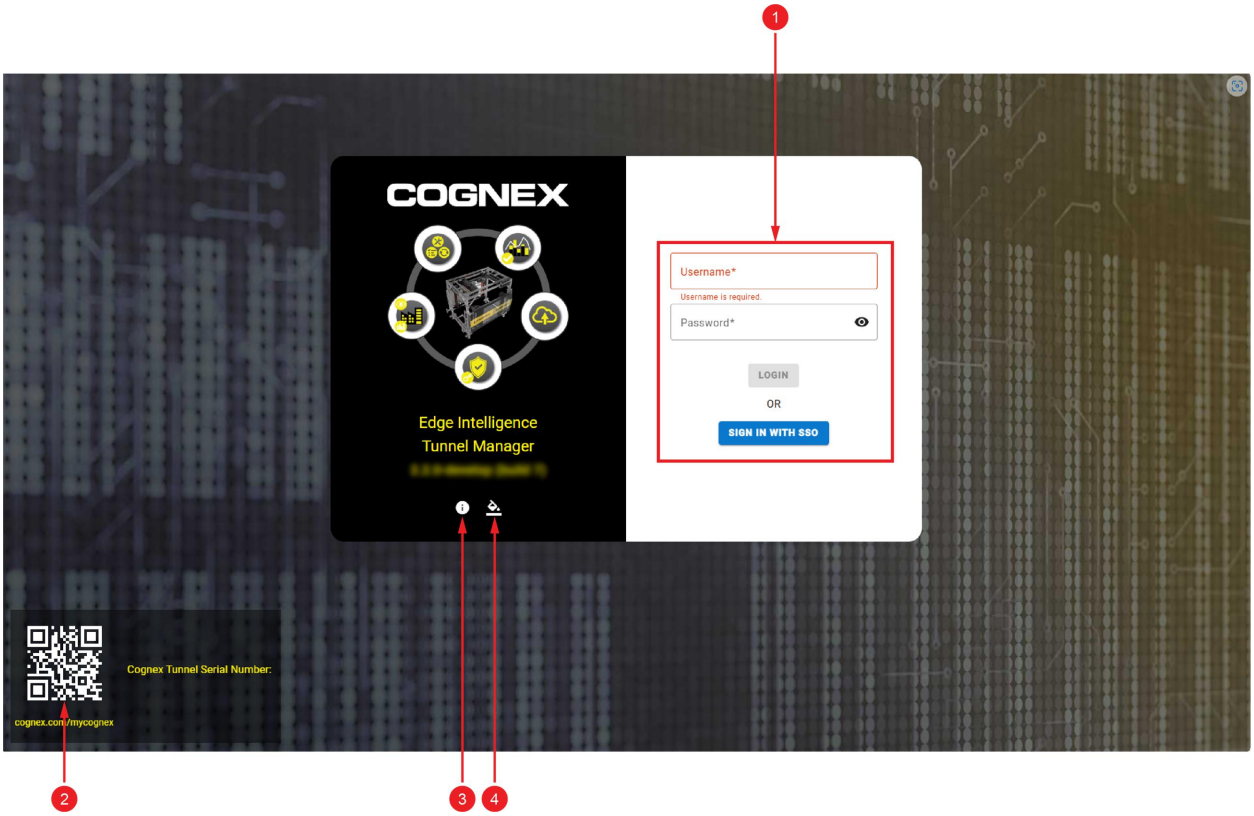
This version added the following enhancements and changes:

- Added the following additional protocols supported by Data Forwarding:
    - Amazon S3
    - Amazon SNS
    - Azure IoT Hub
    - FTP
    - MQTT
    - SFTP
- Added a photoeye testing step to the Dynamic Test Tunnel Setup app.
- You can now switch between a light mode theme and dark mode theme.
- General fixes and enhancements to the workflow of Tunnel Setup and commissioning apps.

Logging In

To access the EI Tunnel Manager web interface, simply log in using your credentials or single sign-on (SSO). If this is your first time logging in, use the default credentials. Once logged in, you can modify your settings and explore the apps available to you.

EI Tunnel Manager Login Page



Number	Element
1	Sign in using your credentials or SSO. **Note**: The Sign in with SSO button only appears in the login page if SSO is configured for the EI Tunnel Manager unit. For more information, see *Single Sign-On* on page 93.
2	Scan the QR code to register your EI Tunnel Manager unit on the cognex.com/mycognex website.

3	The information button opens the *About Pop-Up* on page 11 window that provides the following options and information: • Information about the EI Tunnel Manager unit, such as serial numbers, software version, and license expiration date. • The documentation link opens the reference manual stored on the device. • The System Diagnostics Data section allows you to collect, download, and delete device logs that you can send to Cognex support engineers for troubleshooting support. • The Network Interfaces section lists the available and connected network ports with their configurations. • The Components section lists the different features that run on the device.
4	The paint bucket icon allows you to change the website color theme.

Default User Credentials

The following users credentials are available by default:

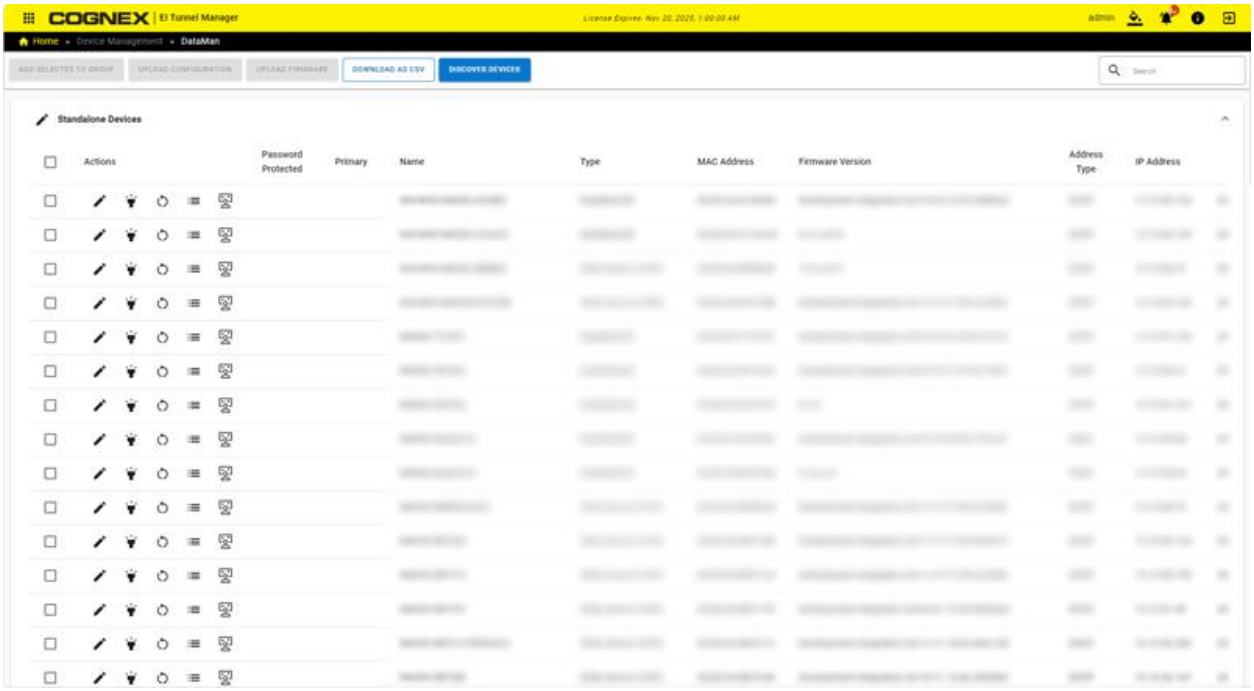
User	Password	Default Permissions
admin	BnthWWSD	Has access to all apps and features. Admin users can modify the default user profiles, enable access permissions for the other user roles, or create new profiles.
engineer	TaRDpKVx	Has access to all apps and features.
operator	SxtXGmxs	User with read-only rights. The operator does not have access to the Device Management app and the Settings.

Note: Change the default credentials to avoid security risks. For more information, see *User Management* on page 90.

Discovering Devices on the Network

The default IP address for the Ethernet 2 port of Cognex product name uppercase is 192.168.1.100. The Cognex product name uppercase device discovers every reader automatically if the Cognex product name uppercase is connected to the corresponding network.

The readers found on the network appear on the *DataMan* on page 39 page of the Device Management app.



Note: The readers that are not on the same 192.168.1.x local subnet have the Misconfigured state.

Cognex recommends that all readers be on the same network as Cognex product name uppercase device. Either change the IP address of every reader on the network to be on the same network as 192.168.1.x, or change the IP address of the Ethernet port of the Cognex product name uppercase device to match those of the readers.

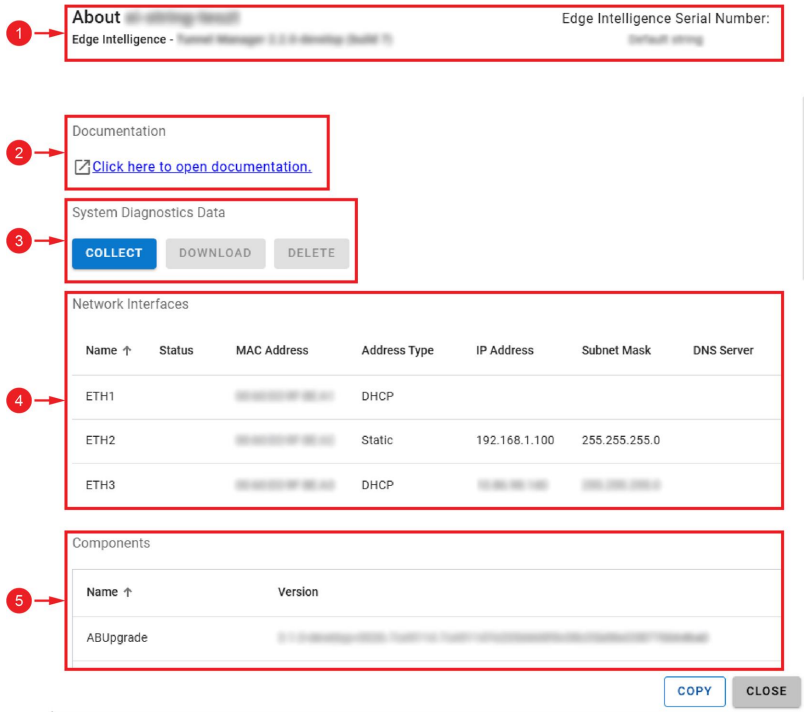
To change the network settings of your Cognex product name uppercase device, go to the *Edge Intelligence* on page 83 page.

EI Tunnel Manager User Interface

Number	Element	Description
1	App menu	Click the **Menu icon** in the upper left corner to open the navigation pane.
2	Navigation pane	Use the navigation pane to open a page under an app.
3	App window	Use the app window to access the functions of the open page.
4	Ribbon elements	• The ribbon displays the user that is signed in. • Click the **Theme** icon to switch between dark and light themes. • Click the **Bell** icon to view the notifications. Click on a notification to open it in the *Notification Center* on page 120. • Click the **Info** icon to open the *About Pop-Up* on page 11 • Click the **Logout** icon to log out.

About Pop-Up

The **About** pop-up window allows you to access documentation, collect diagnostics for troubleshooting support, and view network and component information for your EI Tunnel Manager unit.



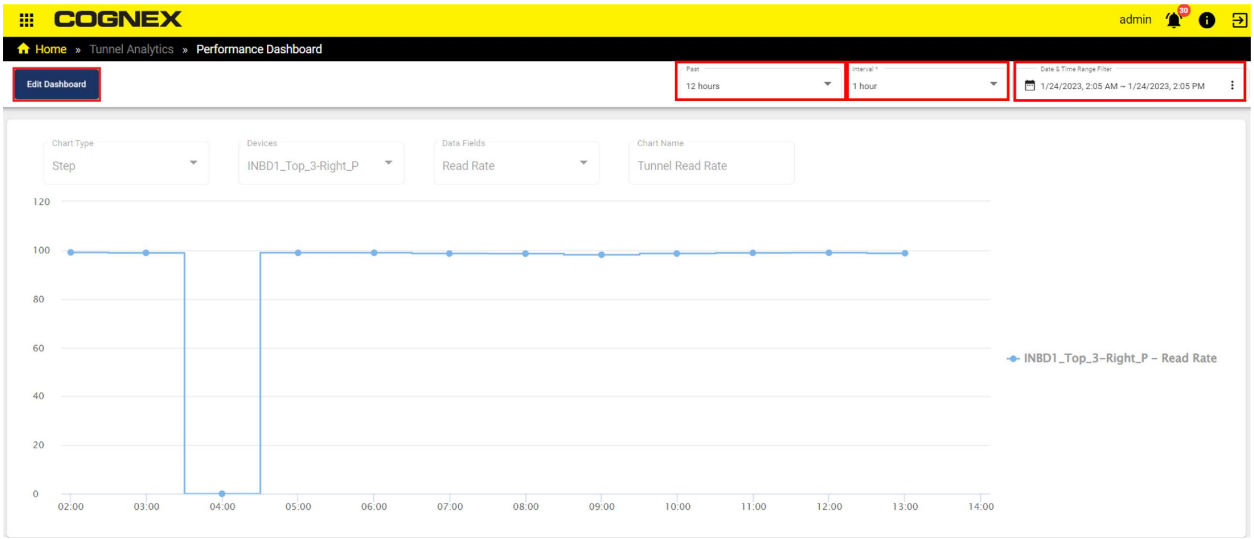
Number	Description
1	Information about the EI Tunnel Manager unit, such as serial numbers, software version, and license expiration date.
2	The documentation link opens the reference manual stored on the device.
3	The System Diagnostics Data section allows you to collect, download, and delete device logs that you can send to Cognex support engineers for troubleshooting support. **Note**: The log files in the downloaded *.zip* file are password-protected. Only Cognex support engineers can access them.
4	The Network Interfaces section lists the available and connected network ports with their configurations.
5	The Components section lists the different features that run on the device.

Tunnel Analytics

The Tunnel Analytics app provides analytics options.

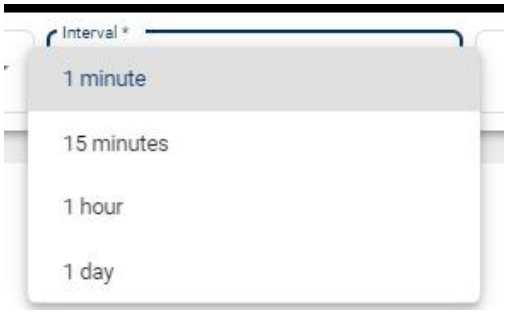
Performance Dashboard

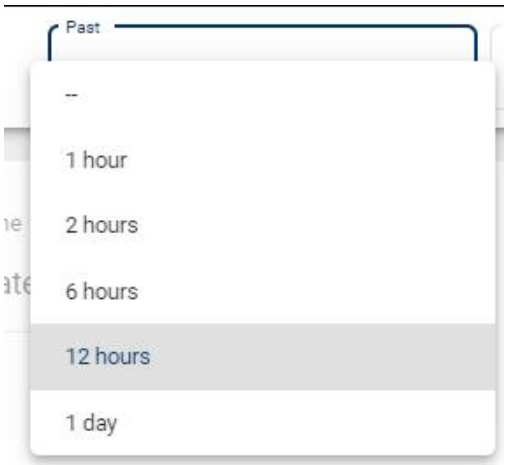
The Performance Dashboard page provides a configurable set of saved charts that visualize the performance data of connected devices.



Setting a value you want for **Past**, **Interval***, **Date & Time Range Filter** fields helps you to see the visualization of the performance data for that specific time interval and date.

You can adjust the data point granularity using **Interval***.





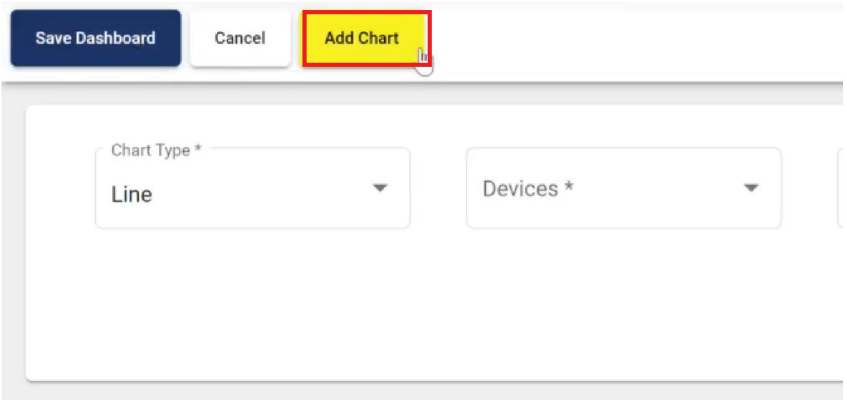
To look at a smaller time intervals, choose a smaller value for **Interval***.

For example, to see a data point for every hour in the past one day, set **Past** to *1 day*, **Interval*** to *1 hour*.

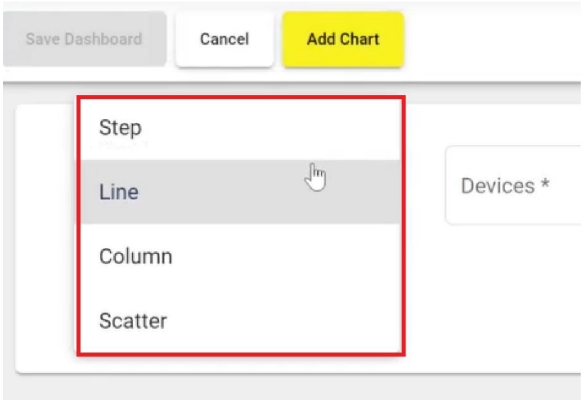
Edit the Dashboard

The **Edit Dashboard** function allows you to add, edit, delete, and sort charts.

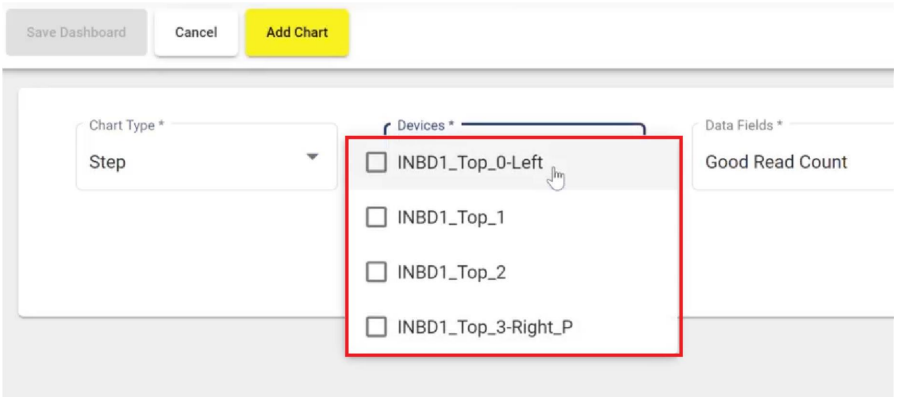
1. Click **Add Chart**.



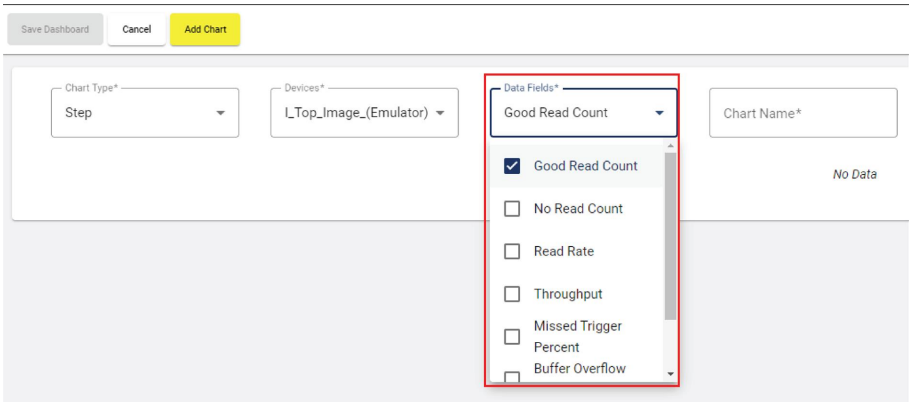
2. Select the chart type from the dropdown list.



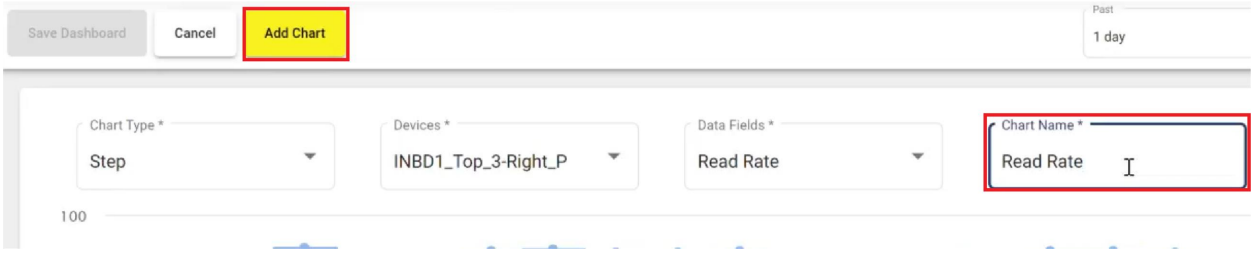
3. Select the device type from the dropdown list.



4. Select the data field type from the dropdown list.

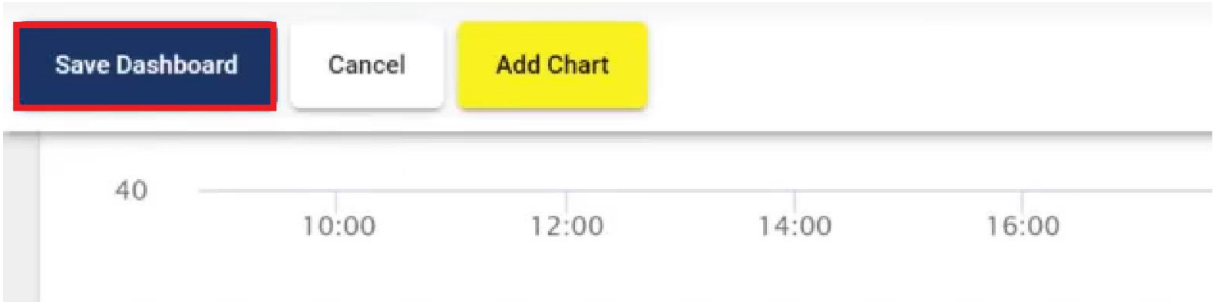


5. Name the new chart. Click **Add Chart**.



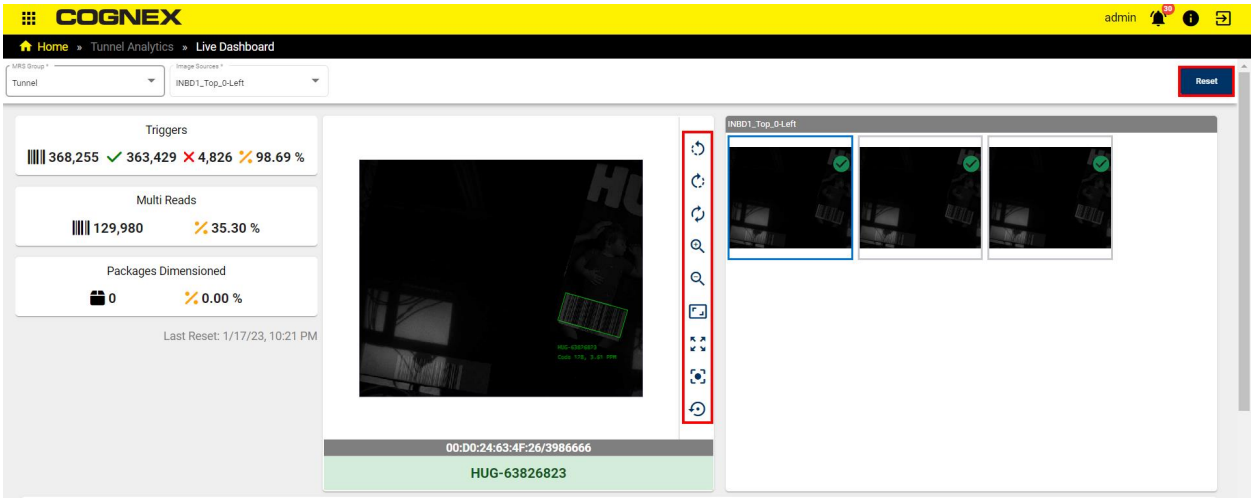
6. Repeat the procedure to add more charts to the Dashboard. You can sort, edit, and delete the charts from the Dashboard.

   Click **Save Dashboard** when you are done.



Live Dashboard

The Live Dashboard page allows you to configure the live dashboard and the triggers that visualize the performance data of connected devices.

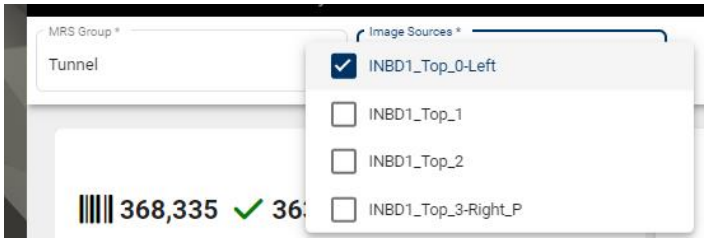


Using the buttons on the right side of the live view, you can manipulate the image on the live feed.

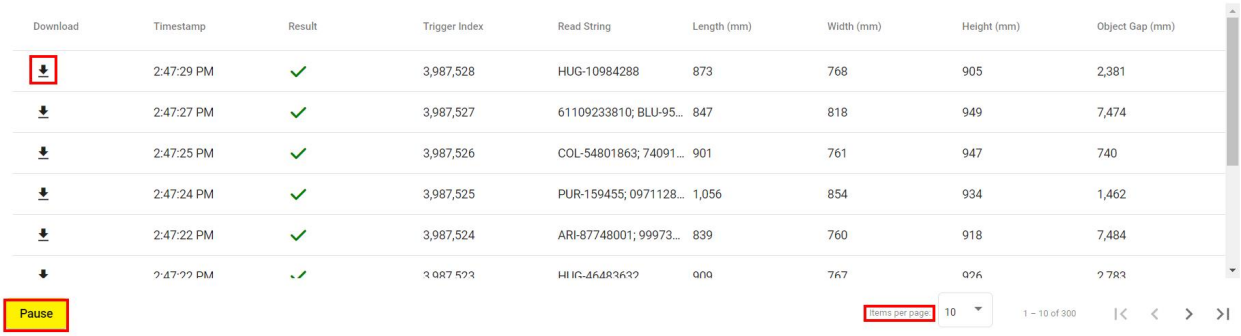
To reset the live dashboard, click on **Reset** on the top right corner.

You can choose the image sources you want to work with on the top left corner under the **Image Sources*** field.

> **Note**: **Image Sources*** corresponds to readers.



In the bottom of the **Live Dashboard** page you can find saved triggers that are available to download.

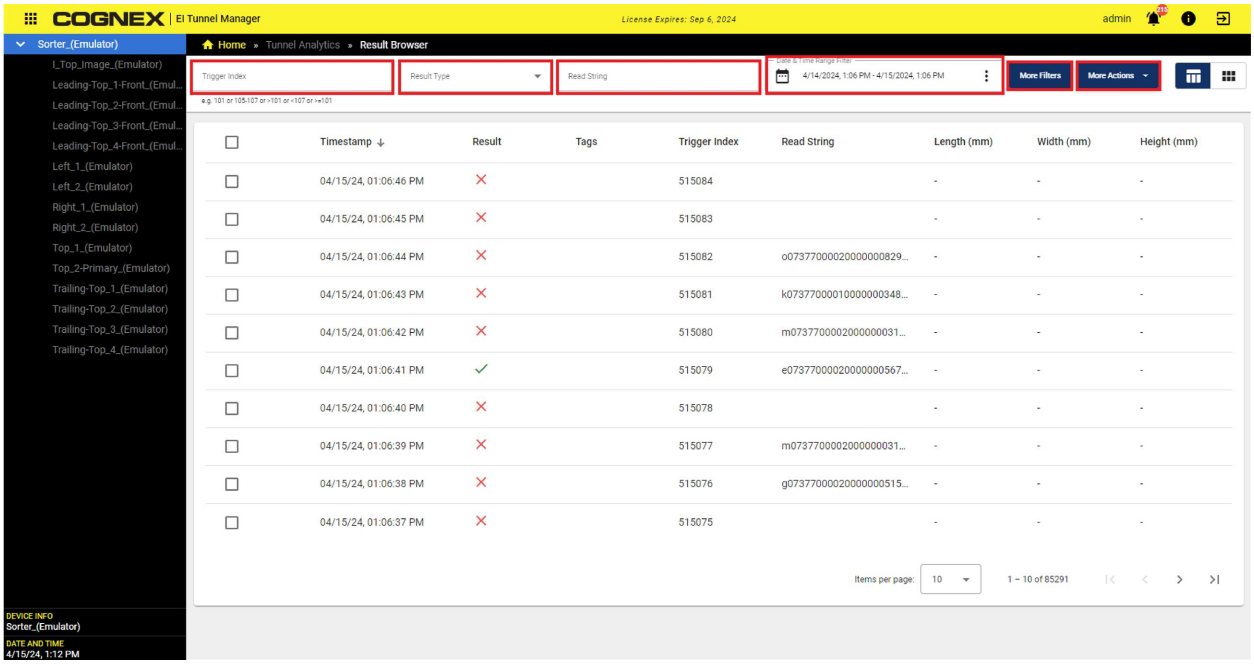


You can also pause the saving of live triggers by clicking on **Pause**.

Set the number of items you want to see on each page in the **Items per page** field.

Result Browser

The Result Browser page allows you to filter the results that Cognex devices collect and to find the data that is the most important to you. By default, the page is in Table View. You can also switch to *Gallery View* on page 22.



To download all triggers, select **Download All** in the **More Actions** menu. To avoid exceeding the trigger count, select the triggers you want to download before clicking **Download All**.

To filter out the data, you can use default filter fields, such as **Trigger Index**, **Result Type**, **Read String**, and **Date & Time Range Filter**.

The **Trigger Index** is an index number that the DataMan reader assigns to every trigger as an identifier. You can search for multiple triggers by typing in the index numbers of those triggers. You can search for:

- Simple index number, for example 1010.
- Several index numbers separated them by pressing **ENTER**, for example, 1010, 1013, 1014.
- Range of index numbers using a hyphen, for example 1010-1016. You can also add another range by pressing **ENTER** and add the new value.

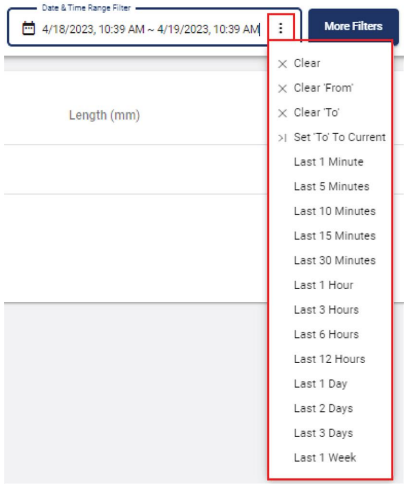
The **Result Type** is the classification of the trigger. The result type can be the following:

- Good Read: the reader successfully decoded the correct codes.
- No Read: the reader did not read any codes, or read the wrong codes.
- Failed Validation: the reader read an invalid code because the code is improperly formatted, or does not meet specific requirements.

The **Read String** is the string the unit reads.

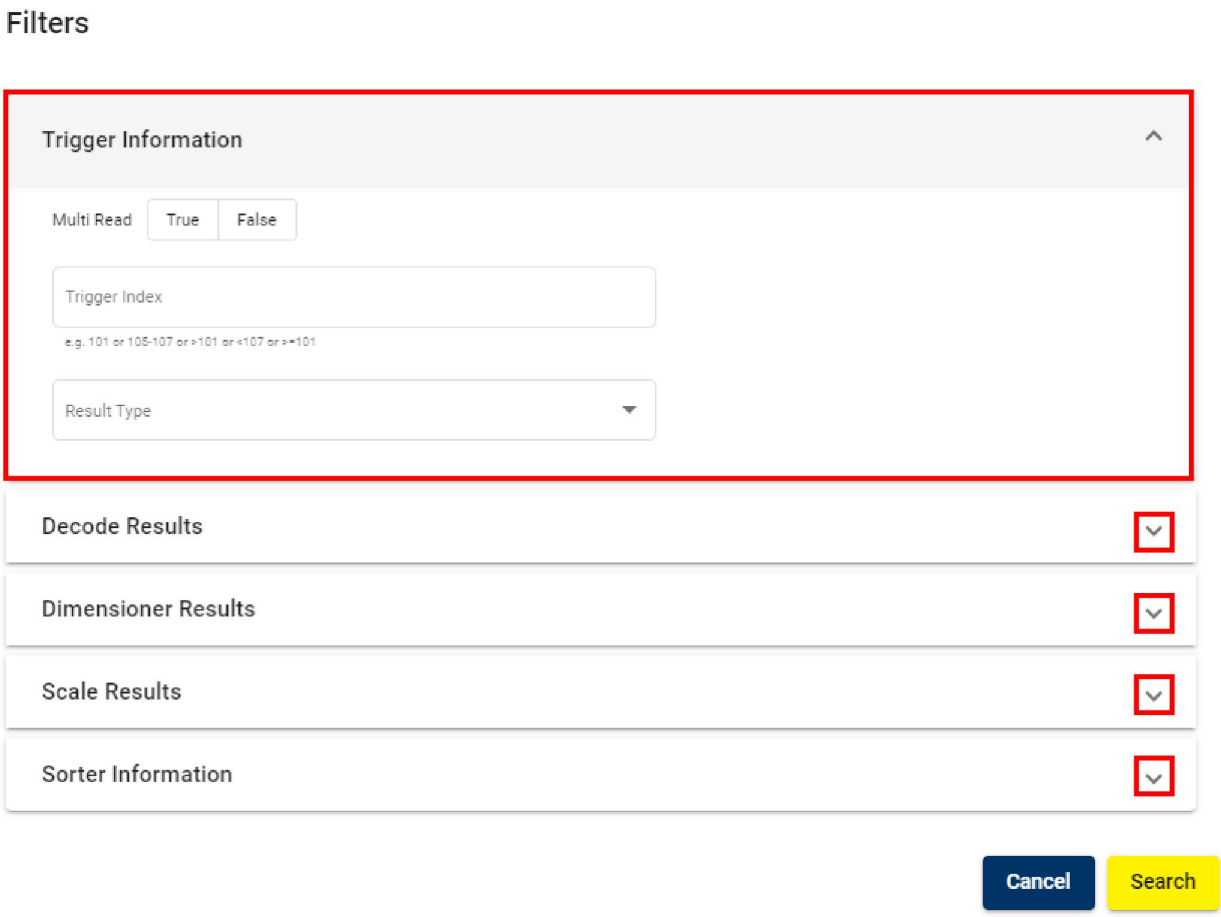
The **Date & Time Range Filter** provides options to type a time range directly into the input field, select a time range using the menu, or select from a list of relative time options. Use the options to set the range. Use the **clear** functions to delete all or a part of the range.

Date and Time Range Picker



Quick Relative Time Options

You can find more filter options by clicking on **More Filters** on the top right corner of the page:



To use more filters, click on the **down arrow** next to the name of a filter group.

Decode Results

Read String

Symbology Name

Assignment Result

Assigned Surface

Dimensioner Results

Legal For Trade | True | False

Angle

e.g. 101 or 105-107 or >101 or <107 or >=101

Length

e.g. 101 or 105-107 or >101 or <107 or >=101

Width

e.g. 101 or 105-107 or >101 or <107 or >=101

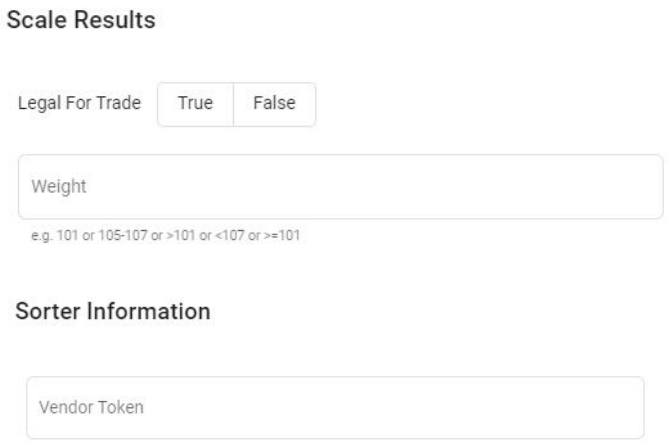
Height

e.g. 101 or 105-107 or >101 or <107 or >=101

Object Gap

e.g. 101 or 105-107 or >101 or <107 or >=101

Side By Side | True | False



Filter Query

You can create a filter query by entering input into the filter fields. When you add an input into one of the fields, you create a search condition that limits your trigger results to those that meet the set condition.

For boolean values, you can set the value to:

- True: Search for results where this condition is true.
- False: Search for results where this condition is false.
- Neither: Do not filter the results by this field.

For fields that can have multiple string values, use the dropdown to select one or more values.

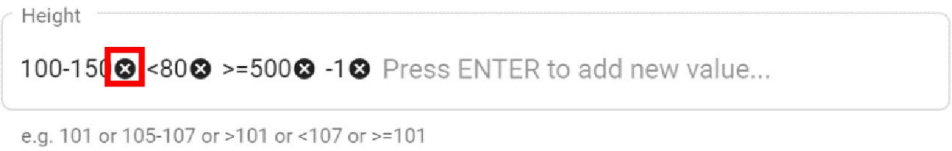
If you select a value, you are searching for results that match that value. For example, you can search for any results that contain a Code 128 code:

If you select more than one value, you are searching for results that match either of those values. For example, you can search for results that contain a Code 128 code, *OR* an I2of5, *OR* a UPC/EAN code:

Use the input fields for data that have a numerical value. The numerical input field supports the following input formats:

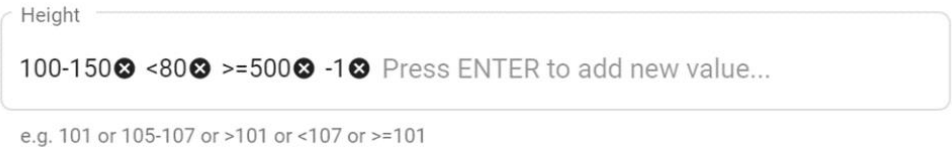
Condition	Example
Single value	Packages that have a reported length of 533 (length = 533).
Less than condition	Packages that have a reported length less than 533 (length < 533).
Less than or equal to	Packages that have a reported length that is less than or equal to 533 (length <= 533).
Greater than condition	Packages that have a reported length greater than 533 (length > 533).
Greater than or equal to	Packages that have a reported length that is greater than or equal to 533 (length <= 533).
Range	Packages that have a reported length between 500 and 550 (500 <= length <= 550).

You can add multiple inputs of the various format listed above. To add an additional input, press **ENTER** and begin typing the next input. Each input appears with a remove icon next to it. To remove any of the inputs, click on the remove icon next to the input you want to remove.



Note: Any input field that has a text input field, or a dropdown that allows you to enter, or select multiple values are joined together with an *OR* function. This means that the results appear if any of the criteria meets any of the provided inputs.

For example, you can type in the following four inputs into the height filter field. This search filters the results by packages that have a reported height between 100 and 150, *OR* a height less than 80, *OR* a height greater than or equal to 500, *OR* a height that is -1.



Combining Filter Queries

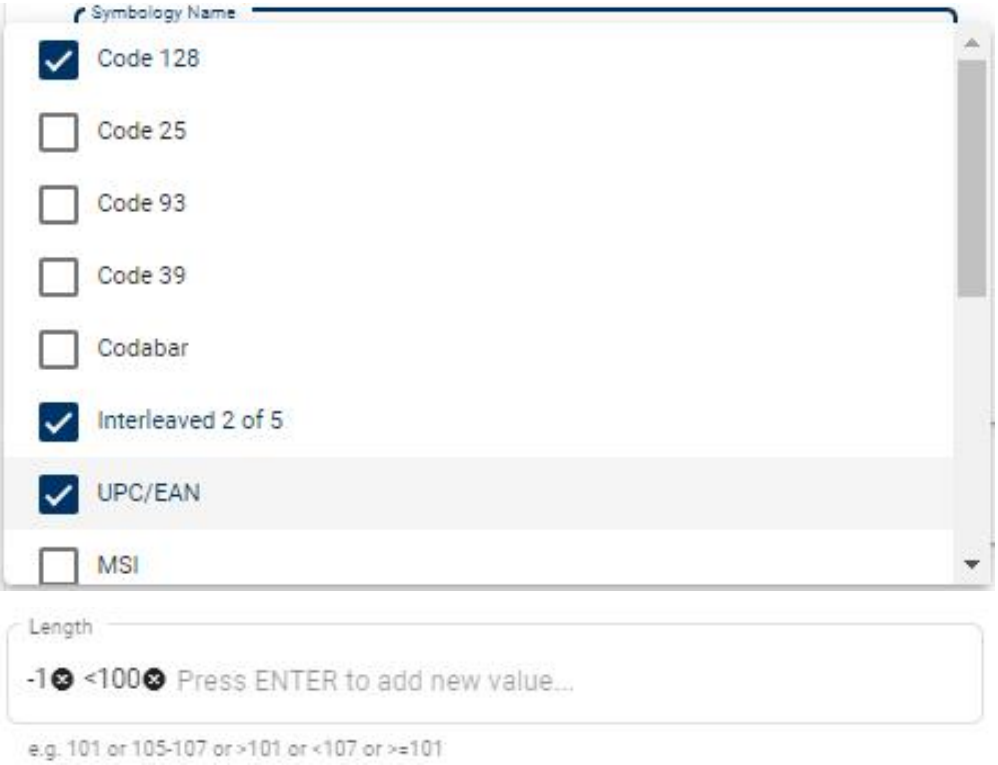
When you enter input to more than one of the filter fields, you create multi-conditional queries. The conditions from different filter fields are evaluated with an *AND* function.

For example, if you select True for the Multi Read filter, and add the following values:

- Code 128
- Interleaved 2 of 5
- UPC/EAN
- -1 and <100 values for the length filter

Then you created the following filter query:

Multi Read = TRUE AND (Symbology Name = Code 128 OR Symbology Name = Interleaved 2 of 5 OR Symbology Name = UPC/EAN) AND (Length = -1 OR Length < 100)

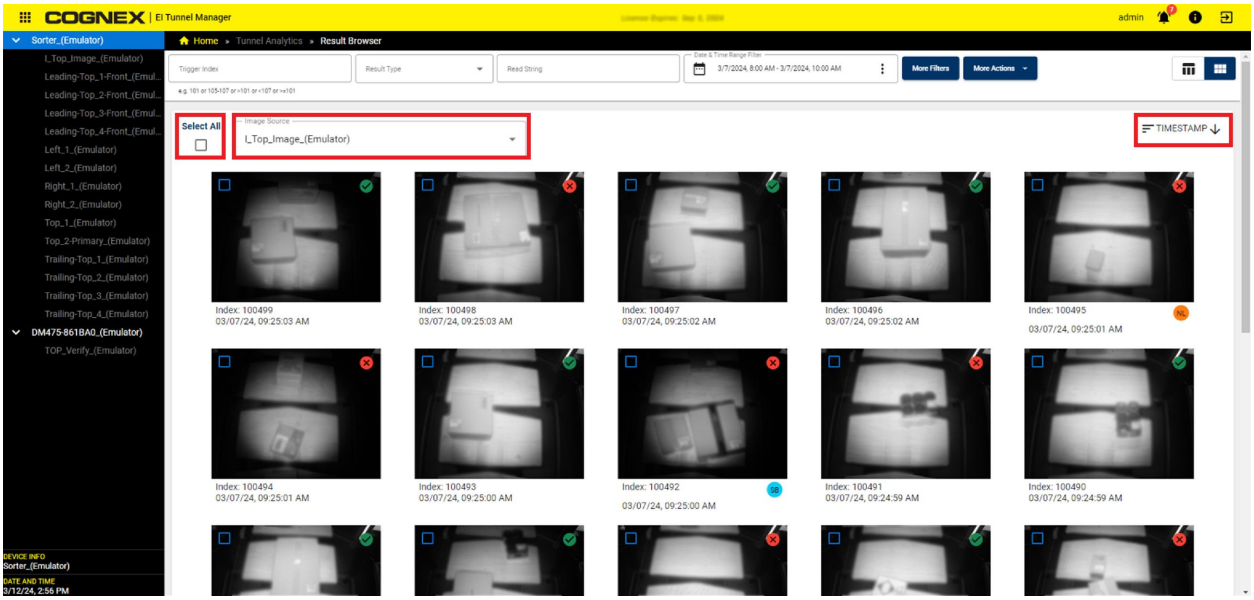


This means the filter shows results that are tagged as multi-reads *AND* contain a code that is either a code 128 *OR* Interleaved 2 of 5, *OR* UPC/EAN *AND* the reported length of the package is either -1 *OR* less than 100.

Gallery View

By default, the Result Browser page is in Table View. Switch the page from Table View to Gallery View using the view controls at the top of the page. Toggle between the two views by clicking on the representative icon.

In Gallery View, the table is replaced by a grid of thumbnail images. All other components remain the same. Similar to the Table View, the Gallery View shows all the triggers within the filtered time range.



Click the **Select All** checkbox to select all the items displayed on the current page.

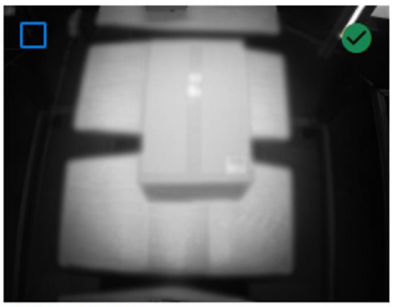
The **Image Source** dropdown lists all the devices. You can change the device source of the images displayed by selecting a different device name from the list.

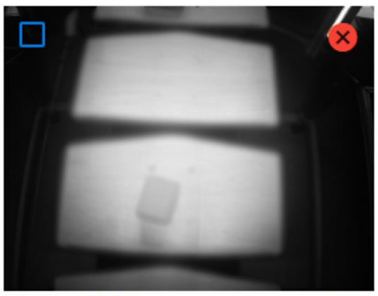
The **Timestamp** sort option allows you to sort the triggers by timestamp in ascending or descending order.

Instead of trigger data shown in the columns of the table, the Gallery View shows a cell for each trigger.

Each cell contains:

- A single image from the selected device source.
- A Good Read or No-Read icon (top-right corner).
- The trigger index.
- The date and timestamp of the trigger (bottom-left).
- The data tags assigned to the trigger (bottom-right).

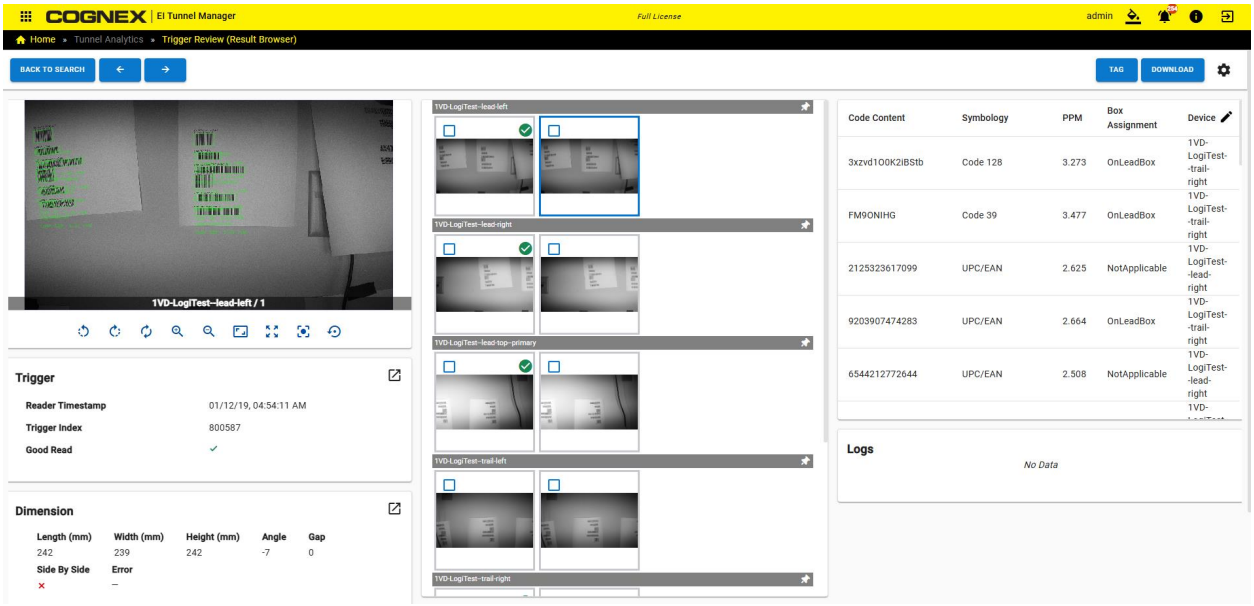




Click on a trigger cell to navigate to the Trigger Review page, which displays the rest of the images and the specific data for that trigger.

Trigger Review

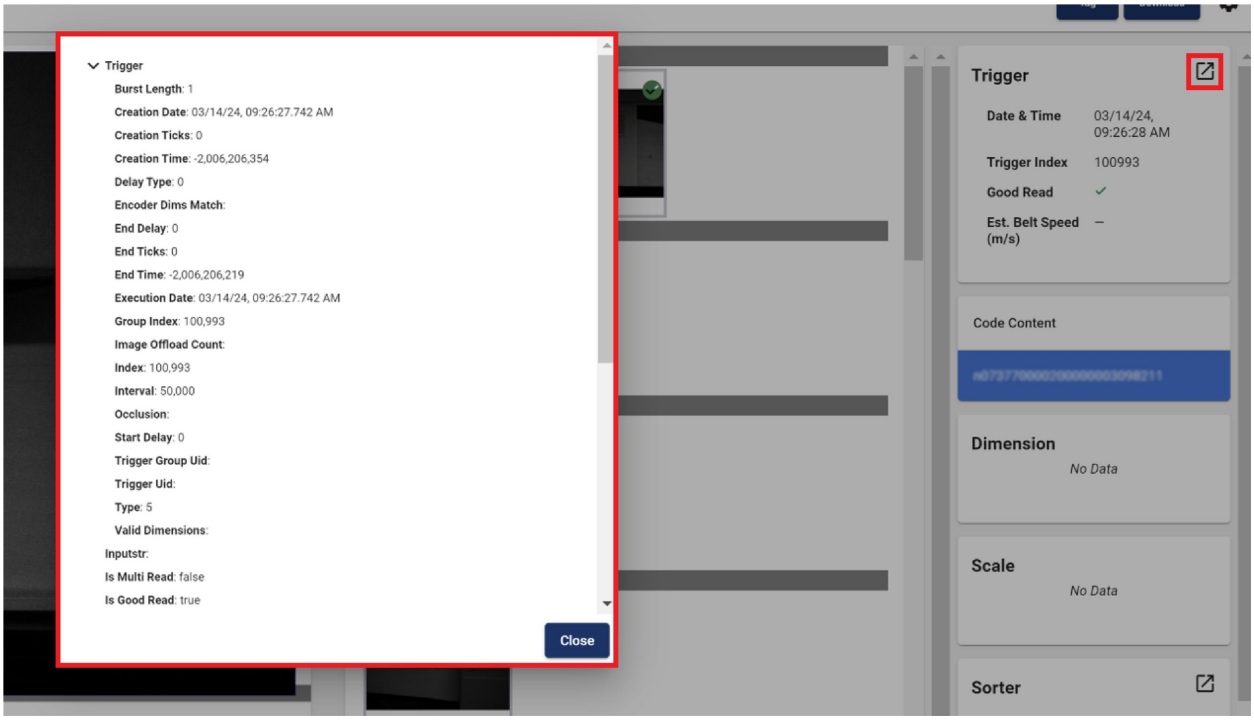
The Trigger Review page shows all the images and data associated with a selected trigger. Navigate to the Trigger Review page by clicking on a table row in Table View or by clicking on a cell in the Gallery View. The Trigger Review page displays several cards containing information for the selected trigger.



Trigger Details

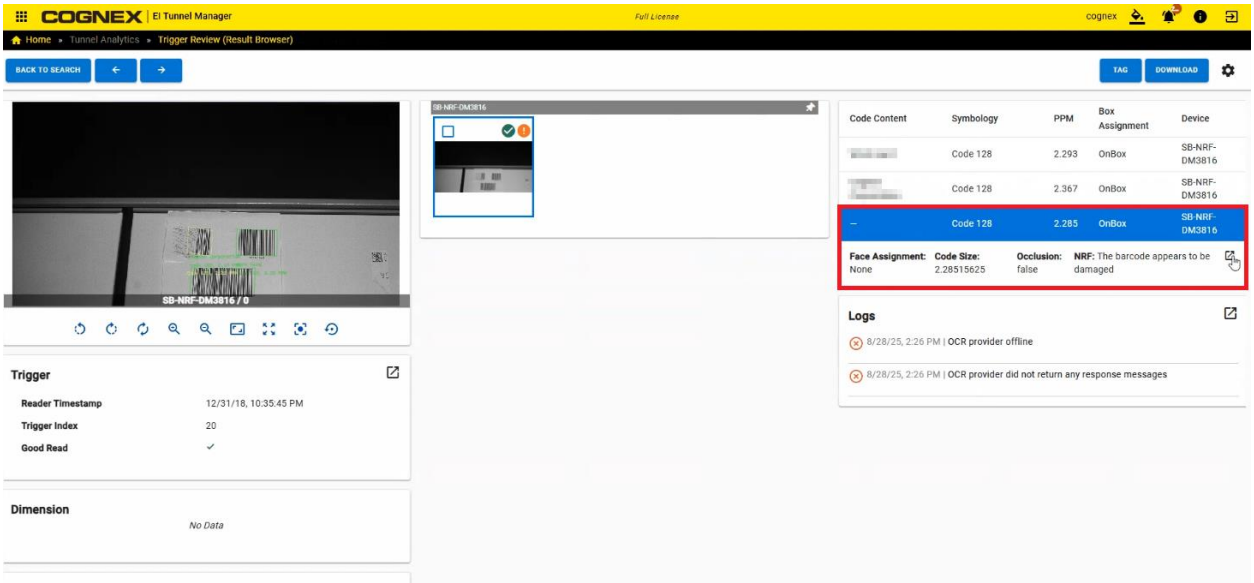
Click on the pop-out icon in the top right corner of the Trigger card to open a dialog with all the details of the trigger.

> **Note**: The pop-out icon does not appear on cards that have no data. Instead, the card shows **No Data** indicating that no data was collected. This can happen if the system does not have a dimension or scale.



Code Content

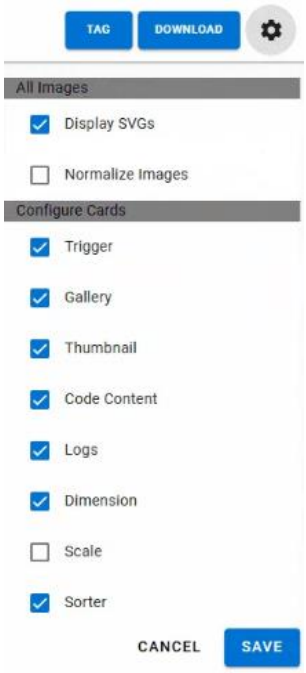
The **Code Content** table is populated with read codes. Click on a row to populate the main image viewer with an image of the read code. The row also expands to display highlights of the result data in a second row, including Face Assignment, Code Size, and Occlusion. Additionally, in the case of an unsuccessful read, the expanded row also displays the returned NRF (No Read Feedback) message.



Click on the pop-out icon to the right of the result data highlights to open a dialog with all the details of the result.

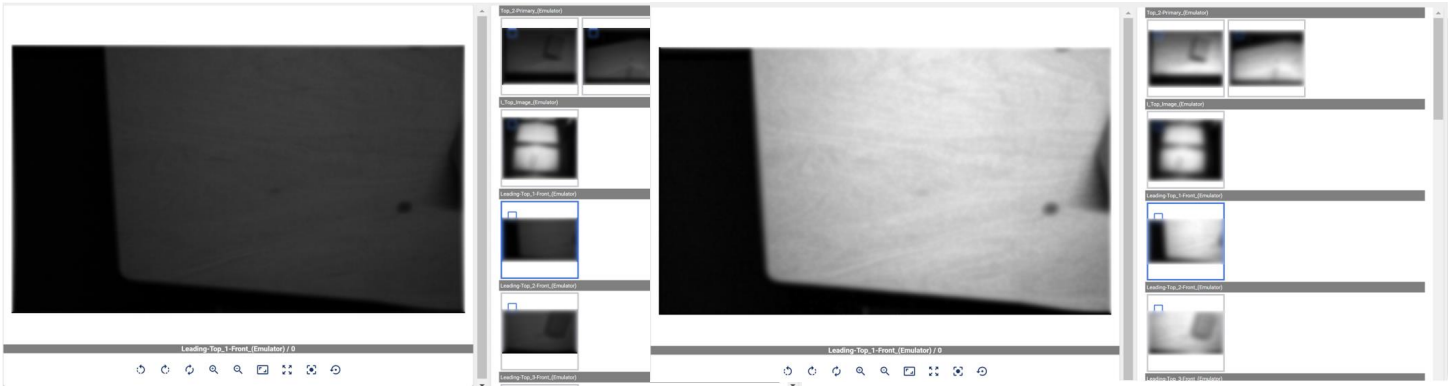
Settings

The **Settings** icon in the upper right-hand corner of the Trigger Review page expands the settings panel for the page.



In the **All Images** section of the panel, check the **Display SVGs** checkbox to enable or disable displaying the SVG overlays. By default, the page displays the SVG overlays.

Check the **Normalize Images** checkbox to enable image normalization. Normalization brightens the contrast on dark images so the details are easier to see. By default, the normalization is off.



Normalization Disabled

Normalization Enabled

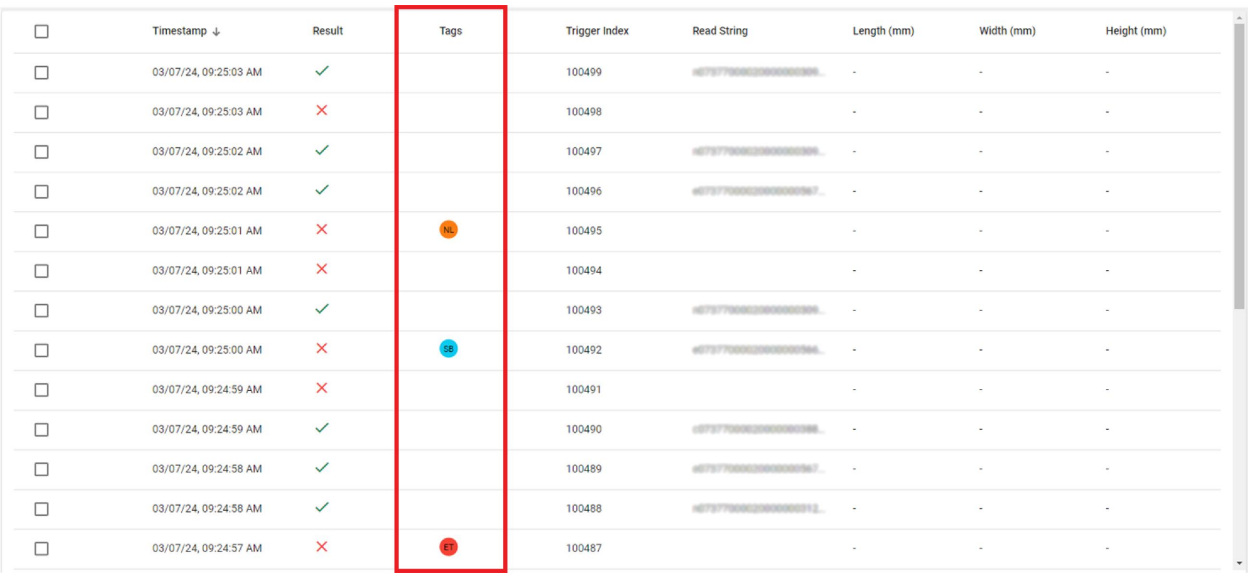
> **Note**: Normalization adds additional processing time to the images and can cause the images in the gallery and main image viewer to load more slowly. Cognex recommends to only use the feature when images are too dark to see the details.

In the **Configure Cards** section of the settings panel, check or uncheck the checkbox next to each item to configure which data cards to display on the page.

Data Tagging

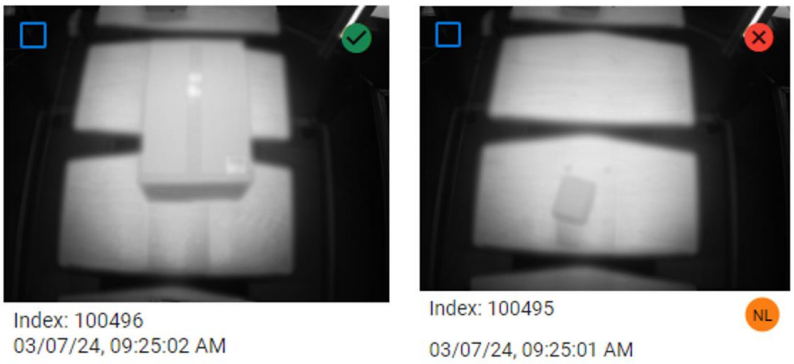
You can add, view, and remove data tags from the triggers.

In the Table View, the **Tags** column displays the tags for each trigger.



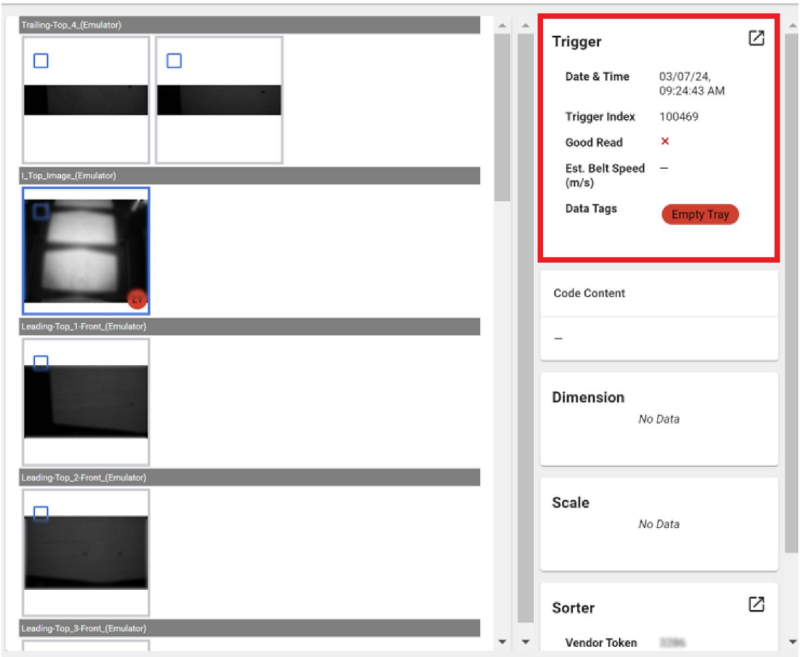
Timestamp	Result	Tags	Trigger Index	Read String	Length (mm)	Width (mm)	Height (mm)
03/07/24, 09:25:03 AM	✓		100499		-	-	-
03/07/24, 09:25:03 AM	✗		100498		-	-	-
03/07/24, 09:25:02 AM	✓		100497		-	-	-
03/07/24, 09:25:02 AM	✓		100496		-	-	-
03/07/24, 09:25:01 AM	✗	NL	100495		-	-	-
03/07/24, 09:25:01 AM	✗		100494		-	-	-
03/07/24, 09:25:00 AM	✓		100493		-	-	-
03/07/24, 09:25:00 AM	✗	SB	100492		-	-	-
03/07/24, 09:24:59 AM	✗		100491		-	-	-
03/07/24, 09:24:59 AM	✓		100490		-	-	-
03/07/24, 09:24:58 AM	✓		100489		-	-	-
03/07/24, 09:24:58 AM	✓		100488		-	-	-
03/07/24, 09:24:57 AM	✗	ET	100487		-	-	-

In the Gallery View, the tags for each trigger are displayed in the bottom-right corner of each cell.



The tags appear as abbreviated versions. The letters from the first two words in the tag are displayed in a circular chip. For example, if the tag is "Flagged Label", the chip displays "FL" as the abbreviation. If the tag is "Side by Side", the chip displays the letters "SB". You can hover over the tags to see the full name.

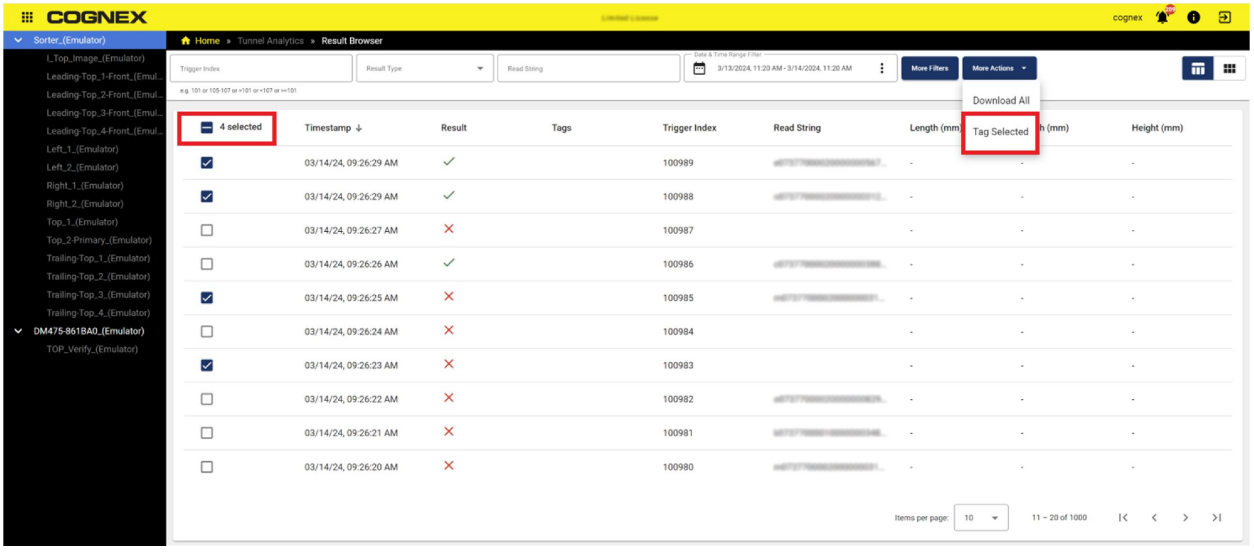
In the Trigger Review page, the tags applied to the entire trigger result are shown in the **Trigger** section under **Data Tags**. The tags are displayed in the non-abbreviated form. Tags applied to specific images appear in the thumbnail image in the abbreviated form.



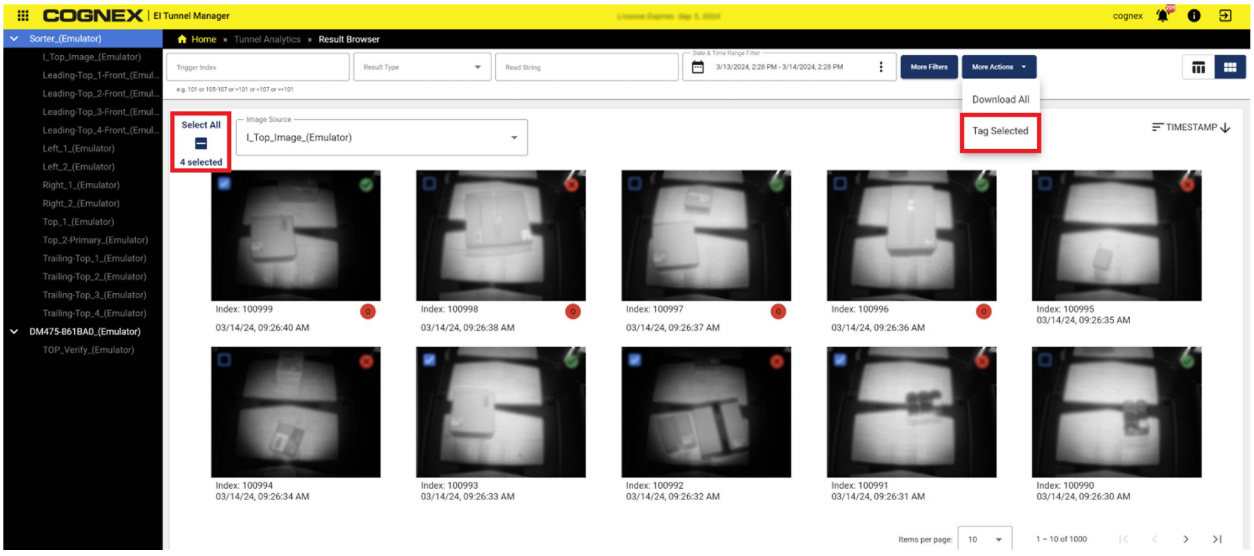
Tagging in the Result Browser

You can apply tags in bulk to multiple triggers or images in the Result Browser page.

To apply a tag in Table View, use the corresponding checkboxes in each row to select multiple triggers. Use the global checkbox to select all the triggers on a single page. The count next to the global checkbox shows the number of triggers selected.

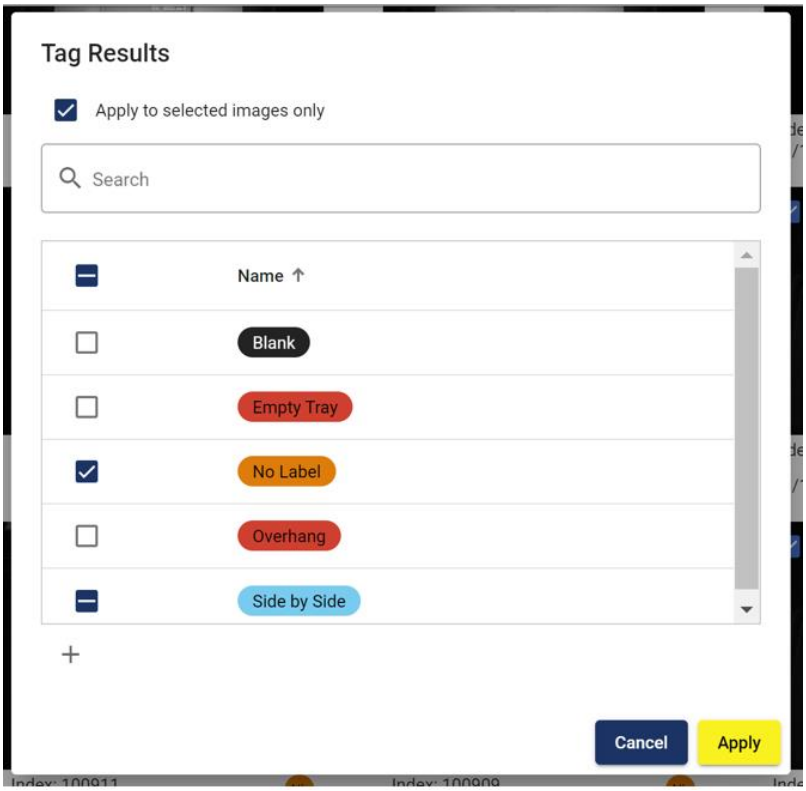


To apply a tag in Gallery View, select the checkboxes located in the top left corner of the thumbnail in each trigger cell. Click the **Select All** global checkbox to select all the items on the current page. The count below the global checkbox shows the number of triggers selected.



Note: In Gallery View, you apply the tag to the specific image shown. When you click on the trigger to navigate to the Trigger Review page, the tag is on the thumbnail image in the gallery. Tagging specific images also gives you the option to only download an image from the trigger rather than the entire set of images.

Click **More Actions**. Click the **Tag Selected** option to open the **Tag Results** dialog.



Previously-created tags appear in the table list. You can search for a specific tag using the search field above the list.

If the triggers selected do not have any existing tags, all the tag selections show an empty checkbox. If all the selected triggers have one or more of the same tags, those tags have a checked checkbox. If only some of the selected triggers have one or more of the tags, those tags have a partial checkbox.

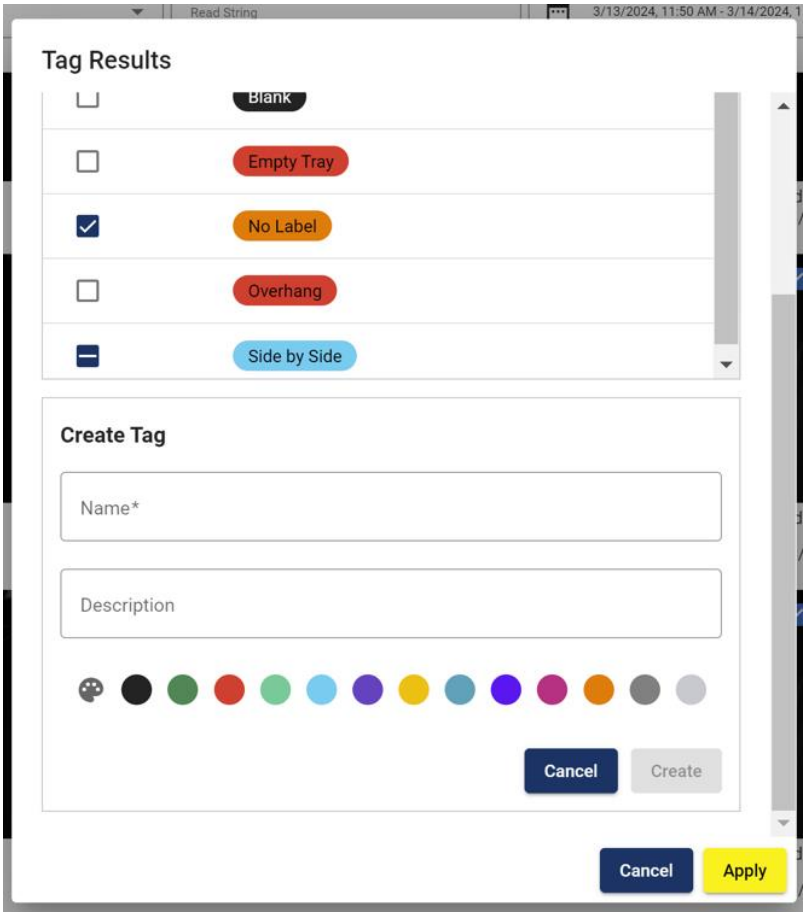
You can remove tags from the selected triggers by unchecking the checkbox. To add a tag that exists on some of the triggers but not all, click once to clear the checkbox and then click again so the checkbox is checked. This applies the tag to the rest of the triggers which do not already contain the tag.

ⓘ **Note**: Duplicate tags are not created for a single trigger.

Click **Apply** to add tags to the selected triggers. Click **Cancel** to discard changes or close the **Tag Results** dialog.

Create a New Tag

Click on the plus icon below the tag list in the **Tag Results** dialog. The **Create Tag** section appears within the dialog.



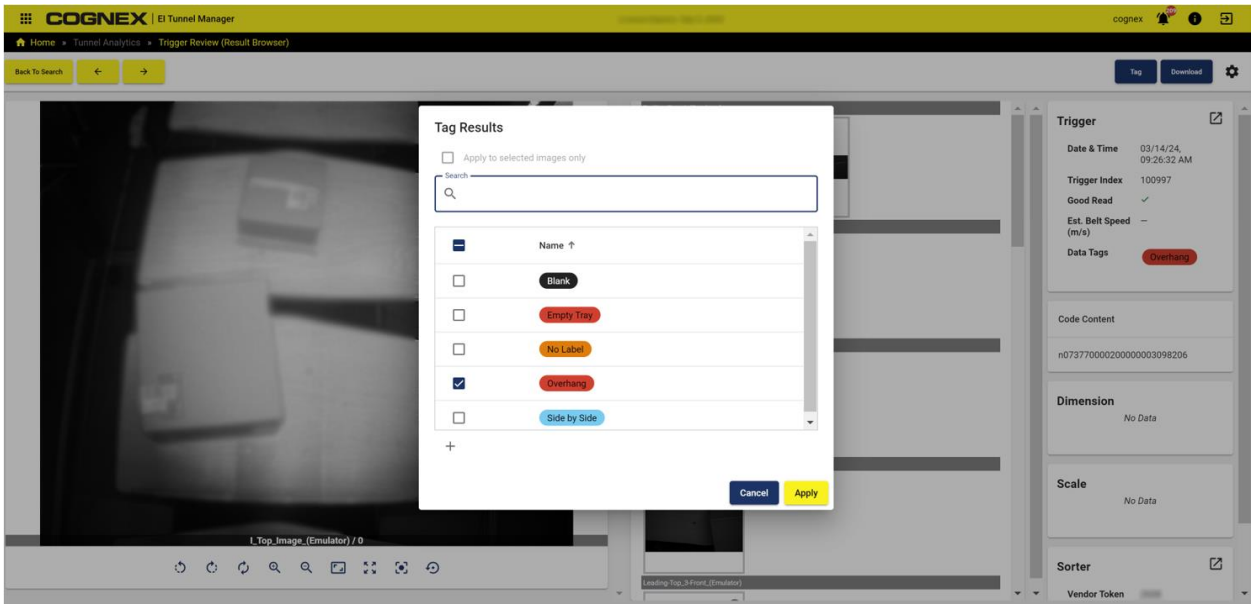
Provide a name for the tag and select a color. Choose from the default colors available or create a custom color by clicking on the palette icon. You can also provide a short description for the tag. Click **Create**, and the tag appears in the list above.

> **Note**: Tags applied in the Table View are automatically applied generally to the entire trigger rather than to specific images.

Tagging in Trigger Review

You can tag triggers one at time in the Trigger Review page. This is useful when sorting through no-reads and classifying the root cause one at a time.

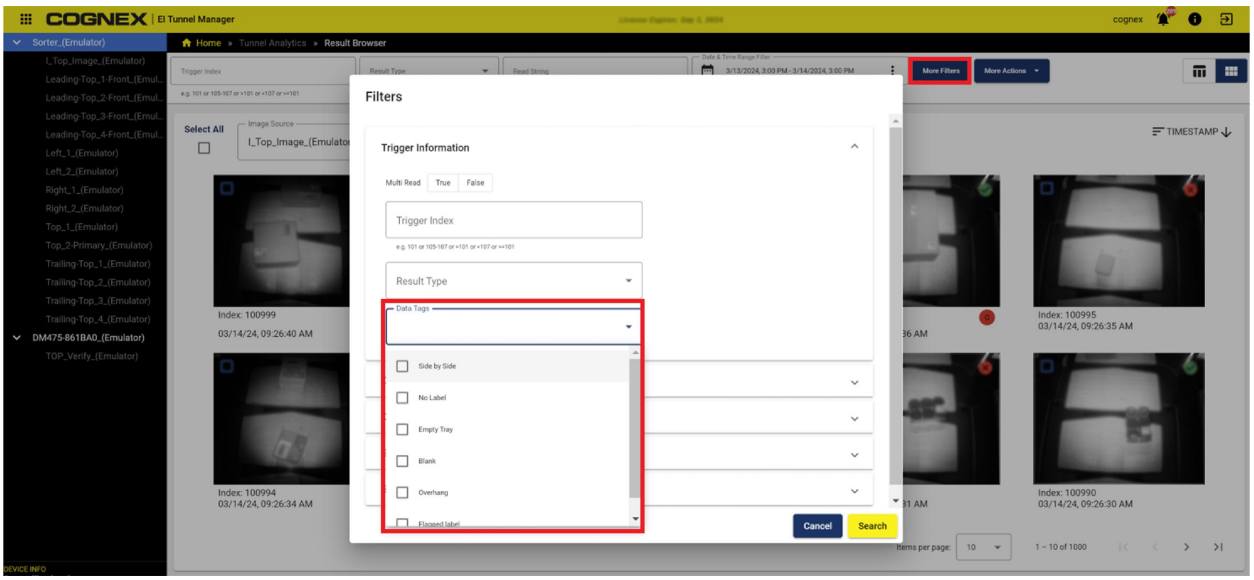
To tag in the Trigger Review page, select images and click the **Tag** button. The **Tag Results** dialog appears. You can select, deselect, and add tags to the selected images.



Filtering by Tags

You can filter results by tag in the Result Browser page. Select **More Filters**. The **Filters** dialog appears. In the **Trigger Information** section, use the **Data Tags** dropdown to select one or more data tags to filter the results by.

> **Note**: If you select more than one data tag from the list, the filter includes triggers that contain any one of the tags selected.

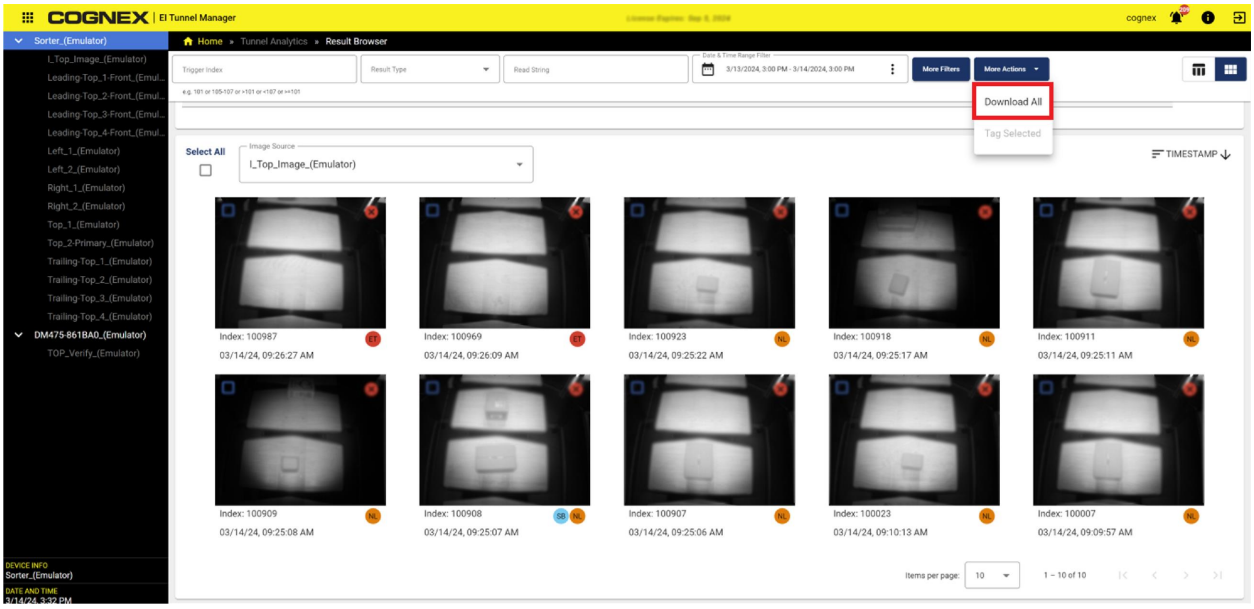


Click **Search**. The Result Browser now only shows the results within the filtered dataset. The **Active Filters** section shows the filters.

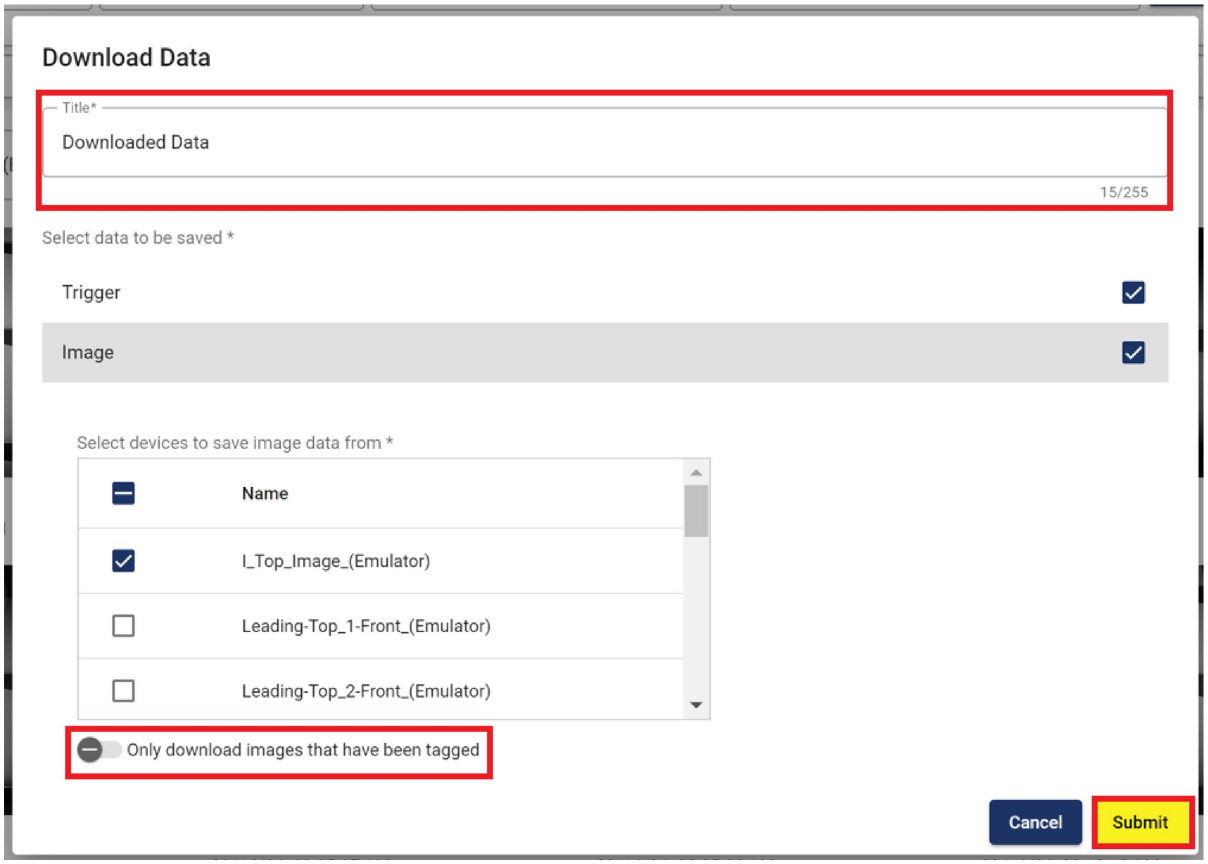
Downloading Tagged Images

You can download images in bulk from the Result Browser or individually from the Trigger Review page.

In the Result Browser, download the set of filtered data by selecting **More Options** and clicking **Download All**.



The **Download Data** dialog appears.



Provide a title for the download. Select Trigger and Image data to include in the download. The Trigger data is all the result data, such as trigger index, read code string, and dimensions, downloaded into a *.csv* file. The Image data is the *.jpg* for each trigger.

In the Image data section, you can choose to download the image data for all devices or only from select devices. You can select all devices by clicking the global checkbox.

> **Note**: From Gallery View, the device you were already viewing is selected by default. From Table View, all devices are selected by default.

You can choose to only download tagged images by switching the **Only download images that have been tagged** toggle.

Click **Submit** to start the download.

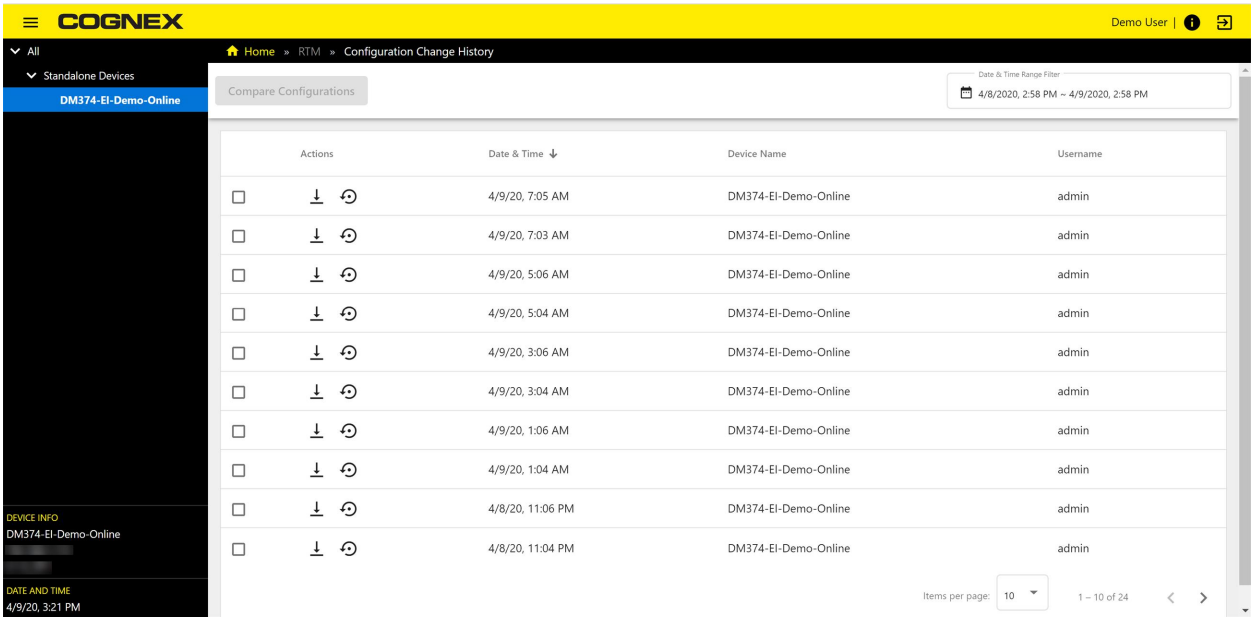
> **Note**: After filtering the triggers or images to specific tags, you can also download the tagged triggers or images specifically by the filter applied. For example, if you select "empty tray" as the filter for the data tags, when you click **Download All**, it downloads the triggers or images with just the "empty tray" tag, not the entire timeframe of data.

Events

The Events app allows you to track changes to the connected readers.

Configuration Change History

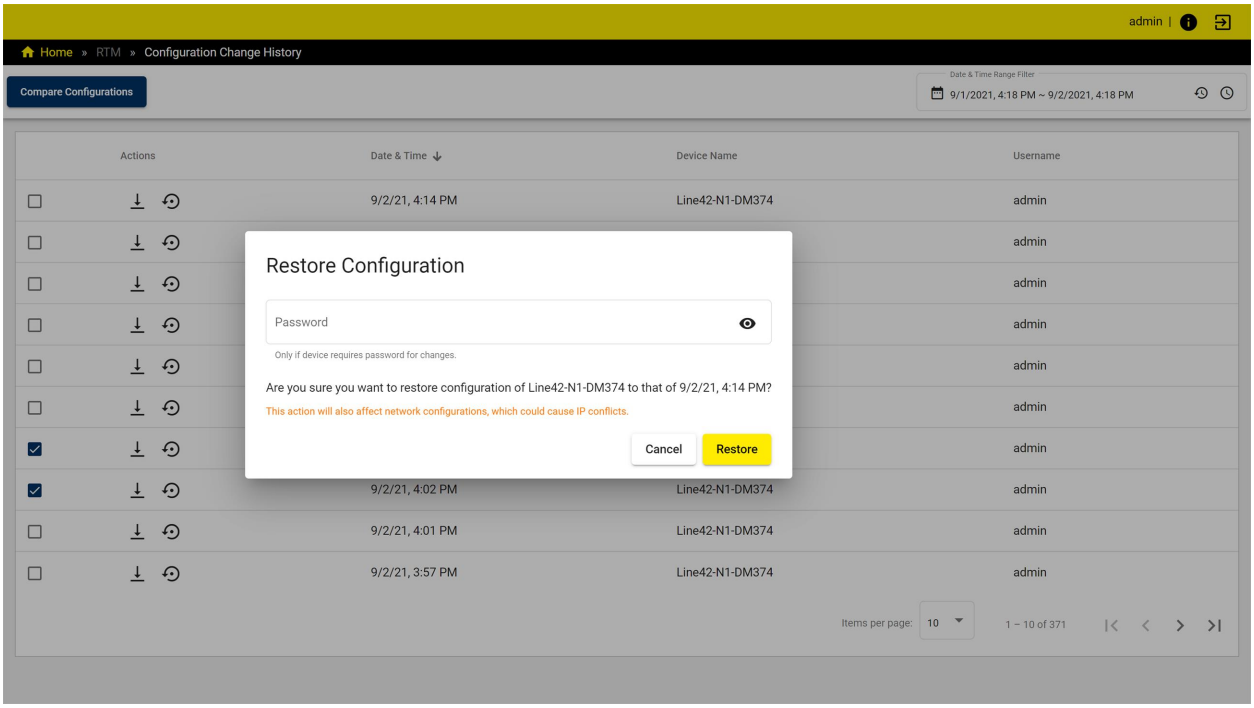
The Configuration Change History page tracks changes made to the configuration of all connected readers and shows changes in a customized fashion. The window displays the Device tree with available grouped and standalone readers. The page automatically links configurations with the respective usernames.



Configuration Change Actions

Icon	Action
	Selected checkbox
	Download Configuration File
	Restore Configuration

- Click the **checkbox** from the list in the left side of the rows to select a configuration.
- Click the **Download Configuration File** to download the selected Configuration files.
- Click **Restore Configuration** to revert to a previous configuration.
    - After clicking **Restore Configuration** enter your password and click **Restore** to revert configuration. Click **Cancel** to leave the popup window without restoring the selected configuration.



Dashboard overview:

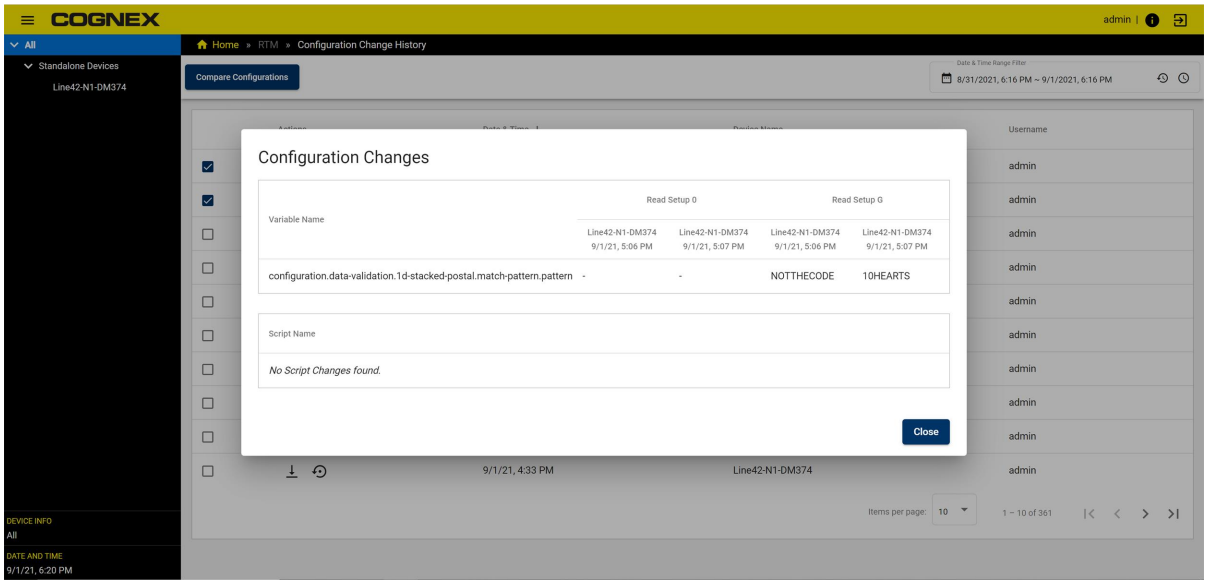
Item	Description
Compare Configurations button	Select 2 checkbox to enable the button. Click the button to see configuration changes in a pop-up window.For more information see
Date & Time Range Filter	Use the time range to define a period of time from which performance data is collected for the charts. For more information see *Date & Time Range Filter on page 1*
Configuration tables	List of readers and groups available for comparison.

Note: Changes made from Dataman Setup Tool are labeled as admin changes.

Column Name	Description	Display
Date and time	Date and time of the configuration change.	3/3/20, 9:10 AM
Device name	Name of the reader on the network.	
Username	Name and type of the user who made the configuration change.	

Configuration Changes

To compare two configurations, select the readers to compare. Click the **Compare Configurations** button. A pop up window appears with a table that shows the compared configurations.



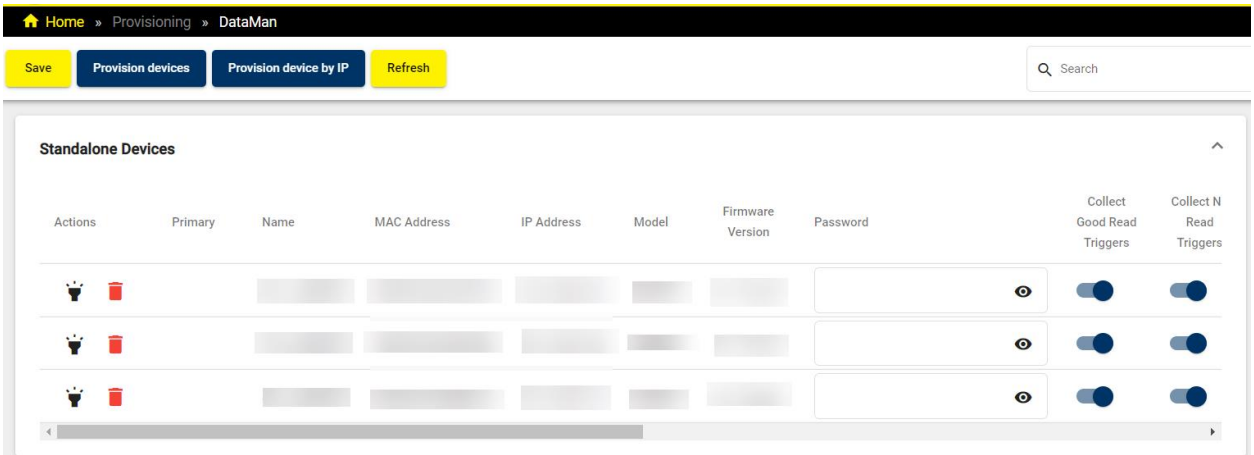
Item	Description
Configuration Changes	Lists variables that have different values in the compared versions
Read Setups	Display the name of the readers compared, and the difference in values pertaining to the row of the configuration scripts
Variable Name	Name of the variable which has different values in the compared versions
Script Name	Name of the recently modified script
Read Setup	Name of the read setup

Provisioning

The Provisioning app allows you to provision your connected devices and device groups, and allows you configure what data you want to collect from each of your devices, and manage your remote subnets.

DataMan

The DataMan page of the Provisioning app provides a list of standalone readers, as well as reader groups, and allows you configure what data you want to collect from each of your readers. You can also provision one or more of your readers at the same time, or individually by IP address.



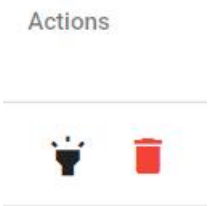
To refresh the list of connected readers, click **Refresh** in the header.

To provision readers, click **Provision devices** and use the pop-up dialog to select the readers. To provision a reader by IP address, click **Provision device by IP** and enter the reader IP address.

Click **Save** to apply any changes you make to data collection settings.

Actions

You can perform actions on an individual reader by clicking on the icons in the **Actions** column of the row for the selected reader:

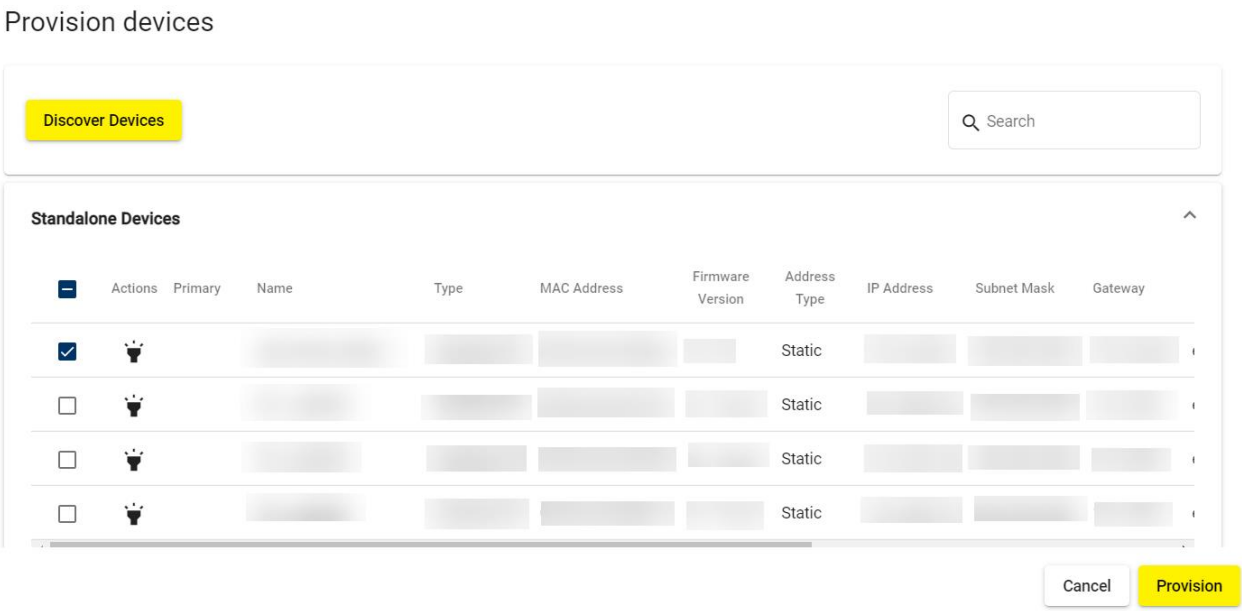


Icon	Action
	Flash LED
	Delete

- Click the **Flash LED** button to remotely trigger the LED of the reader for easy identification.
- Click the **Delete** button to remove the reader from the list.

Provisioning Devices

Click on **Provision devices** in the header to open the **Provision devices** pop-up dialog:



The **Provision devices** dialog provides a list of connected readers. To provision one or more readers, check the checkbox for the selected readers, and click **Provision**.

To flash the LED on a reader for easier identification, click the **Flash LED** icon in the **Action** column of the row for the selected reader.

To refresh the list of connected readers, click **Discover Devices**.

To search for a specific reader in the list, enter the name or IP address in the **Search** bar.

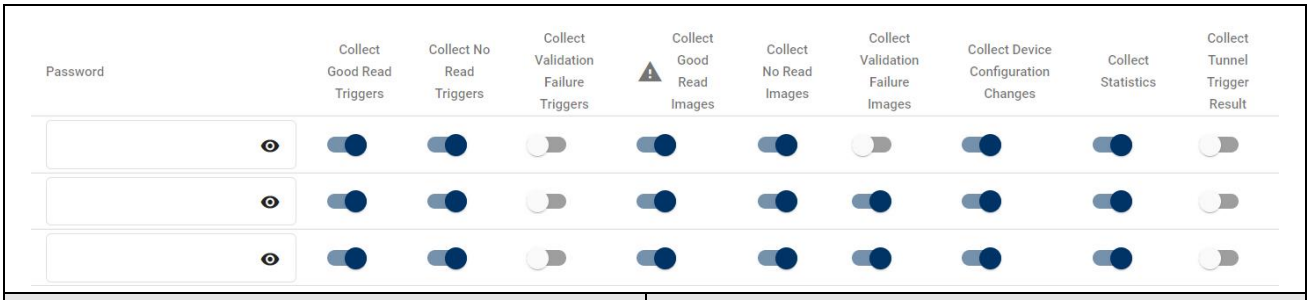
Provision Device by IP

Click on **Provision device by IP** in the header to open the **Provision device by IP** pop-up dialog:

Enter the IP address of the selected reader, and click **Provision**.

Data Collection Settings

You can modify collection settings for different types of data using the toggles in each column of the row for the selected reader:

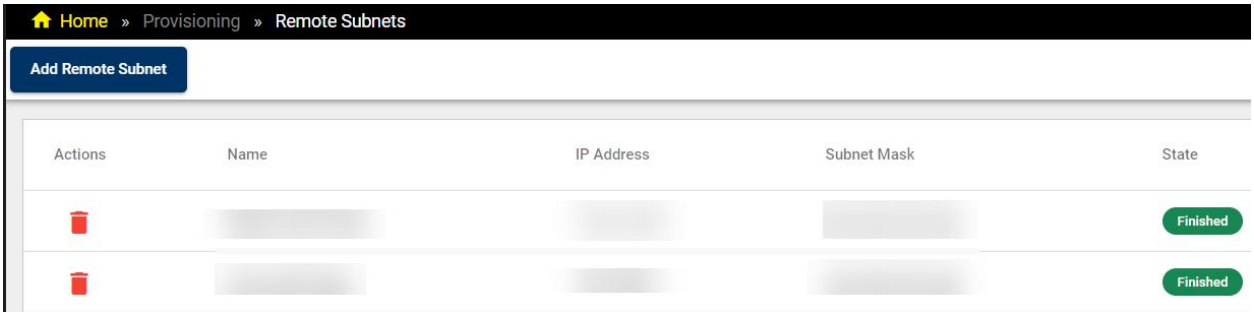


Column	Description
Password	Provide the password for the reader to make any changes.
Collect Good Read Triggers	Enable this setting to collect good read trigger data from the reader.
Collect No Read Triggers	Enable this setting to collect no read trigger data from the reader.
Collect Validation Failure Triggers	Enable this setting to collect validation failure trigger data from the reader.
Collect Good Read Images	Enable this setting to collect good read image data from the reader.
Collect No Read Images	Enable this setting to collect no read image data from the reader.
Collect Validation Failure Images	Enable this setting to collect validation failure image data from the reader.
Collect Device Configuration Changes	Enable this setting to collect reader configuration change data from the reader.
Collect Statistics	Enable this setting to collect statistics from the reader.
Collect Tunnel Trigger Result	Enable this setting to collect tunnel trigger results from the reader.

To order the list of readers by type of data collection enabled, click on a data collection column header.

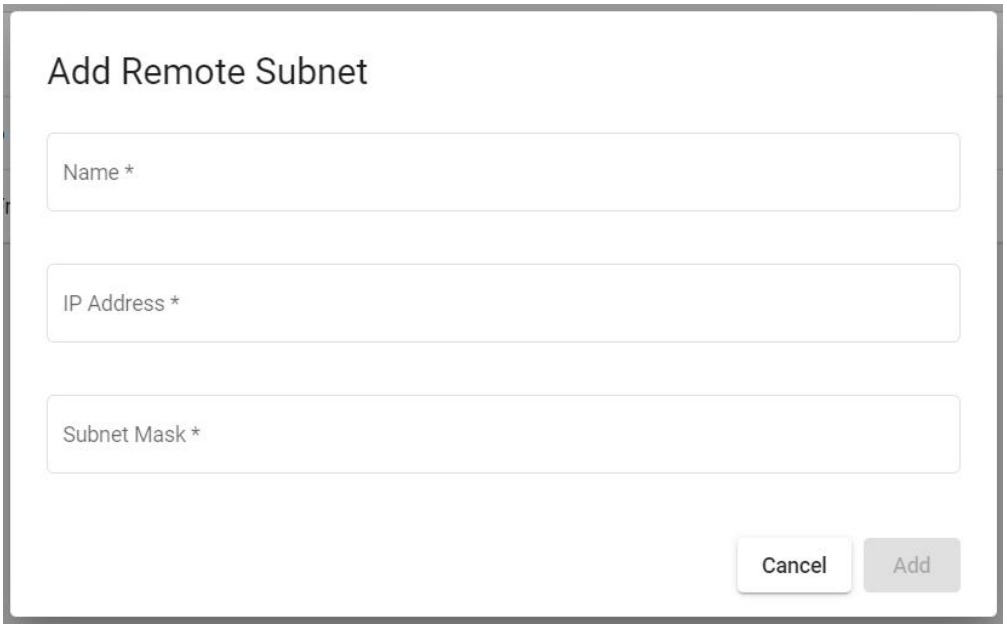
Remote Subnets

The Remote Subnets page provides a list of remote subnets, and allows you to add additional subnets.



To remove a remote subnet from the list, click on the **Bin** icon in the **Actions** column of the row for the selected subnet.

Click on **Add Remote Subnet** to open the **Add Remote Subnet** pop-up dialog:



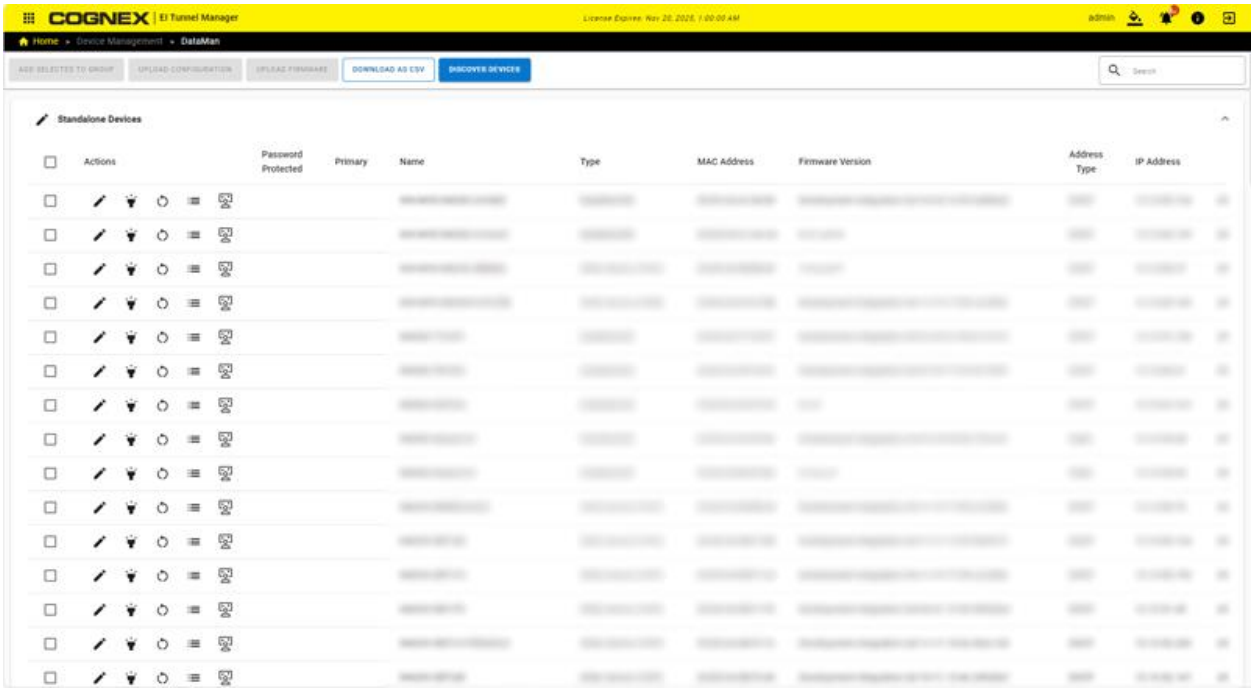
Enter the name, IP address, and subnet mask for the remote subnet you want to add, and then click **Add**.

Device Management

The Device Management app provides a list of standalone devices and device groups, shows device information, and allows you to modify settings on individual devices as well as multiple devices simultaneously. You can also save entire tables of device configuration data to your local machine.

DataMan

The DataMan page of the Device Management app provides a list of standalone readers and reader groups, including reader data. You can edit the configuration, flash the LED, reboot, or access the DataMan WebHMI of individual readers. You can perform mass configuration or firmware updates for reader groups.



Item	Description
Action ribbon	Provides quick access to actions you can perform on the selected readers. **Button** — **Description** **Add Selected to Group** — Add selected readers to MRS group. **Upload Configuration** — Upload a configuration file to the selected readers. **Upload Firmware** — Upgrade firmware on selected readers. **Download as CSV** — Download a list of readers as a CSV file. **Discover devices** — Find readers on the local and remote networks, depending on the configuration on the *Remote Subnets* on page 38 page.
Search Field	Allows for searching for a reader by any characteristic, such as name, model or firmware version.
Standalone reader list	A table view of the settings of the standalone readers that are discovered on the network with options that can be enabled or disabled for the reader.
Grouped reader list	Table views of the readers in a group sorted alphabetically by group name with options that can be enabled or disabled for the individual reader.

Columns of the Table View

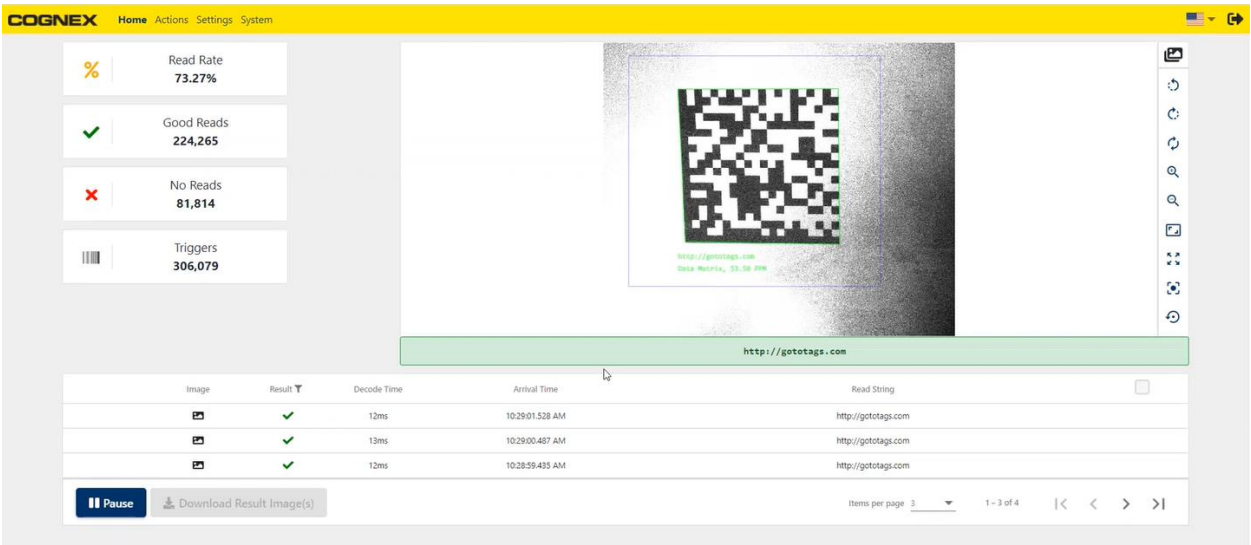
The table view of the standalone or group readers displays information and allows setting changes to the individual readers.

Column Title	Description

Actions	Click on the icons to perform actions on an individual reader. **Button** — **Description** **Edit Device Network Settings** — Modify the name, IP address, Subnet Mask, and Default Gateway of the reader. Enter the reader password if required. **Flash LED** — Remotely trigger the LED of the reader for easy identification. **Reboot** — Reboot the reader. **Show Device Logs** — Opens a window that shows the reader logs. In this window, you can reload to pull the latest logs or download them as *.log* file. **Open DataMan WebHMI** — Open the DataMan WebHMI in a new tab. For more information, see *DataMan WebHMI* on page 41.
Password Protected	Indicates whether the reader is password protected.
Primary	A check mark signifies the primary reader.
Name	A customizable name of the reader.
Type	The model of the reader.
MAC Address	The MAC address of the reader.
Firmware Version	The version of firmware installed on the reader.
Address Type	Indicates network address type (DHCP or static) for the reader.
IP Address	The IP address of the reader.
Subnet Mask	The subnet mask of the reader.
Gateway	The gateway of the reader.
Source Network Interface	The Ethernet port the reader uses for connection.
State	Displays the state of the reader, which can be: • In Local Subnet • In Remote Subnet • In Remote Subnet Behind NAT • Waiting For DHCP • Misconfigured • Unknown
Task Status	Displays the status of the task, such as rebooting, applying network settings, and name changes.

DataMan WebHMI

The DataMan WebHMI provides a live view of reads, results and statistics, and allows you to pause the feed and scroll back to analyze or download individual result images. You can manually trigger or tune readers and adjust reader settings from the DataMan WebHMI.



You can access the DataMan WebHMI for a connected reader from the DataMan page by clicking the icon labeled **Open DataMan WebHMI** in the **Actions** column of the selected reader.

Home

The DataMan WebHMI **Home** page displays a live feed of the reader with statistics and result logs.

On the left side, the DataMan WebHMI home page shows statistics for:

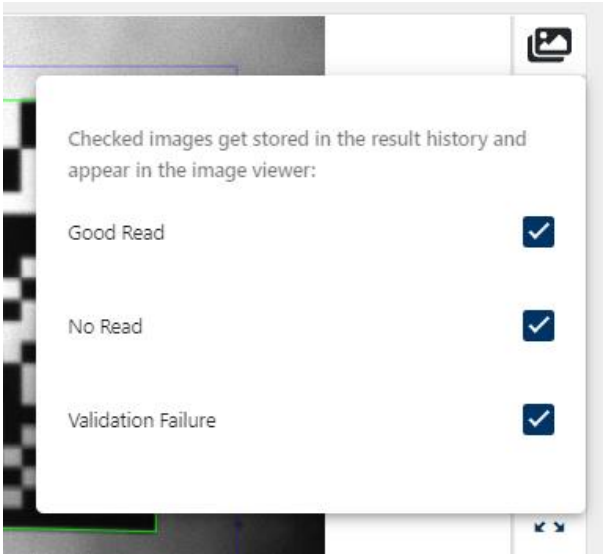
- **Read Rate** percentage
- Number of **Good Reads**
- Number of **No Reads**
- Number of **Triggers**

The display on the right side of the page provides a live feed of the reader view with additional controls on the right side of the display for changing orientation and zoom:

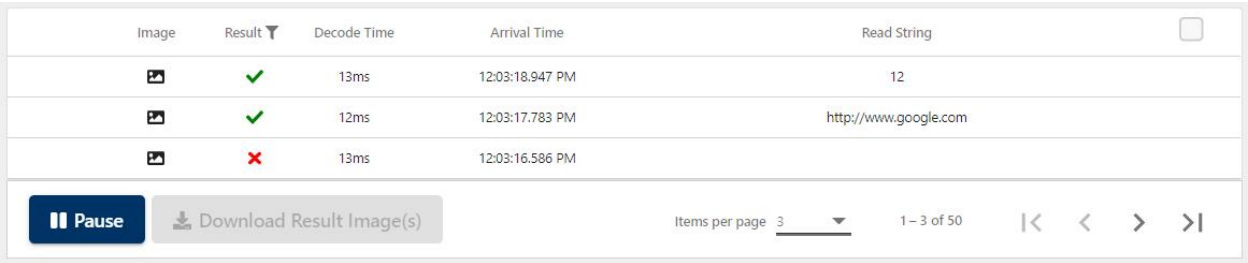
Icon	Action
	Rotate Left 90°
	Rotate Right 90°
	Reset Rotation
	Zoom In

Icon	Action
	Zoom Out
	Zoom To Original Size
	Reset Zoom
	Move Center
	Reset All Settings

You can also filter the feed to display only **Good Read**, **No Read**, or **Validation Failure** results by clicking on the **Images** icon in the top right corner of the display.



The result logs of the last 50 captures are listed on the bottom of the page. You can browse the list using the navigation buttons in the bottom right corner of the pane.



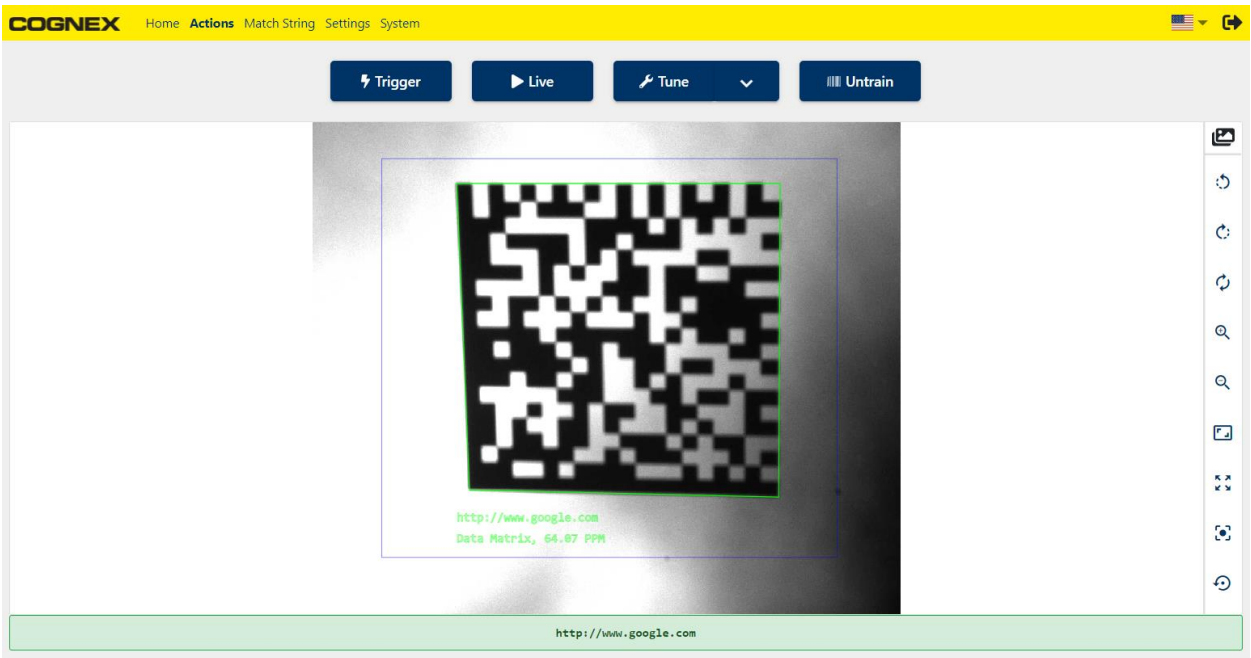
Click on the **Pause** button in the bottom left corner to pause the live feed. Pausing the feed allows you to select and download result images. Click on a log to put the result image on the display.

To download the image currently on the display, click on the **Download Result Image(s)** button without selecting any images from the result logs.

Check the checkboxes in the rightmost column of the result logs to select images for download, or check the checkbox in the table header to select all images. Click on **Download Result Image(s)** while multiple images are selected to download a ZIP file containing the selected result images.

Actions

The **Actions** page of the DataMan WebHMI allows you to manually trigger, start or stop, tune, or untrain the reader.



Click **Trigger** to trigger the reader manually.

Click **Live** to show the live feed of the reader.

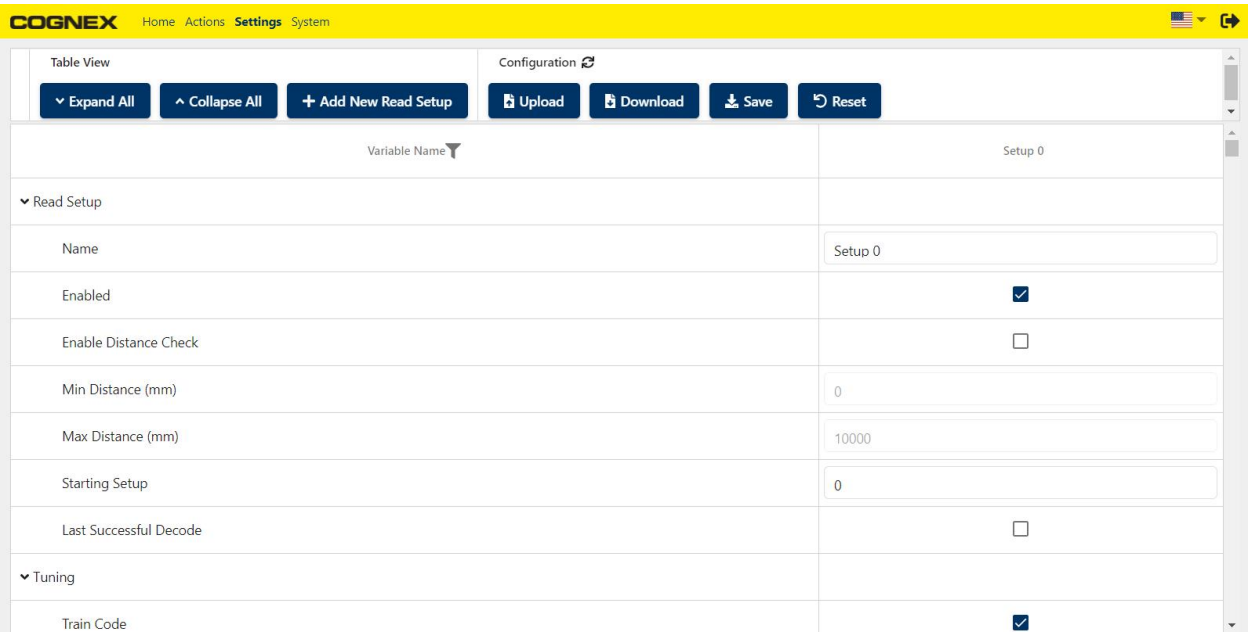
Click **Tune** to initiate an automatic recalibration. Open the Tune dropdown to optimize brightness or focus individually.

> **Note**: When you tune a reader, the reader stops triggering.

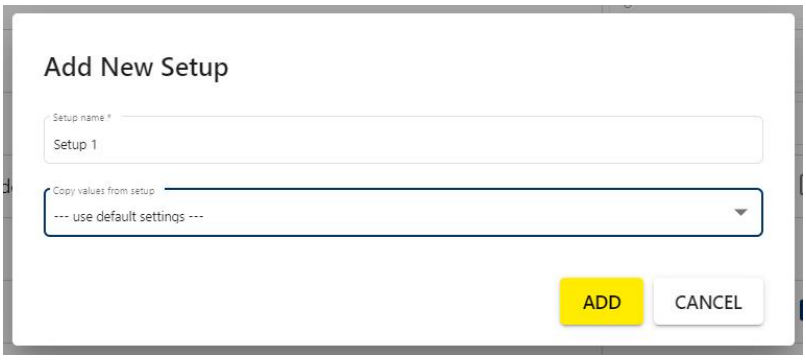
Click **Untrain** to untrain the reader.

Settings

The **Settings** page of the DataMan WebHMI allows you to manually change the reader configuration, upload, download, or save the current configuration, or reset the reader to a previously saved configuration.



- Click **Expand All** or **Collapse All** at the top of the page to expand or collapse the setting categories in the settings table.
- Click **Add New Read Setup** to create a new setup using default settings or an existing setup as a template.

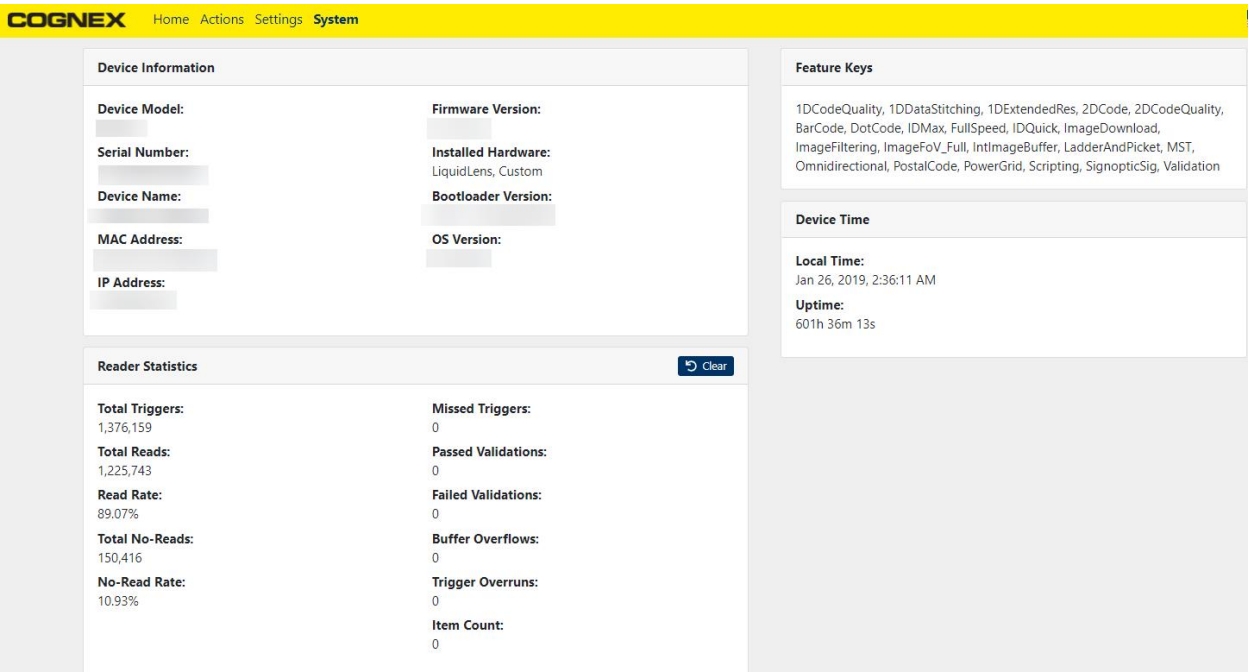


- Click **Upload** to upload a local configuration file to the reader.
- Click **Download** to save the reader configuration locally.
- Click **Save** to save the configuration on the reader flash memory.
- Click **Reset** to reset the reader configuration to default or a saved configuration.

The settings table provides you with detailed and in-depth configuration options for all reader functionality. Each setting corresponds to a control command for the reader. For a detailed description of the available settings for the reader you are configuring, see the corresponding control commands for the reader in the *DataMan Control Commands Documentation*.

System

The **System** page of the DataMan WebHMI displays detailed reader information, reader statistics, feature keys, and reader time.

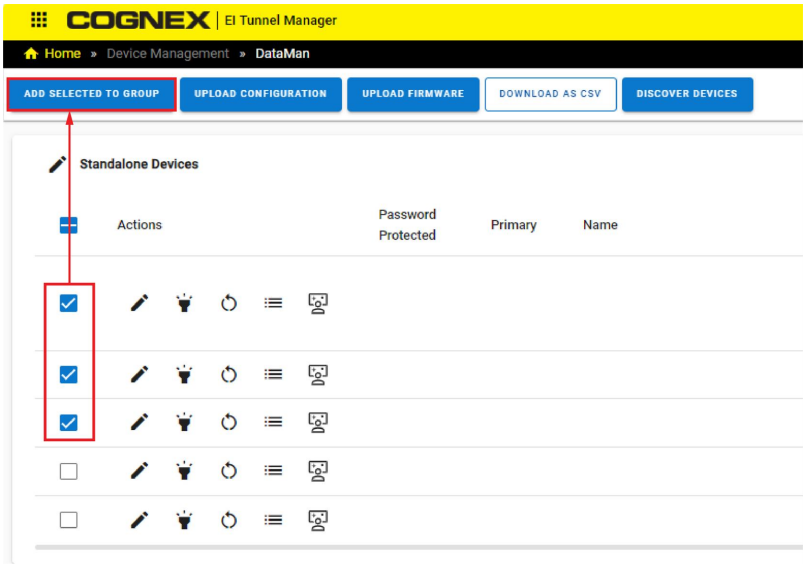


Add DataMan Readers to Groups

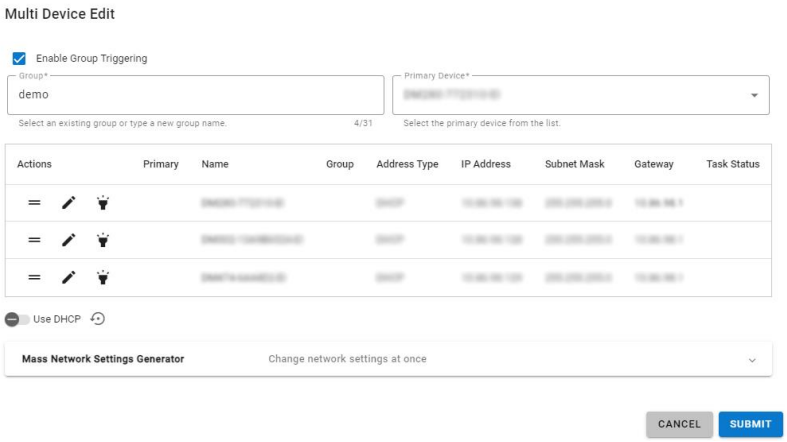
Create device groups to organize and manage the configuration of your readers collectively.

Procedure

1. Click the **Menu** icon and go to the **DataMan** page of the Device Management app.
2. Select one or more readers or reader groups using the checkboxes.
3. Click the **Add Selected to Group** button.



4. In the window that pops up:



   a. Type in the name of an existing group, or type a new group name.

   b. Select the primary reader in the group.

   c. Optionally, you can:

      - Reorder the readers in the group.
      - Flash the LEDs of the individual readers for easy identification.
      - Manually edit the network settings of each reader, or edit the network settings for every reader in the group with the **Use DHCP** toggle and the **Mass Network Settings Generator** option.

      > **Note**: When editing the IP address of readers in a group, the readers get sequential IP addresses. For example, if you enter 10.86.98.100 in the **IP Address** field, the first reader in the group gets the 10.86.98.100 address, and the other readers get 10.86.98.101, 10.86.98.102, and the subsequent addresses.

5. If editing a password-protected reader, enter the password.

6. Click **Submit**.

Upload Configuration to DataMan Readers

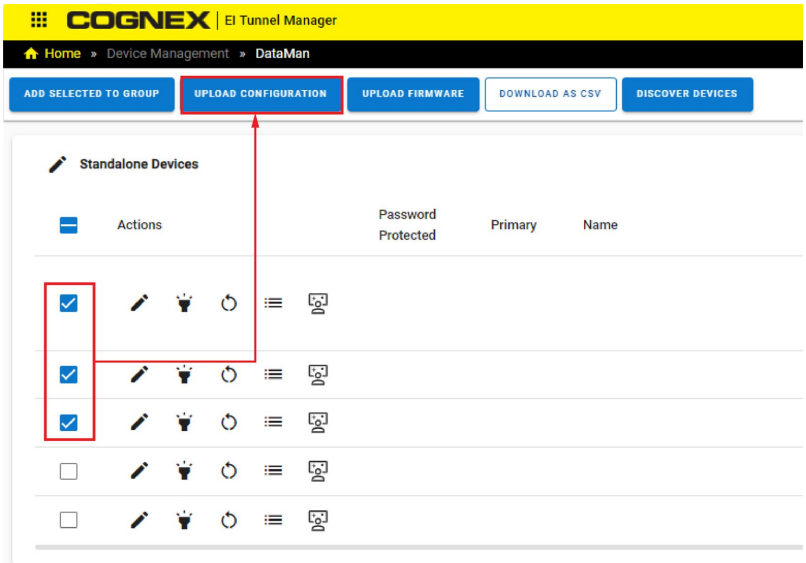
Upload a configuration file to one or more readers to apply the same configuration to multiple readers in one batch.

Procedure

1. Click the **Menu** icon and go to the **DataMan** page of the Device Management app.

2. Select one or more readers or reader groups using the checkboxes.

3. Click the **Upload Configuration** button.



4. Click **Browse** in the window that pops up.
5. Select the configuration file for upload.
6. If you want to apply network settings, enable the **Apply Network Settings** toggle.

   ⓘ **Note**: When uploading configuration to multiple readers, this option is disabled.

7. If editing a password-protected reader, enter the password.
8. Click **Submit**.

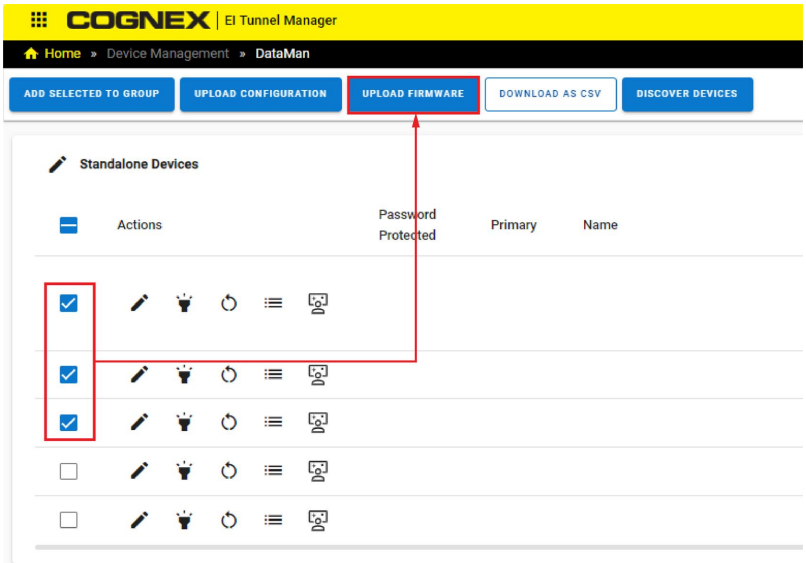
Upload Firmware to DataMan Readers

Upload a firmware file to one or more readers to update the firmware of multiple readers in one batch.

Procedure

1. Click the **Menu** icon and go to the **DataMan** page of the Device Management app.
2. Select one or more readers or reader groups using the checkboxes.

3. Click the **Upload Firmware** button.



4. Click **Browse** in the window that pops up.
5. Select the firmware file for upload.
6. If editing a password-protected reader, enter the password.
7. Click **Submit**.

Other Devices

The Other Devices page allows you to create a connection between the production network and devices on the subnet of an EI Tunnel Manager unit. The connection uses port forwarding to access the device through the IP address of the EI Tunnel Manager unit. Using this method, you can connect to devices such as a reader, dimensioner, network switch, or computer.

The following examples are typical use cases for port forwarding:

- Accessing the WebHMI of a DataMan reader or a 3D-A1000 dimensioner
- Connecting to a laptop through remote desktop

Connection Behavior and Timeout

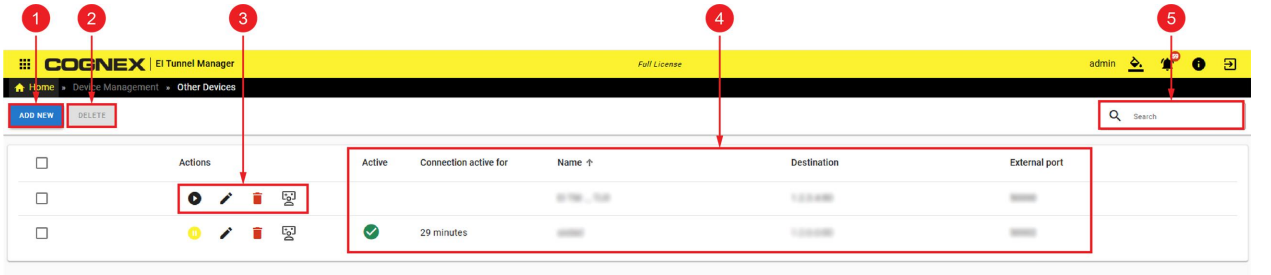
Connections automatically close after 30 minutes to support basic security principles. When a connection closes, all communications stop on that port. Processes in other apps that use the device through the connection also stop.

Connections operate based on the following behavior:

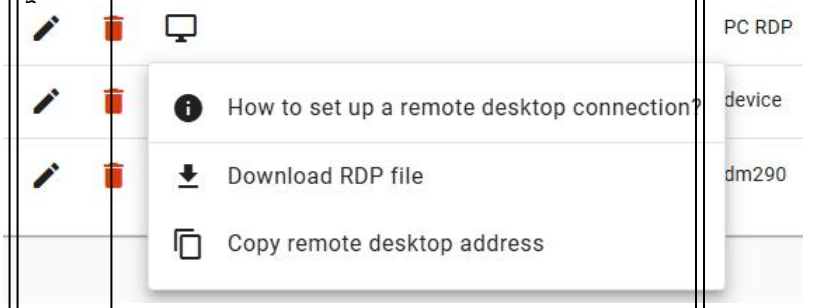
- Newly created connections start in a closed state.
- Editing a connection or opening the WebHMI changes the state to open.
- Opening the WebHMI refreshes the timeout of an active connection, keeping it open.
- To manually start or close a connection, click the **Start** or **Stop** action buttons in the user interface.

Features of the Other Devices User Interface

At first, the Other Devices page only provides an option to create a new connection. The connections you create appear in a list along with their name and network details. The list provides options to edit, delete, access, or filter your connections.



Number	Name	Description
1	**Add New** button	Opens the form where you can create a connection for a device.
2	**Delete** button	Deletes the selected connections. This button only becomes active after you select one or more connections from the list.
3	Actions	Several actions are available for each connection in the list.

Action	Description
Start/Stop	Starts or stops the connection.
Edit	Allows you to edit the connection. This action opens the same form used when creating the port forwarding configuration.
Delete	Deletes a connection.
Copy Device Address	Copies the IP address and port number of the device to the clipboard. This action is available only if you select the **Other Destination Type** when creating the configuration.
Remote Desktop	Downloads an *.rdp* file for connecting remotely or copies the remote desktop address to the clipboard, depending on the sub-option you select.  This action is available only if you select the **Remote Desktop Destination Type** when creating the configuration. **Note**: For more information about using an *.rdp* file, see the in-app help.
Open WebHMI	Opens the WebHMI of the device. This action is available only if you select the **WebHMI Destination Type** when creating the configuration.

4	Connection details	The connection list shows details for each connection. • **Active**: The state of the connection, open or closed. • **Connection active for:** The elapsed duration of the current connection. Connections automatically time out after 30 minutes. • **Name**: The unique name given when adding a new connection. • **Destination**: The IP address and port of the device. • **External Port**: The port by which you can access the device through the EI Tunnel Manager unit.
5	Search field	Filters the connection list. Enter any detail (name, destination, external port) to quickly find a specific connection.

Connect to Other Devices

You can connect from the production network to devices on the subnet of an EI Tunnel Manager unit by creating a port-forwarding configuration.

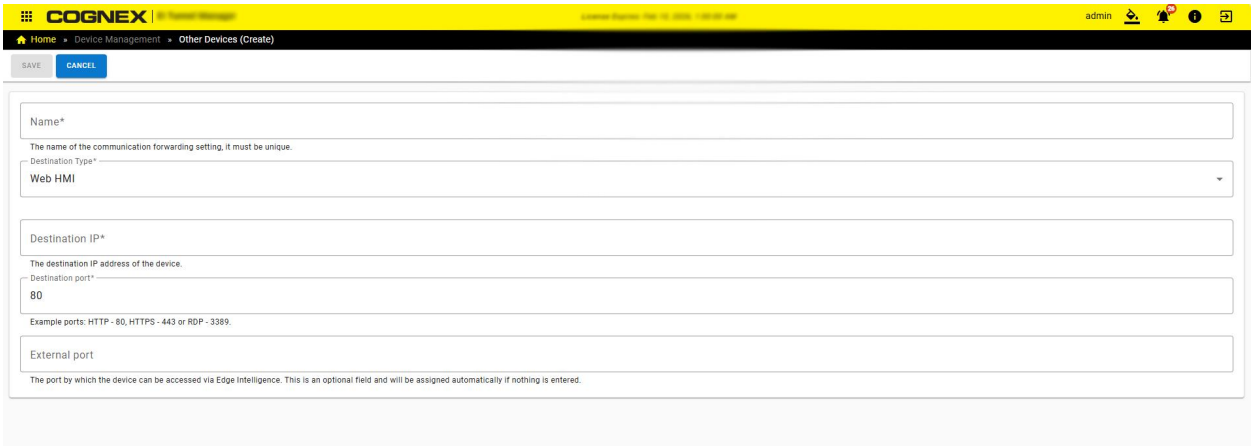
Prerequisites

Obtain the IP address and the port of the device you want to access.

Procedure

To create a new connection:

1. Open the **Apps** menu and select the *Other Devices* on page 49 page of the Device Management app.
2. Click **Add New**, which opens the form where you can configure port forwarding for a device.



3. Fill in the required fields:

Required Fields	Description
Name	The unique name of the connection. The name can only contain lowercase and uppercase letters, numbers, spaces, periods, hyphens, and underscores.
Destination Type	The type of access you want to configure for the device. Select an option from the dropdown menu: • **WebHMI**: Adds a button on the Other Devices page that opens the WebHMI of the device. • **Remote Desktop**: Adds a button on the Other Devices page that downloads an *.rdp* file for connecting remotely or copies the remote desktop address to the clipboard. • **Other**: Adds a button to the Other Devices page that copies the IP address and port number of the device to the clipboard.
Destination IP	The IP address of the device that you want to access. Ensure that each **Destination IP** and **Destination Port** combination is unique among your connections. ⓘ **Note**: The **Destination IP** cannot be the IP address of the EI Tunnel Manager unit.
Destination port	The port of the device that you want to access. You can use any of the valid ports of the device. If you do not know which port to use, consider the following examples: • Port 80 for HTTP • Port 443 for HTTPs • Port 3389 for a remote desktop connection

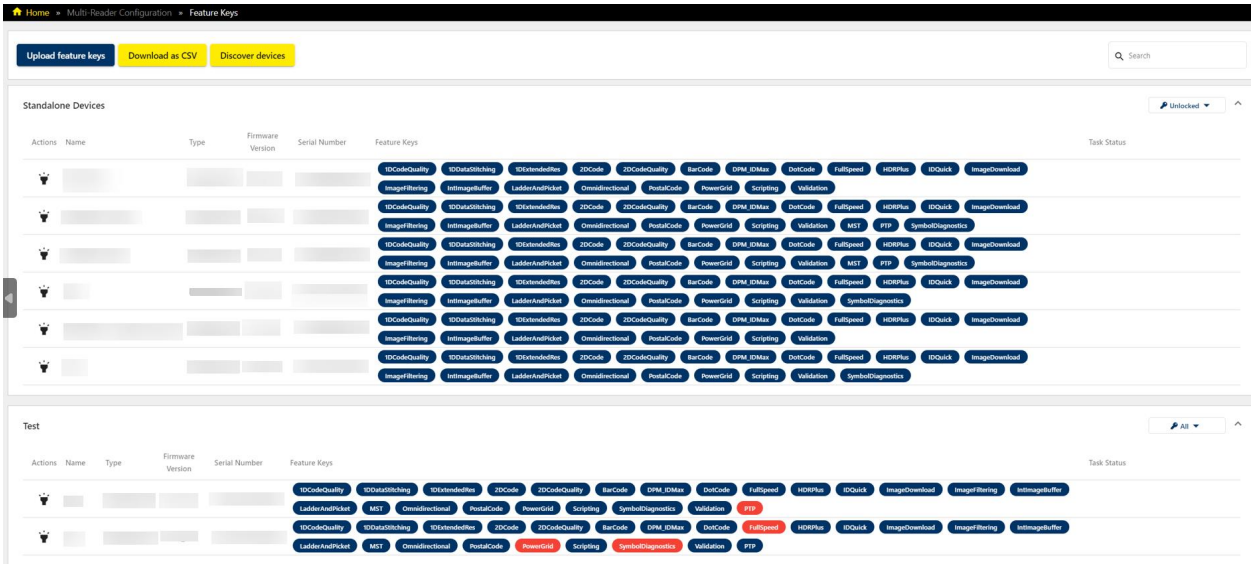
4. Option: To configure a specific open port of the EI Tunnel Manager unit for port forwarding, fill out the **External port** field. You have to use a unique external port for each connection. The available range is 50000-59999.

   ⓘ **Note**: If you leave the **External port** field empty, the EI Tunnel Manager unit automatically assigns a suitable port.

5. Click **Save**.

Feature Keys

The Feature Keys page shows the feature keys applied on each discovered reader.



The following actions are available:

- Uploading feature key files
- Downloading Feature Keys page information in CSV
- Discovering devices

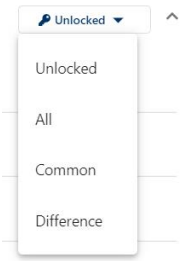
Upload feature keys	Download as CSV	Discover devices

Button	Description
Upload feature keys	Upload feature key files.
Download as CSV	Download device list with all data in CSV format.
Discover devices	Discover connected devices.

The Feature Keys page also allows comparing uploaded feature keys between readers in a group:

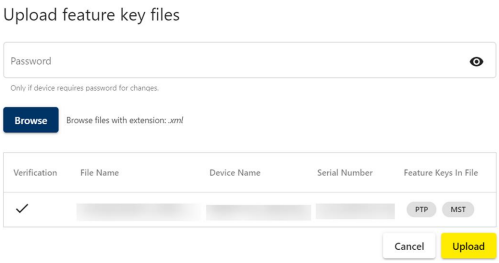
Feature Key Color	Description
BLUE	The feature is unlocked for the device.
RED	The feature is unlocked for some devices in the group, but not for the respective device.

Click the **Difference** dropdown menu to select the following menu items for comparison:



Item	Description
Unlocked	Show unlocked feature keys for all devices.
All	Show unlocked and locked feature keys for all devices.
Common	Show feature keys which are unlocked for all devices.
Difference	Show feature keys which have a different status among the devices.

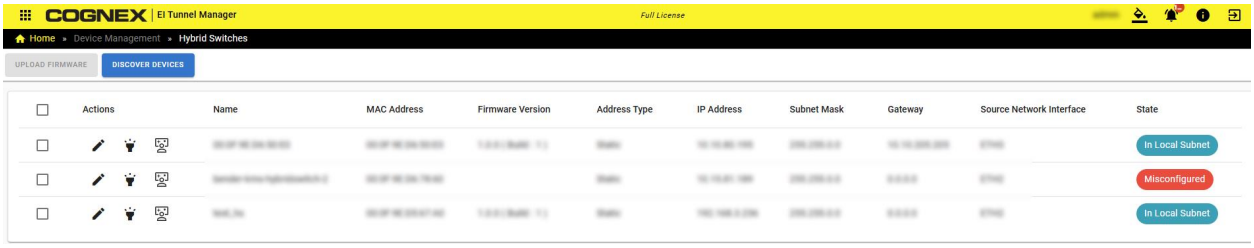
Click the **Upload feature keys** button to upload a feature key file from your computer:



Item	Description
Password	Password is only needed if the device requires a password.
Browse	Browse files with .xml extension on your computer.
Verification	Shows verified status.
File Name	Name of the feature key files.
Device Name	Name of the device which gets the new feature key file.
Serial Number	Serial number of the device.
Feature Keys in File	Feature keys contained in the file.

Hybrid Switches

The Hybrid Switches page of the Device Management app allows you to manage hybrid switches.



Item	Description
Action ribbon	Provides quick access to actions you can perform on the selected switches. **Button** — **Description** **Upload Firmware** — Upgrade firmware on selected switches. **Discover Devices** — Find switches on the local and remote networks, depending on the configuration on the *Remote Subnets* on page 38 page.
Device list	A table view of the settings of the switches that are discovered on the network with options that can be enabled or disabled for the switch.

Columns of the Table View

The table view of the switches displays information and allows setting changes to the individual switches.

Column Title	Description
Actions	Click on the icons to perform actions on an individual switch. **Icon** — **Button Name** — **Description** **Edit Switch Network Settings** — Modify the name, IP address, Subnet Mask, and Default Gateway of the switch. **Flash LED** — Remotely trigger the LED of the switch for easy identification. **Open WebHMI** — Opens the WebHMI in a pop-up window. For more information, see the WebHMI Window section in this topic. **Note**: When you connect directly to the Tunnel Manager using a monitor, the **Open WebHMI** button is not available.
Name	A customizable name of the switch.
MAC Address	The MAC address of the switch.
Firmware Version	The version of firmware installed on the switch.
Address Type	Indicates network address type (DHCP or static) for the switch.
IP Address	The IP address of the switch.

Subnet Mask	The subnet mask of the switch.
Gateway	The gateway of the switch.
Source Network Interface	The Ethernet port the switch uses for connection.
State	Displays the state of the switch, which can be: • In Local Subnet • In Remote Subnet • In Remote Subnet Behind NAT • Waiting For DHCP • Misconfigured • Unknown

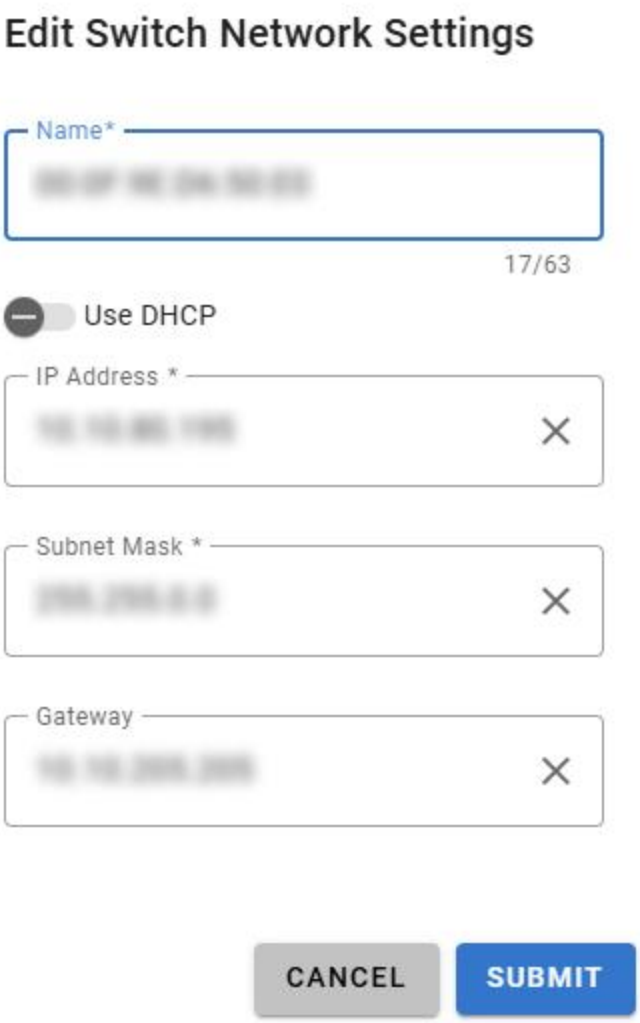
Add Hybrid Switch

If the switch list does not contain switches or contains misconfigured switches, you can discover and configure switches.

To add a hybrid switch:

1. Click **Discover Devices**.
2. Find the switch whose state is **Misconfigured** in the switch list and click the **Edit Switch Network Settings** icon next to it.

   The **Edit Switch Network Settings** window pops up.



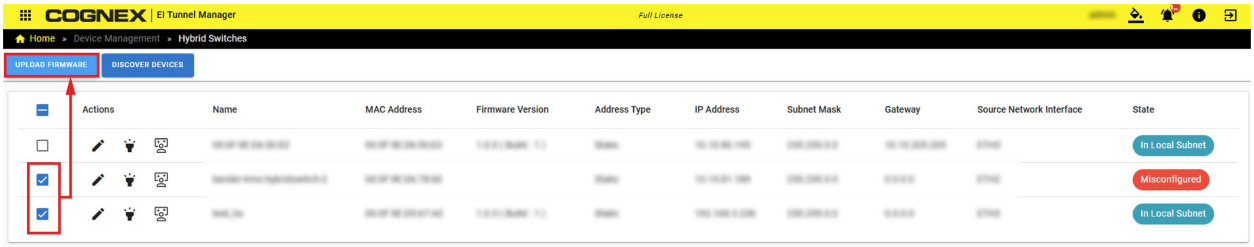
3. Disable the **Use DHCP** toggle.
4. Edit the **IP Address**, **Subnet Mask**, and **Gateway** so that the switch is on the correct local or remote subnet.
5. Click **Submit**.

   The state of the switch in the switch list is now **In Local Subnet**.

Upload Firmware to Hybrid Switches

To upload firmware to one or more switches:

1. Select one or more switch from the switch list.
2. Click the **Upload Firmware** button.

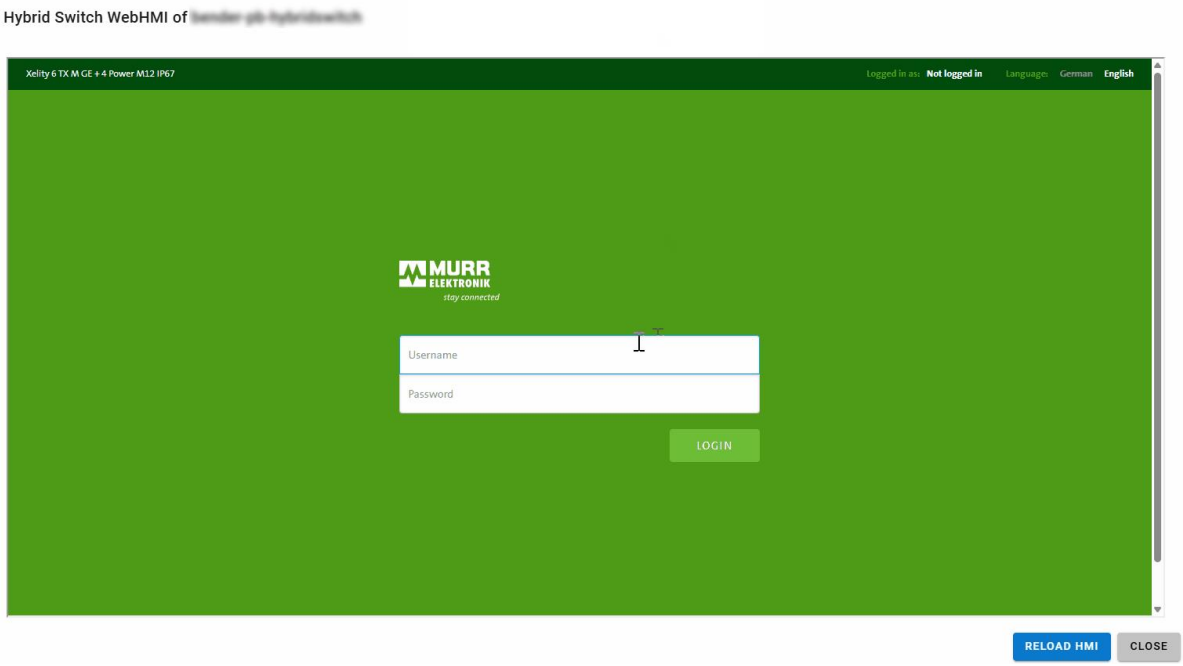


3. Click **Browse** in the window that pops up.
4. Select the firmware file for upload.
5. Click **Submit**.

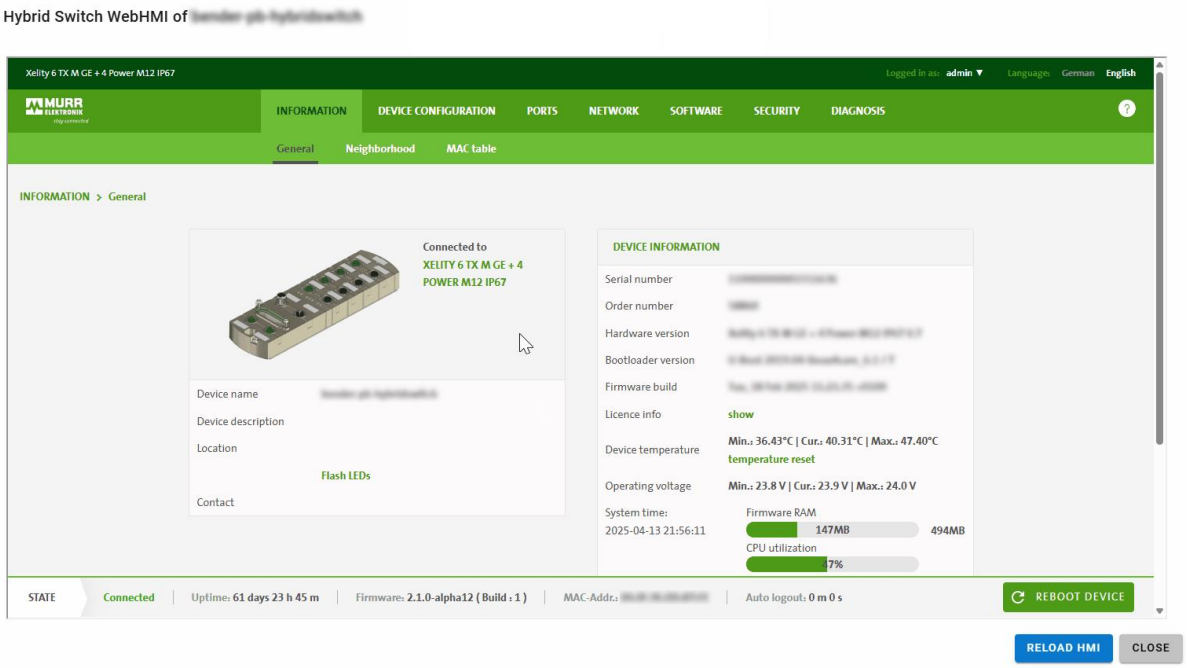
Accessing the WebHMI Window

The WebHMI window provides a connection to the WebHMI interface of the hybrid switch. When you connect directly to the Tunnel Manager using a monitor, the **Open WebHMI** button is not available.

To access the WebHMI, click the **Open WebHMI** button in the action column. The WebHMI opens in a pop-up window and prompts you to log in:



After logging in, you have access to the WebHMI interface of the switch:



You can click **Reload HMI** to reset the WebHMI, this prompts you to log in again. To return to the Hybrid Switches page, click **Close**

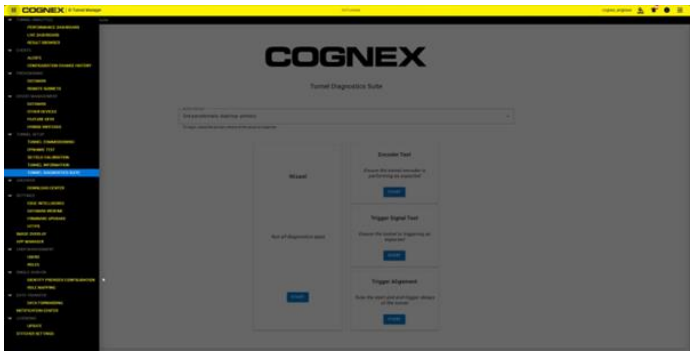
Tunnel Setup

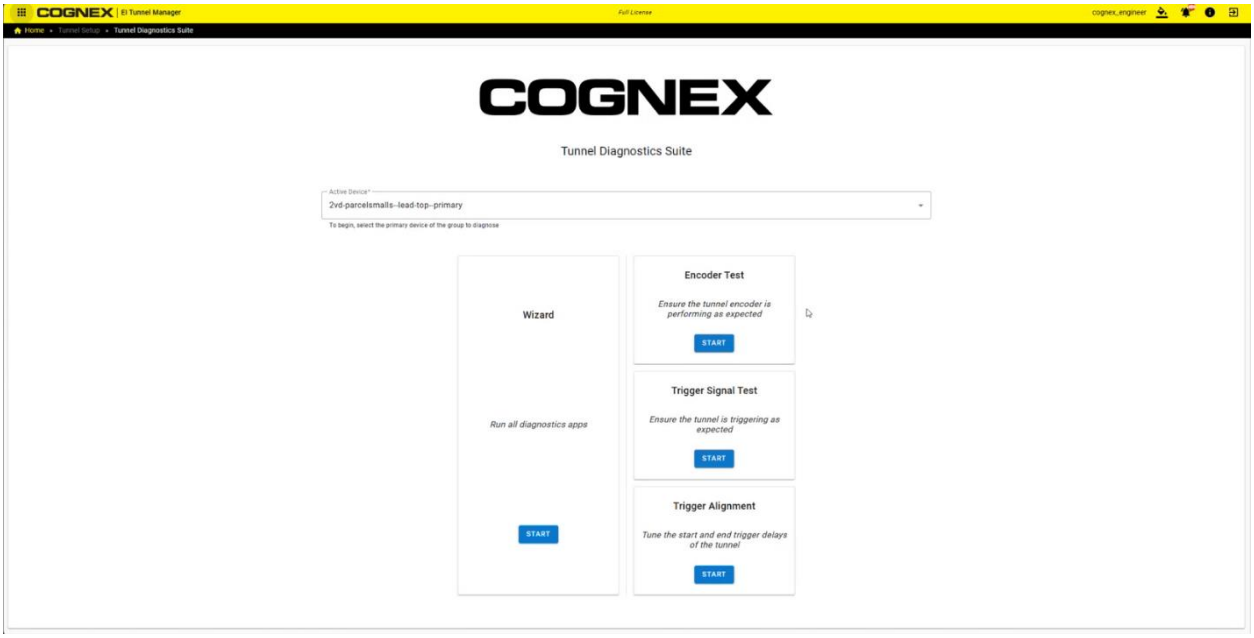
The Tunnel Setup app allows you to perform dynamic tests and 3D calibration on your device.

Trigger Alignment

Tunnel Diagnostic Suite

Go to the Tunnel Diagnostic Suite page to begin the setup wizard (Encoder Test, Trigger Signal Test, and Trigger Alignment).



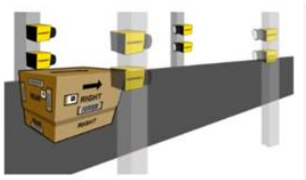


Encoder Test

1. Bring the conveyor belt up to full production speed.

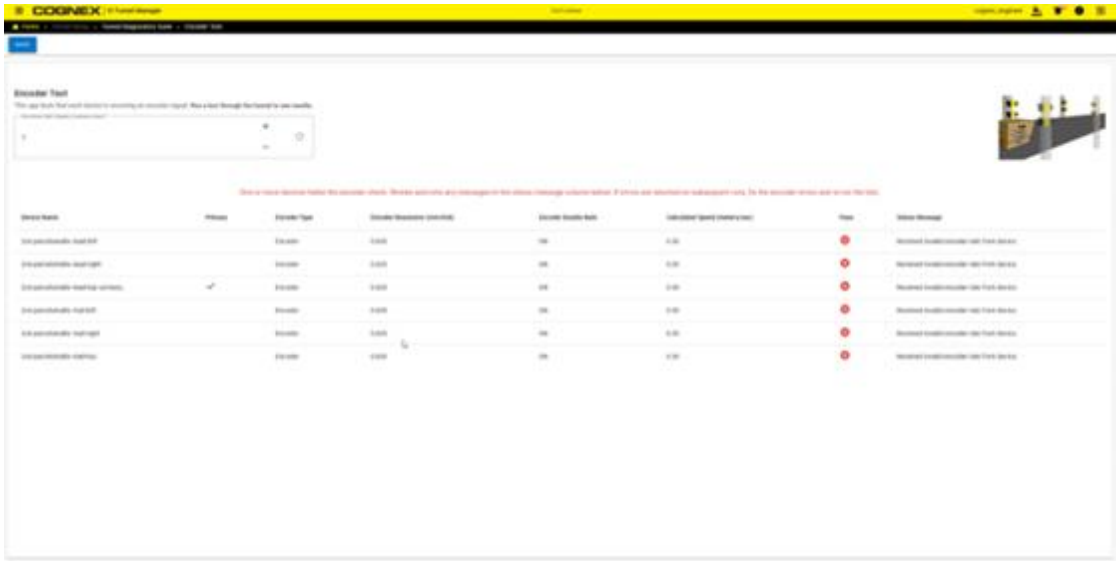
2. Use a tachometer to measure the belt speed.
3. Enter the **Nominal Belt Speed (meter/sec)**.

4. Run a box through the tunnel. Any orientation is acceptable.



5. Verify that the encoder resolution matches your expected values.
   For the Modular Vision Tunnel, the expected values are 0.653 mm/tick for the **Encoder Resolution** and the **Double Rate** is **ON**.

6. Verify that the **Calculated** speed matches the speed of your conveyor.



Encoder Types supported:

- Fixed Speed: The user specifies a single speed value through DMST or DMCC. All primary and secondary DataMan devices operate at this speed. The speed remains constant until a new value is provided and replaces the current setting.
- Encoder
- Encoder Upscaling: Increases the resolution of an incoming encoder signal by generating additional ticks to match a user-defined target resolution.
- Measured Speed Dual Input: Conveyor speed is calculated from two hardware trigger inputs. The user defines the distance between devices, and the primary DataMan device computes speed from the timing between rising edges. This speed value is shared with each of the secondary cameras through MRS messaging.
- Single Input Primary
- Invalid

Status Messages:

- Device communication failure
- Failed to calculate primary device speed.
- Received invalid encoder rate from device.
- Received invalid encoder resolution from device.
- Calculated speed differs by ${percentage}% from the specified belt speed

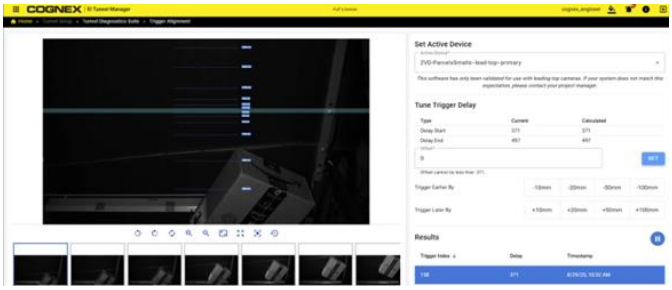
7. Click **Next Step**.

Trigger Alignment

The Trigger Alignment page lets you add and tune a trigger delay. Send the Dynamic Test box down the conveyor and through the tunnel to get a baseline for the trigger.

Note: The green section is specific to your project. Calculate the distance between the green section and the leading edge of the package (or where you want to trigger the delay)

1. Enter the **Offset** (±).
   In this example, it would be +150.
2. Click **Set**.
3. Run packages through the tunnel to test the delay.
4. Update the **Offset**, if necessary.
5. Click **Save and Apply**.
6. Use the **Results** section to confirm the delay.



Dynamic Test

Dynamic Test is a diagnostic tool in the Tunnel Setup app. The test allows you to validate the proper functioning of your vision tunnel. During the initial commissioning of the vision tunnel, Cognex engineers use this test to validate that the vision tunnel functions properly. The engineers ensure that the test is run correctly, and they address all issues. It is a standard procedure for new installations.

While the test is typically part of the installation process, you can rerun the test any time to validate that the vision tunnel still functions correctly. If you run into an error during the test, refreshing the page can likely solve the error. If the error persists, contact Cognex technical support for further assistance.

Note: The Dynamic Test can have variations to fit various vision tunnel designs. This document describes one common type of Dynamic Test but you might have a different variation. Despite this, most of the guidance here is still relevant.

- In some variations, the test includes only a center position, without the left- and right-justified tests.
- Certain variations allow you to skip the encoder check or do not include it at all. This is more common when using a non-belted conveyor, such as a tilt tray, crossbelt, or bomb-bay system.

Prepare the Target Box for the Test

The Dynamic Test uses a special target box that you have to build specifically for the purpose of the test. The box and a sheet of adhesive 1D and 2D code labels comes with the tunnel delivery.

Prerequisites

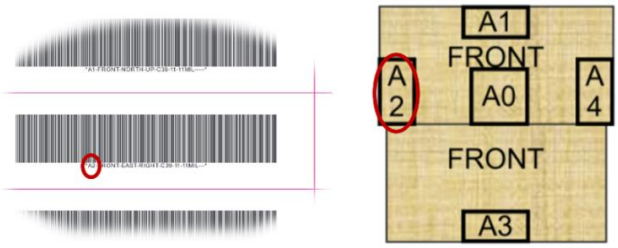
Locate the box and the sheet of adhesive 1D and 2D code labels.

Procedure

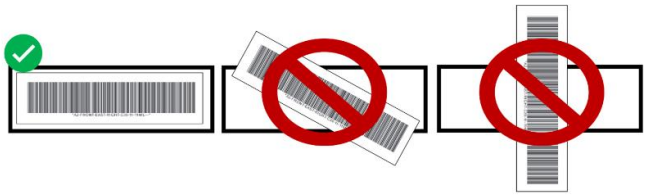
To prepare the box for the test:

1. Build the box.
2. Adjust the height of the box to the maximum height supported by the vision tunnel.

3. Apply each code label within the corresponding rectangular outline on the box.
   a. Match the first two characters of the code content and the two characters printed within the rectangle.



   b. Apply the label within the rectangle printed on the box.

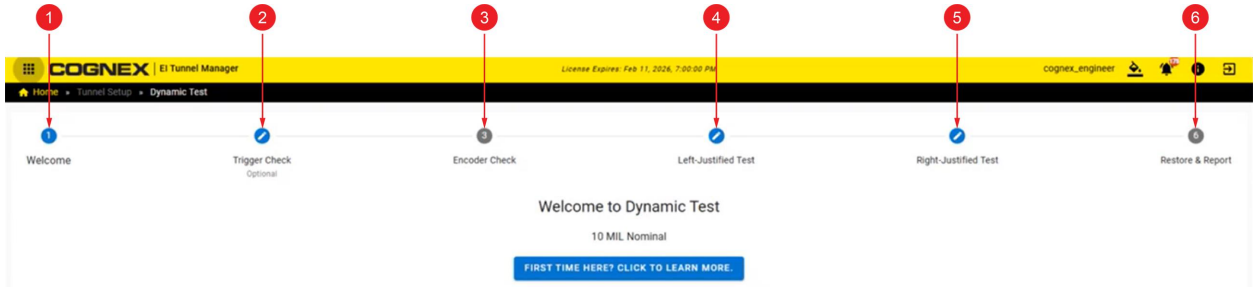


Steps of the Dynamic Test

During the Dynamic Test, you physically run a target box, specifically built for the test, through the vision tunnel multiple times. The readers take images of the box as it runs through the vision tunnel on the conveyor belt. While the box runs on the conveyor belt, you navigate through the steps of the test in the user interface of your Tunnel Manager unit. The test validates the proper functioning of the vision tunnel and gives you visual feedback and detailed test results in the user interface for each step.

The test consists of six steps, which you can access through the Dynamic Test page of the Tunnel Setup app. The user interface guides you through the steps. The test is mostly automatic and it requires little user input.

The following image shows the steps of the test in order.



Step	Description
1	The *Welcome* on page 64 step prepares the readers on the vision tunnel for the test.
2	*Trigger Check* on page 65 is an optional step, which validates whether the box passing through the vision tunnel correctly triggers the readers.
3	The *Encoder Check* on page 66 step validates whether each reader is receiving an encoder signal.

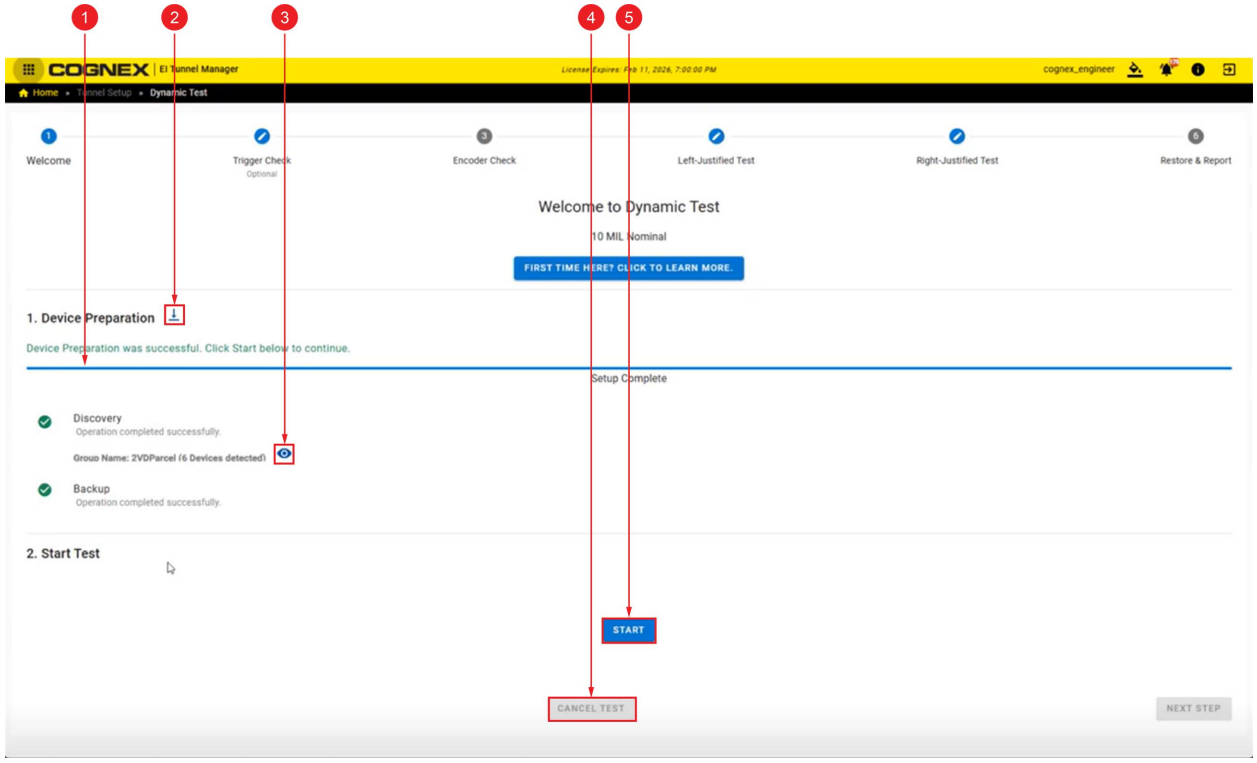
4	The *Left-Justified Test* on page 66 step validates that the readers properly read barcodes if the box is running on the left side of the conveyor belt.
5	The **Right-Justified Test** step is similar to the **Left-Justified Test**, but the box is running on the right side of the conveyor belt.
6	The *Restore & Report* on page 70 step restores the readers to their original settings and allows you to generate and download a report of the test results.

Welcome

This step prepares the readers on the vision tunnel for the test as follows:

1. Runs device discovery to discover the Multi-Reader Sync (MRS) group of the vision tunnel.
2. Makes backups of the reader settings.
3. Modifies the reader settings for the purposes of the test.

Note: At the end of the test, the app restores the original settings of your readers and reboots them. You can manually download the backups, but it is not necessary.



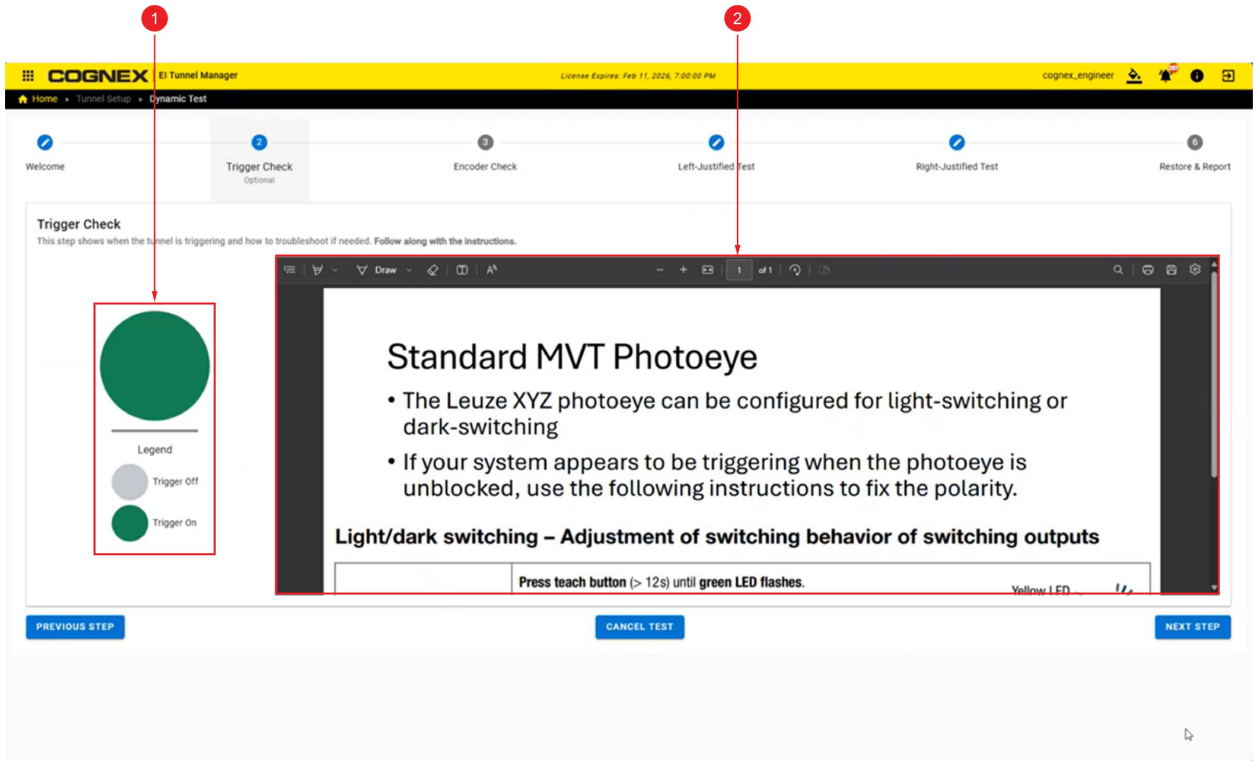
Number	Description
1	The progress bar gives you information about the status of the current step of the test.
2	Click the download button to manually download the backups.

3	Click the eye icon to access detailed information about the readers in the MRS group.
4	Click **Cancel Test** if you want to cancel the test for any reason. If you cancel the test, the app automatically restores the original settings of your reader.
5	Click **Start** to proceed to the next step.

Trigger Check

The **Trigger Check** step helps you to validate whether the box passing through the vision tunnel correctly triggers the readers. This is an optional step, which means that you can skip this step and still complete the test. If there is a problem with triggering, however, the test might fail because of it.

Vision tunnels typically use a photoeye to control the triggering. The photoeye, also known as a photoelectric sensor, detects the presence or absence of boxes using a light beam. When a box interrupts the light beam, the photoeye senses this change and sends out a signal that turns the trigger on. The test validates whether the trigger signal and the trigger delay settings are correct.

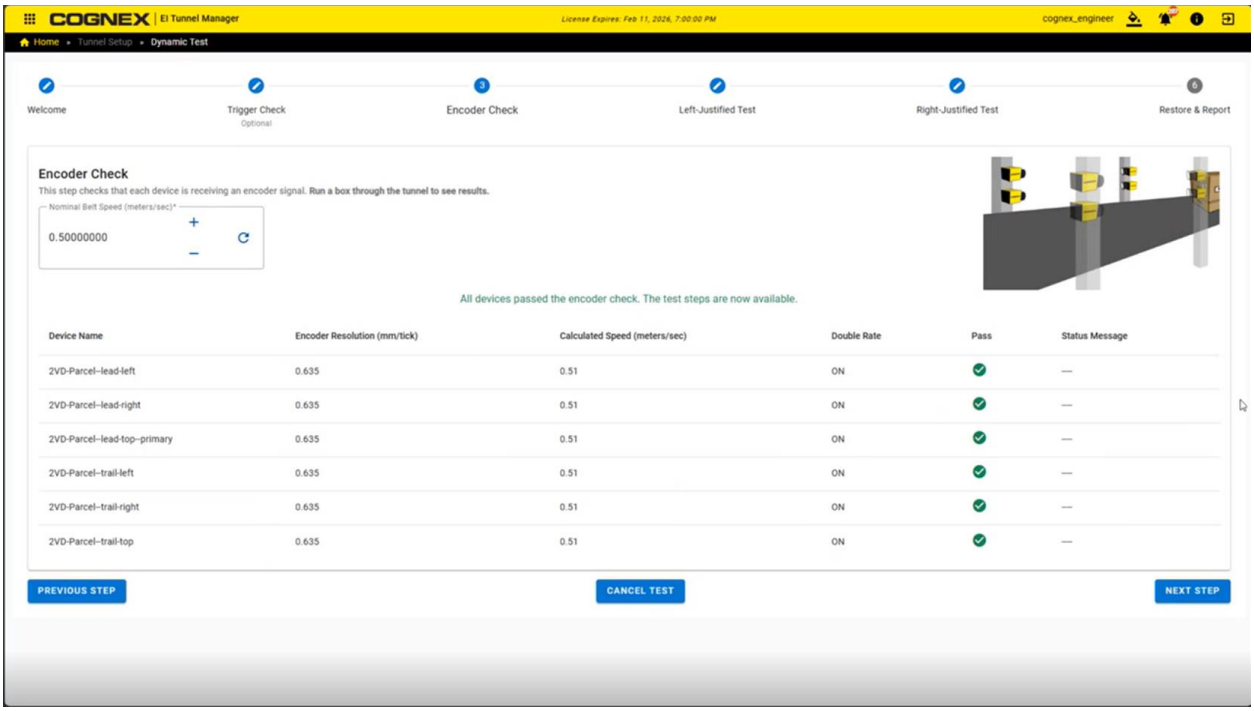


Number	Description
1	The green circle on the left side of the user interface shows that the trigger is currently on. If the circle is grey, the trigger is currently off. As the box passes through the vision tunnel, validate that the trigger turns on and off at the correct time.
2	The **Trigger Check** step shows instructions for fixing common problems with the photoeye. The instructions appear on the right side of the user interface.

Encoder Check

In the **Encoder Check** step, first specify the normal speed of your conveyor belt using the input field. Then run the target box through the vision tunnel to validate that each reader is receiving an encoder signal.

After the box passes through the vision tunnel, the results appear in the user interface. Each line represents a reader and provides the following details:



Element	Description
Device Name	The name of the reader.
Encoder Resolution	This is a setting of the reader.
Calculated Belt Speed	The calculated belt speed is computed based on encoder pulses received by the reader, the encoder resolution, and the trigger time. **Note**: Inconsistent calculated speed results can indicate physical (electrical wiring, mechanical coupling) problems or configuration errors.
Double Rate	This is a setting of the reader.
Pass	A green check mark or a red **X**, indicating whether the test passed or failed.
Status Message	Provides additional information about the reason why the test failed.

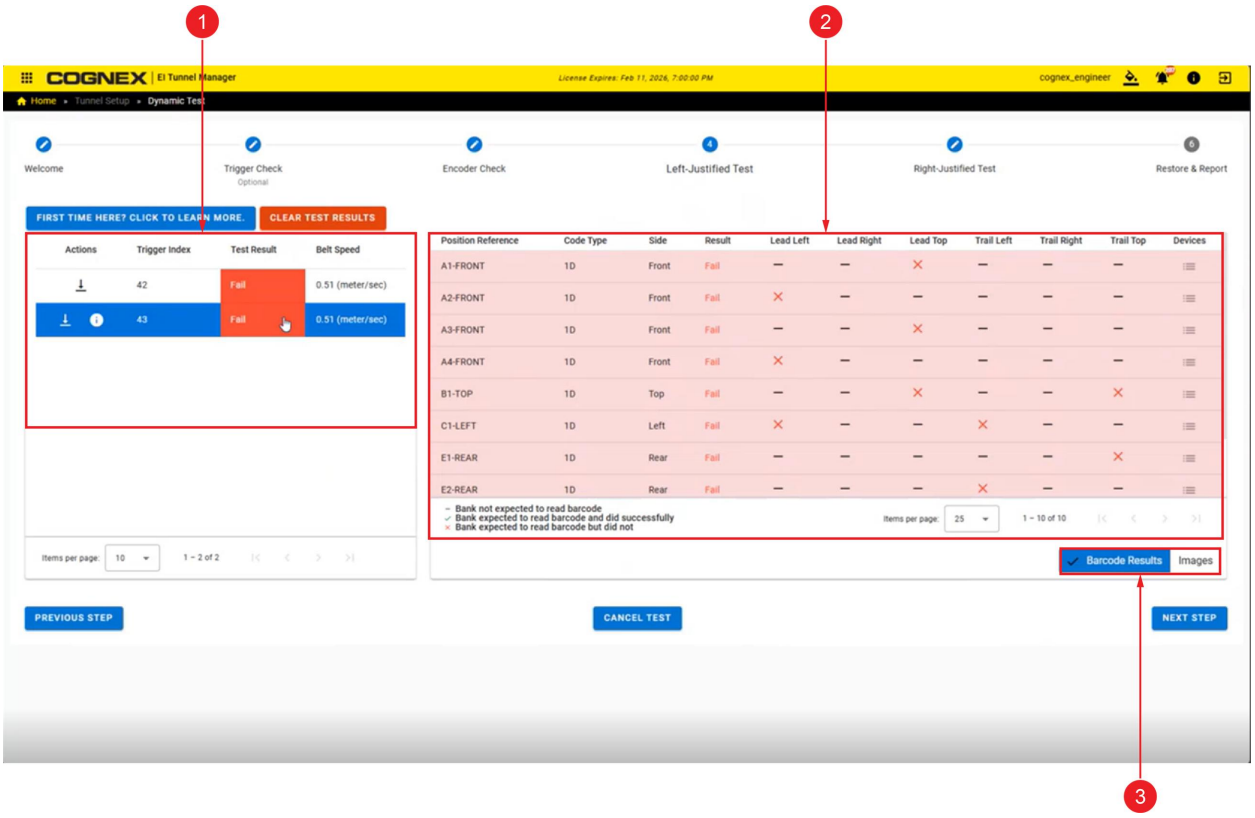
Left-Justified Test

The **Left-Justified Test** step involves running the target box through the vision tunnel. You place the box on the left side of the conveyor belt with the front of the box facing downstream. The test validates whether the readers can read the various codes on the target box in this position.

After the target box passes through the vision tunnel, the test results appear in the left side of the user interface, with one row for each test run. If you select a row, more detailed test results appear in the right side of the user interface. A green check mark indicates that the test passed, while a red **X** indicates that the test failed.

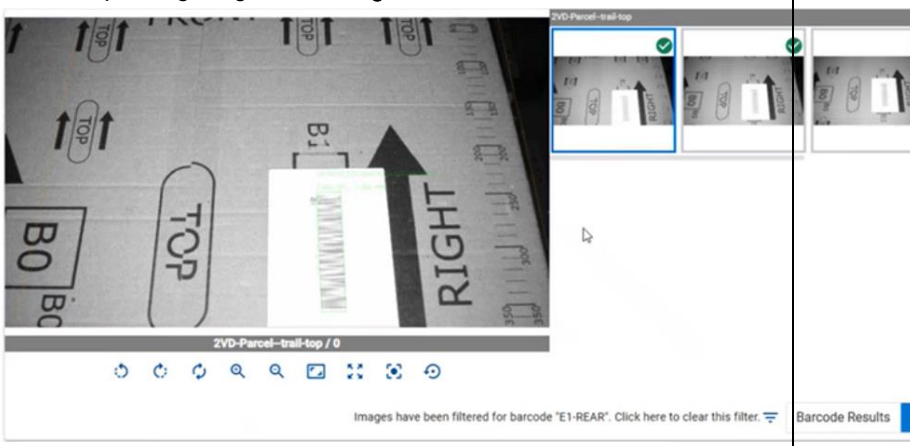
- At belt speeds of less than 300 fpm, every code needs to be read at least once.
- At faster belt speeds, each code needs to be read by the specific banks (group of readers on the vision tunnel).

Note: The **Right-Justified Test** step is similar to the **Left-Justified Test**, but the box is placed on the right side of the conveyor belt instead of the left side.



Number	Description

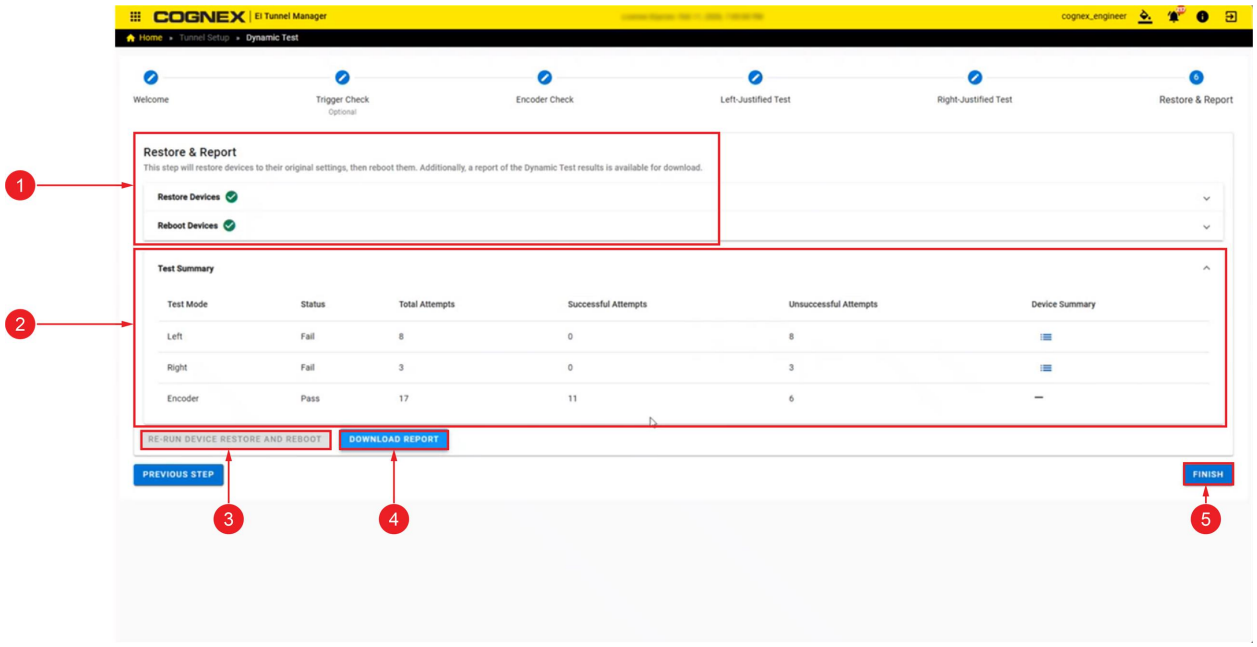
1	In this section, the results of each test run appear after the box passes through the vision tunnel.
	• **Actions** column:
	  • Click the download icon to download detailed information about the barcodes read by the readers.
	  • Click the information button to see the same details in a pop-up window.
	• **Trigger Index**: The index number assigned by the reader associated with the test run.
	• **Test Result**: Can be **Pass** or **Fail**.
	• **Belt Speed**: The speed of the conveyor belt at the time of the read.
	To get more details about a test run in the right side of the user interface, click one of the rows.
	To clear the results in this section, click the **Clear Test Results** button.

2	This section provides more detailed information about the selected test result. Using this information, you can determine which specific tests passed or failed. The details only appear in this section after you have selected one of the tests in the previous section. The image shows the **Barcode Results** tab, which displays a table of the barcodes used in the test and the readers expected to read them. The **Barcode Results** tab provides the following information: • **Position Reference**: The area on the box where the specific barcode is applied. • **Code Type**: The type of the barcode, such as 1D or 2D. • **Side**: The side of the target box where the specific barcode is applied. • **Result**: Can be **Pass** or **Fail**. This indicates whether the bank was able to read the barcode as expected. • From **Lead Left** to **Trail Top**: These refer to the banks of your vision tunnel. Each bank is expected to read a specific barcode on the target box. • **Devices**: Click the icons in this column to access more details about your readers in a pop-up window. Not all banks are expected to read every barcode on the box. • A blank (-) appears in the table if a bank was not supposed to read a specific barcode. • A green check mark indicates that the bank was expected to read the barcode and it was a good read. • A red **X** indicates that the bank was expected to read the barcode but it was a no-read. If you click on a specific test in the **Barcode Results** tab, you are taken to the corresponding image in the **Images** tab. 
3	Click these buttons to switch between the **Barcode Results** view and the **Images** tabs.

Restore & Report

The **Restore & Report** step automatically restores the readers to the original settings and reboots them to ensure that all settings are effective. After the reboot, the test summary appears in the user interface. You can download the report as a *.pdf*.

The summary includes the number of attempts, indicating how many times you ran the target box through the vision tunnel, and the number of failed attempts. Ideally, the summary should show that the box ran through the vision tunnel a few times and the test passes every time.



Number	Description
1	The **Restore & Report** section indicates the status of reader restoration and reboots. After the readers reboot, the results appear in the **Test Summary** section.

2	The **Test Summary** section provides a quick overview of the mandatory tests and their results. • **Test Mode**: Refers to the test, such as **Left-Justified Test**. • **Status**: Can be Pass of Fail. • **Attempts**: Refers to the number of times you ran the target box through the vision tunnel. The **Test Summary** lists the total number of attempts, and the number of successful and unsuccessful attempts. Click the buttons in the **Device Summary** column to access additional information about how many codes the different readers read. **Right Justified Test Device Summary** Name ↑ / Read Count ↑ 2VD-Parcel–trail-top / 7 2VD-Parcel–trail-right / 7 2VD-Parcel–trail-left / 9 2VD-Parcel–lead-top–primary / 12 2VD-Parcel–lead-left / 13 2VD-Parcel–lead-right / 17 CLOSE
3	Click the **Re-Run Device Restore and Reboot** button to re-attempt failed reader restorations or reboots.
4	Click the **Generate Report** button to download the test report as *.pdf*. For more information, see *Generate Dynamic Test Report* on page 74.
5	Click the **Finish** button to return to the Tunnel Manager home page.

Run a Dynamic Test

The *Dynamic Test* on page 62 involves running the target box through the vision tunnel multiple times, allowing the readers to take images and validate the proper functioning of the vision tunnel. The test consists of six steps, which are mostly automated and require minimal user input.

If you have to abort the test at any time, you can click on the **Cancel** button at the bottom of the page in each step.

Prerequisites

Before you start, ensure that the following prerequisites are met:

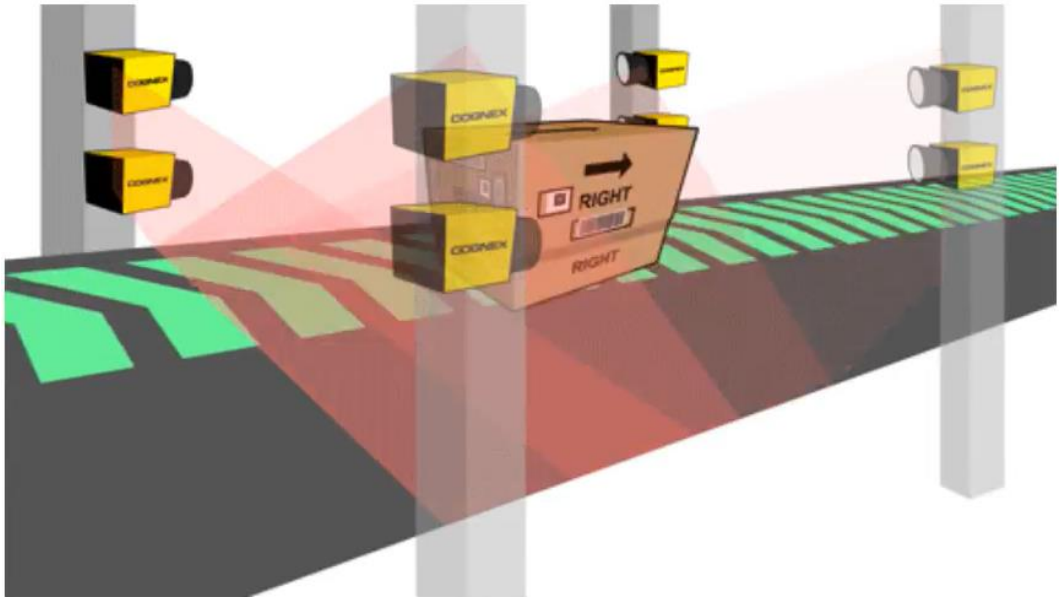
- Learn about the test and its various steps by reading *Steps of the Dynamic Test* on page 63
- *Prepare the Target Box for the Test* on page 62
- Add weight to the box to ensure it stays on the conveyor belt. Always give the box enough distance before the vision tunnel, so it moves through at full speed.

Procedure

To run the dynamic test:

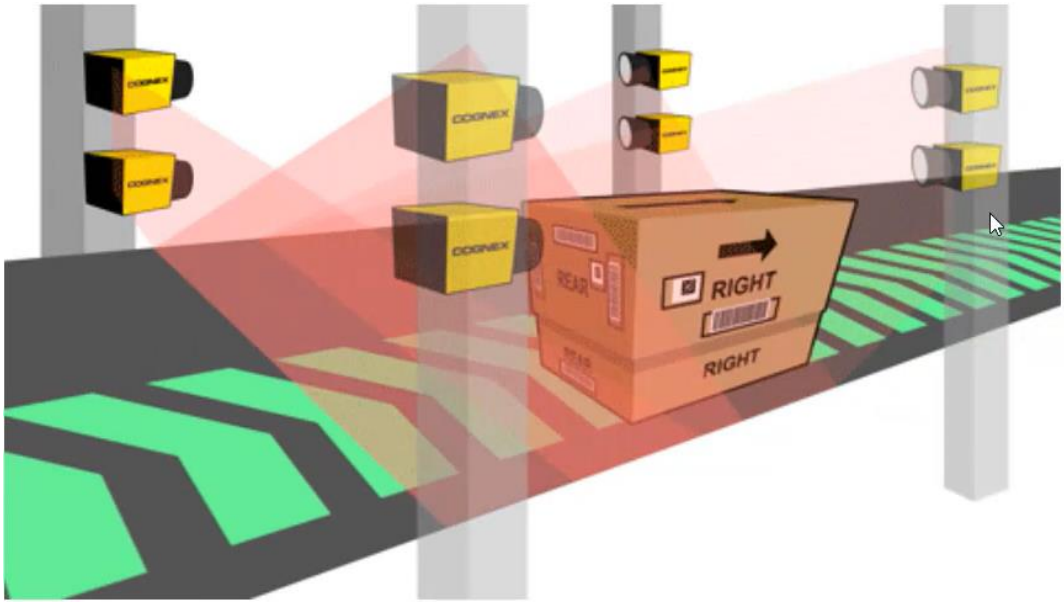
1. Open the **Apps** menu and select the Dynamic Test page of the Tunnel Setup app. You are now at the *Welcome* on page 64 step.
    a. Wait until the app finishes preparing your readers.
    b. To continue to the *Trigger Check* on page 65 step, click **Start**.
2. Option: In the **Trigger Check** step, validate that the readers are triggered correctly.
    a. To validate the trigger settings, run the box through the vision tunnel, and validate that the trigger turns on and off at the correct time.
    b. If the check fails, follow the instructions on the right side of the user interface to fix common problems with the photoeye.
    c. To continue to the *Encoder Check* on page 66 step, click **Next Step**.
3. In the **Encoder Check** step, first set the **Nominal Belt Speed** to the actual speed of your conveyor belt.
    a. Place the box on the conveyor belt.
    b. Bring your conveyor belt up to full production speed and run the box through the vision tunnel.
    c. If any of the readers fail the check:
        i. Review and note the messages in the status message column.
        ii. If errors are returned on subsequent runs, click **Cancel Test**, which restores the readers to the original settings.
        iii. Fix the encoder errors, for example using DataMan Setup Tool then restart the Dynamic Test.
    d. If every reader passes the test, click **Next Step** to continue to the *Left-Justified Test* on page 66 step.

4. In the **Left-Justified Test** step:
   a. Place the box on the left side of the conveyor belt with the front side of the box facing downstream.



   b. Run the box through the vision tunnel. If possible, run the box at both slower (less than or equal to 300 ft/min or 1.52 m/s) and faster belt speed (greater than 300 ft/min or 1.52 m/s).
   c. As the box runs through the vision tunnel, the test results appear in the user interface.
      - If any **X**s appear, it indicates that a test failed.
        - To review the no-read image, click on the row that has an **X**. Reviewing the image can tell you why the reader could not read the barcode.
        - You might have to run the box multiple times through the vision tunnel to pass.
      - If all of the rows have green check marks, it means that the readers can read the barcodes correctly.
   d. To continue to the **Right-Justified Test** step, click **Next Step**.

5. In the **Right-Justified Test** step:
   a. Place the box on the right side of the conveyor belt with the front side of the box facing downstream. Otherwise, this step has the same workflow as the previous step.



   b. Run the box through the vision tunnel the same as in the previous step, then review the results.
   c. If all of the rows have green check marks, click **Next Step** and the **Complete Dynamic Test** pop-up appears.
6. To complete the test and continue to the next step, click **Confirm**.

After the Procedure

- The *Restore & Report* on page 70 step automatically restores your readers to their original settings.
- Option: Generate and download a report of the test results. For more information, see *Generate Dynamic Test Report* on page 74.

Generate Dynamic Test Report

In the **Restore & Report** step of the *Dynamic Test* on page 62, you can download the test report in *.pdf* format.

To generate and download the test report:

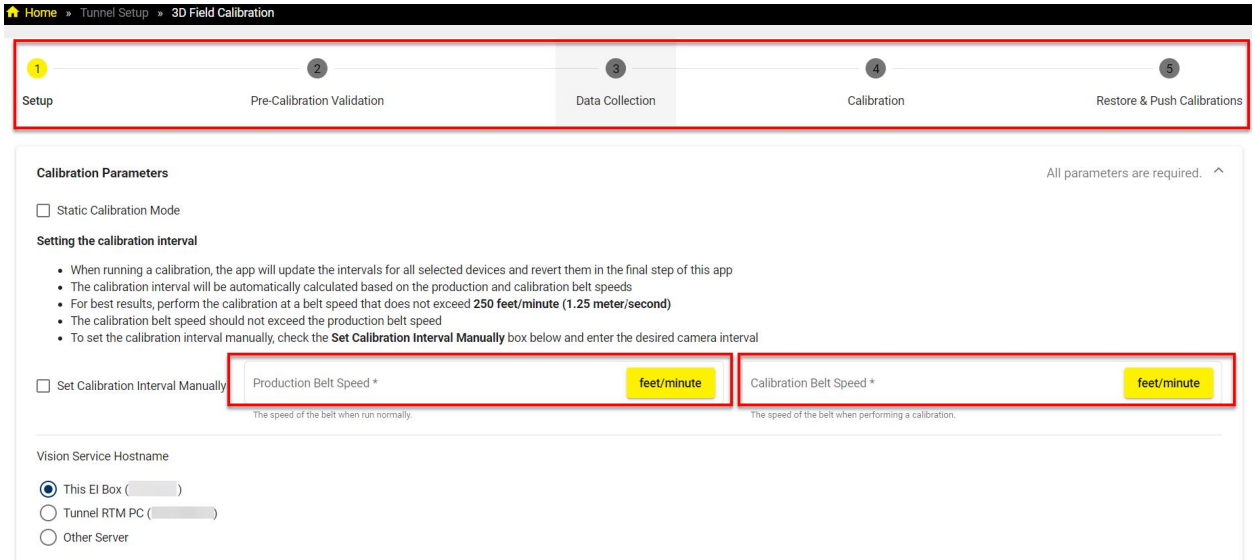
1. In the **Restore & Report** step of the Dynamic Test, click **Download Report**.
2. Fill in the details in the pop-up window.
3. Click **Generate Report**, which automatically downloads the file into the download directory on your computer.

3D Field Calibration

The 3D Field Calibration page allows you to calibrate devices which consists of five different steps allowing for features such as barcode assignment.

Before getting started:

- Complete the **Dynamic Test** page steps.
- Make sure that the dimensioner collects the data.
- Disconnect DataMan Bottom Side Line Scan and Image-Only readers.

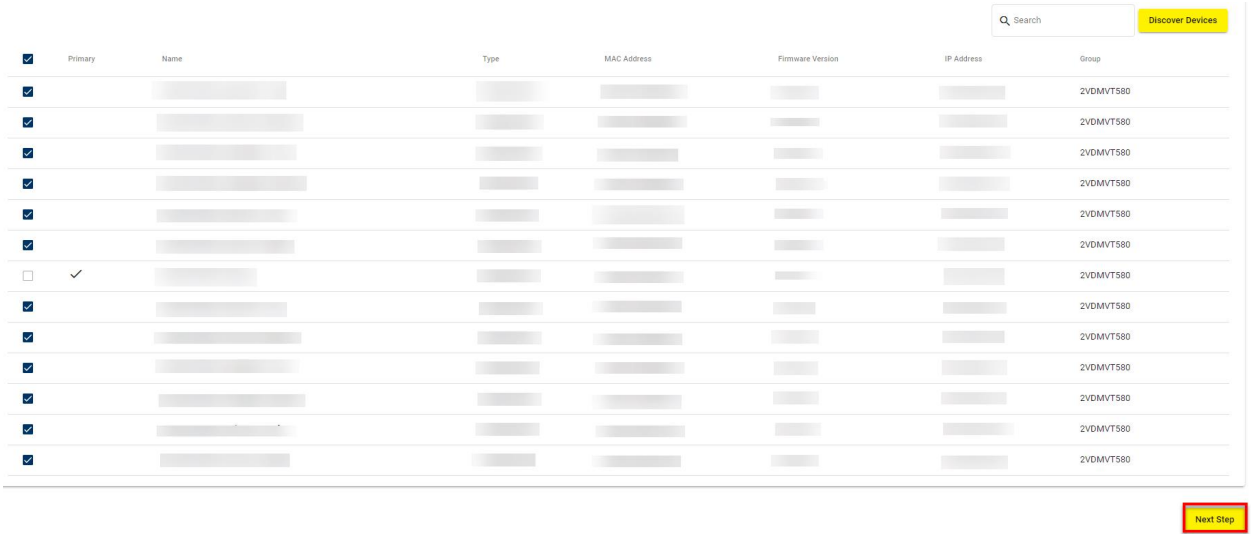


This EI Box for the *Vision Service Hostname* and *LGM-CALIBBOX-556* for the *Calibration Box Type* are by default selected values.

1. In the first step, start with setting the calibration interval. Enter conveyor parameters which are **Production Belt Speed** and **Calibration Belt Speed** and select readers:

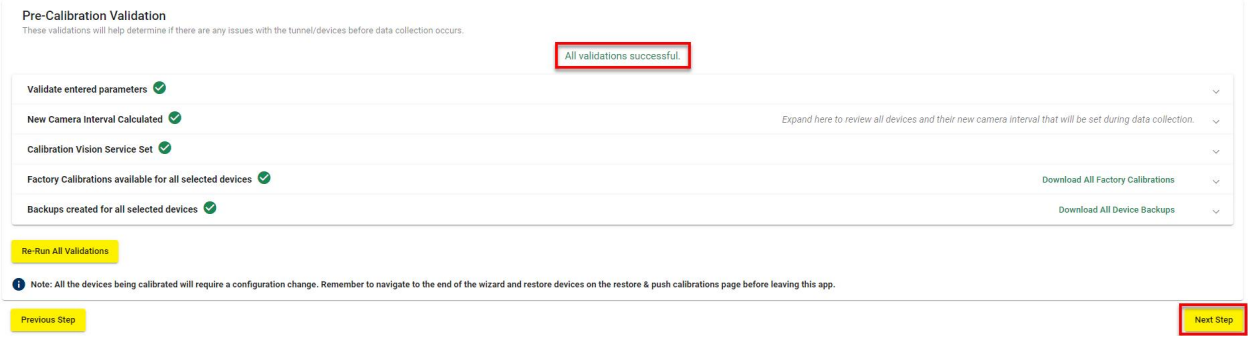
> **Note**: Consider the following aspects when setting the calibration interval:
> - When running a calibration, the app updates the intervals for all selected devices and reverts them in the final step.
> - The calibration interval is automatically calculated based on the production and calibration belt speeds.
> - For best results, perform the calibration at a belt speed that does not exceed 250 feet/minute (1.25 meter/second).
> - The calibration belt speed must not exceed the production belt speed.
> - To set the calibration interval manually, check the **Set Calibration Interval Manually** box below and enter the desired camera interval.

Select devices to calibrate:



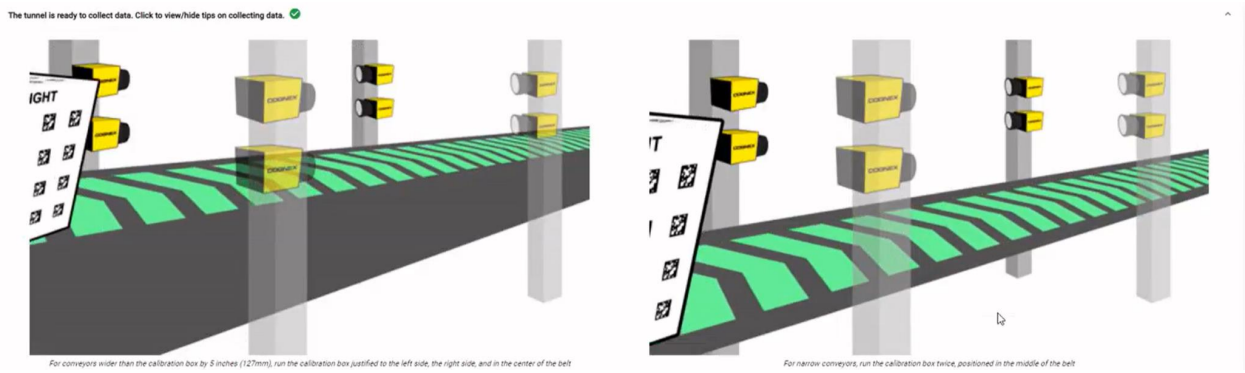
Click on **Next Step** to switch to the **Pre-Calibration Validation** step.

2. In the **Pre-Calibration Validation** step, validate the test parameters. After the validation is complete, the *All validations successful.* message appears. Click on **Next Step**.



> **Note**: If you receive an error that you cannot take backups and expanding the drop down shows an error about dirty configurations, either reload the backups taken from a previous run or re-run *Tunnel Commissioning* wizard.

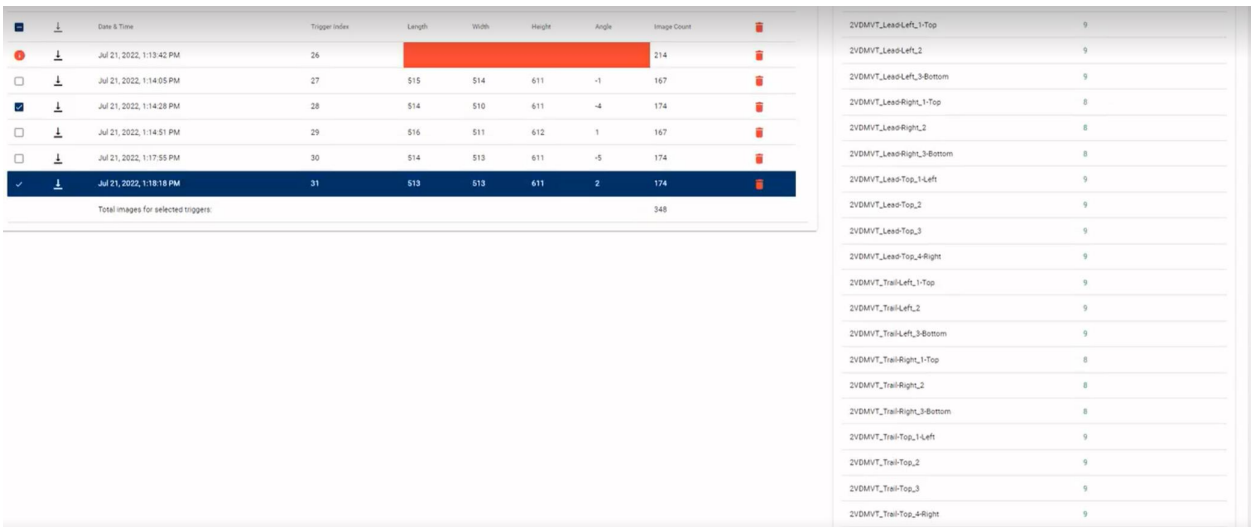
3. In the **Data Collection** step, the calibration triggers are captured.



- Make sure that the calibration box is oriented correctly with the front side facing downstream on the conveyor and run the box through the tunnel at the calibration speed you set in the previous step.

> **Note**: If the conveyor is wider than the calibration box by 5 inches, you have to run the box through at different positions on the belt:
>
> - The left side of the belt.
> - The right side of the belt.
> - The center of the belt.
>
> If the conveyor is narrow, place the box at the center of the belt and run it through twice.

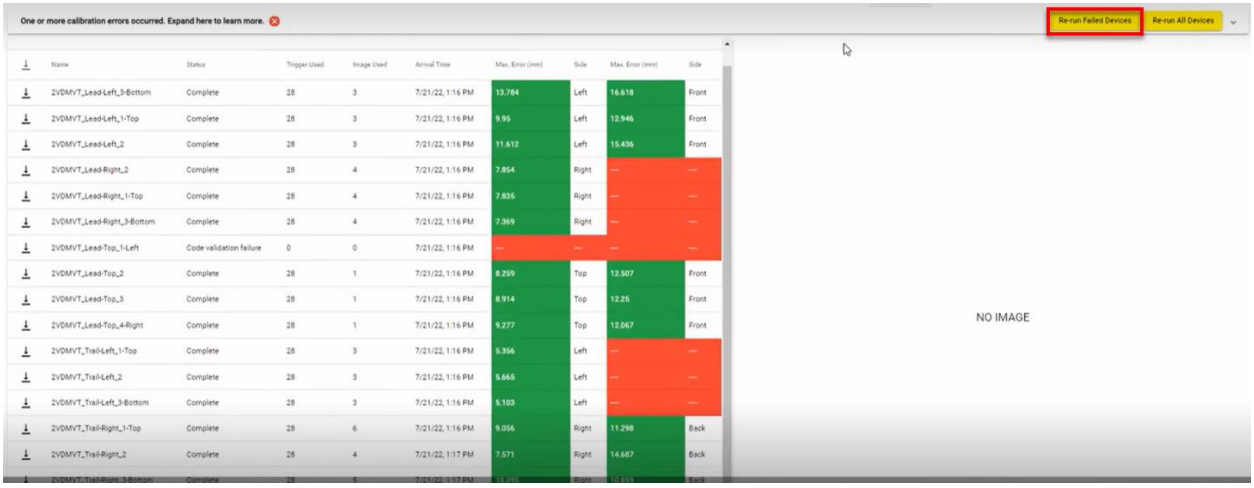
- Select the best triggers from the triggers list and click on **Next Step** to calibrate.



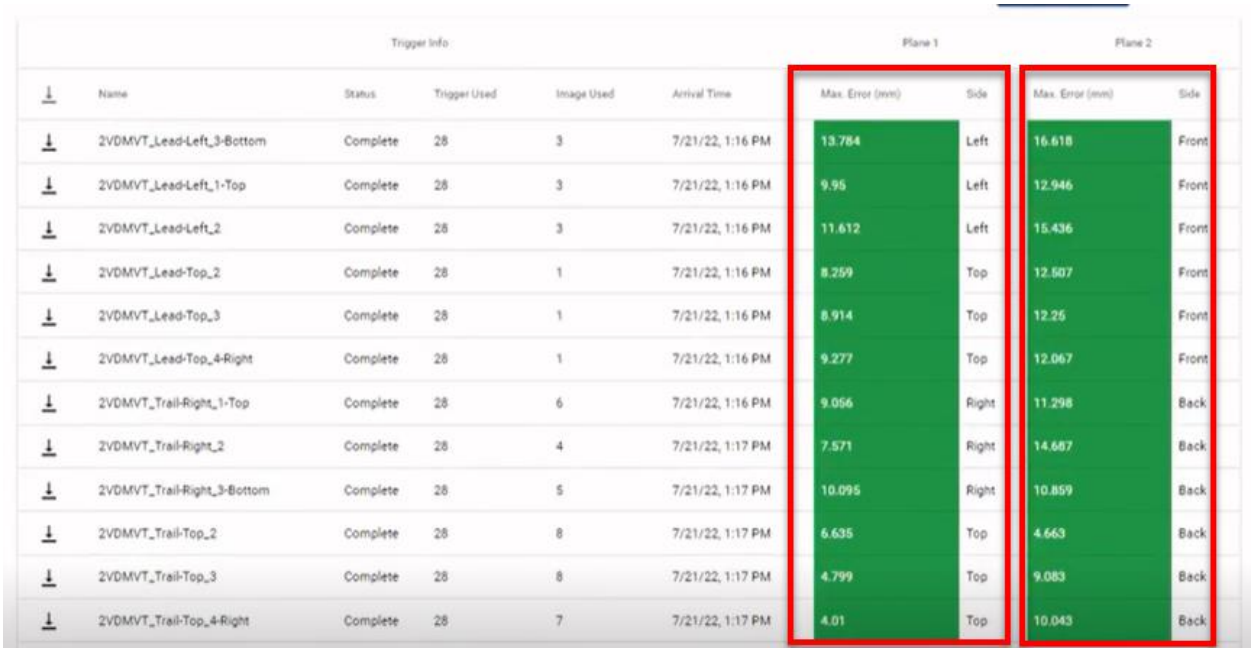
Date & Time	Trigger Index	Length	Width	Height	Angle	Image Count
Jul 21, 2022, 1:13:42 PM	26					214
Jul 21, 2022, 1:14:05 PM	27	515	514	611	-1	167
Jul 21, 2022, 1:14:28 PM	28	514	510	611	-4	174
Jul 21, 2022, 1:14:51 PM	29	516	511	612	1	167
Jul 21, 2022, 1:17:55 PM	30	514	513	611	-5	174
Jul 21, 2022, 1:18:18 PM	31	513	513	611	2	174
Total images for selected triggers:						348

2VDMVT_Lead-Left_1-Top	9
2VDMVT_Lead-Left_2	9
2VDMVT_Lead-Left_3-Bottom	9
2VDMVT_Lead-Right_1-Top	8
2VDMVT_Lead-Right_2	8
2VDMVT_Lead-Right_3-Bottom	8
2VDMVT_Lead-Top_1-Left	9
2VDMVT_Lead-Top_2	9
2VDMVT_Lead-Top_3	9
2VDMVT_Lead-Top_4-Right	9
2VDMVT_Trail-Left_1-Top	9
2VDMVT_Trail-Left_2	9
2VDMVT_Trail-Left_3-Bottom	9
2VDMVT_Trail-Right_1-Top	8
2VDMVT_Trail-Right_2	8
2VDMVT_Trail-Right_3-Bottom	8
2VDMVT_Trail-Top_1-Left	9
2VDMVT_Trail-Top_2	9
2VDMVT_Trail-Top_3	9
2VDMVT_Trail-Top_4-Right	9

4. The **Calibration** step appears. Click on **Re-run Failed Devices** to re-run the the failed device calibrations where the calibration process begins automatically and the calibration for each device takes place.



If necessary, after all the calibration is successfully complete, click on **Next Step**.



	Trigger Info					Plane 1		Plane 2	
	Name	Status	Trigger Used	Image Used	Arrival Time	Max. Error (mm)	Side	Max. Error (mm)	Side
	2VDMVT_Lead-Left_3-Bottom	Complete	28	3	7/21/22, 1:16 PM	13.784	Left	16.618	Front
	2VDMVT_Lead-Left_1-Top	Complete	28	3	7/21/22, 1:16 PM	9.95	Left	12.946	Front
	2VDMVT_Lead-Left_2	Complete	28	3	7/21/22, 1:16 PM	11.612	Left	15.436	Front
	2VDMVT_Lead-Top_2	Complete	28	1	7/21/22, 1:16 PM	8.259	Top	12.507	Front
	2VDMVT_Lead-Top_3	Complete	28	1	7/21/22, 1:16 PM	8.914	Top	12.25	Front
	2VDMVT_Lead-Top_4-Right	Complete	28	1	7/21/22, 1:16 PM	9.277	Top	12.067	Front
	2VDMVT_Trail-Right_1-Top	Complete	28	6	7/21/22, 1:16 PM	9.056	Right	11.298	Back
	2VDMVT_Trail-Right_2	Complete	28	4	7/21/22, 1:17 PM	7.571	Right	14.687	Back
	2VDMVT_Trail-Right_3-Bottom	Complete	28	5	7/21/22, 1:17 PM	10.095	Right	10.859	Back
	2VDMVT_Trail-Top_2	Complete	28	8	7/21/22, 1:17 PM	6.635	Top	4.663	Back
	2VDMVT_Trail-Top_3	Complete	28	8	7/21/22, 1:17 PM	4.799	Top	9.083	Back
	2VDMVT_Trail-Top_4-Right	Complete	28	7	7/21/22, 1:17 PM	4.01	Top	10.043	Back

The error value columns determine if the test result is pass or fail. It is expected that error values to be higher in the right column due to higher perspective on those faces:

- An optimal error value is less than 25 mm.
- An acceptable error value is between 25 and 50 mm.
- Any values over 50 mm are not accepted.

If you receive unacceptable values, you can return to the previous step and run another box for the area that failed by clicking on **Re-run Failed Devices** or **Re-run All Devices**.

The **Complete Calibration** pop-up appears. To complete the calibration, click on **Confirm**.

5. The final step of **Restore & Push Calibrations** restores the devices to their original settings and automatically load calibration data to all devices. Once this process is complete, you can close the page.

Archiver

The Archiver app provides a method of storing and organizing data obtained from your readers, such as downloaded images and trigger sequences.

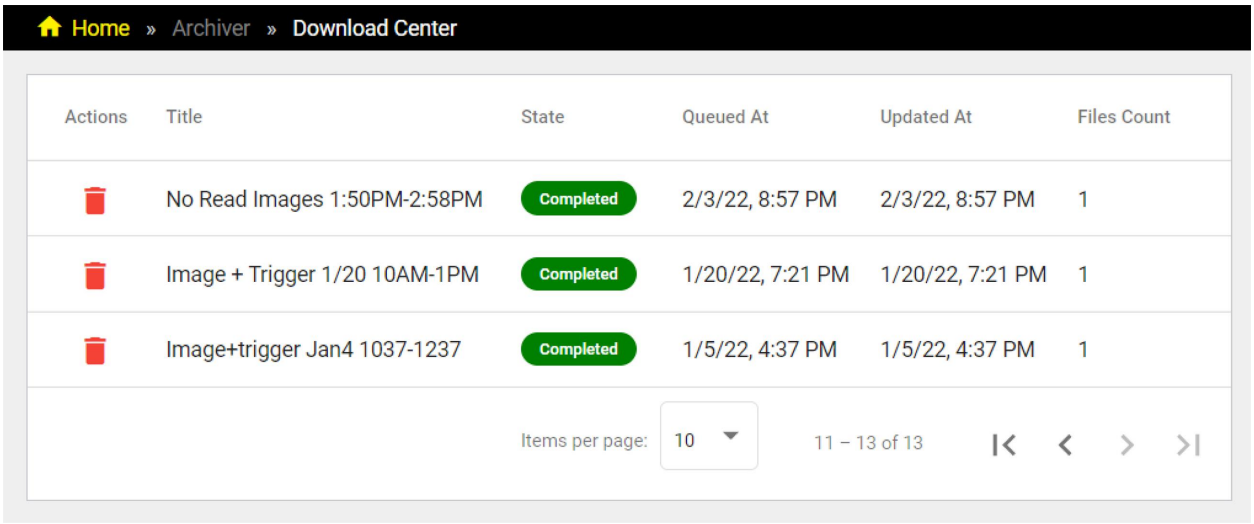
Download Center

The Download Center page allows you to manage your current and historical archives.

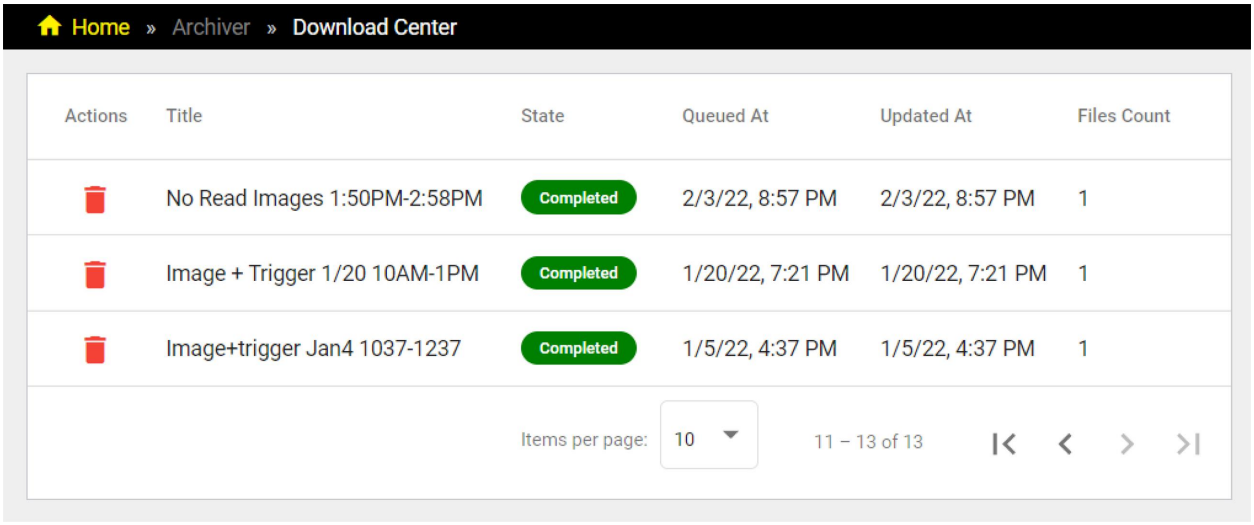
When you download image or trigger data from the Results Explorer page, Unit stores it in an archive file. Downloaded archives reside on the hard drive of the Unit unit. The time it takes to create the archive depends on the size and the number of images that needs processing, and can take from around one minute to up to two hours. Depending on the amount of data, Unit generates one or more archives. The size limit for a single archive is 1 GB. When the remaining disk space approaches approximately 50 GB, Unit automatically starts to delete older images.

Note: Archives always have storage priority over the images stored in Results Explorer.

The Download Center page:



Column	Description
Actions	The possible actions for an archive. The following actions are available when clicking in the appropriate icon: deletes an archive cancels the request to create the archive resubmits the request to create the archive
Title	The user-specified name of the archive.



Column	Description
State	The status of the archive. Displays one of the following states: • Idle • Collecting Data • Running • Completed • Canceled
Queued At	The time when download starts.
Updated At	The time of the last status update or when the download finishes.
Files Count	The total number of ZIP files in the archive.

The archive file has the following contents:

- One or more folders that contain the images. Unit organizes the folders by date, and each folder name has the format of YYYYMMDD.

  The images in each folder follow a naming convention based on whether they originate from a standalone reader or from an MRS group:

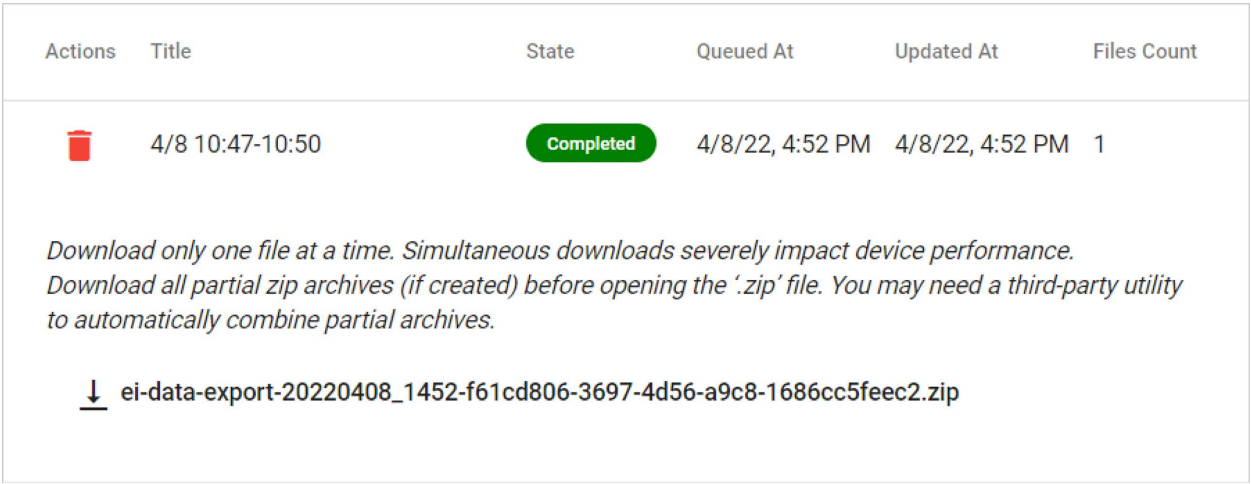
  - For standalone readers, the image name contains the device name, the trigger index, the image index, and the time stamp, in this order and separated by underscores. For example, *ST_1_DM470_566898_0_20211221T190905.jpg*.
  - For readers in an MRS group, the image name contains the group name, the device name, the trigger index, the image index, the time stamp, and four random characters to prevent name collision, in this order and separated by underscores. For example, *Tunnel1_ST_3_DM470_1126_0_20220204T141531_6802.jpg*.

- One CSV file that contains trigger data. The name of the file contains the MRS group name when applicable, and the name of the primary device, for example, *Tunnel_1_ST1_DM470.csv*. The file organizes data into the following columns:
  - time: The time stamp of the image.
  - deviceMacAddress: The MAC address of the device.
  - group: The MRS group name.
  - type: The trigger type
  - triggerIndex: The index of the trigger.
  - goodRead: TRUE indicates a Good-read, FALSE indicates a No-read.
  - readString: The read string. For an MRS group, this column contains the overall result string.

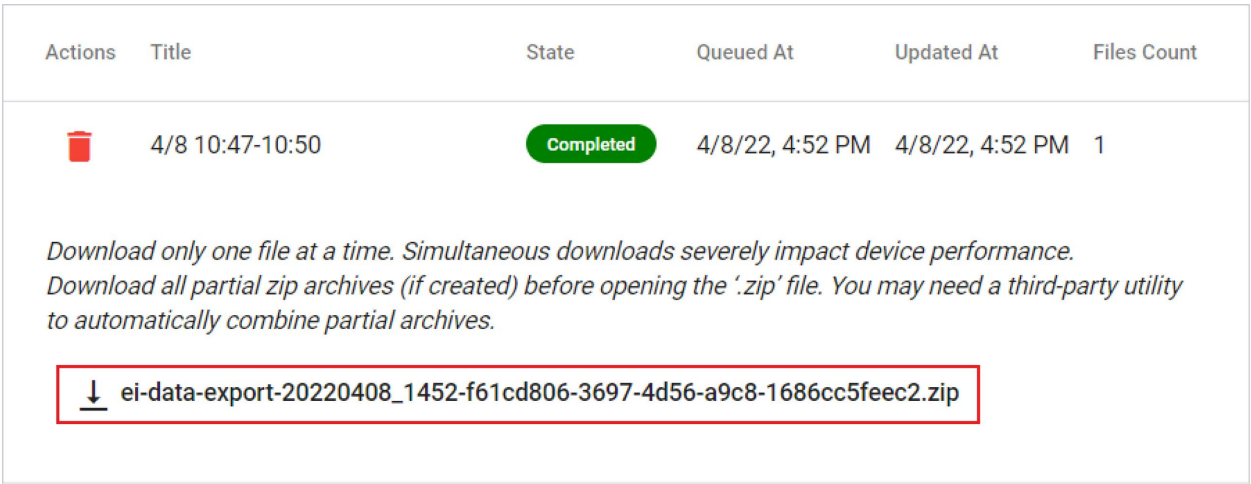
Note: For an MRS group, the image folder(s) contain images from all readers, and the CSV file contains trigger data from the primary reader.

Extract a Single Archive File

1. In the **Download Center**, click on the row of the archive you want to download to see its contents.



2. Click on the download icon to download the ZIP file.



The default download location depends on the browser you are using.

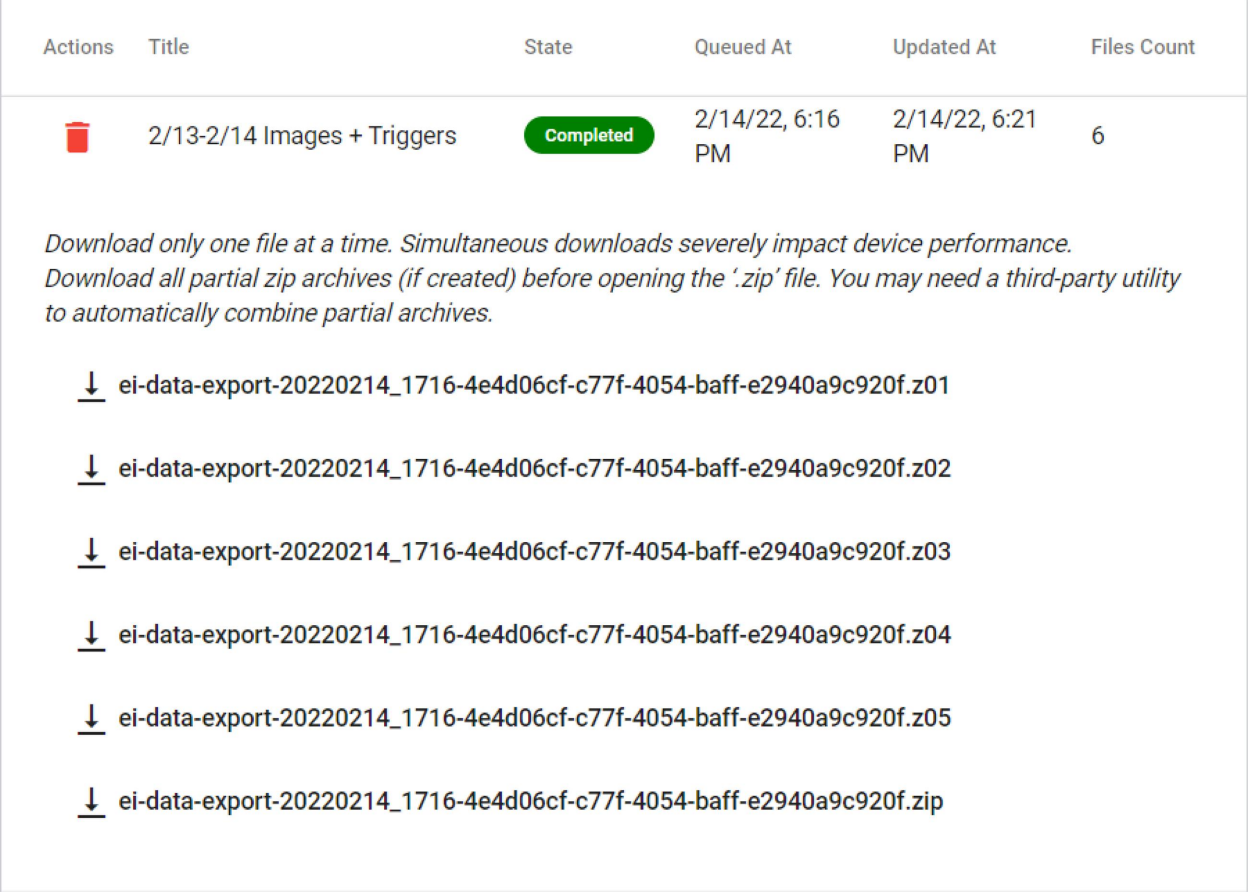
3. Navigate to the folder on your computer that contains your downloaded file, and extract the contents of the file.

Extract a Multi-Archive File

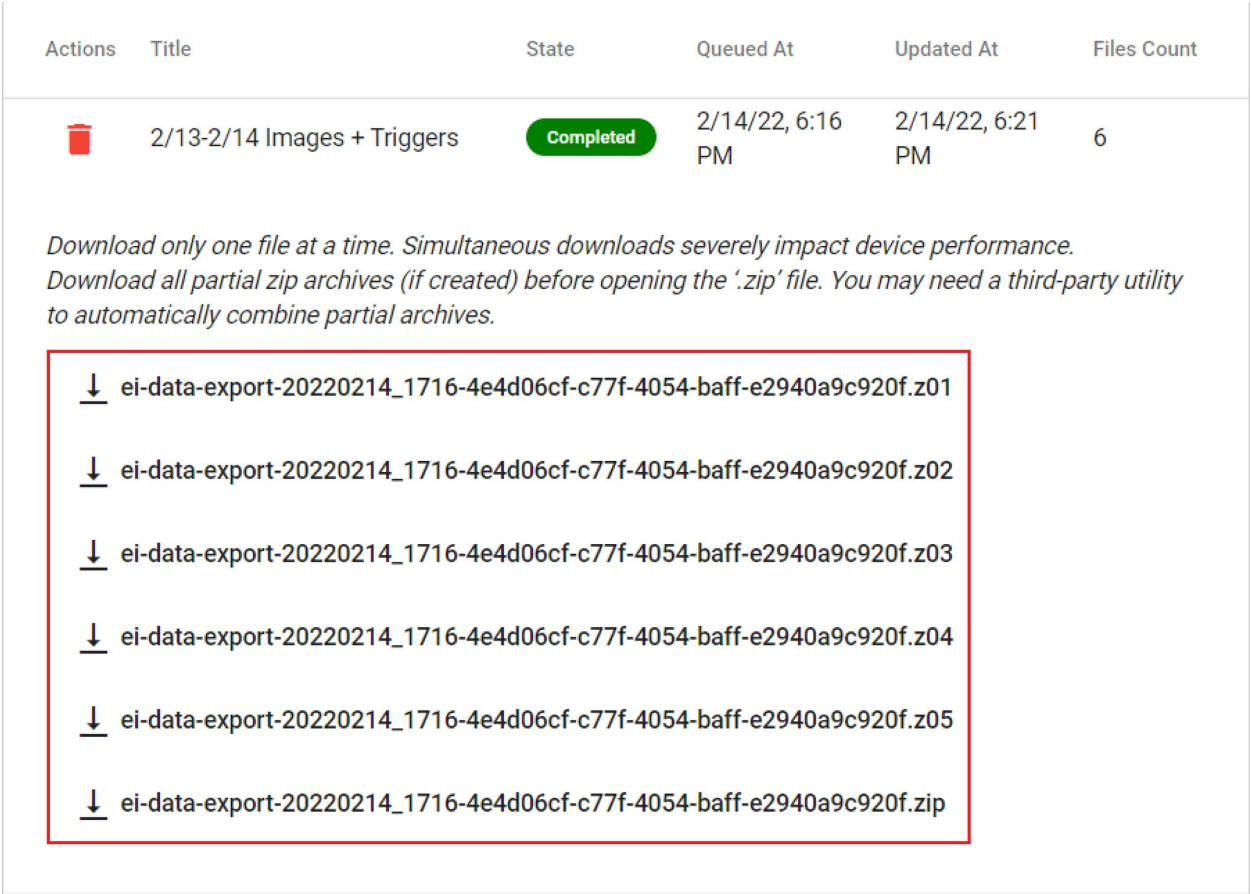
When the size of the archive exceeds 1 GB, Unit creates multiple partial ZIP files from that archive.

> **Note**: As the built-in Windows file extractor cannot handle partial ZIP files, you need to install 7Zip or a similar program to manage them.

1. In the **Download Center**, click on the row of the archive that you want to download to see its contents.



2. Download each ZIP one at the time file by clicking on the download icon, and store them in the same location.



The default download location depends on the browser you are using.

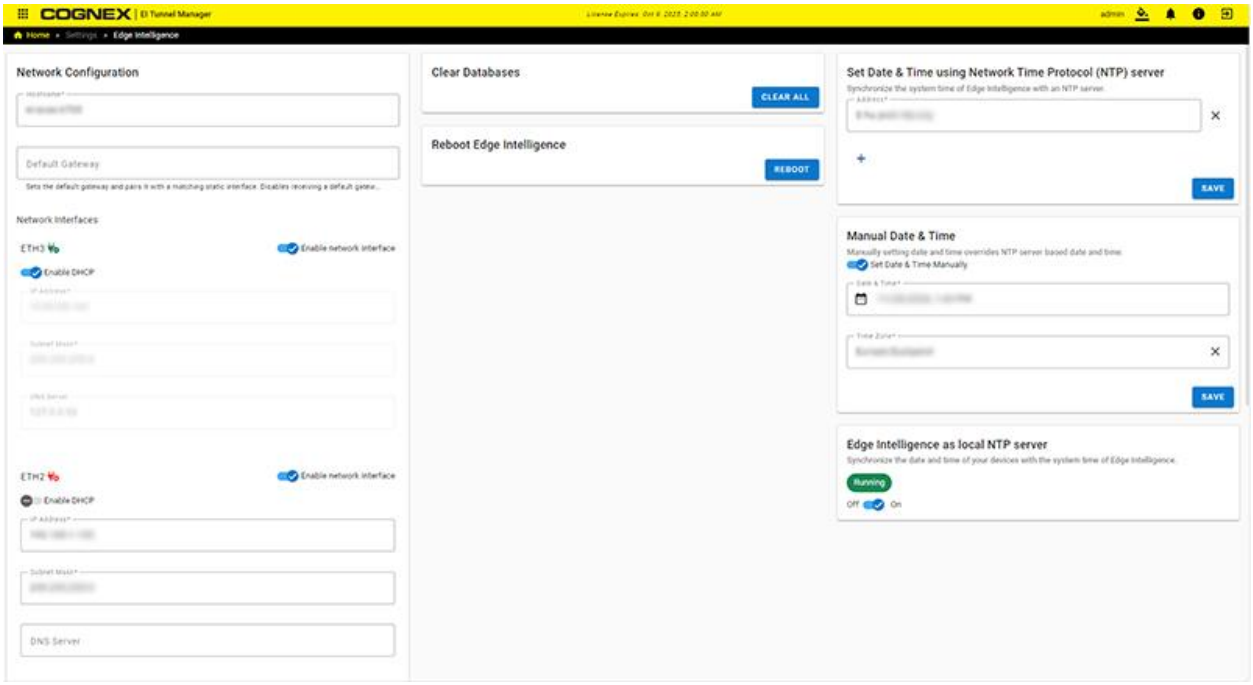
3. Navigate to the folder on your computer that contains all the downloaded partial ZIP files.
4. Right-click on the file with ZIP extension.
5. Click on the ZIP file extractor.
6. Click on **Extract to** to merge all partial files.

Settings

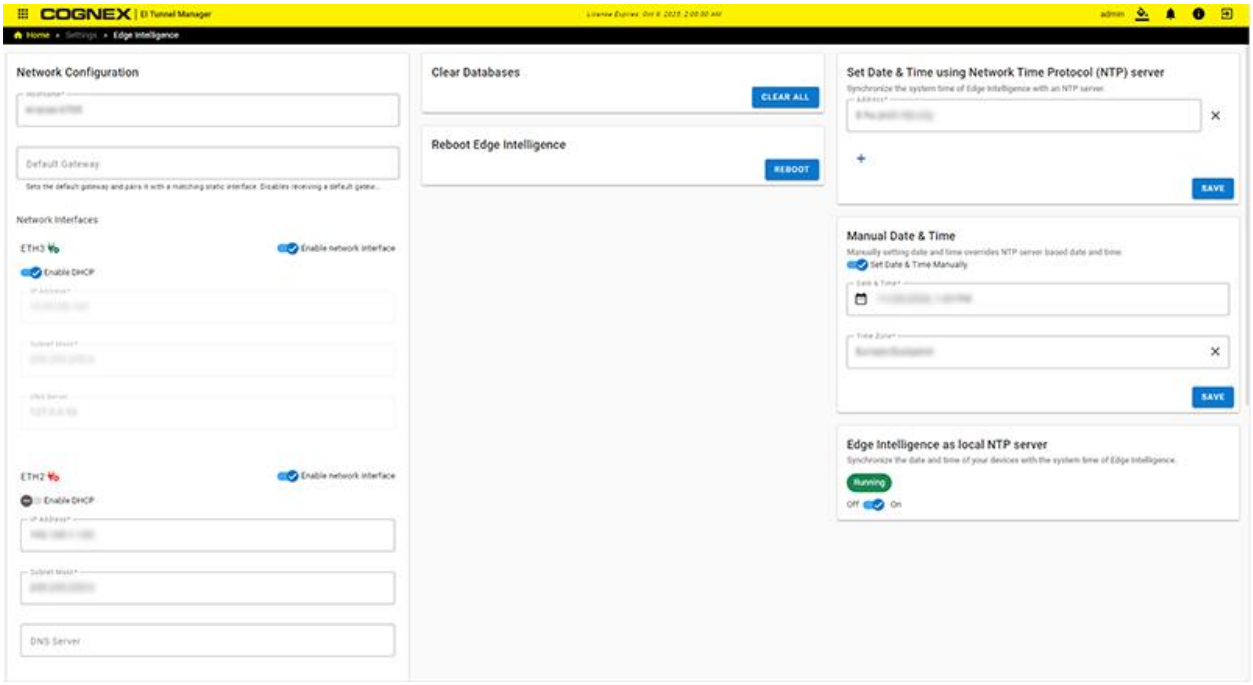
The Settings app allows you to configure your device, enable or disable the DataMan WebHMI pages of your connected devices, and upgrade your device firmware.

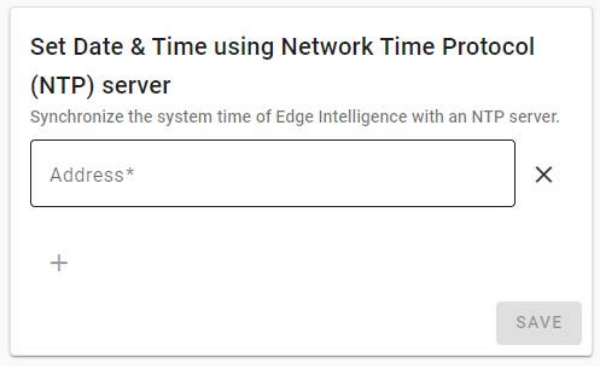
Edge Intelligence

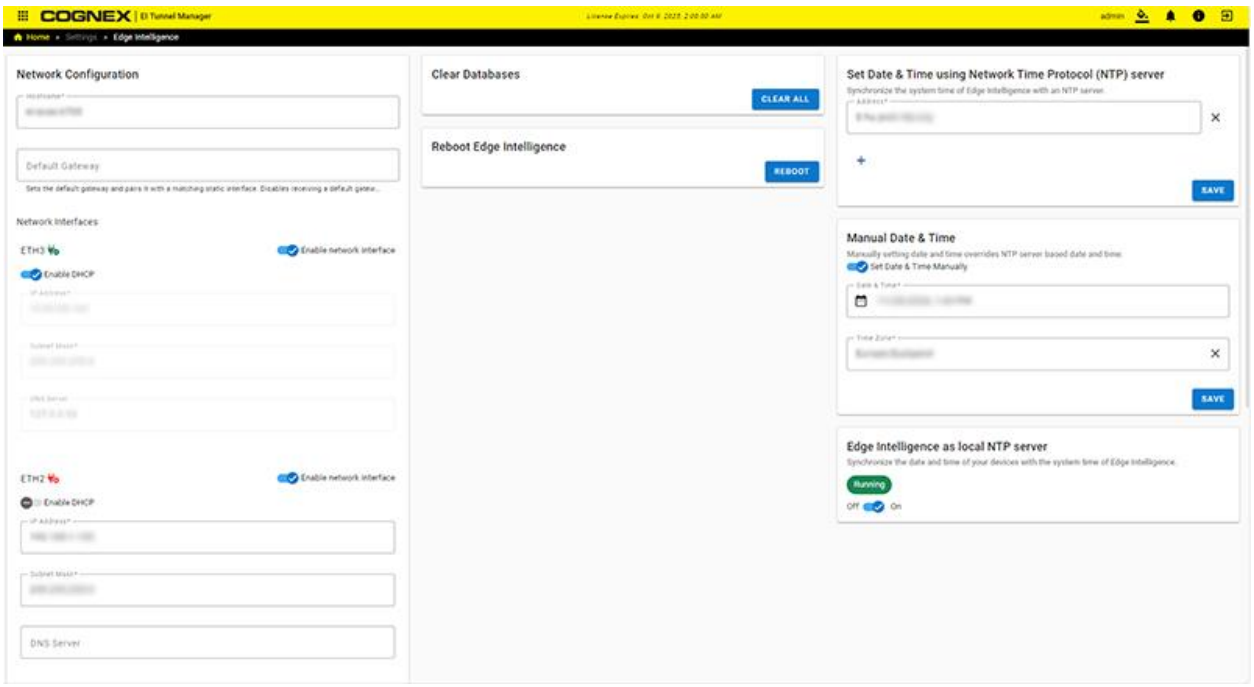
The Edge Intelligence page shows the network configuration, and allows you to edit and save the network settings of the EI Tunnel Manager device.



Section	Item	Description
Network Configuration	Hostname	The hostname of the EI Tunnel Manager.
	Default Gateway	The Gateway of the EI Tunnel Manager.
	Network Interfaces	Configuration options for each of the Ethernet ports (1-3). For each Ethernet port: • Enable or disable the interface. • Enable using the DHCP protocol instead of static protocols. • See if the Ethernet cable is connected by checking the green and red icons next to the name of the interfaces.
	IP Address	The IP Address of the EI Tunnel Manager.
	Subnet Mask	The Subnet Mask of the EI Tunnel Manager.
	DNS Server	The DNS server of the EI Tunnel Manager.
	Network Address Translation (NAT)	Toggle the switch to enable the NAT. See *Setting up the NAT* on page 86.



Section	Item	Description
Clear Databases	Clear the device lists, data, and images from the Unit, and create a new state. ⓘ **Note**: The **Clear database** option is only available with Admin level clearance.	
Reboot Edge Intelligence	Reboot the EI Tunnel Manager device.	
Set Date & Time using Network Time Protocol (NTP) server	Add an NTP server to set the system time: 1. Click **+**.  2. Enter the IP address of the NTP Server. 3. Click **Save**. ⓘ **Note**: You need to log out and log back in after saving the system time.	
Manual Date & Time	Toggle **Set Date & Time Manually** to specify the date, time and the time zone. ⓘ **Note**: You need to log out and log back in after saving the system time.	



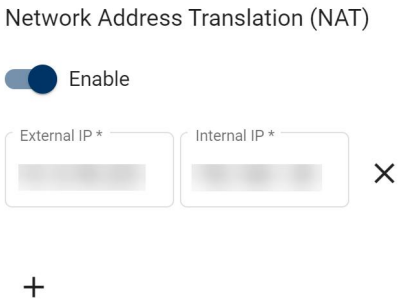
Section	Item	Description
Edge Intelligence as local NTP server	Toggle the switch to synchronize the date and time of your devices with the EI Tunnel Manager device.	

Setting up the NAT

Network address translation (NAT) remaps IP address spaces into other IP address spaces by modifying network address information in the IP header of information packets. Scroll down for the NAT option.

To set up the NAT:

1. Make sure that the Default Gateway of the DataMan readers is the IP address of the TM network port they are connected to.
2. Set the switch to enable NAT Settings.

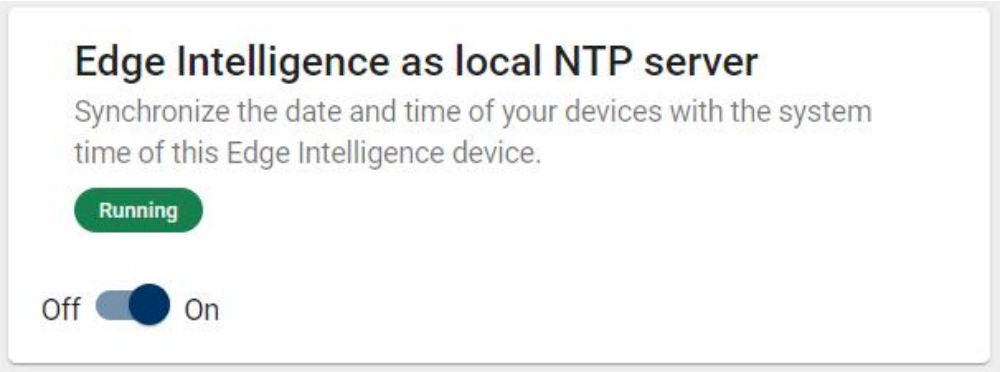


3. Click the **+** symbol to Add New Mapping.
4. Set the reader IP address as the Internal IP.
5. For the External IP, enter an available IP address you want to map to the reader.
6. Click Save.

NTP Server Function

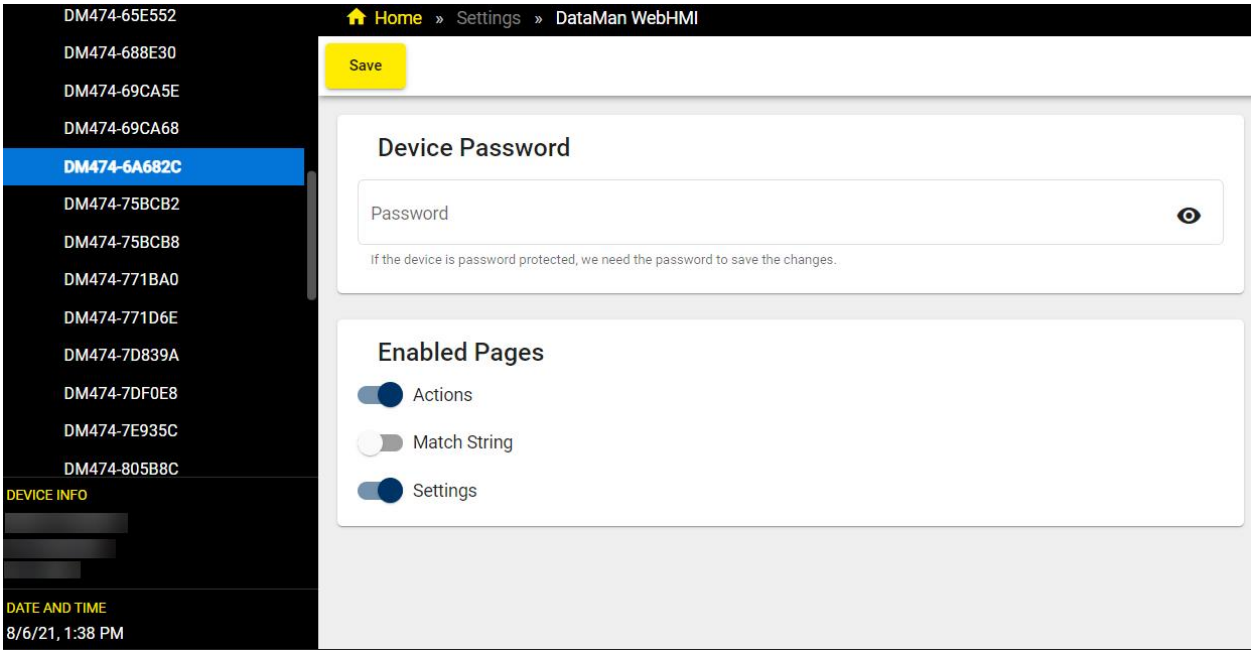
The Unit device can act as a Network Time Protocol (NTP) server. NTP is an internet protocol for synchronizing clocks on a network to within a few milliseconds of universal coordinated time (UTC).

In the **Settings** menu, click on the **Edge Device** tab. Set the switch to **On** to enable NTP server and synchronize the date and time of your devices with the system time of Unit.



DataMan WebHMI

The DataMan WebHMI page allows you to enable or disable the pages displayed on the individual device DataMan WebHMI interfaces that are accessible through the DataMan page of the Device Management app.



Select the device for which you want to change the displayed DataMan WebHMI pages from the device list on the left side of the page. The device information for the selected device appears under the list.

If the selected device is password protected, provide the password in the **Device Password** section of the page, otherwise you will not be able to save your changes.

You can enable or disable the following DataMan WebHMI pages for the selected device in the **Enabled Pages** section of the page:

- **Actions**
- **Match String**
- **Settings**

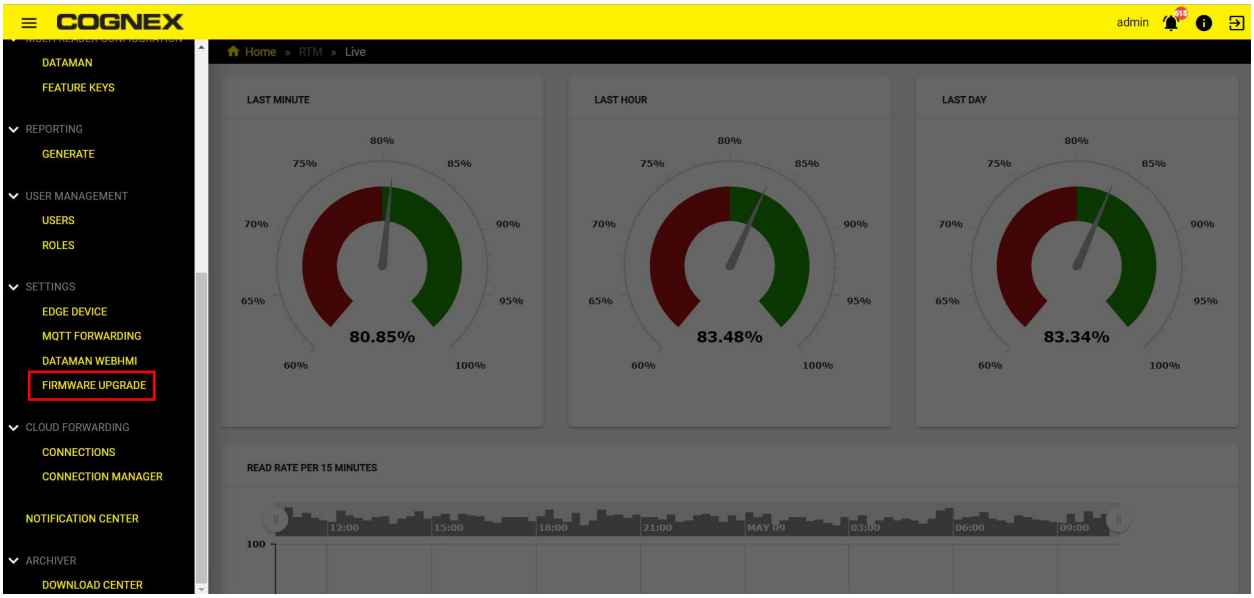
Click **Save** at the top of the page to apply your changes.

Firmware Upgrade

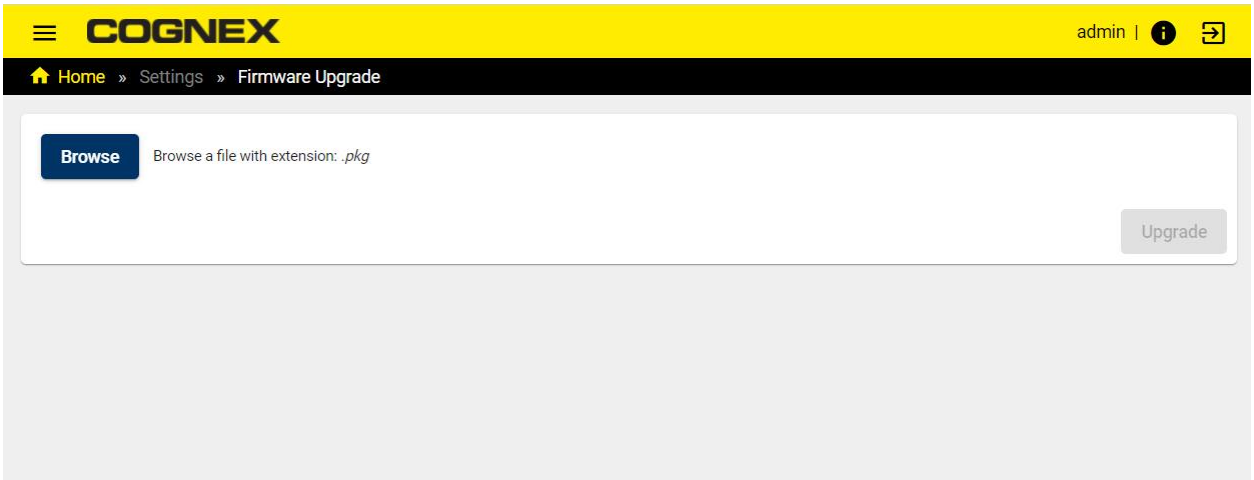
The Firmware Upgrade page allows you to upload new firmware packages for upgrading device firmware.

If the EI Tunnel Manager unit is on version 1.2.1 or later, you can upgrade the EI Tunnel Manager firmware through the user interface by performing the following steps:

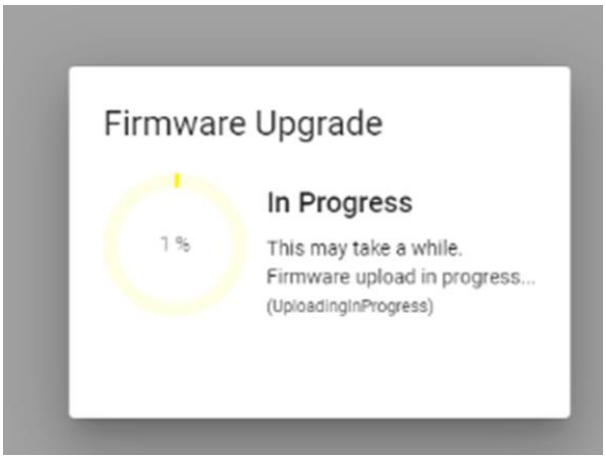
1. Make sure you are on the same network as EI Tunnel Manager Internal Ethernet port. The IP address of the Internal Ethernet port is in the form of 192.168.1.X.
2. Connect to the EI Tunnel Manager Internal Ethernet port..
3. Open a web browser and type the IP address of the EI Tunnel Manager unit into the address bar. The default static IP address is 191.168.1.100. The EI Tunnel Manager user interface opens up.
4. Navigate to **Settings** > **Firmware Upgrade** in the EI Tunnel Manager navigation pane.



5. Click on the **Browse** button and select the latest firmware version available for download on the Cognex website. The firmware is a *.pkg* format file.



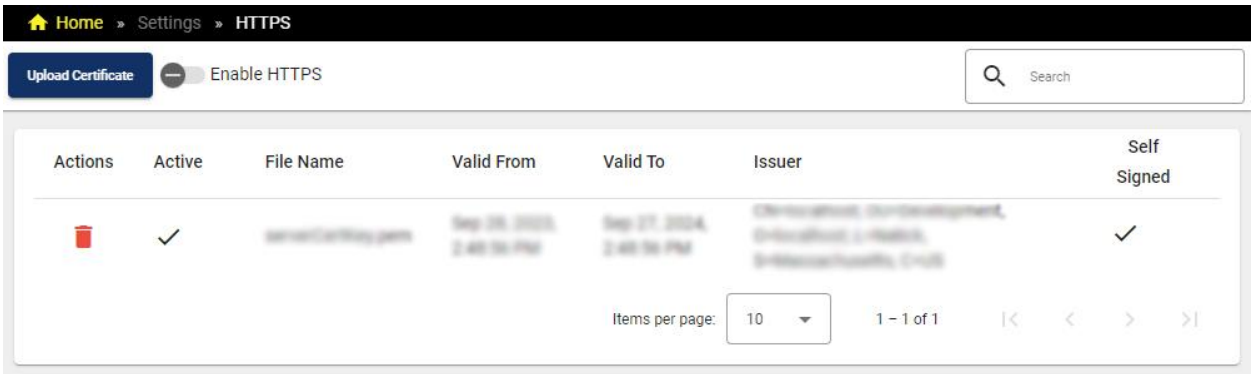
6. Click on the **Upgrade** button and wait for upgrade to complete.



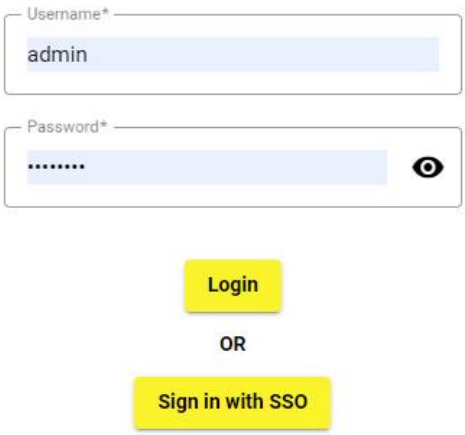
HTTPS

HTTPS connection provides secure browser access to the EI Tunnel Manager interface. HTTPS also enables the *Single Sign-On* on page 93 feature.

HTTPS connection is enabled only if the Authority link in the Identity Provider Configuration uses the same HTTPS protocol. In this case, HTTP is disabled on the Identity Provider, and you are automatically redirected to HTTPS, which enforces a secure channel for authentication.



1. Click **Upload Certificate** to add a .pem file.
2. Click **Submit**.
3. Turn on the **Enable HTTPS** toggle. You are automatically logged out.
4. Log in again to the EI Tunnel Manager, either with the normal login or with Single Sign-On.

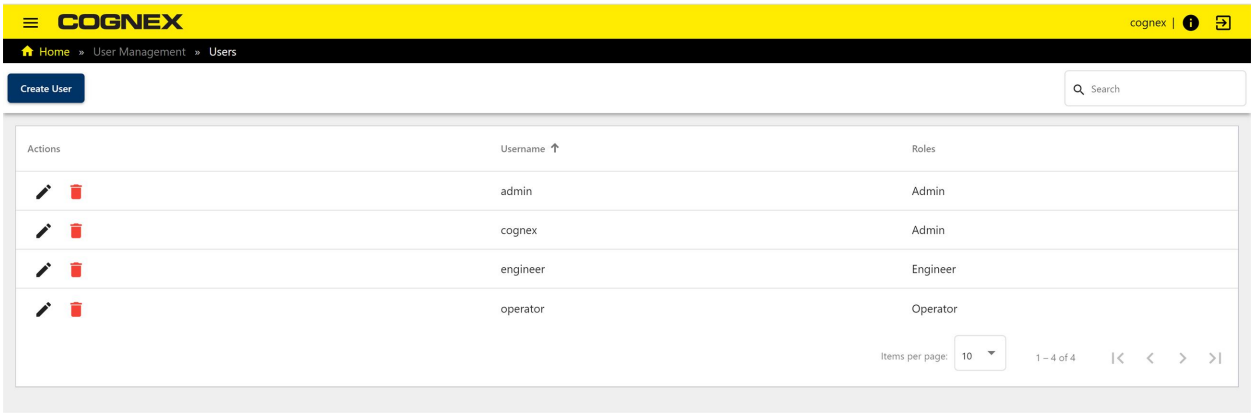


User Management

The Roles page allows an admin level user to create roles and define which EI features those roles have access to. The User page allows an admin level user to create users and assign them roles.

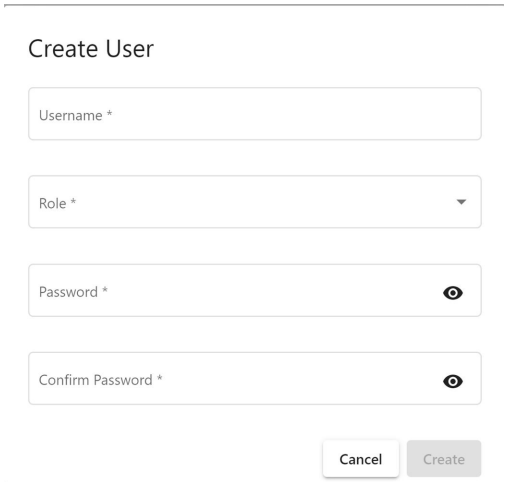
Users

The Users page allows creating new users and assigning Roles to them.



Item	Description
Create User	Brings up the pop-up window to add a new user.
User management table	Table listing the existing users, the assigned Username and roles.

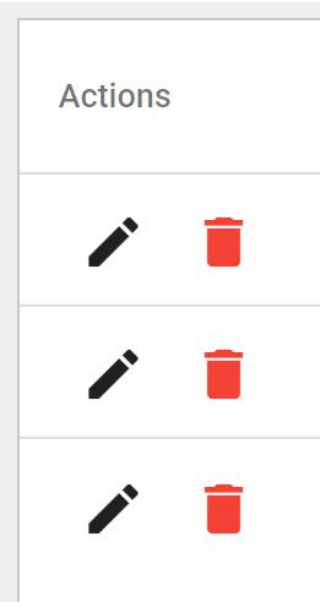
The **Create User** button is available on the top ribbon. Set the following options for each user:



Item	Description
Username	The username of the user for logging in.
Role	The role of the user: • Admin • Engineer • Operator
Password	The password of the user for logging in.
Confirm Password	Reenter the password.

Note: A user with admin rights can also edit the same options for each user by clicking the **Edit** button.

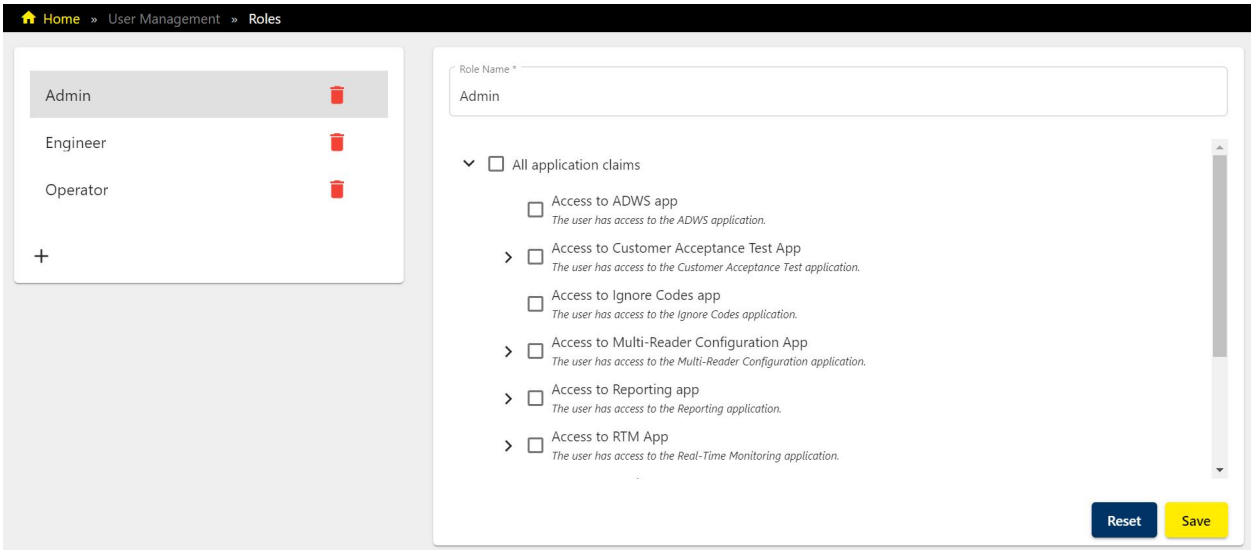
The Users page lists the existing users. Edit or delete an existing user by clicking the appropriate icon.



Icon	Description
	Click Edit to edit the settings of a user.
	Click Delete to delete a user.

Roles

This page allows admin level users to create new roles and grant access to certain applications.



Item	Description
Roles	List of roles.
Accesses	List of accesses for the specified role.

Default User Credentials

The following users credentials are available by default:

User	Password	Default Permissions
admin	BnthWWSD	Has access to all apps and features. Admin users can modify the default user profiles, enable access permissions for the other user roles, or create new profiles.
engineer	TaRDpKVx	Has access to all apps and features.
operator	SxtXGmxs	User with read-only rights. The operator does not have access to the Device Management app and the Settings.

Note: Change the default credentials to avoid security risks. For more information, see *User Management* on page 90.

Single Sign-On

EI Tunnel Manager supports Single Sign-On (SSO). Single Sign-On is a session and user authentication service that permits you to use a single set of login credentials. For example, you can set up a username and password that allows you to access multiple applications.

When choosing SSO on the EI Tunnel Manager login page, you are directed to the authentication service login page where you provide your credentials. Once your credentials are validated, you are redirected back with the security token to EI Tunnel Manager and logged in. You need to

To configure this process on EI Tunnel Manager, set up HTTPS with uploading certificates. From there, configure roles and map these roles to an existing one in the customer identity provider.

Then, you have to setup EI Tunnel Manager as a client and configure return URLs. For more information, see *Role Mapping* on page 94.

Note: Cognex product name uppercase only supports the OpenID Connect (OIDC) standard for Single Sign-On.

Identity Provider Configuration

To set up Single Sign-On (SSO) in EI Tunnel Manager, log in to EI Tunnel Manager using the admin credentials. The Identity Provider Configuration page of the Single Sign-On app allows you to enter the details of your configuration to setup the login with the existing environment.

After filling in the mandatory fields, click **Save** to proceed.

Input Field	Description

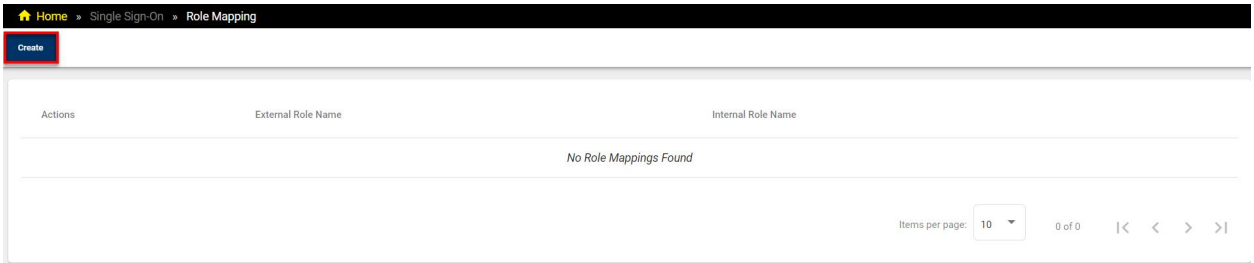
Authority	Your Identity Provider (IdP) Authority URL. This is the endpoint where EI Tunnel Manager redirects users to perform the login step with the IdP.
Client ID	Your EI Tunnel Manager fully qualified domain name and any variations.
Client Secret	You need to configure a client secret on your IdP and enter the EI Tunnel Manager domain entries as redirect URLs. Redirect URLs take the following form: *https://%3cEIhttps://<EI address>/identity-provider/api/v1/oidc-external/callback*
Role Claim Type	This field indicates the roles or groups of the user. If you do not use Role Based Access Control in your IdP, this might not be required.
User Name Claim Type	This field indicates the username of the individual.

Role Mapping

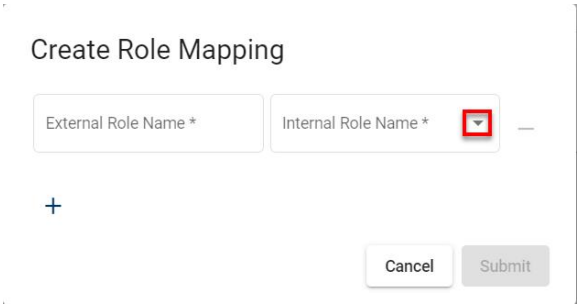
The Role Mapping page of the Single Sign-On app allows you to create external roles and map them to the internal roles.

To create role mapping:

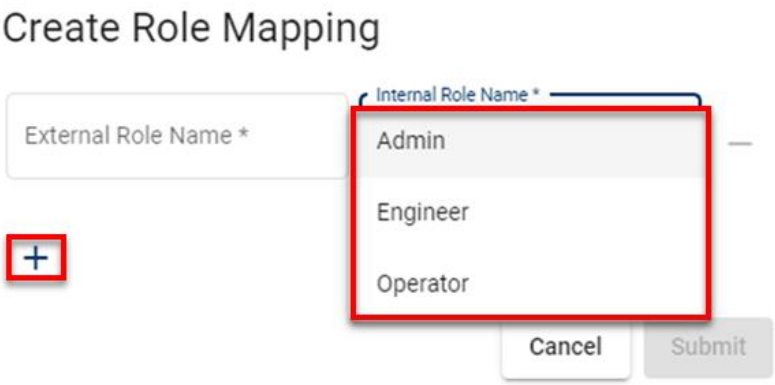
1. Click on **Create** on the top left corner of the **Role Mapping** page.



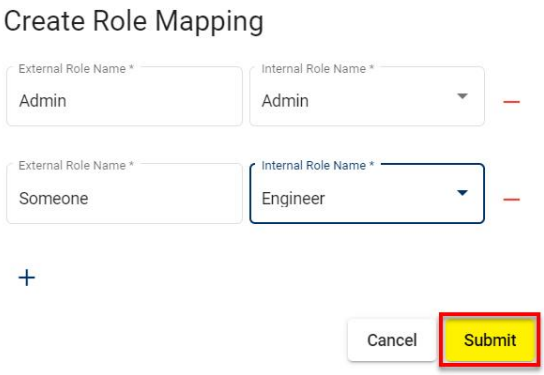
2. The **Create Role Mapping** pop-up appears.



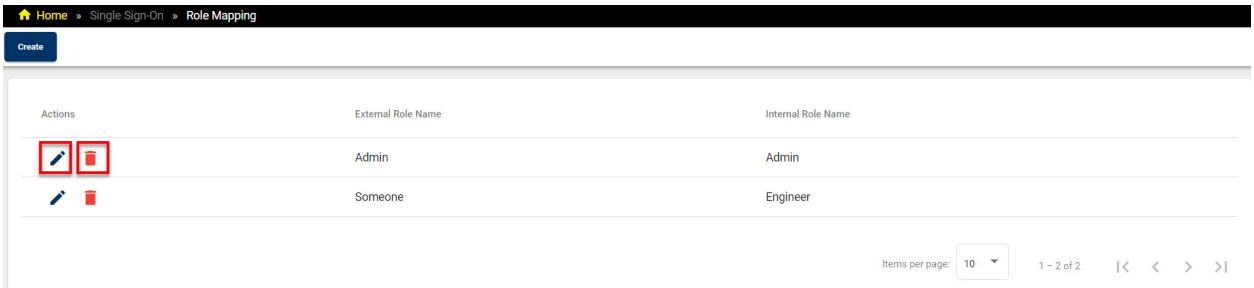
3. Fill in any external role name in the **External Role Name** field and select an **Internal Role Name** from the default options.



4. Click on the **+** to add more role mappings.

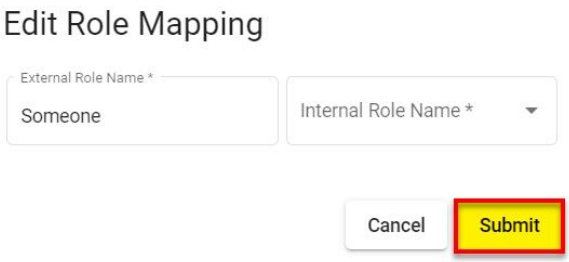


5. After filling in the given fields, click **Submit** to create the role mappings.



You can edit or delete any role mapping from the list by clicking on the corresponding button icons.

If you click on the **Pencil** icon, the **Edit Role Mapping** pop-up appears.



To save your changes after editing, click on **Submit**.

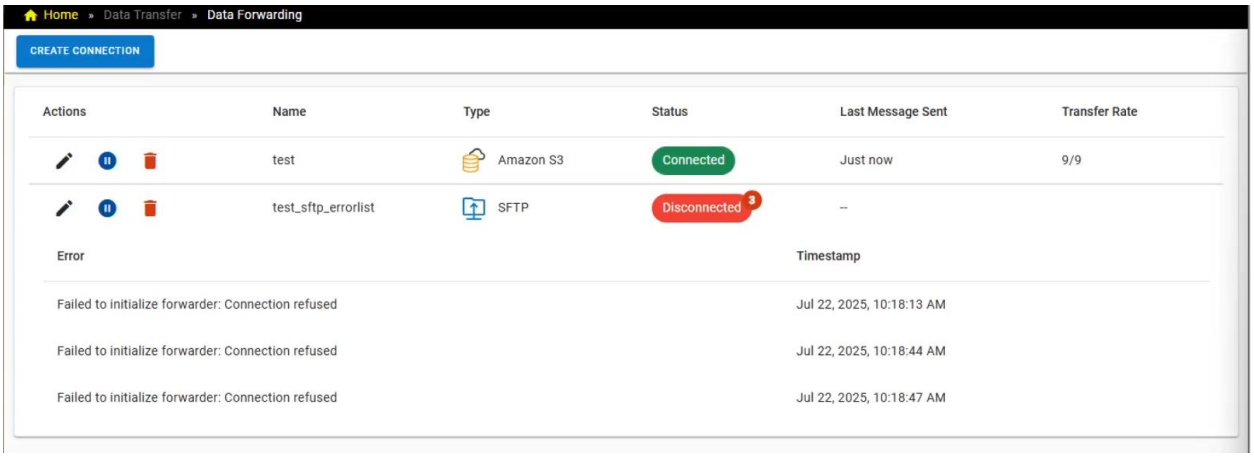
Data Transfer

Unit collects, parses, formats, and collates data from several readers.

Data Forwarding

The Data Forwarding page allows you to manage how the Unit sends your device data to different destinations. On this page, you can:

- Set up a data forwarding connection.
- Check, edit, pause, and delete connections.
- If an error occurs, the error message appears with the associated timestamp.



Note: To enable data forwarding, you need a license from Cognex. See *Licensing* on page 124.

Unit supports the following connection types:

- MQTT
- SFTP
- Amazon SNS
- Amazon S3
- Azure IoT Hub
- Azure Storage Blob
- FTP
- REST

Set Up an MQTT Connection

You can set up data forwarding through an MQTT connection from the Data Forwarding page. Data forwarding through MQTT only supports transferring results data. To set up the connection, you need to provide the details of your MQTT broker.

Prerequisites

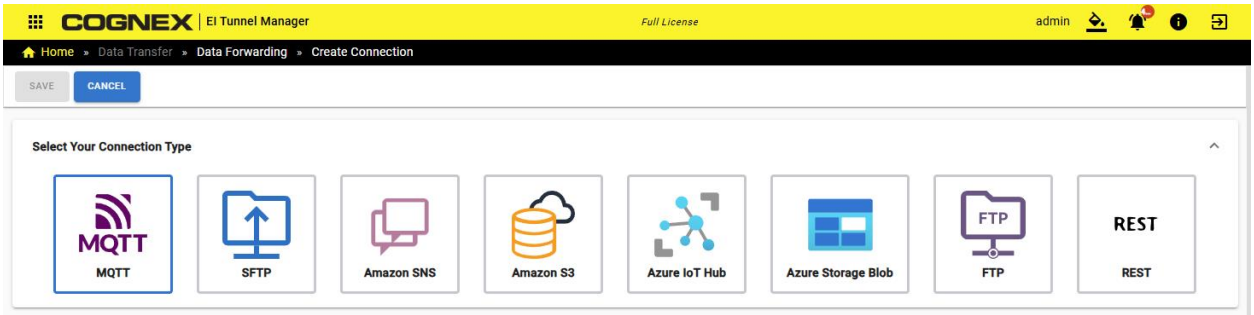
Before you start, ensure that the following prerequisites are met:

- The Unit is connected to the local network.
- You are subscribed to the devices from which you intend to forward data.
- The details of your MQTT broker are available.

Procedure

To set up an MQTT connection:

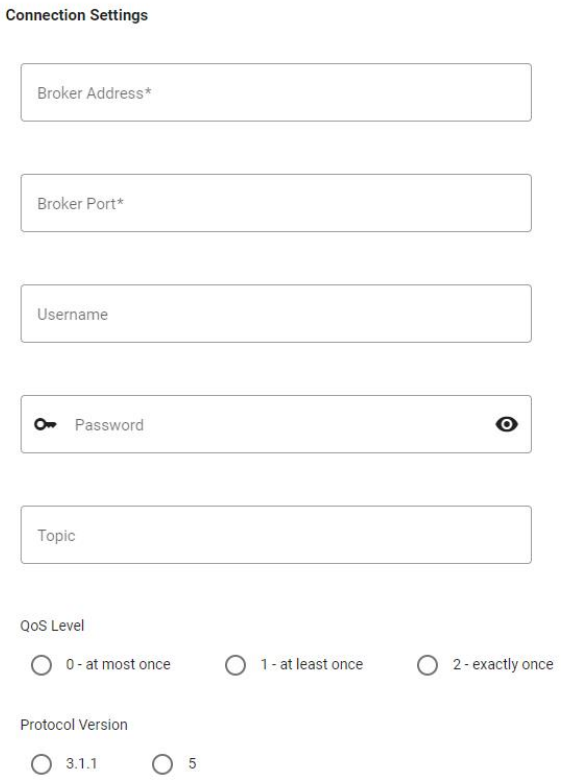
1. Click **Create Connection** on the Data Forwarding page.
2. Choose **MQTT**.



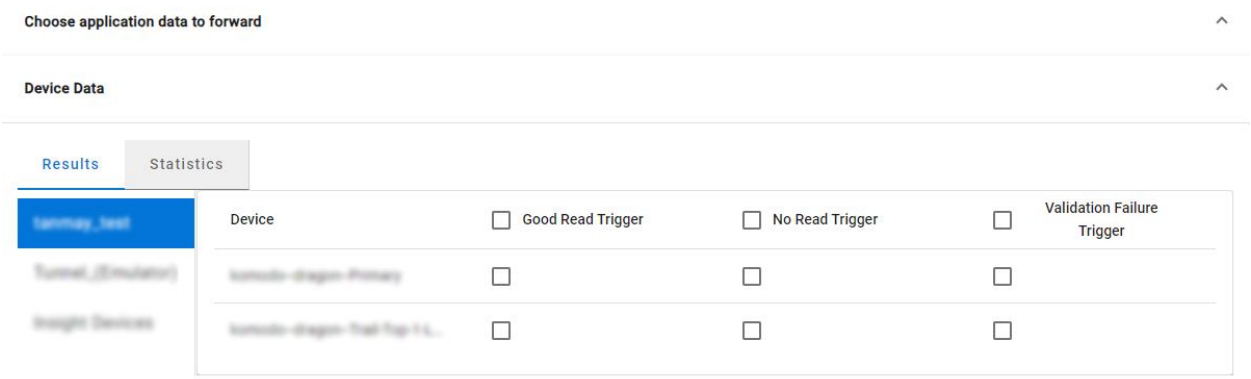
3. Configure your connection:
   a. Provide the **Connection Name**.
   b. Optionally, to help differentiate between connections, provide a custom **Client ID**.
   c. Choose the **Authentication Method** from the drop-down menu. Once you have selected the authentication method, the **Connection Settings** section appears in the page.

> **Note**: If you select TLS, you must upload a **CA certificate**. If you select mTLS, you must upload a **CA certificate** and a **Client pfx**.

4. Enter the connection details, QoS, and Protocol Version for the MQTT broker.



5. Choose the application data you want to forward and from which device. Under **Device Data** and **Tunnel Data**, you can choose specific data from each device by checking the corresponding box.



6. Click **Save**.

Your connection is now listed on the Data Forwarding page. You can edit, pause, and delete connections here.

Set Up an SFTP Connection

You can set up data forwarding through an SFTP connection from the Data Forwarding page. Data forwarding through SFTP supports both transferring results data and images. To set up the connection, you need to provide a custom file path.

Prerequisites

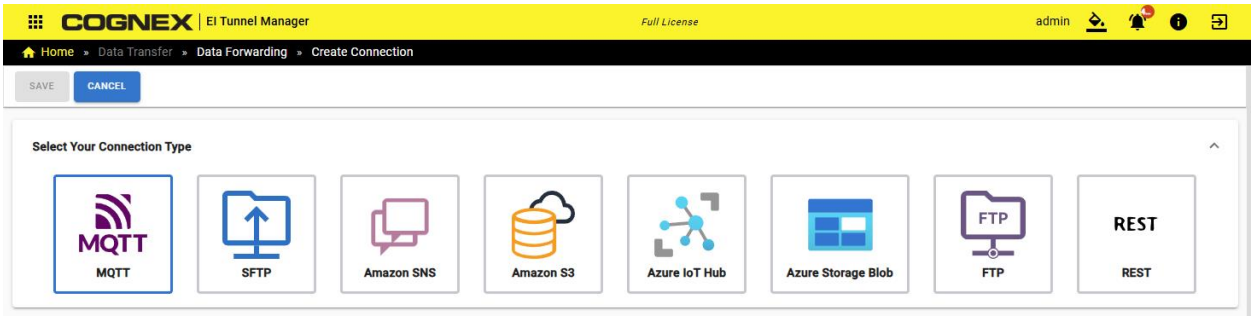
Before you start, ensure that the following prerequisites are met:

- The Unit is connected to the local network.
- You are subscribed to the devices from which you intend to forward data.

Procedure

To set up an SFTP connection:

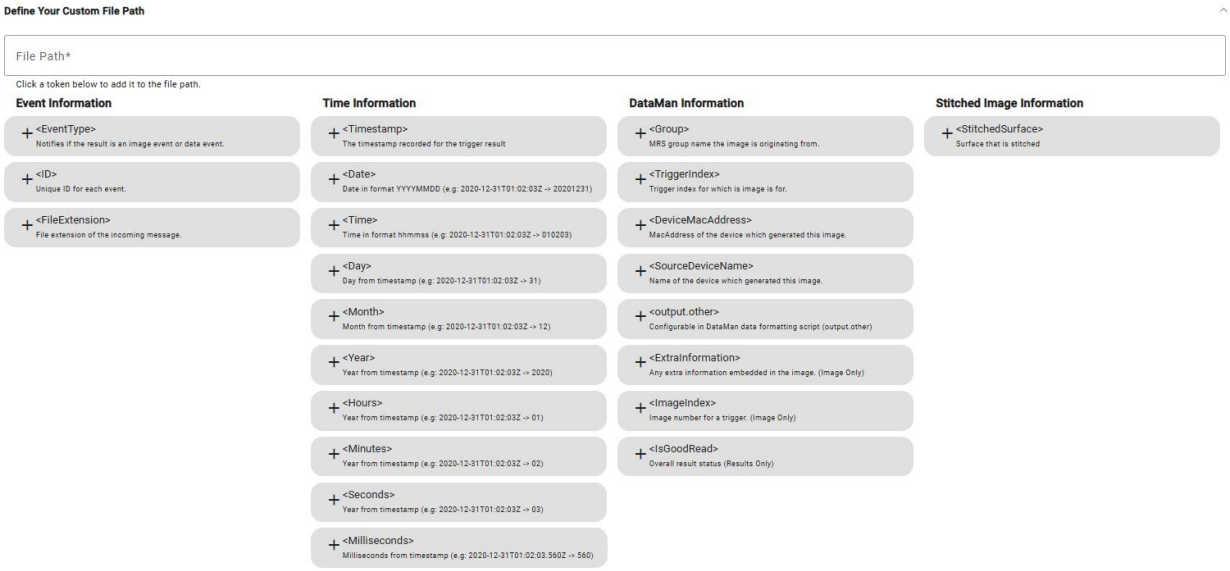
1. Click **Create Connection** on the Data Forwarding page.
2. Choose **SFTP**.



3. Configure your connection:
   a. Provide the **Connection Name**.
   b. Optionally, to help differentiate between connections, provide a custom **Client ID**.
   c. Choose the **Authentication Method** from the drop-down menu. Once you have selected the authentication method, the **Connection Settings** section appears in the page.

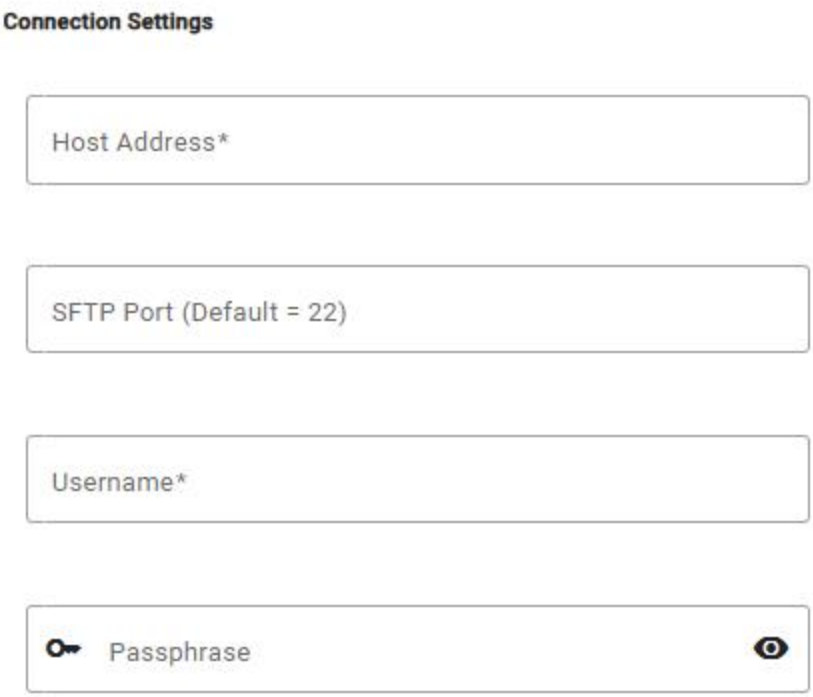
Note: If you select Private Key, you must upload a **Private Key** file.

4. Define a custom file path.

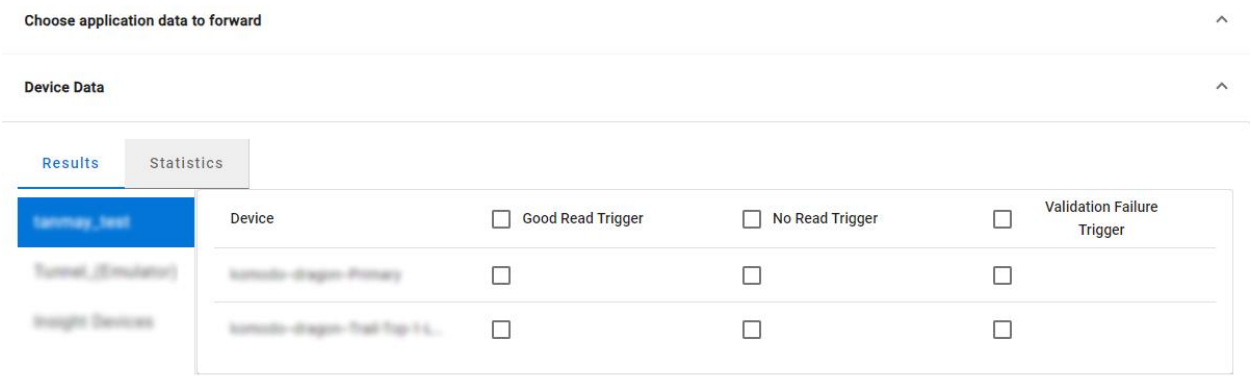


Note: You can use a mix of literals and tokens to set up the custom file path. Tokens are replaced object information at the time of forwarding (for example, triggerID, timestamp). Image information tokens are only available for forwarding images and are not replaced on other data types.

5. Enter the connection details based on which authentication method you have selected.



6. Choose the application data you want to forward and from which device. Under **Device Data** and **Tunnel Data**, you can choose specific data from each device by checking the corresponding box.



7. Click **Save**.

Your connection is now listed on the Data Forwarding page. You can edit, pause, and delete connections here.

Set Up an Amazon SNS Connection

Set up data forwarding through an Amazon SNS connection from the Data Forwarding page. Data forwarding through Amazon SNS only supports transferring results data. To set up the connection, you need files and details that you can get from your AWS account.

Prerequisites

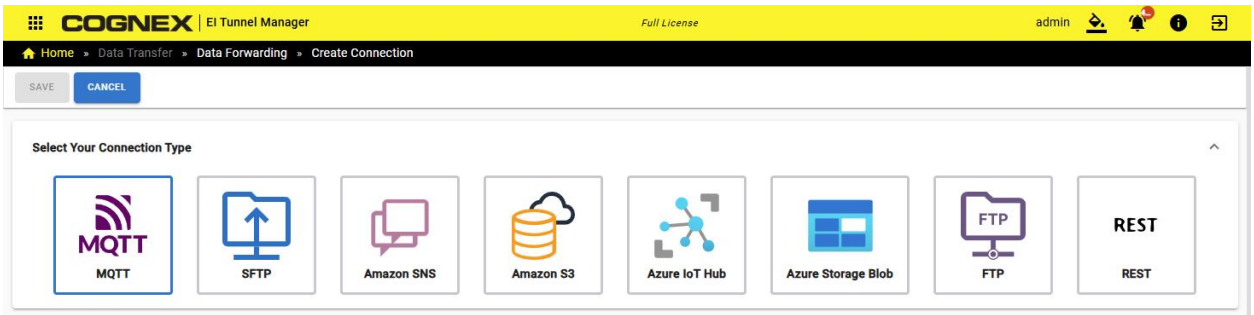
Before you start, ensure that the following prerequisites are met:

- The Unit is connected to the Internet.
- You are subscribed to the devices whose data you want to forward to an SNS topic.
- The certificate and private key files, generated from your AWS account, are available.

Procedure

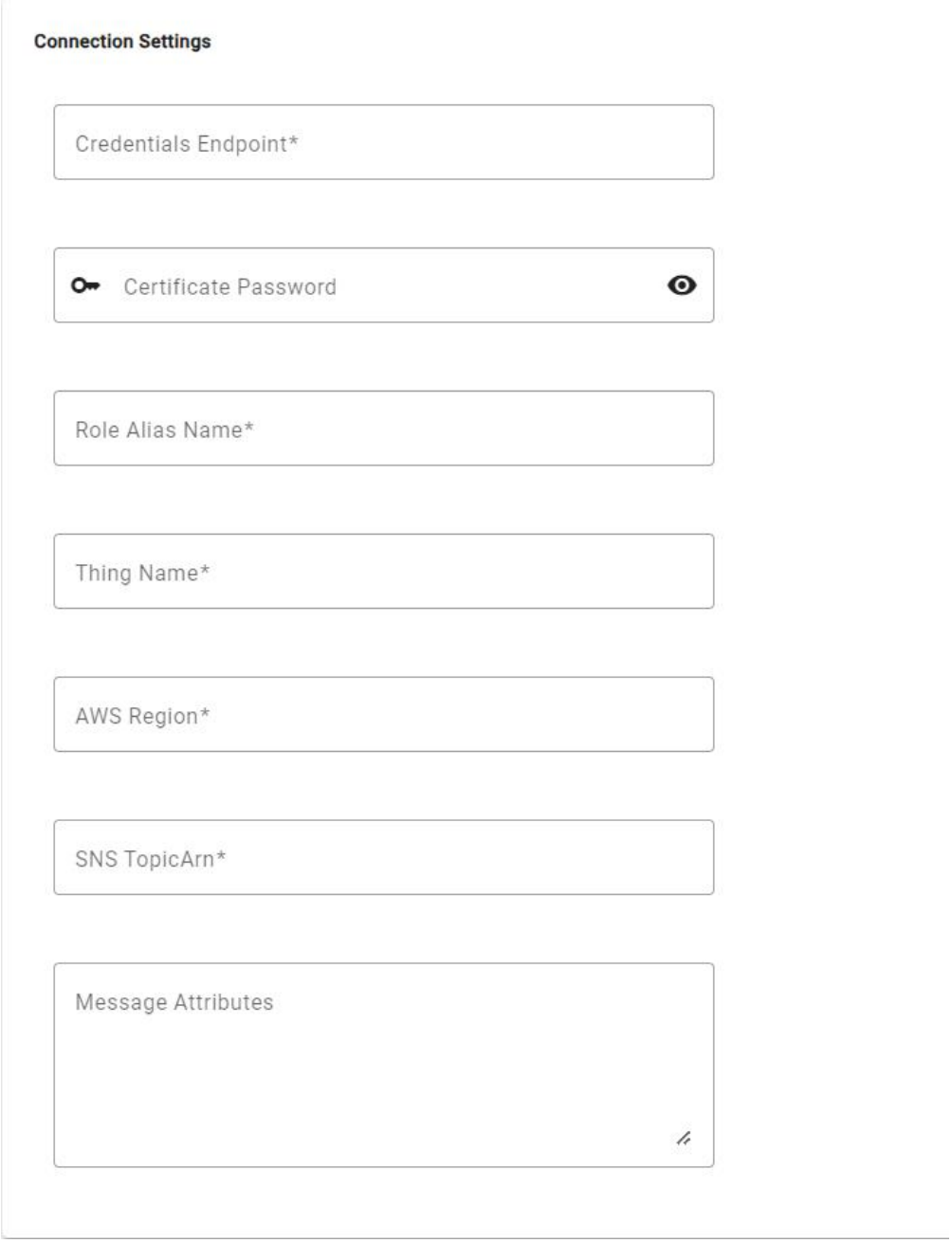
To set up an Amazon SNS connection:

1. Click **Create Connection** on the Data Forwarding page.
2. Choose **Amazon SNS**.

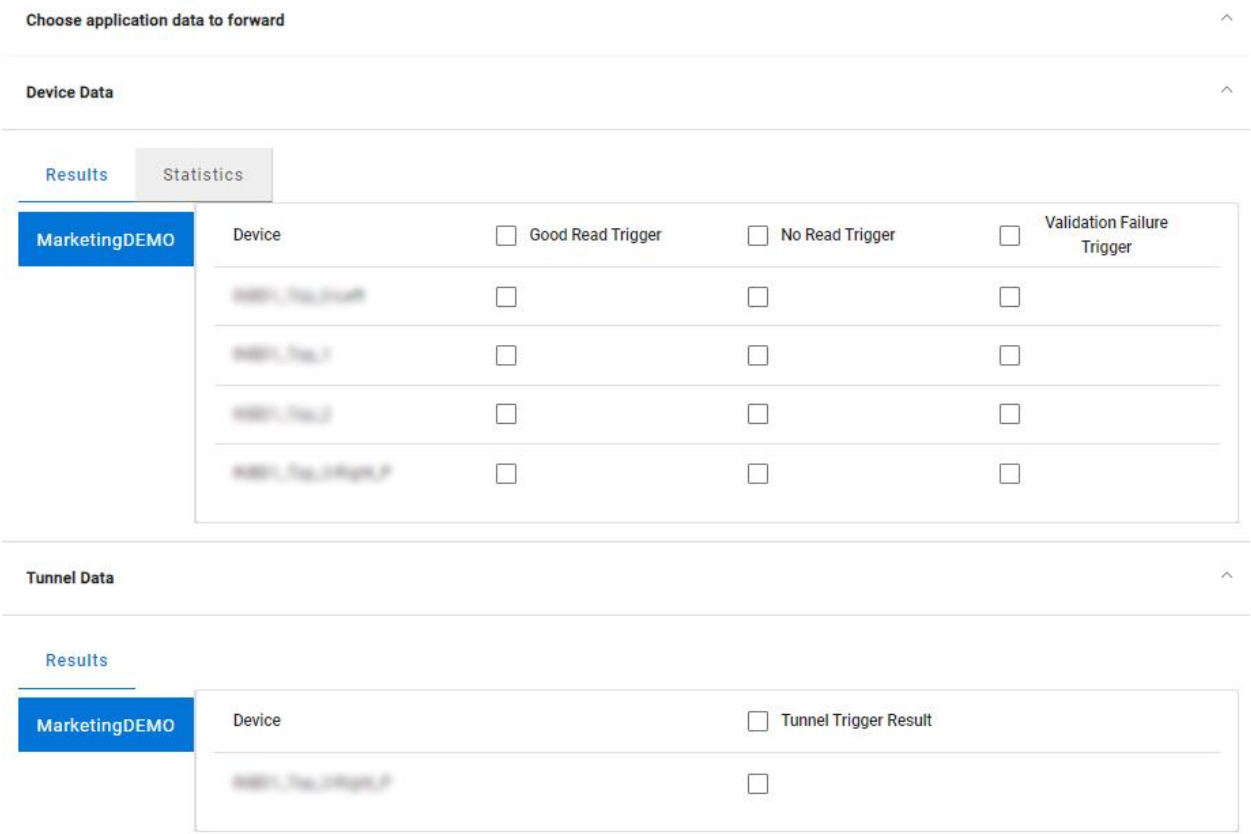


3. Configure your connection:
    a. Provide the **Connection Name**.
    b. Optionally, to help differentiate between connections, provide a custom **Client ID**.
    c. Upload the certificate and private key files generated from your AWS account.

4. Provide the details for the **Connection Settings**. You can find these details in your AWS account.



5. To choose the data you want to forward and the source devices, check the corresponding box.



6. Click **Save**.

Your connection is now listed on the Data Forwarding page. You can edit, pause, and delete connections here.

Set Up an Amazon S3 Connection

Set up data forwarding through an Amazon S3 connection from the Data Forwarding page. Data forwarding through Amazon S3 supports both transferring results data and images. To set up the connection, you need to provide a custom file path, and files and details that you can get from your AWS account.

Prerequisites

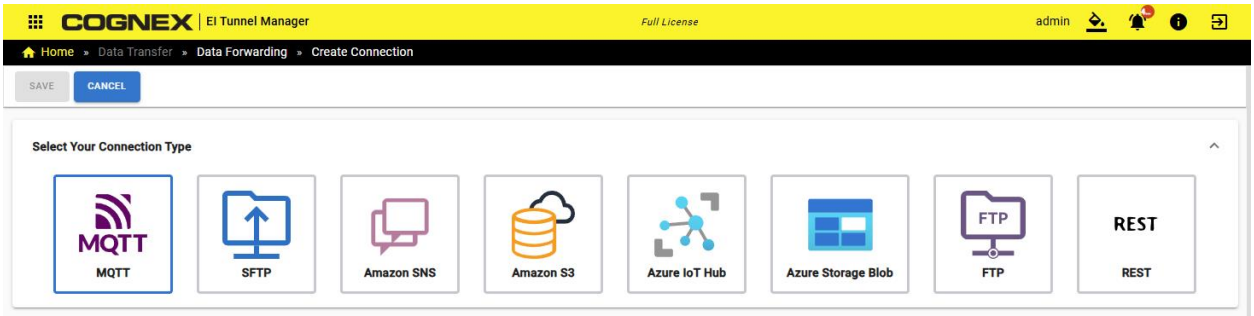
Before you start, ensure that the following prerequisites are met:

- The Unit is connected to the Internet.
- You are subscribed to the devices whose data you want to forward to an S3 bucket.
- The certificate and private key files, generated from your AWS account, are available.

Procedure

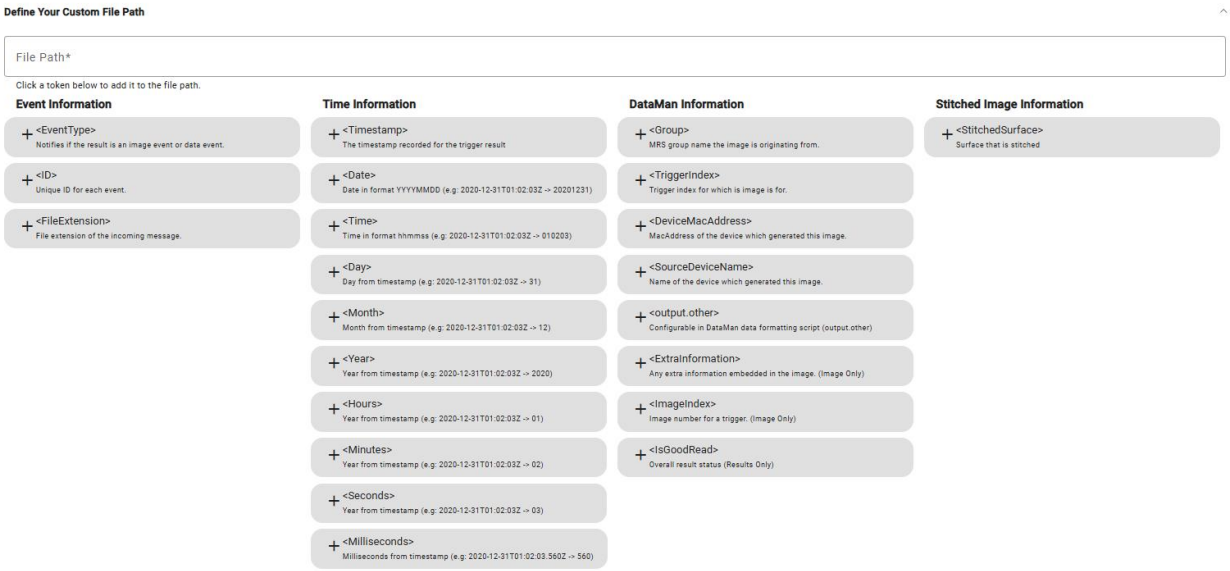
To set up an Amazon S3 connection:

1. Click **Create Connection** on the Data Forwarding page.
2. Choose **Amazon S3**.



3. Configure your connection.
   a. Provide the **Connection Name**.
   b. Optionally, to help differentiate between connections, provide a custom **Client ID**.
   c. Upload the certificate and private key files generated from your AWS account.

4. Define a custom file path.



Note: You can use a mix of literals and tokens to set up the custom file path. Tokens are replaced object information at the time of forwarding (for example, triggerID, timestamp). Image information tokens are only available for forwarding images and are not replaced on other data types.

5. Provide the details for the **Connection Settings**. You can find these details in your AWS account.

Connection Settings

Credentials Endpoint*

Certificate Password

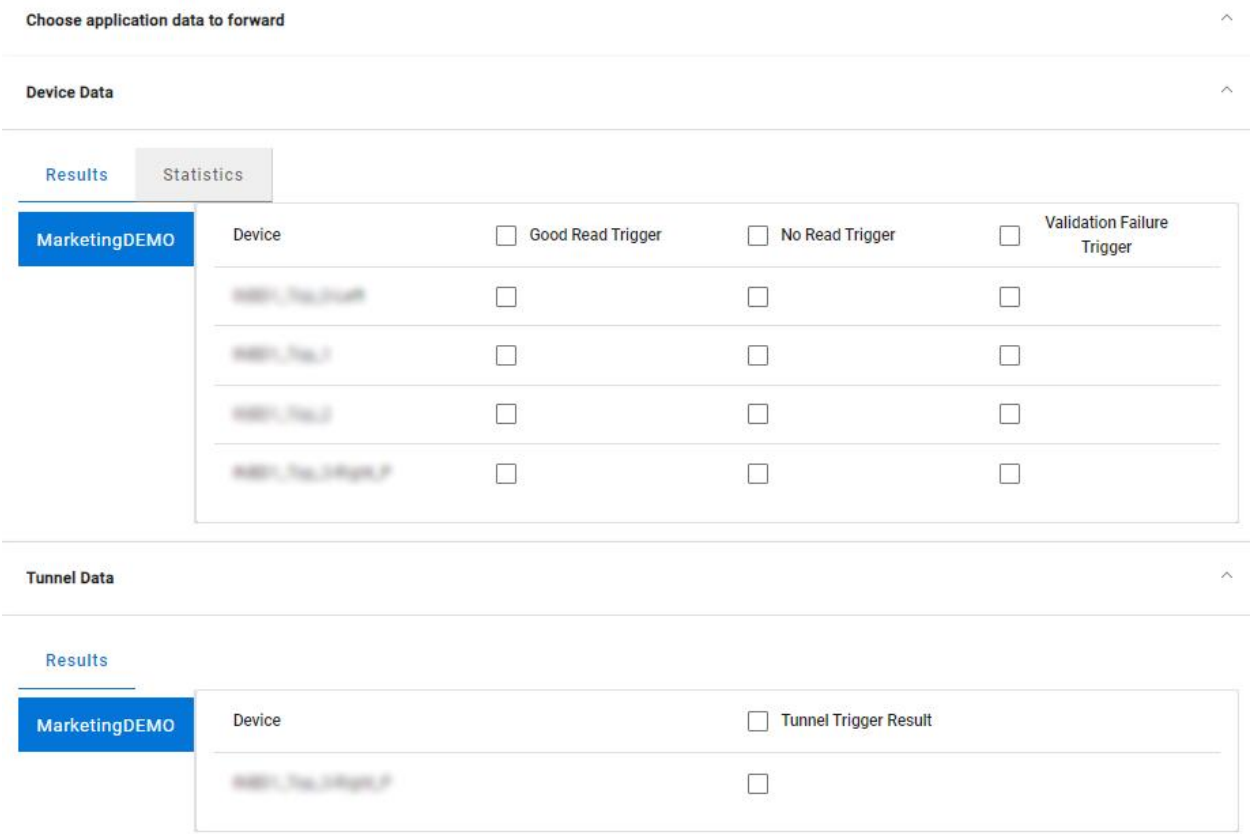
Role Alias Name*

Thing Name*

S3 Region*

BucketName*

6. To choose the data you want to forward and the source devices, check the corresponding box.



7. Click **Save**.

Your connection is now listed on the Data Forwarding page. You can edit, pause, and delete connections here.

Set Up an Azure IoT Hub Connection

Set up data forwarding through an Azure IoT Hub connection from the Data Forwarding page. Data forwarding through Azure IoT Hub only supports transferring results data. To set up the connection, you need to provide a custom file path.

Prerequisites

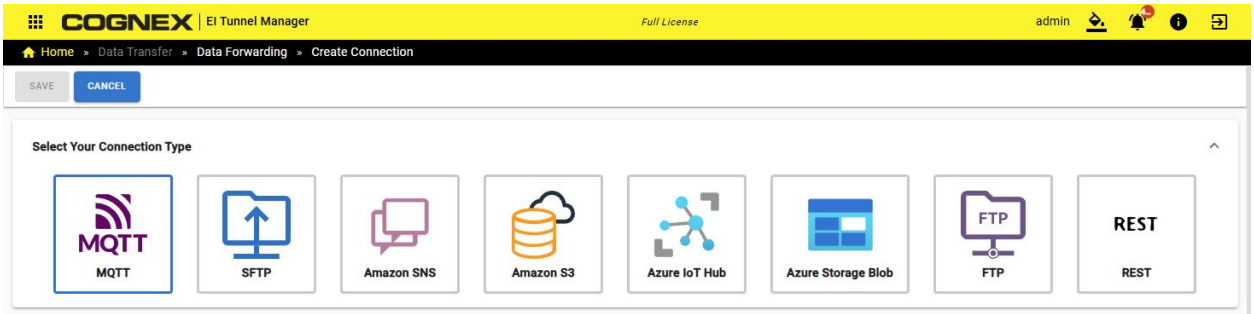
Before you start, ensure that the following prerequisites are met:

- The Unit is connected to the local network.
- You are subscribed to the devices from which you intend to forward data.

Procedure

To set up an Azure IoT Hub connection:

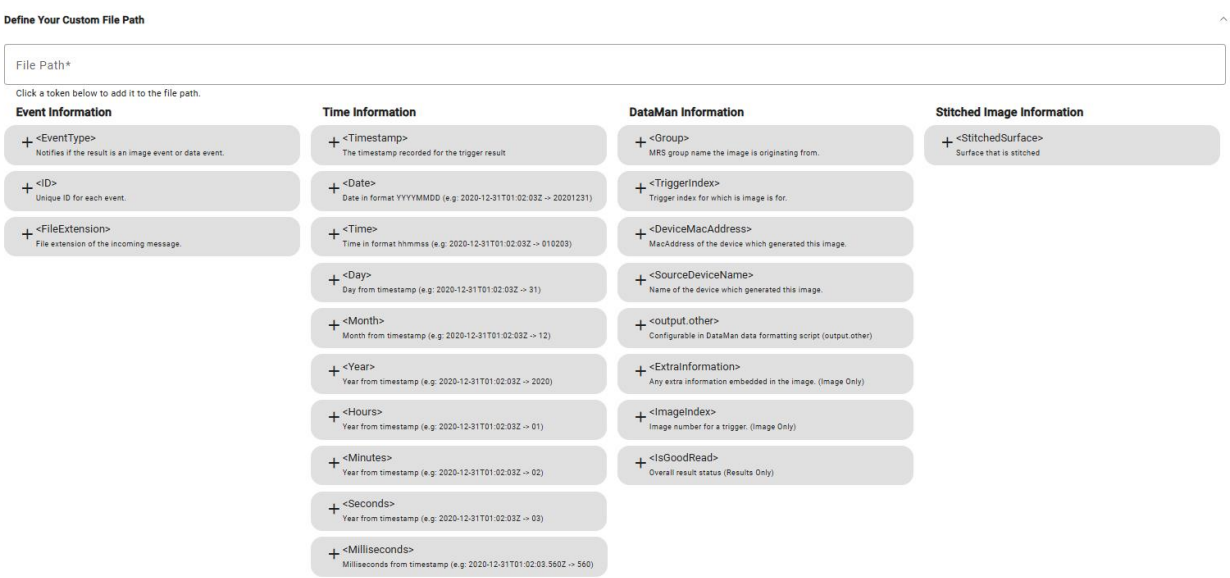
1. Click **Create Connection** on the Data Forwarding page.
2. Choose **Azure IoT Hub**.



3. Configure your connection:
   a. Provide the **Connection Name**.
   b. Optionally, to help differentiate between connections, provide a custom **Client ID**.
   c. Choose the **Authentication Method** from the drop-down menu. Once you have selected the authentication method, the **Connection Settings** section appears in the page.

Note: If you select X509 Certificate, you must upload a **Pfx File**.

4. Define a custom file path.



5. Enter the connection details based on which authentication method you have selected.

Connection Settings

Hostname*

Device ID*

Certificate Password

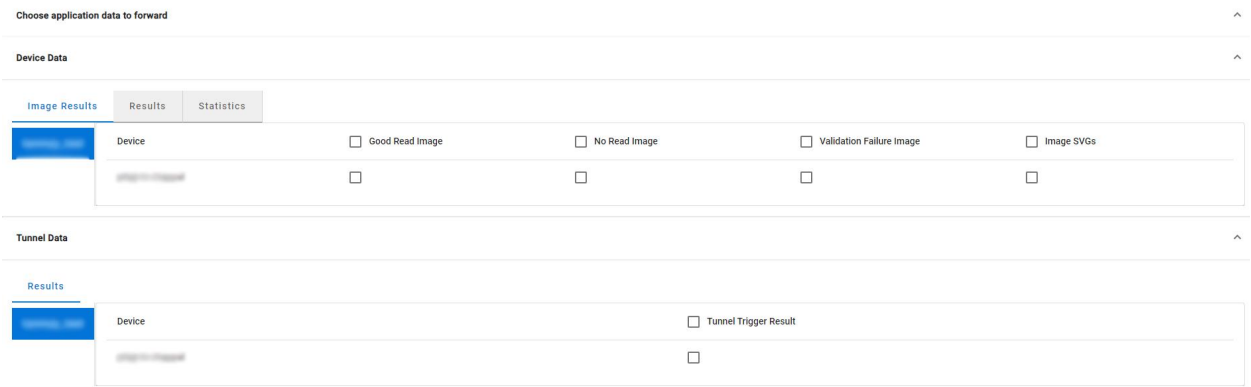
Connection Settings

SAS Token*

Connection Settings

Azure Connection String*

6. Choose the application data you want to forward and from which device. Under **Device Data** and **Tunnel Data**, you can choose specific data from each device by checking the corresponding box.



7. Click **Save**.

Your connection is now listed on the Data Forwarding page. You can edit, pause, and delete connections here.

Set Up an Azure Storage Blob Connection

Set up data forwarding through an Azure Storage Blob connection from the Data Forwarding page. Data forwarding through Azure Storage Blob only supports transferring results data. To set up the connection, you need to provide a custom file path.

Prerequisites

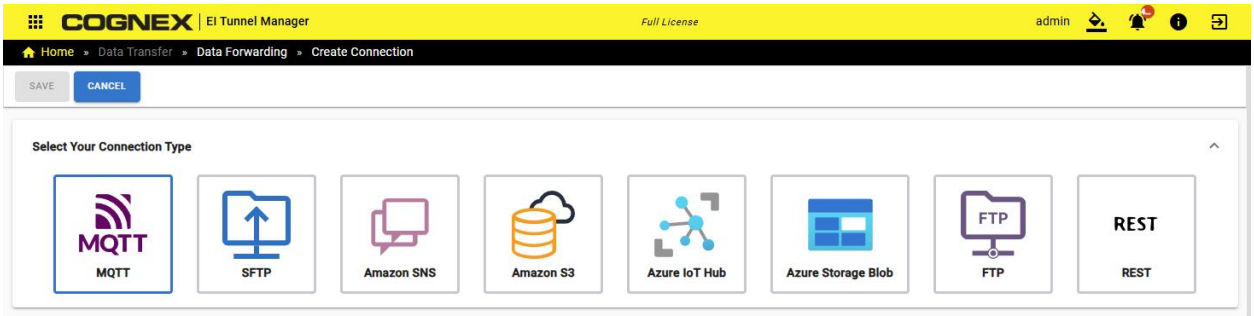
Before you start, ensure that the following prerequisites are met:

- The Unit is connected to the local network.
- You are subscribed to the devices from which you intend to forward data.

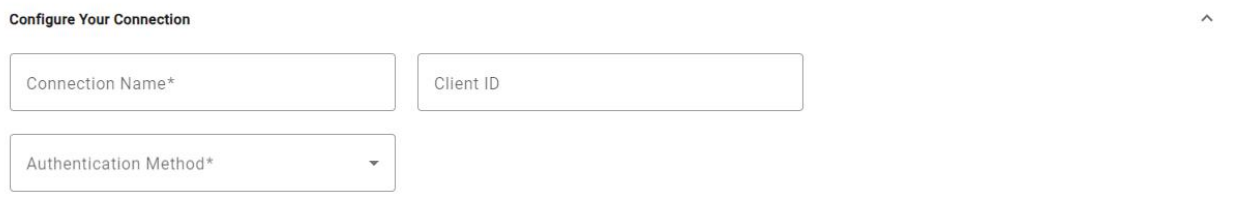
Procedure

To set up an Azure Storage Blob connection:

1. Click **Create Connection** on the Data Forwarding page.
2. Choose **Azure Storage Blob**.

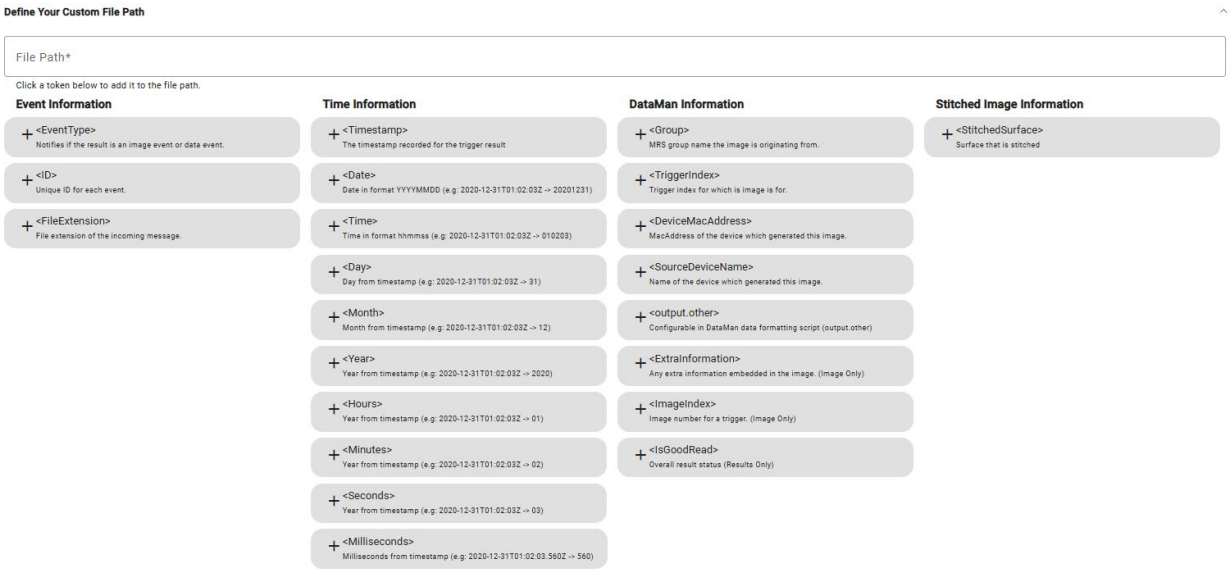


3. Configure your connection:
   a. Provide the **Connection Name**.
   b. Optionally, to help differentiate between connections, provide a custom **Client ID**.
   c. Choose the **Authentication Method** from the drop-down menu. Once you have selected the authentication method, the **Connection Settings** section appears in the page.



Note: If you select Certificate Credential, you must upload a **Pfx File**.

4. Define a custom file path.



5. Enter the connection details based on which authentication method you have selected.

Connection Settings

Blob Account Name*

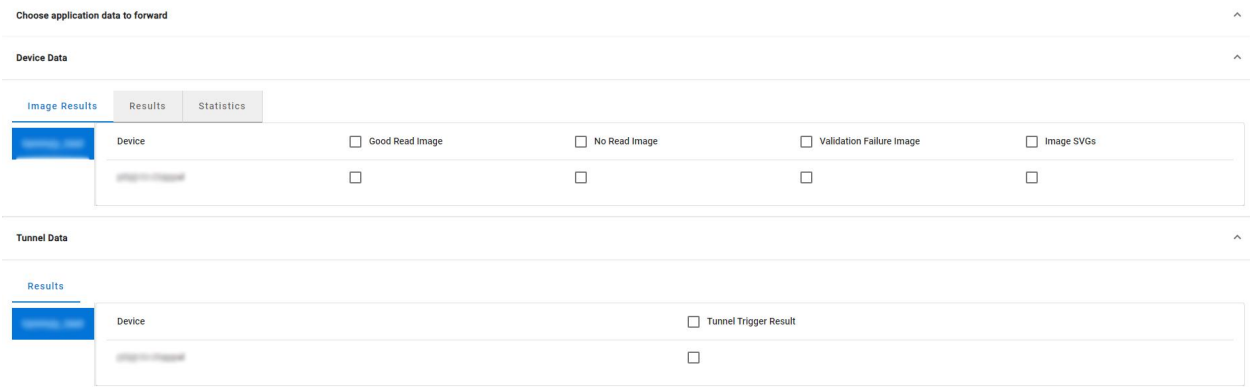
Blob Container Name*

Tenant ID*

Client ID*

Pfx Password

6. Choose the application data you want to forward and from which device. Under **Device Data** and **Tunnel Data**, you can choose specific data from each device by checking the corresponding box.



7. Click **Save**.

Your connection is now listed on the Data Forwarding page. You can edit, pause, and delete connections here.

Set Up an FTP Connection

Set up data forwarding through an FTP connection from the Data Forwarding page. Data forwarding through FTP only supports transferring results data. To set up the connection, you need to provide a custom file path.

Prerequisites

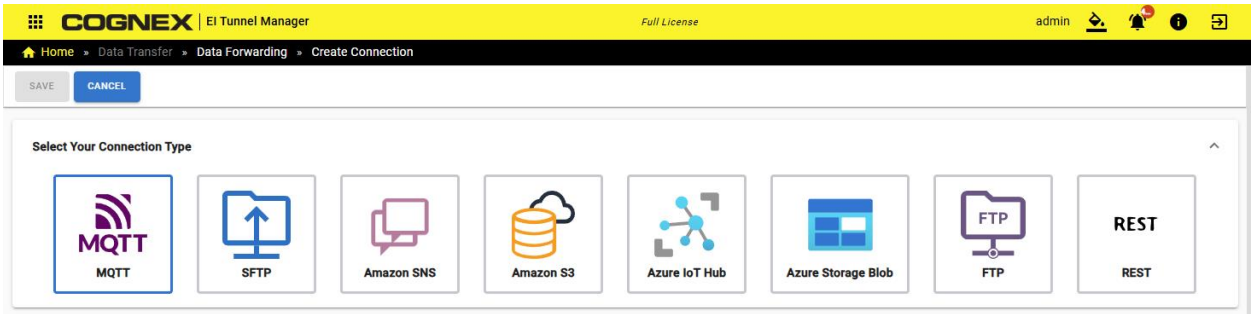
Before you start, ensure that the following prerequisites are met:

- The Unit is connected to the local network.
- You are subscribed to the devices from which you intend to forward data.

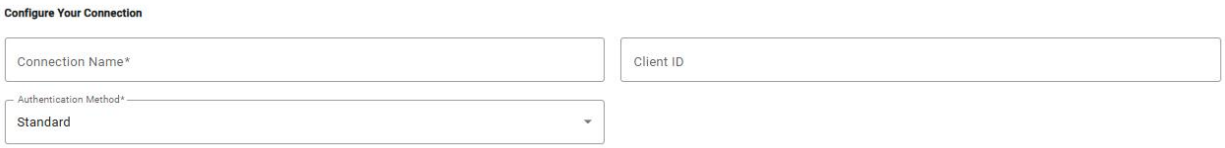
Procedure

To set up an FTP connection:

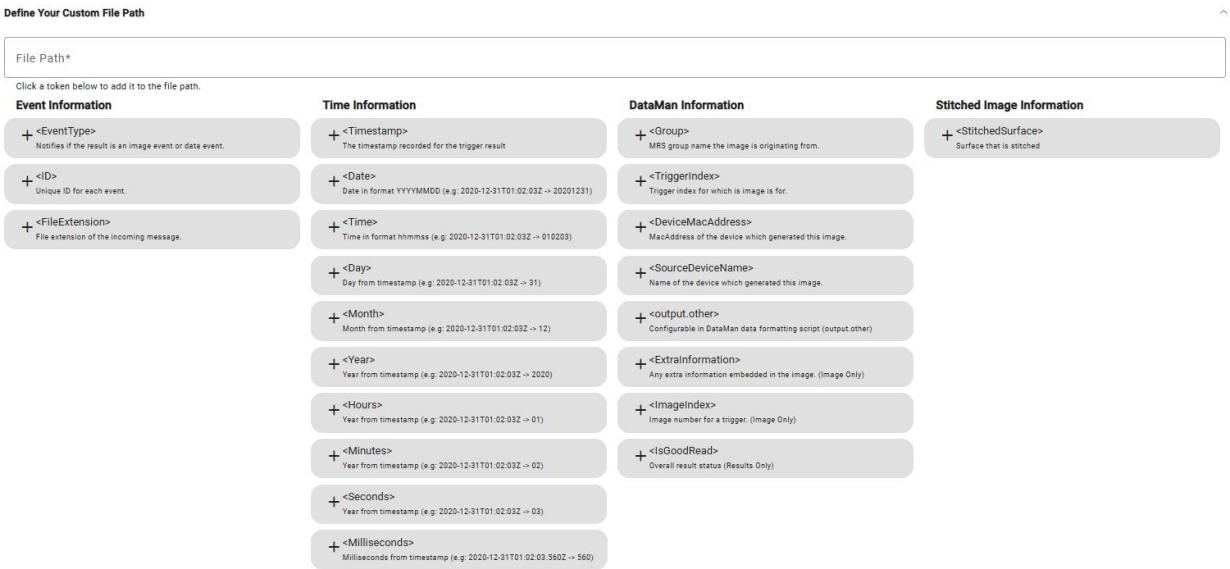
1. Click **Create Connection** on the Data Forwarding page.
2. Choose **FTP**.



3. Configure your connection:
   a. Provide the **Connection Name**.
   b. Optionally, to help differentiate between connections, provide a custom **Client ID**.

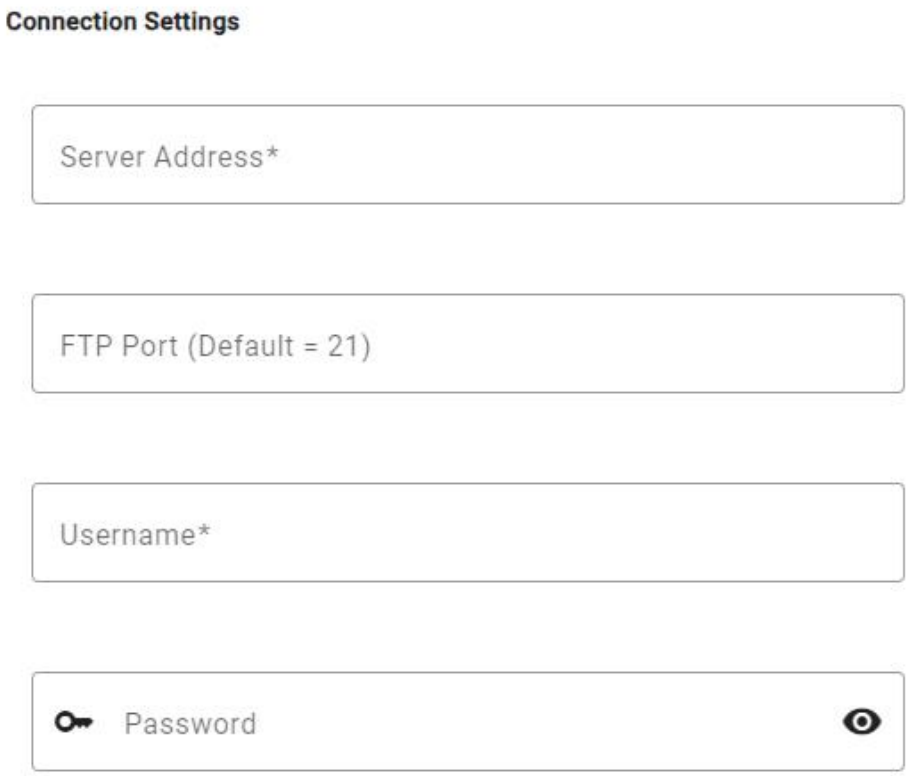


4. Define a custom file path.

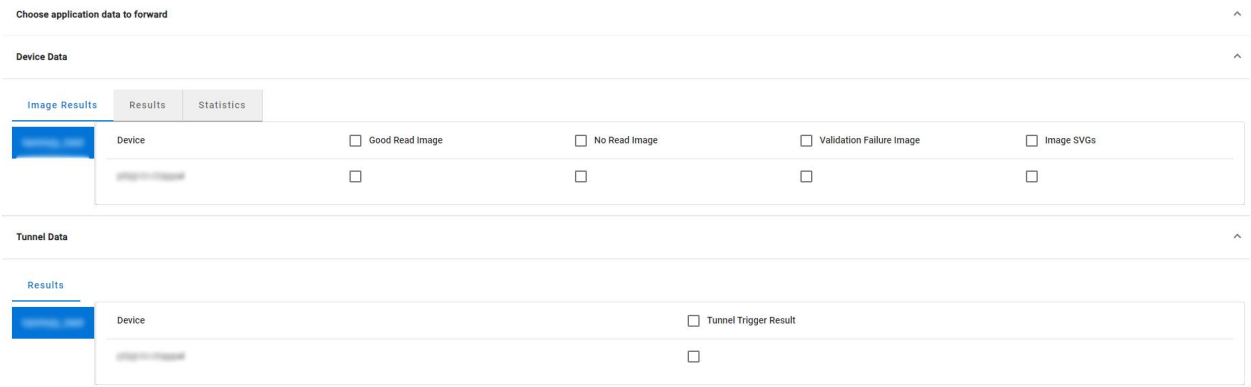


> **Note**: You can use a mix of literals and tokens to set up the custom file path. Tokens are replaced object information at the time of forwarding (for example, triggerID, timestamp). Image information tokens are only available for forwarding images and are not replaced on other data types.

5. Configure your connection:
    a. Provide the **Server Address**.
    b. Optionally, provide an **FTP Port**.
    c. Provide a **Username**.
    d. Optionally, provide a **Password**.



6. Choose the application data you want to forward and from which device. Under **Device Data** and **Tunnel Data**, you can choose specific data from each device by checking the corresponding box.



7. Click **Save**.

Your connection is now listed on the Data Forwarding page. You can edit, pause, and delete connections here.

Set Up a REST Connection

You can set up data forwarding through a REST connection from the Data Forwarding page. Data forwarding through REST only supports transferring results data.

Prerequisites

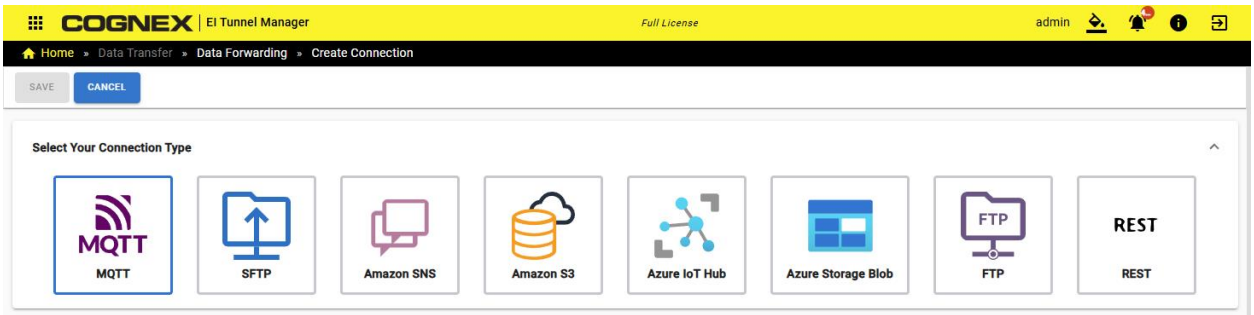
Before you start, ensure that the following prerequisites are met:

- The Unit is connected to the local network.
- You are subscribed to the devices from which you intend to forward data.

Procedure

To set up a REST connection:

1. Click **Create Connection** on the Data Forwarding page.
2. Choose **REST**.



3. Configure your connection:
   a. Provide the **Connection Name**.
   b. Optionally, to help differentiate between connections, provide a custom **Client ID**.
   c. Choose the **Authentication Method** from the drop-down menu. Once you have selected the authentication

method, the **Connection Settings** section appears in the page.

4. Enter the connection details based on which authentication method you have selected.

Connection Settings

REST API endpoint url*

Grant Type

Client Credentials

Application Client ID*

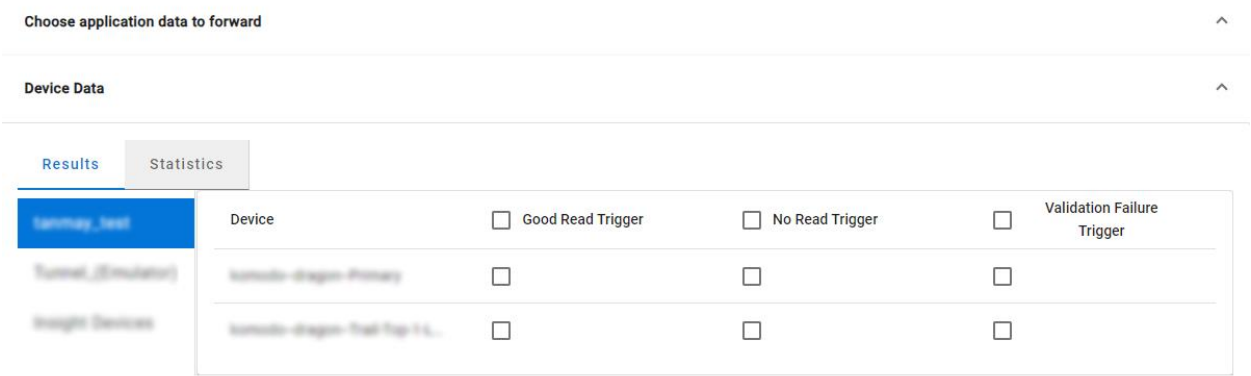
Client Secret

Token Generation URL*

Scope*

Headers (JSON)

5. Choose the application data you want to forward and from which device. Under **Device Data** and **Tunnel Data**, you can choose specific data from each device by checking the corresponding box.



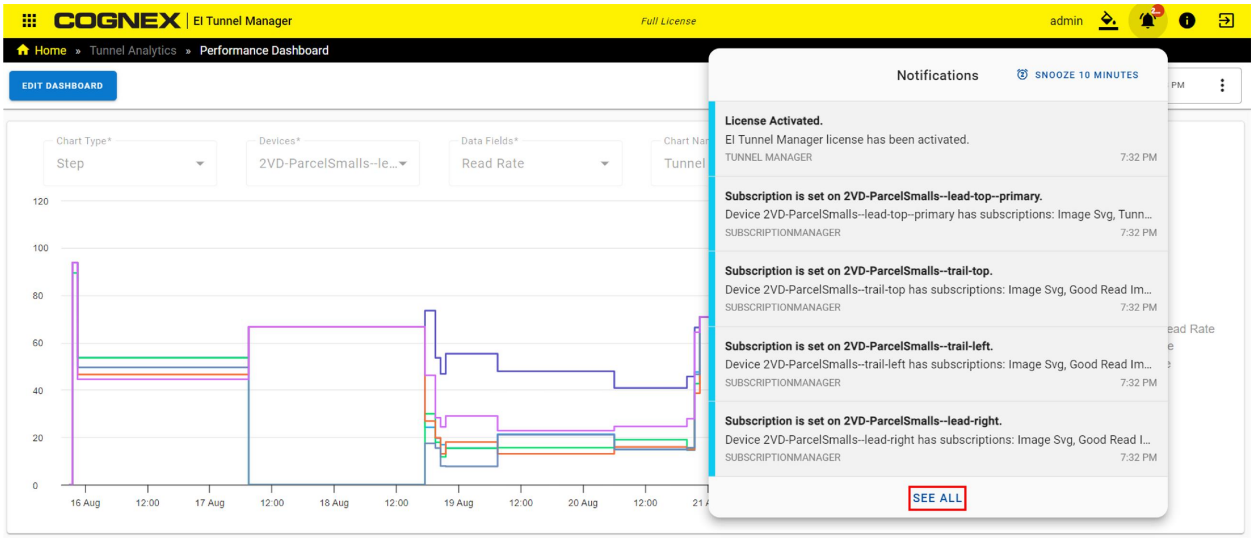
6. Click **Save**.

Your connection is now listed on the Data Forwarding page. You can edit, pause, and delete connections here.

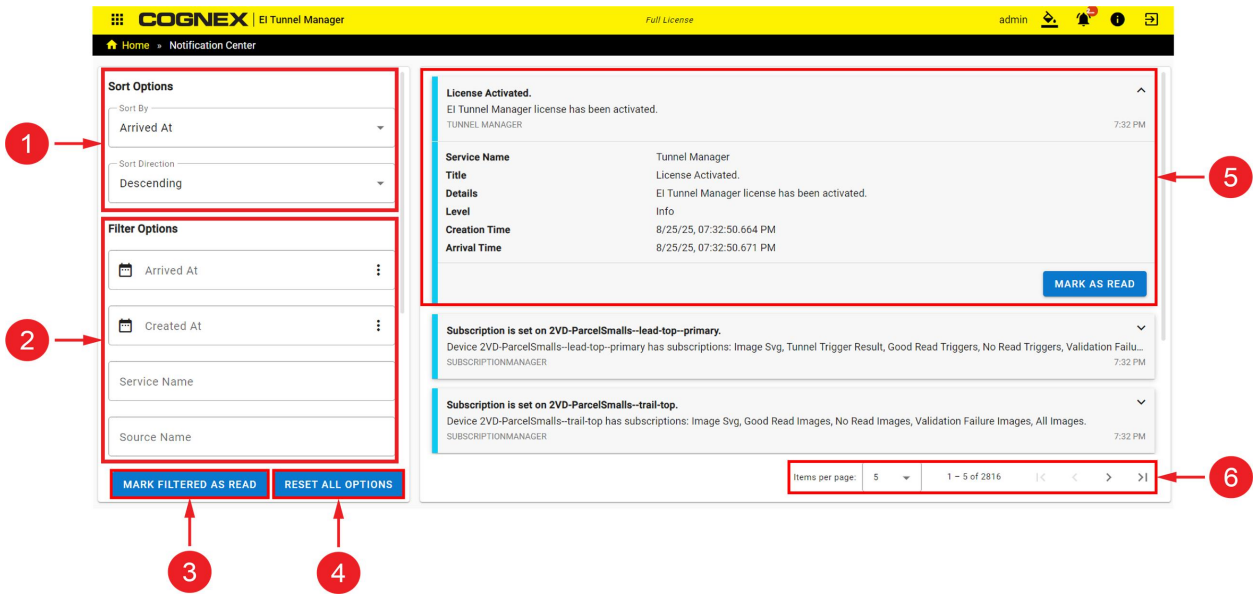
Notification Center

The Notification Center allows you to filter and sort the notifications that EI Tunnel Manager sends you. You can access the Notification Center from the main menu or from the notification bell icon.

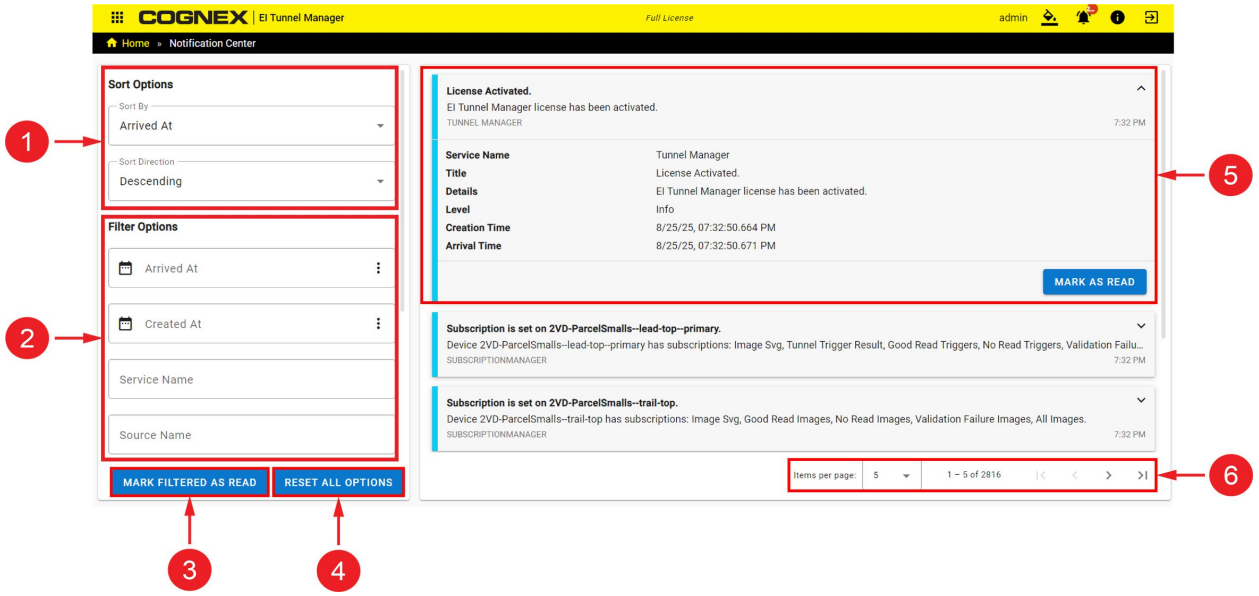
Click the bell icon in the upper-right corner of the home page to see the latest notifications. Click the **See All** button to open the Notification Center. You can switch off getting notifications for 10 minutes by clicking the **Snooze 10 Minutes** button.



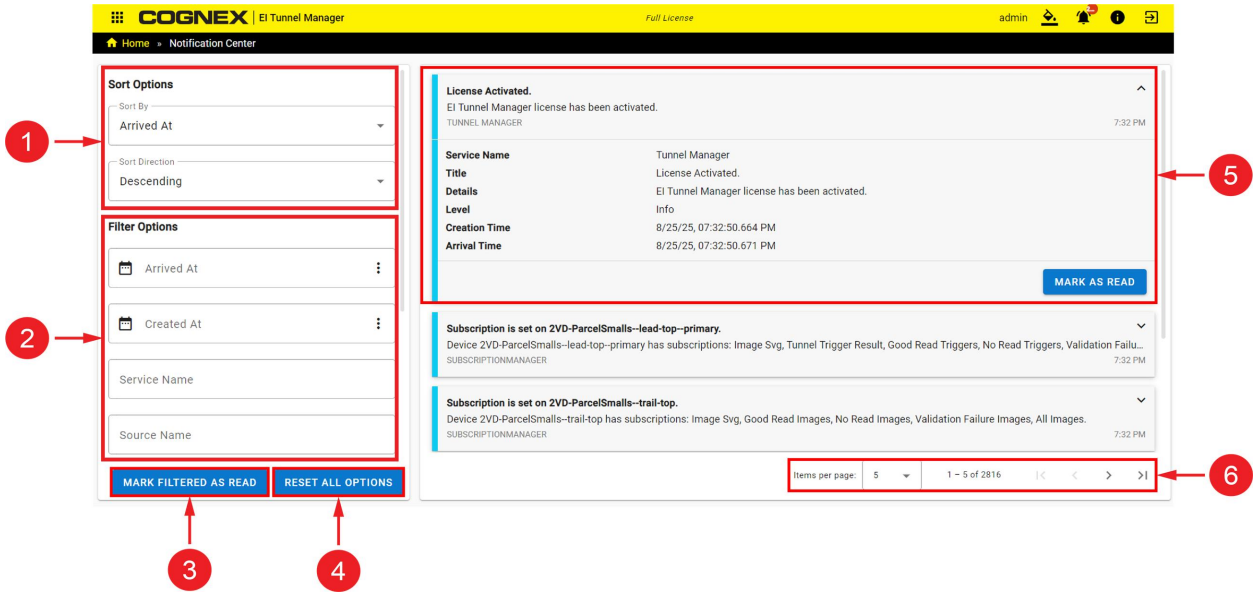
Notification Center Features



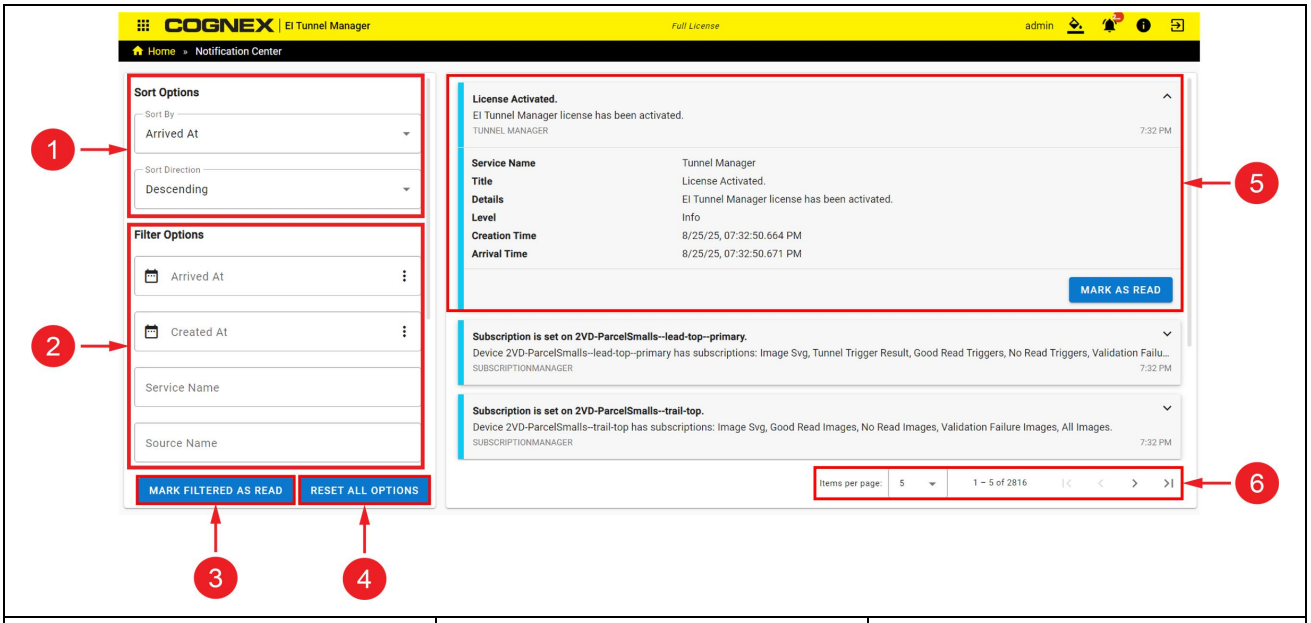
Number	Element	Description



1	Sort Options	Click on the **Sort By** dropdown to sort your notifications according to the following options: • **Service Name:** Sorts the notifications according to service name of the notifications. • **Created At:** Sorts the notifications according to the date of creation. • **Level:** Sorts the notifications according to the level of the notification (**Info**, **Warning**, **Error**, or **Critical**). • **Is Read:** Sorts the notifications according to whether the notification is read. • **Arrived At:** Sorts the notifications according to the date of arrival. Click on **Sort Direction** dropdown to determine the order of the notifications: • **Ascending** • **Descending**



2	Filter Options	You can filter the notifications by using the following filter options: • **Arrived At:** When the notification arrived in the Notification Center. • **Created At:** When the notification is created. • **Service Name:** Type in the Service Name of the notification. • **Title:** Type in the title of the notification. • **Details:** Type in the details of the notification. • **Is Read:** Filters your notifications according to the status of the notification (**Read/Unread**). • **Notification Level:** Filters according to level (**Info**, **Warning**, **Error**, or **Critical**).
3	Mark Filtered as Read	Mark the filtered notifications as read.
4	Reset All Options	Clears the selected Sort and Filter options.
5	Notification	Click on the notification to see the details. Click on the **Mark as read** button to mark the notification as read.



6	Paging buttons	Click on the **Items per page** dropdown to choose the number of notifications showed on the screen. Click on the arrows to turn pages between the notifications.

Notification Levels

The Notification Center displays four levels of notifications:

- **Info:** Updates about general processes. No action is required.
- **Warning:** Caution, your process can be halted. You have to resolve the issues in the notifications before continuing.
- **Error:** Blocks your process. You have to resolve the issues in the notifications before continuing.
- **Critical:** Your process is no longer working. You have to resolve the issues in the notifications before continuing.

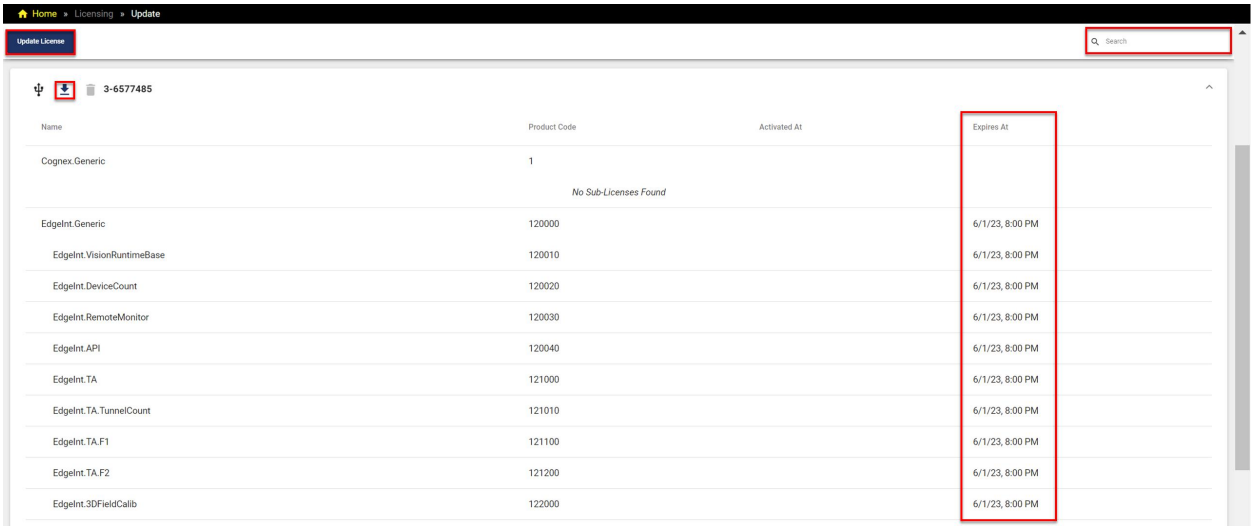
Licensing

The Licensing app allows you to update your licenses using the Update page.

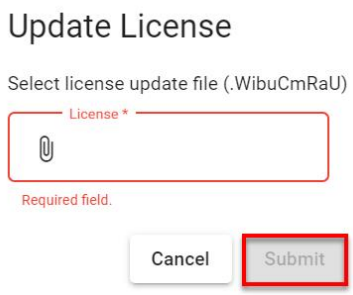
Update

The Update page allows you to update your licenses.

1. Download the license request file by clicking on the **Download License Request File** icon from the license table.



2. Email the generated license request file with the *.WibuCmRaC* extension to Cognex Support: *TSupport@cognex.com*.
3. Cognex Support emails the license file with the *.WibuCmRaU* extension back to you.
4. Click on **Update License**. Select the file you have received with the *.WibuCmRaU* extension and click on **Submit**.



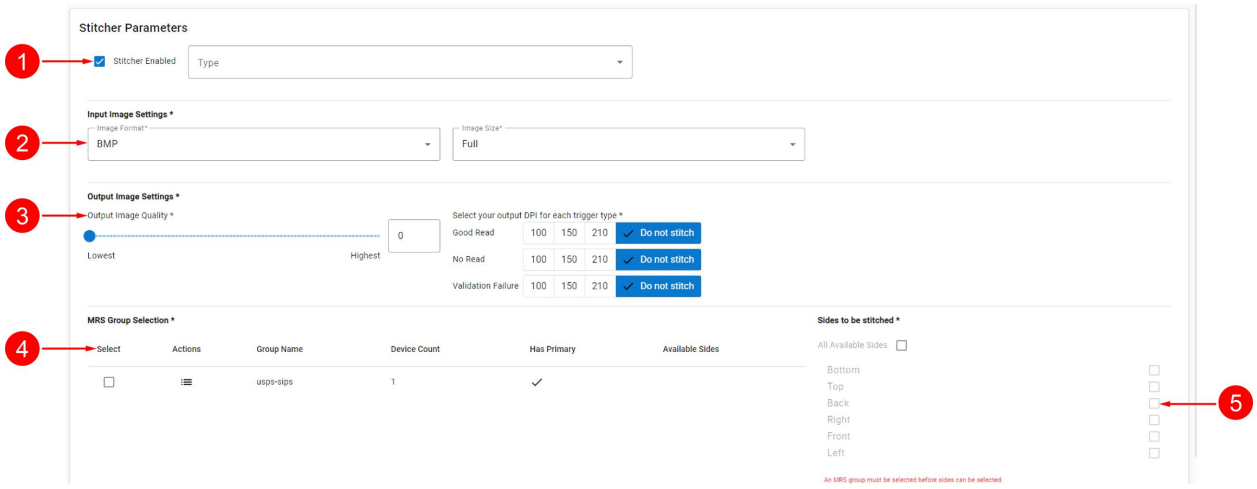
5. Check if the **Expires At** column updates automatically to the new license expiration date, to verify successful license update.

You can search for any information on the page by using the **Search** field.

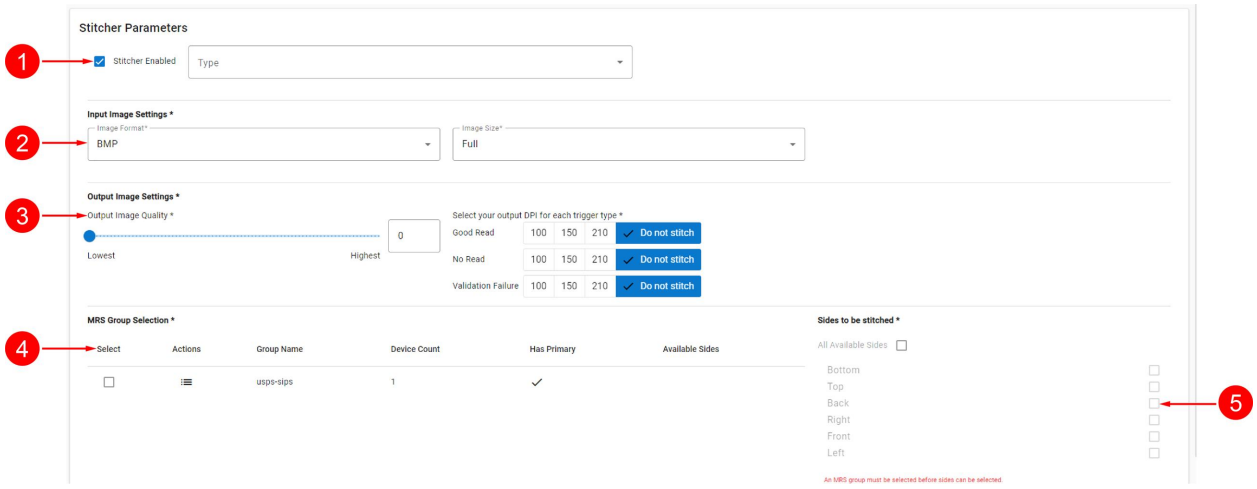
Stitcher Settings

The Stitcher feature stitches images together into one bigger image. The stitched images appear in the Results Browser as normal images.

Note: Only the EI-A9-TUNMGR-xxx hardware supports image stitching.



Number	Description
1	Click the **Stitcher Enabled** checkbox to enable the type. You can choose the type of the Stitcher feature: • Modular Vision Tunnel (MVT): A flexible scan tunnel in which the units can detect up to six sides of the boxes. Scalable for various speeds and gaps, without sacrificing accuracy. • Top Only No Perspective: For units that only aimed at the top of the boxes.
2	Choose the image format from the dropdown: • JPG • PNG • BMP Choose the image size from the following: • Full • Quarter • 1/16 • 1/64



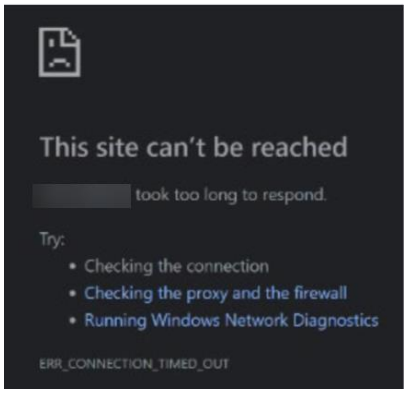
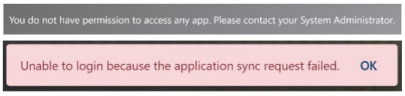
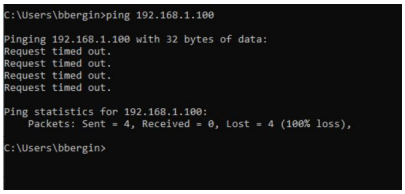
3	Adjust the quality of the output image on the slider or write a number in the box. Select the Dots per Inch (DPI) value of the output images for each trigger type: • 100 DPI: lower quality, suitable for long-term storage and basic analysis. • 150 DPI: sacrifice some quality to reduce storage size. • 210 DPI: suitable for post-processing, for example OCR. • Do not stitch: you can choose not stitching the images together for that particular trigger type.
4	Select the Multi-Reader Sync (MRS) group. You can choose a group if there are multiple groups provisioned on the Edge Intelligence system.
5	Select which sides of the boxes you want to stitch into one image. For example, if you have a unit that detects the top and the front of a box, you can select only the top to be stitched into one image.

Troubleshooting

This section provides solutions to common issues, helping you troubleshoot and resolve issues quickly and efficiently.

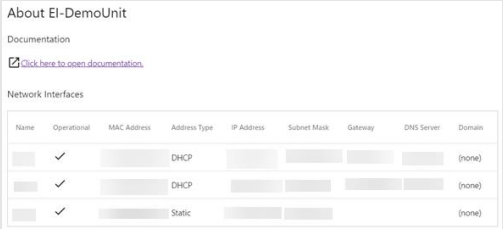
Remote Connection Troubleshooting

This section lists the most common errors and their solutions.

Error	Illustration	Solution
Unit is not visible in the browser		Check cable connections and secure them if necessary.
Failed login error message		Check the credentials and reenter username and/or password.
Component load error message		Reboot unit and wait for services to start.
No data/images available		Check unit availability and setup.
Cannot access Cognex product name uppercase URL		Check that subnets do not overlap. The network administrator must ensure that the IPs do not overlap.

Note: For the best results, use Ethernet connection to your network, because Wi-Fi might not allow the connection depending on your network settings.

Note:
The login page lists the IP address of your devices.



Enable Remote Access for Cognex Technical Support

Select the appropriate remote access solution depending on the specific requirements and infrastructure of your organization.

Virtual Private Networking (VPN) and Virtual Desktop Infrastructure (VDI) allow Cognex Technical Support to connect with network-connected devices remotely. VPN and VDI access solutions provide secure, authorized remote support personnel with access to impacted equipment when resolving issues. Make sure you have support for HTTP, HTTPS, SSH, or SCP when using these solutions.

These solutions require engagement between the IT groups of both parties so that they can properly configure the remote access solution.

Contact Cognex Technical Support to get started.

Note: For further assistance or specific configuration guidance, contact the Cognex Technical Support department directly.

Access Solution	Requirements
VPN	• A VPN-compatible router or firewall at your site or a software VPN (such as Hamachi or TeamViewer). • Known accessible hostname for setup. • VPN software to provide the Cognex Technical Support team with. **Recommendations for Setup:** 1. Configure your VPN device (router/firewall) to enable VPN tunnels. For example: a. Set up a VPN server. b. Define user access controls. c. Select encryption protocols and specify permissions to ports. 2. Create user accounts for Cognex Technical Support personnel with unique credentials. **Note**: At least 20 access accounts are required to ensure all support personnel have individual access. 3. Assign the necessary permissions for accessing the required systems. 4. Provide the Cognex Technical Support team with the VPN connection details, including the server address, login credentials, two-factor authentication, and any required VPN client software. 5. Continuously maintain accounts and provide the Cognex Technical Support team with relevant updates on policies.

Virtual Desktop Infrastructure (VDI)	• VDI solution (such as VMware Horizon or Citrix). • Sufficient bandwidth to support remote desktop sessions. • Software or web browser to provide the Cognex Technical Support team with. **Recommendations for Setup:** 1. Set up a VDI instance within your network. For example: a. Configure a virtual desktop. b. Set resource allocations (CPU, RAM, storage, and necessary software to access Cognex equipment). c. Define access controls. 2. Create dedicated VDI user accounts for the Cognex Technical Support personnel. **Note**: At least 20 access accounts are required to ensure all support personnel have individual access. **Note**: Make sure that the support personnel only have access to the necessary applications and data. 3. Provide the Cognex Technical Support team with the connection details, including the VDI portal URL, login credentials, and two-factor authentication.
TeamViewer	• Latest TeamViewer software installed. • Internet connection for simultaneous connection between on-site equipment and Cognex Technical Support. **Note**: Make sure you have IT permission to change the Ethernet adapter settings on your laptop. **Recommendations for Setup:** 1. Make sure TeamViewer is installed and running on a Windows PC connected to the Unit box. 2. Open TeamViewer to obtain the session ID and password. 3. Share the session ID and password with the Cognex Technical Support team to enable a secure connection.

Video Conferencing Software	• Video conferencing software application installed, such as:
	  ◦ Microsoft Teams
	  ◦ Zoom
	  ◦ Webex
	  Note: Run the video conferencing software on a Windows PC connected to the Unit box.
	• Internet connection for simultaneous connection between on-site equipment and Cognex Technical Support.
	Note: Make sure that you have company permissions to share in a meeting and give remote control.
	Note: This access option is not recommended by the Cognex Technical Support team since it limits the ability of the support team to resolve problems.
	Recommendations for Setup:
	1. Either party can schedule a meeting and share the meeting invitation link with the other party.
	2. Use the provided meeting ID or link to join the meeting at the scheduled time.
	3. Share your screen with the Cognex Technical Support.

Open Source Licenses

The table below shows the open source licenses used by EI Tunnel Manager:

@amcharts/amcharts3-angular	Paid
angular-resize-event	MIT
angular2-moment	MIT
core-js	MIT
dateformat	MIT
daterangepicker	MIT
fullscreen	MIT
moment	MIT
ngx-daterangepicker-material	MIT
ngx-spinner	MIT
primeicons	MIT
rxjs	Apache-2.0
rxjs-compat	Apache-2.0
screenfull	MIT
socket.io	MIT
socket.io-client	MIT
Timescaledb	Apache-2.0
Timescale toolkit	Timescale License
zone.js	MIT

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