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RESTRICTED

Administrator Guide

IRIS Focus Lightning Version 7.1

VAISALA

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1. About this document

1.1 Version information

This document provides information for installing, operating, and maintaining IRIS Focus Lightning software.

Table 1 Document versions

Document code	Date	Description
M212545EN-C	November 2022	For IRIS Focus 7.1.
M212545EN-B	June 2022	For IRIS Focus 7.0.
M212545EN-A	November 2020	First version of this document. For IRIS Focus 6.0.

1.2 Related documents

Table 2 Related documents

Document code	Name
M211850EN	*IRIS Focus Administrator Guide*
M211849EN	*IRIS Focus User Guide*
M212545EN	*IRIS Focus Lightning Administrator Guide*
M212544EN	*IRIS Focus Lightning User Guide*
M211904EN	*IRIS Focus Release Notes*
M211315EN	*IRIS and RDA Software Installation Guide (M211315EN)*

1.3 Trademarks

Vaisala® is a registered trademark and HydroClass™, IRIS™ and Total Lightning Processor™ are trademarks of Vaisala Oyj.

Chrome™ is a trademark of Google Inc.

Firefox® is a registered trademark of Mozilla Foundation.

Edge® is a trademark of Microsoft Corporation in the United States and other countries.

All other product or company names that may be mentioned in this publication are trade names, trademarks, or registered trademarks of their respective owners.

1.4 Documentation conventions

WARNING! Warning alerts you to a serious hazard. If you do not read and follow instructions carefully at this point, there is a risk of injury or even death.

CAUTION! Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.

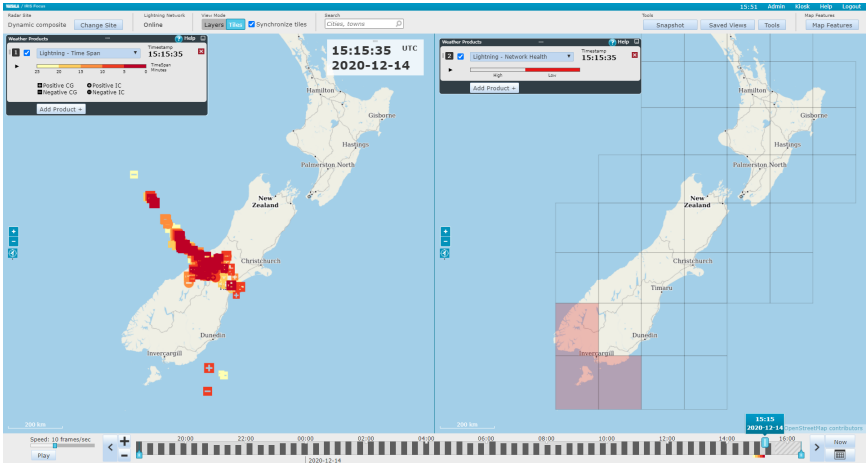
Note highlights important information on using the product.

Tip gives information for using the product more efficiently.

Lists tools needed to perform the task.

Indicates that you need to take some notes during the task.

2. IRIS Focus overview



1) Lightning data: courtesy of Transpower New Zealand Ltd.

Figure 1 IRIS Focus main view

IRIS Focus provides user-friendly, browser-based tools for viewing and analyzing lightning data received from a sensor network.

Lightning data is overlaid on a customizable geographical map. The data is visualized through products such as the **TimeSpan**, which provides information about recent lightning events.

With the zoomable animation timeline, you can easily visualize and animate recent data.

IRIS Focus can also be used to visualize weather radar data from a weather radar network. The application was initially designed for handling weather data, but it is suitable for visualizing any remotely sensored map-based data.

2.1 Lightning product generation

The data for lightning products in IRIS Focus originates from a Vaisala Lightning Detection System which uses multiple, remote sensors to detect signals emitted by lightning discharges, while filtering out the signals from non-lightning sources. Each sensor sends its data to the central processor (the **Total Lightning Processor**, TLP) where lightning locations are determined.

To ensure that the sensor data set applies to the same lightning event, the TLP compares the time at which the event was recorded by each sensor, and then calculates the precise location of the lightning event. The TLP also records several other descriptive characteristics of each lightning event.

The data from the TLP is delivered to IRIS Focus. The data is ingested to the system in real time, after which it can be requested across specific time frames by lightning products.

A single TLP can consume and merge data sets from multiple other TLP systems to produce a superset of data. For example, if organizations from three neighboring countries share TLP data, they can have a superset of lightning solutions from all three countries on each of the TLP systems. From there, they can create subsets of data feeds by lightning characteristics or geographic regions. Each of these subsets can then be fed to a specific Kafka topic on a specific Kafka cluster. Each of these topics can feed several IRIS Focus systems.

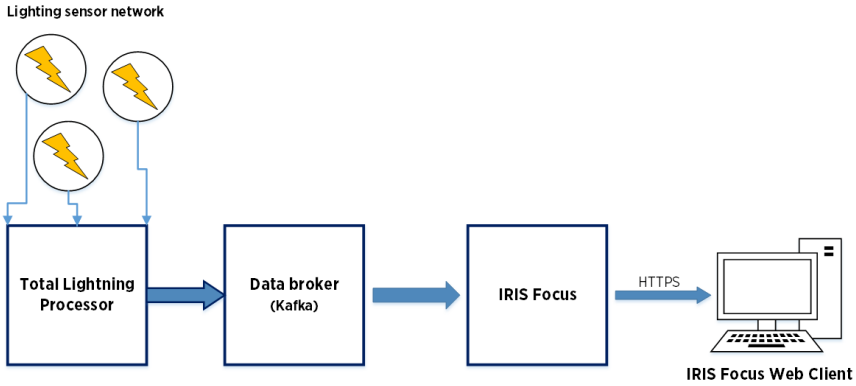
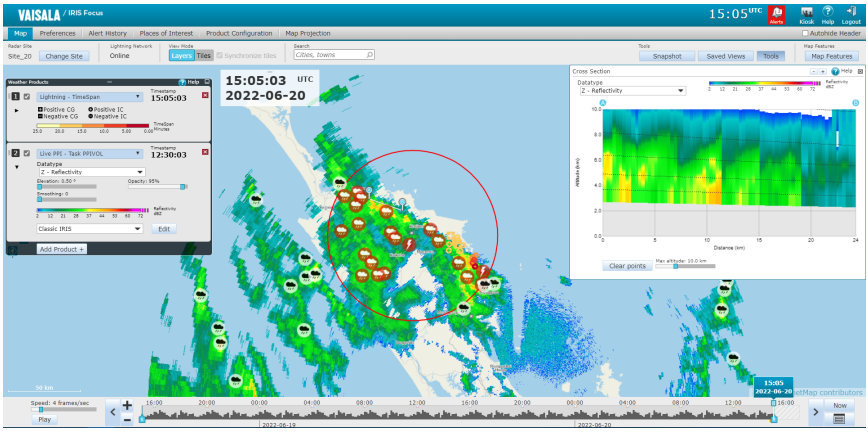


Figure 2 IRIS Focus lightning architecture

2.2 Weather radar data visualization



1) *Weather radar data: courtesy of Meteorological Service of New Zealand Ltd. Lightning data: courtesy of Transpower New Zealand Ltd.*

Figure 3 IRIS Focus main view with weather products

IRIS Focus can also be used to visualize weather radar data. The data comes from a single radar or a network of radar sites. With the zoomable animation timeline, you can easily visualize and animate recent or nowcasted data.

Nowcasting performs advection calculations on motion data from radar products to predict weather movement and severity up to 2 hours in the future.

Significant weather events such as hail, wind shear, or heavy rain are automatically detected when they enter a pre-defined area of interest.

2.3 IRIS Focus licensing

IRIS Focus requires a software license to run. To activate the license, you need a product key.

Vaisala delivers the product key when you purchase the software. If you have purchased the software and you have not received the product key, please contact Vaisala.

For server deliveries, Vaisala activates the product key in the factory, and a Vaisala representative sends you the key for future reference.

The license is mapped to the hardware of your IRIS Focus server or the ID of your virtual environment. If your hardware configuration changes and you need to re-install IRIS Focus, you must request a replacement license from your Vaisala representative.

An exception to this is the USB license key. If you have a USB license key, IRIS Focus runs when the USB license key is inserted in the server. If you install IRIS Focus on another server, you can move the USB license key to that server.

To view information about the license version, login to IRIS Focus as `admin`, and select **Admin > System > Licensing Management**.

License options

IRIS Focus has a basic license called *IRIS Focus Light*. This license enables users to view certain weather data on the map, but gives limited interaction with the tools. The full license is called *IRIS Focus*. This license provides access to the interactive features of IRIS Focus. The *IRIS Focus* license includes all the features of *IRIS Focus Light*.

There are separate licenses for weather radar data visualization and for lightning data visualization. One user can have access to both licenses. Access to licenses is defined in the user profile.

IRIS Focus Light

IRIS Focus Light view has an unlimited number of seats. If there are no *IRIS Focus* license seats available, the user will be logged in with an *IRIS Focus Light* license. If the licence is missing, users cannot log in. This could happen, for example, if the USB license key has been removed or if this is a new installation, not from the factory, that requires an e-mail be sent to Vaisala to retrieve the license.

With an *IRIS Focus Light* license, the user sees the *IRIS Focus Light* map view. The following features are available:

- View one predefined weather product at a time
- See areas of interest with active alerts highlighted in the alert severity color when viewing current data
- View WMS map layers
- View the animation timeline
- View the cursor tool
- Edit color scales
- Select map features
- Use the **Ruler Tool**
- Change user preferences

There are two variants of the *IRIS Focus Light* license:

- ***IRIS_Focus_Light_LGT***
  This license is for viewing lighting data.
- ***IRIS_Focus_Light_WR***
  This license is for viewing weather radar data.

IRIS Focus

IRIS Focus licenses are based on a floating seat pool.

There are two variants of the *IRIS Focus* license:

- ***IRIS_Focus_Lightning***
  This license enables users to view the full-scale visualizations of lightning network sensor data, and to use all the related interactive tools.
- ***IRIS_Focus_Weather_Radar***
  This license enables users to view the full-scale visualizations of weather radar data, and to use all the related interactive tools.

The following features are available with the *IRIS Focus* license (in addition to all the *IRIS Focus Light* features):

- Create places of interest and set up alerting for them
- View alert icons on the map
- View alert history and the list of active alerts
- Advanced map features and tools

Advanced feature licenses

In addition to the *IRIS Focus Light* and *IRIS Focus* licenses, the following advanced feature licenses are available. These are system level licenses; one advanced feature license applies for all users.

Using the **NetworkHealth** product and Nowcasting also require that the user has a Focus seat.

- ***IRIS_WMS***
  With the *IRIS_WMS* license, external WMS layers can be added to the system. Users can then access the layers through the weather product panel.
- ***IRIS_Nowcast***
  With the *IRIS_Nowcast* license, you get access to the nowcast algorithm for creating forecasts based on weather radar data up to 6 hours into the future. Using this feature also requires the *IRIS_Focus_Weather_Radar* license.
- ***IRIS_NetworkHealth_LGT***
  With the *IRIS_NetworkHealth_LGT* license, you can get the network performance information from the **Total Lightning Processor**, and display the information as **NetworkHealth** product in the product panel. Using this feature also requires the *IRIS_Focus_Lightning* license.
- ***IRIS_VHF_LGT***
  With the VHF license, you can view VHF lightning data.
- ***IRIS_ThreatZone_LGT***
  With the *IRIS_ThreatZone_LGT* license, you can view the **Lightning Threat Zone** product.
- ***IRIS_StormIntensity_LGT***
  With the *IRIS_StormIntensity_LGT* license, you can view the **Storm Intensity** product layer. Using this feature also requires the *IRIS_WMS* license.

Seat-based license pool

IRIS Focus licenses are available in different configurations. To increase your seat count, you must replace the current license with a new one by contacting your Vaisala representative.

The seat count defines how many users can access IRIS Focus at the same time. For example, if there are 10 users with IRIS Focus privileges configured to the system, and there are only 5 IRIS Focus seats, then the first 5 users to access the system will be given *IRIS Focus* rights, whereas the remaining 5 users will enter the system with *IRIS Focus Light* credential.

Seat counts within a workstation are browser-based. For one license reservation, users may view IRIS Focus in as many instances or tabs of one browser, such as Firefox®, as they like. If a user opens IRIS Focus in a different browser, such as Google Chrome™, they reserve one license for each browser.

3. Requirements

3.1 IRIS Focus hardware requirements

Table 3 Hardware requirements

Minimum	Recommended[1)]
• Modern 4-core CPU (Intel Xeon E5 series or similar) • 32 GB RAM • 1 TB HDD • 1400 x 1050 minimum screen resolution	• Modern 8-core CPU (Intel Xeon E5 series or similar) • 64 GB RAM • 2x 1 SAS TB HDD in RAID 1 configuration • 1920 x 1200 screen resolution

1) *The pre-installed IRIS Focus system delivery option uses the Dell PowerEdge R440 rack server unit, which meets the recommended hardware setup. See the Dell product data sheet for full specifications.*

When viewing IRIS Focus on minimum or low resolution, make sure that the browser zoom is set to 100% or lower.

The hardware capacity directly affects the performance of IRIS Focus. Multiple users can be logged in to IRIS Focus, and each user can have multiple weather and terrain layers rendered on screen at the same time. Each weather and terrain layer requires some resources from the system.

3.2 Software requirements

IRIS Focus supports current Microsoft Edge®, Mozilla Firefox®, and Google Chrome™ browsers.

Before installing IRIS Focus, your environment must meet the following software requirements.

AlmaLinux 8.4

AlmaLinux 8.4 ISO image mounted on your server (offline installation) or a functional internet connection (online installation).

The installation script verifies the version of several core system packages during the installation and updates them from the mounted media or Internet.

This version of IRIS Focus has been tested with AlmaLinux 8.4.

3.3 Network requirements

Table 4 IRIS Network requirements

Item	Specification	
Communication from the TLP to IRIS Focus		
Network data transfer	Minimum of 100 Mbit/s	
Communication from IRIS Focus to the TLP		
Single user (1 seat)	Network data transfer	> 650 kbit/s
	Latency	~150 ms
Multiple simultaneous users	5 seats	> 3.5 Mbit/s
	10 seats	> 7 Mbit/s
	20 seats	> 14 Mbit/s

4. IRIS Focus architecture

Architecture for lightning products

The data for lightning products in IRIS Focus originates from a Vaisala Lightning Detection System which uses multiple, remote sensors to detect signals emitted by lightning discharges, while filtering out the signals from non-lightning sources. Each sensor sends its data to the central processor (the **Total Lightning Processor**, TLP) where lightning locations are determined.

To ensure that the sensor data set applies to the same lightning event, the TLP compares the time at which the event was recorded by each sensor, and then calculates the precise location of the lightning event. the TLP also records several other descriptive characteristics of each lightning event. The data from the TLP is delivered to IRIS Focus. The data is ingested to the system in real time, after which it can be requested across specific time frames by lightning products.

A single TLP can consume and merge data sets from multiple other TLP systems to produce a superset of data. For example, if organizations from three neighboring countries share TLP data, they can have a superset of lightning solutions from all three countries on each of the TLP systems. From there, they can create subsets of data feeds by lightning characteristics or geographic regions. Each of these subsets can then be fed to a specific Kafka topic on a specific Kafka cluster. Each of these topics can feed several IRIS Focus systems.

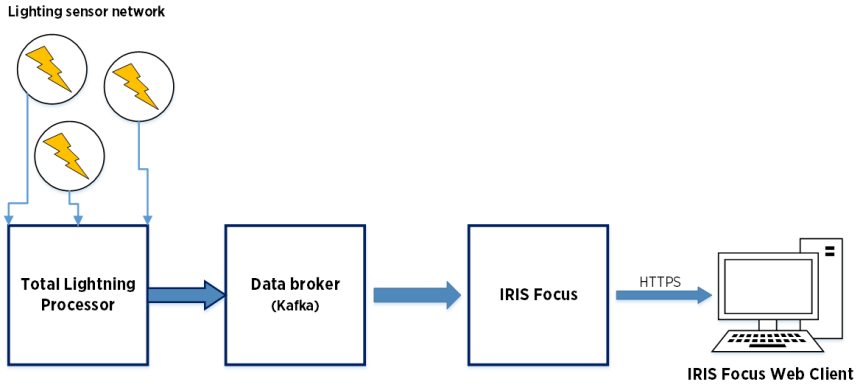


Figure 4 IRIS Focus lightning architecture

Visualization of products on the map

Each weather product is displayed on top of a map view, which is rendered by a GeoServer instance that is installed during the IRIS Focus installation. The map terrain and detail layers are always on the background, and the weather products are drawn on top of them. The user can change the order of weather product layers in real-time.

IRIS Focus can also display data received through WMS protocol, for example, satellite data. This data is also displayed as product layers over the map layer.

Most weather products have editable color scales. Color scales are stored on the IRIS Focus server and can be reused.

4.1 Map layers

The background map and the weather data visualizations are drawn as individual layers and then combined to form an overview of current weather conditions.

You can also view WMS layers from external sources, such as satellite image layers, as layers on the map.

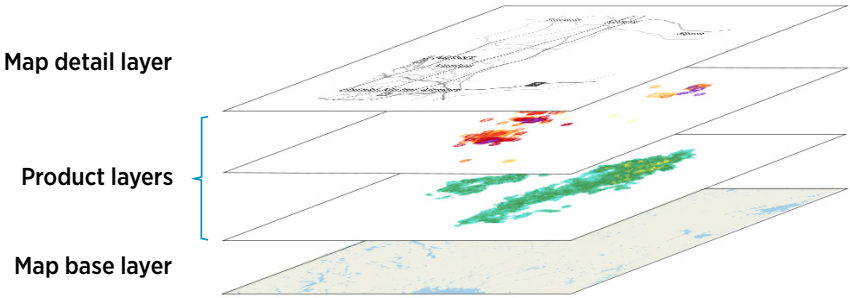


Figure 5 IRIS Focus map layers

Map layers

The background and foreground consist of non-interactive layers. At the bottom is the map base layer, which can be enhanced with the map detail layer containing roads, province boundaries, and other similar terrain features. The map detail layer will be projected on top of product layers.

Product layers

IRIS Focus users may have up to four product layers included in the map rendering, consisting of any combination of the IRIS Focus or external WMS products that the installation is licensed for.

4.2 GeoServer and maps

The map engine in IRIS Focus uses GeoServer architecture.

The terrain data in IRIS Focus consists of a detailed vector map of Earth, separated into multiple layers. The base map content is licensed from the collaborative OpenStreetMap project, which provides all vector shapefiles for the base terrain.

Figure 6 Base map from GeoServer

To save system resources, the shapefiles are combined into different map detail levels that are rendered as a single layer where possible. For example, selecting the **Full detail** map level does not draw separate layers for terrain, roads, map labels, and other map features. Instead, all the content has been precompiled into a single layer in the IRIS Focus map package and then drawn on screen.

When a user opens the map view in IRIS Focus, GeoServer processes the vector data in the current view area into 256×256 PNG tiles that are displayed in the browser window. New tiles are calculated and generated every time the user pans or zooms on the map, so moving on the map may feel a bit sluggish in the beginning. To improve performance, GeoServer runs a caching component called GeoWebCache that stores the tiles for faster retrieval in the future.

GeoServer has a management web interface that runs at the following location:

`http://localhost:34180/geoserver`.

The default management account name is **`admin`**, and the password can be found in the following file:

`/etc/vaisala/radarsw/configuration/gis-override.ini`

The password is generated automatically during IRIS Focus installation.

The base map data is stored in a PostgreSQL database, which also stores all web application data.

4.3 GLD360 lightning layer

Vaisala offers an optional subscription service for the Vaisala Global Lightning Dataset GLD360. GLD360 is a dedicated data stream that measures lightning strikes from the surface of the Earth, and its data is generated outside IRIS Focus.

GLD360 can be integrated with IRIS Focus and included as an additional WMS lightning layer in the web UI, where the user can view it just like radar product layers.

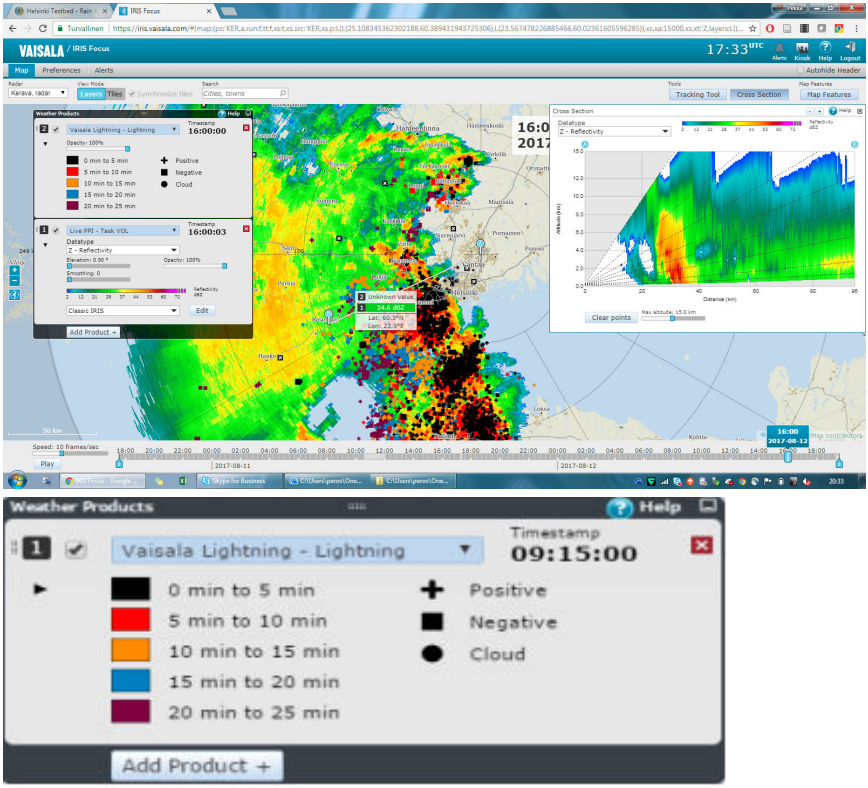


Figure 7 GLD360 lightning layer and controls

To take the GDL360 lightning layer into use, the IRIS Focus server must be online and your organization must have an active subscription to GLD360 data. For information on subscribing to GLD360 data, contact Vaisala Lightning Data Services.

4.4 Web application

IRIS Focus supports current Microsoft Edge®, Mozilla Firefox®, and Google Chrome™ browsers.

IRIS Focus only accepts HTTPS connections. All requests to the standard HTTP port are redirected to the HTTPS port 443.

All application settings are stored in a PostgreSQL database on the IRIS Focus server.

5. Installation

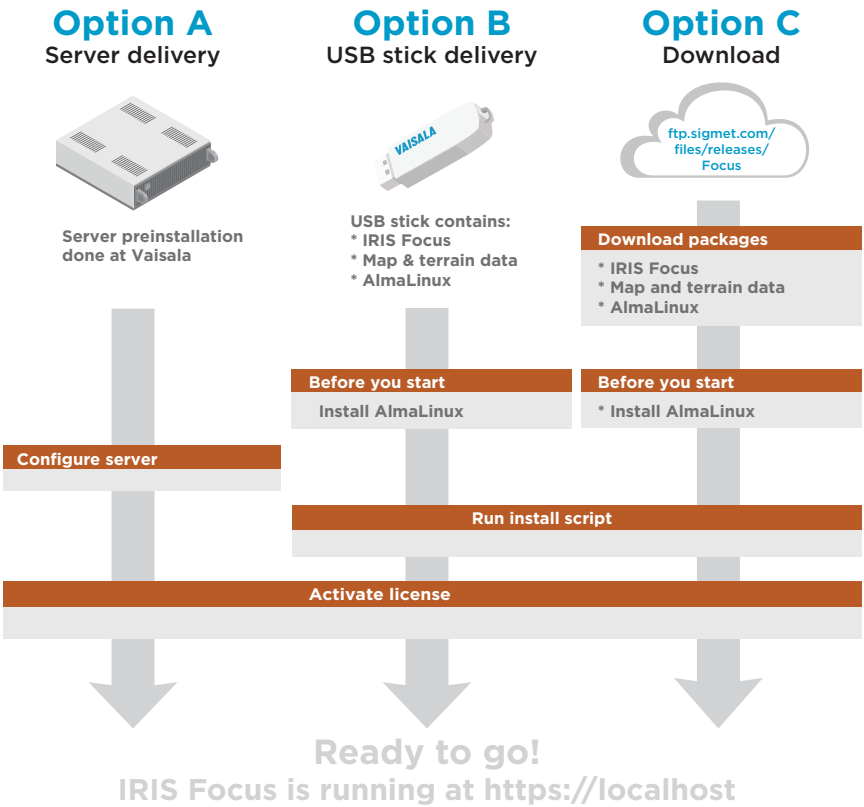


Figure 8 IRIS Focus delivery options

Option A Pre-installed system delivery from Vaisala. The "turnkey" option. Place an order and wait for delivery by Vaisala.

Option B Preconfigured USB stick containing the AlmaLinux operating system and all required files for installing IRIS Focus.

Option C Downloadable installation packages. Download the required packages to install IRIS Focus on your server.

5.1 Downloading installation packages

1. Connect to Vaisala Sigmet server (https://ftp.sigmet.com) using a web browser or an FTP client.

   The host server allows read access for anonymous FTP connections.
2. If using a web browser, navigate to */files/releases/Focus/<latest version>/Focus_install*, or if using an FTP client, navigate to */outgoing/releases/Focus/latest version>/Focus_install*.
3. Download the files inside the *installer* directory.

   The files are very large. Use a download tool such as CrossFTP that allows resuming downloads to fetch the files.

4. Navigate to */releases/Focus/vaisala-map-data*, and download the following files:
   - Maps directory: *vaisala-iris-maps-v2.zip*
   - Terrain data directory: *vaisala-iris-terrain-v2.zip*
5. If you require the AlmaLinux installation image, download it from:

   https://ftp.sigmet.com/files/releases/AlmaLinux/AlmaLinux-8.4-x86_64-dvd.iso

   The AlmaLinux installation image is very large.

   You can skip the AlmaLinux installation image if you already have an appropriately configured AlmaLinux server installed.

5.1.1 Verifying and joining files

Each file has an associated *md5sum* file located in the same download directory.

After downloading the file(s), verify their integrity by checking each file's MD5 hash against the one provided at the installation site.

1. Verify the MD5 checksum values of the downloaded files:
   - In AlmaLinux – Use the pre-installed **md5sum** command line tool: **md5sum [filename]**
   - In Microsoft Windows – Use the pre-installed **CertUtil** utility: **certutil -hashfile [filename] MD5**

2. Join the IRIS Focus installation file parts together to form a single tar file with the following command:

```
cat IRIS_Focus*_part_* >| IRIS_Focus_7_1_Installer.tar
```

3. Get the MD5 checksum value for the tar file that you created:

```
md5sum IRIS_Focus_7_1_Installer.tar
```

4. Verify that the MD5 checksum value matches the one shown in the *IRIS_Focus_7_1_Installer.tar.md5* file that you downloaded from https://ftp.sigmet.com
5. If you see any discrepencies in the hashes, download the mismatching file again.

5.2 Prerequisites for installation

Before installing IRIS Focus, make sure your environment meets the necessary hardware and software requirements.

5.3 Installing AlmaLinux

A prerequisite for installing IRIS Focus is that AlmaLinux is installed on your intended IRIS Focus system.

This version of IRIS Focus has been tested with AlmaLinux 8.4.

If you do not have an AlmaLinux system running, select an installation image from Vaisala Sigmet server (https://ftp.sigmet.com/files/releases/AlmaLinux/AlmaLinux-8.4-x86_64-dvd.iso), and see instructions at Tecmint Linux Guides (https://www.tecmint.com/almalinux-installation/) on how to perform the AlmaLinux installation.

Table 5 Vaisala-recommended disk partitioning

Partition	Size
/home	50 GB
/boot	500 MB
/var	100 GB
/	100 GB
swap	size of RAM + 2 GB

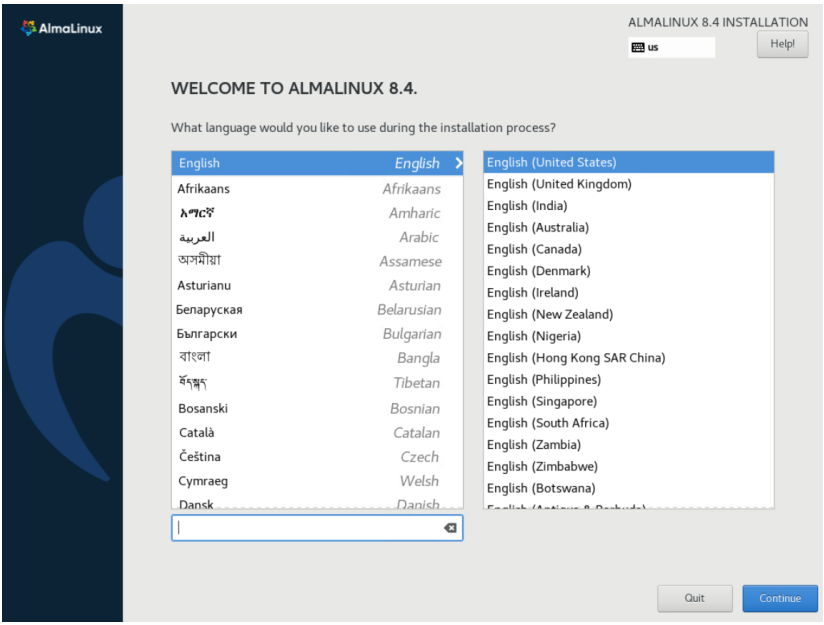
Partition	Size
/usr/iris_data	200 GB
/srv	100% of the remaining disk space

If there is only a little disk space, you can decrease the size of the */home*, */var*, and */* partitions by 10-20 GB.

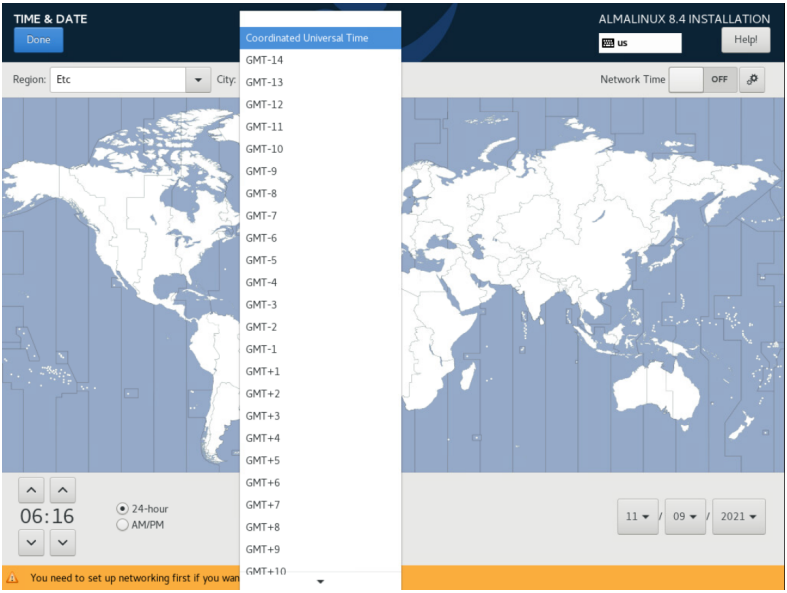
When you are only installing IRIS Focus on the server (and not IRIS Analysis), do not create a */usr/iris_data* partition. Instead, allocate all remaining diskspace to the */srv* partition.

Install AlmaLinux according to the standard instructions, with the following changes.

1. Select your installation language.

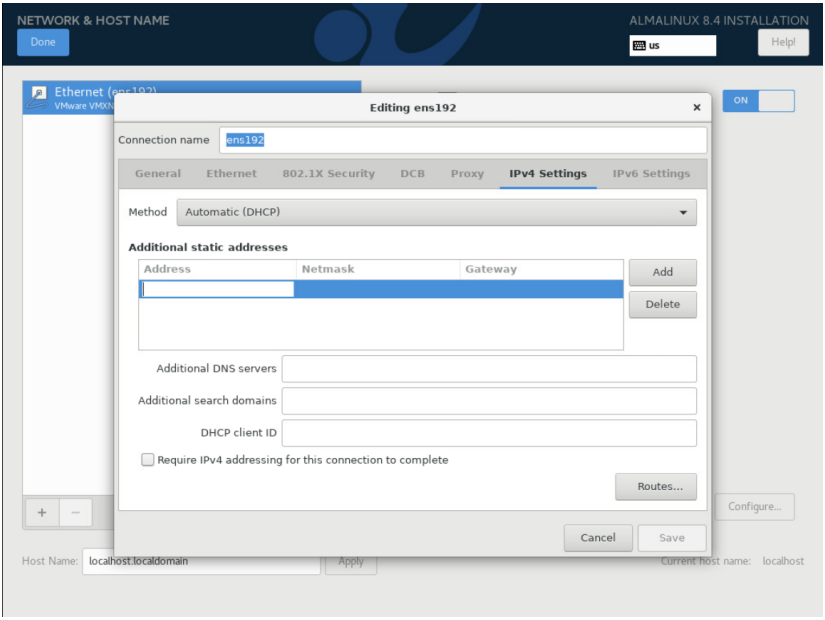


2. In **TIME & DATE**, set the system clock to Coordinated Universal Time (UTC) by choosing the following values:
   - Region: **Etc**
   - City: **Coordinated Universal Time**



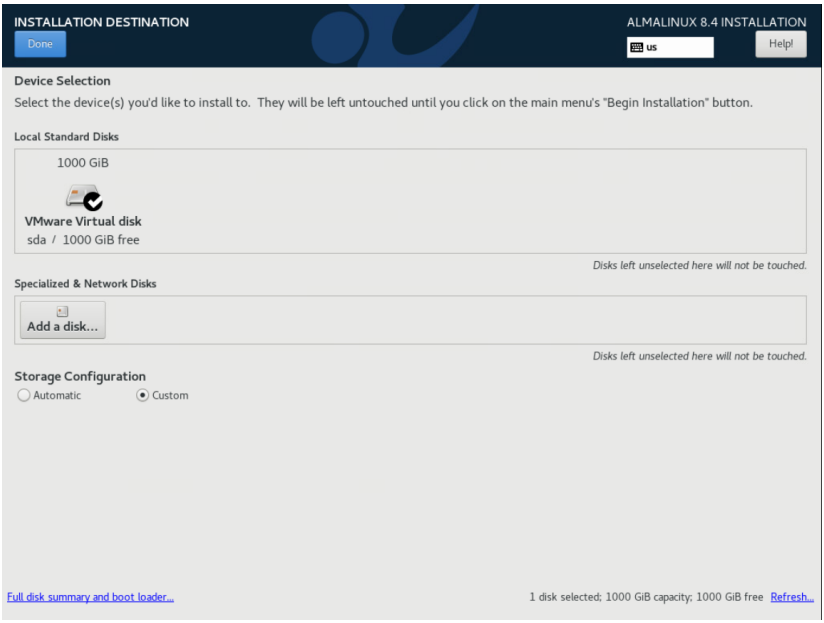
3. In **SOFTWARE SELECTION**, keep the default selection for **Base Environment Type** : **Server With GUI**.

4. In the AlmaLinux installation screen, select **Network & Host Name**.

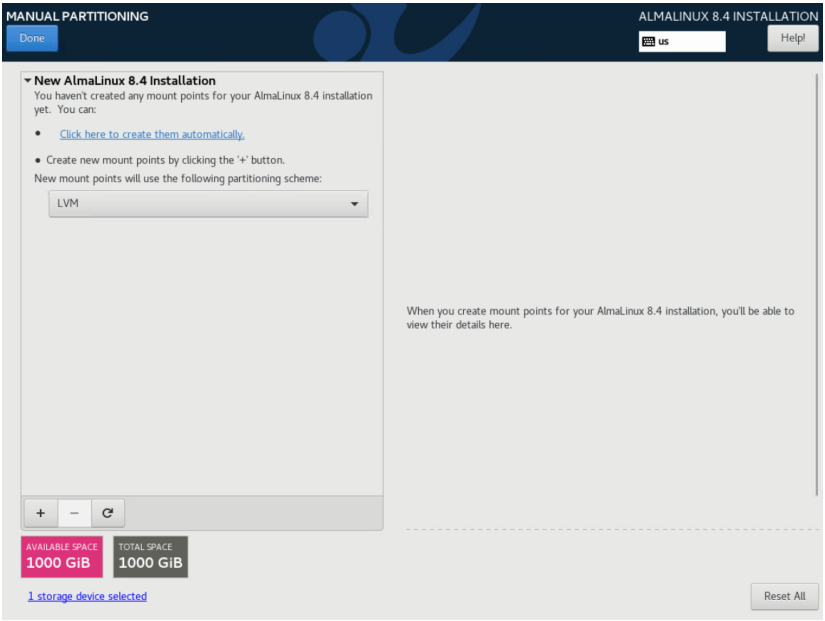


   a. Turn the network **ON**.
   b. Select **Configure**.
   c. In the **General** tab, select **Connect automatically with priority**.
   d. In the **IPv4 Settings** tab, select **Method > Manual**.
   e. In the **IPv4 Settings** tab, select **Add** to add your network IP address, Netmask, Gateway, and DNS servers.
   f. Select **Save**.
   g. In **Host Name**, type a name for this server.
   h. Select **Apply**.
   i. Select **Done**.

5. In **INSTALLATION DESTINATION**, start manual partitioning:
   a. Select the hard disk.
   b. Select **Select Storage Configuration, Custom**.
   c. Select **Done**.



6. Select **Click here to create them automatically**.

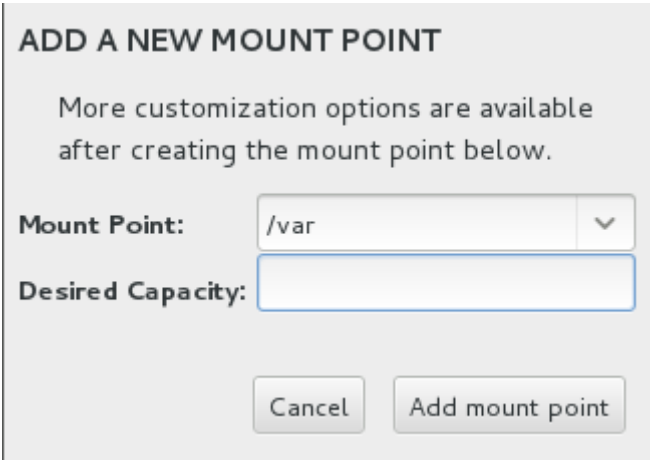


After creating the automatic partitions, you need to modify the partition manually in the next steps.

7. Modify the **/home** partition.
   a. Select the */home* partition.
   b. Under **Desired Capacity**, set the size of the home partition (*/home*) to **`50 GiB`**.
   c. Select **Update Settings**.

8. Create the */var* partition:
   a. Select the plus (**+**) icon.

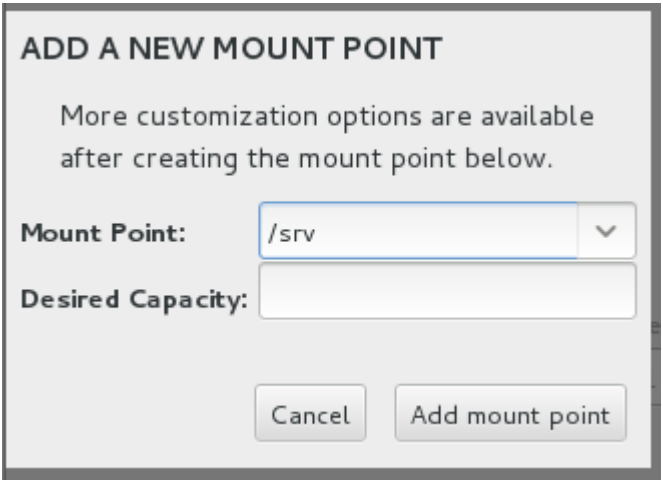
      The **ADD A NEW MOUNT POINT** dialog appears.



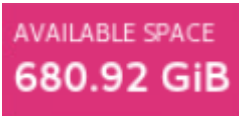
   b. In **Mount Point**, type */var*
   c. Under **Desired Capacity**, set the size of the */var* partition by typing **`100 GiB`**.
   d. Select **Add mount point**.
9. Select **/boot**.
   a. Under **Desired Capacity**, set the size of the */boot* partition by typing **`500 MiB`**.
   b. Select **Update Settings**.
10. Select **/**.
   a. Under **Desired Capacity**, set the size of the root partition (/) by typing **`100 GiB`**.
   b. Select **Update Settings**.
11. Select **swap**.
   a. Under **Desired Capacity**, set the size of the swap to the size that corresponds to RAM + 2 GB.
   b. Select **Update Settings**.

12. Create the */srv* partition:
    a. Select the plus (**+**) icon.

       The **ADD A NEW MOUNT POINT** dialog appears.

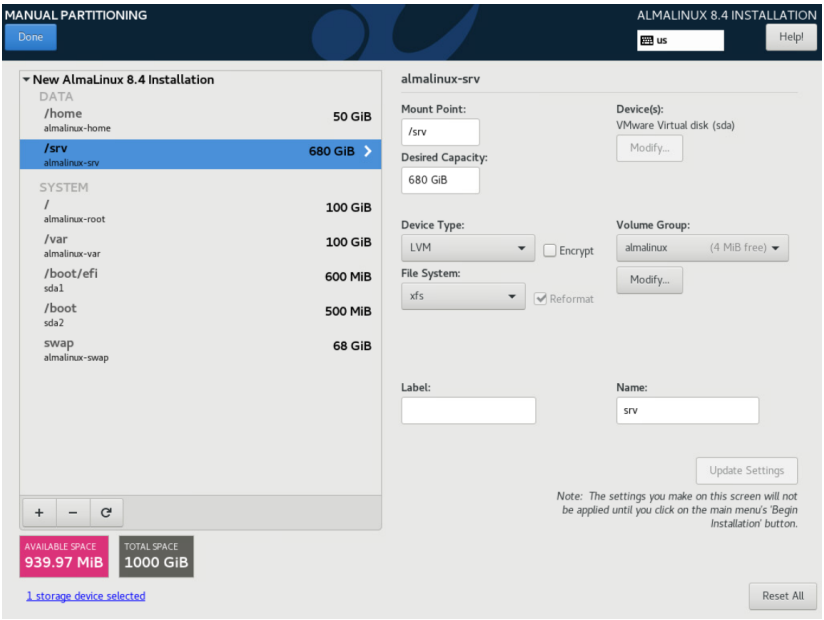


    b. In **Mount Point**, type */srv*
    c. Under **Desired Capacity**, use nearly all the available server space (indicated in the pink box) for the */srv* partition by typing, for example, **`680 GiB`**.



    d. Select **Add mount point**.
13. Select **Done**.

14. Check that the partitions are defined as follows (note that `/srv` has a different value):



15. Select **Done > Accept Changes**.

5.3.1 Setting the root password

If your system was pre-installed in Vaisala, the default password is `xxxxxxxx`.

1. Select **ROOT PASSWORD**.

   The **Root Password** window opens.

2. Enter your root password.

   Check the password strength meter. While Vaisala recommends a strong password, the software does not stop you from entering a weak one.

3. In the confirm text box, re-enter your root password.
4. In the upper left hand corner, select **Done** to return to the main configuration page.

   If your password is weak, you are prompted to select **Done** a second time.

5.3.2 Finalizing the installation

1. Select **USER CREATION**.

2. Create an account with the following properties:
   - User name: **radarop**
   - Password: **[choose password or use the default password xxxxxx]** Vaisala recommends using a non-default password.
3. In the upper left hand corner, select **Done** to return to the main configuration page.

   If your password is weak, you are prompted to select **Done** a second time.
4. Select **Begin Installation**.

   The installation will continue for a few minutes.
5. When prompted, selet **Reboot System**.
6. Select **LICENSE INFORMATION**.
7. Accept the license agreement.
8. Select **Done**.
9. Select **FINISH CONFIGURATION**.

The AlmaLinux installation is now complete. You are ready to install IRIS Focus.

5.4 Verify or override the FQDN of your server

You must determine or set the fully qualified domain name (FQDN) of the IRIS Focus server before installing the software. The FQDN must be the name that external clients will use when connecting to your IRIS Focus server. The installation assumes that this is correctly reported by the hostname command.

For example, if the final URL will be ***https://my-iris-focus.company.com/***, then the hostname command must report **iris-focus.company.com** as follows:

```
[root@my-iris-focus ~]# hostname --fqdn
my-iris-focus.company.com
[root@my-iris-focus ~]#
```

If your server does not report the correct host name, you can export an environment command to indicate what the correct host name should be. For example, if the output above had been "**my-iris**" and the correct value should have been "**my-iris-focus.company.com**", you should run the following command:

```
export HOST_FQDN=my-iris-focus.company.com
```

5.5 Installing IRIS Focus from a USB stick

The IRIS Focus installation USB contains the following file structure for the main version installation:

```
Focus_install
     vaisala-iris-maps-v2
     vaisala-iris-terrain-v2
     installer
     documentation
```

In the case of a patch release, the USB stick may also include an additional .tar file for the patch.

To install IRIS Focus from the USB stick, you must copy the files to the AlmaLinux server and prepare the files for installation.

1. Reboot the system.
2. Log in to the server as **root**.
3. Insert the USB stick.

   If it is already plugged-in, remove and re-insert the stick.
4. In the pop-up dialog, select **Open With Files**.
5. Right-click a blank area and select **Open in Terminal**.
6. In the terminal, type **pwd** and press **ENTER**.

   The result is usually `/run/media/root/IRIS`.
7. Copy the *Focus_install* directory to the AlmaLinux server:

   ```
   mkdir /srv/Focus_install
   cp -r /run/media/root/IRIS/Focus_install/* /srv/Focus_install
   ```
8. Change to the *srv/Focus_install/installer* directory, and join the .tar file parts:

   ```
   cd /srv/Focus_install/installer
   cat IRIS_Focus_7_1_Installer_part_* >> IRIS_Focus_7_1_Installer.tar
   ```
9. To make sure that the file is now correct, run the following two commands and check that you get the same output:

   ```
   md5sum IRIS_Focus_7_1_Installer.tar
   cat IRIS_Focus_7_1_Installer.tar.md5
   ```
10. Extract the installation files into the default release directory:

    ```
    tar -xvf IRIS_Focus_7_1_Installer.tar
    ```

11. Change to the */srv/Focus_install/vaisala-iris-terrain-v2* directory:

```
cd /srv/Focus_install/vaisala-iris-terrain-v2
```

    a. Join the fileparts:

```
cat vaisala-iris-terrain-v2-part* > vaisala-iris-terrain-v2.zip
```

    b. Unzip the resulting terrain zip file:

```
unzip vaisala-iris-terrain-v2.zip
```

    c. Remove the extra files:

```
rm -rf vaisala-iris-terrain-v2-part*
rm -rf vaisala-iris-terrain-v2.zip
```

12. Run the IRIS Focus installation script:

```
cd /srv/Focus_install/installer
./rsw-installer --offline --gis-db-dump\
/srv/Focus_install/vaisala-iris-maps-v2 --terrain-dir\
/srv/Focus_install/vaisala-iris-terrain-v2\
--lightning -cow <root application URL>
```

    To limit access to port 9094 (kafka) to the TLP, if you know the IP address of your **Total Lightning Processor** (TLP), you can include `--tlp IP_ADDRESS` in the command line. If this option is omitted, port 9094 will be opened to all systems on the network.

13. Reboot the system with the following command to cleanly bring up the services:

```
reboot
```

5.5.1 Installation and configuration command options

Table 6 Installation command options

Option	Description
--admin-password	Assign a non-default admin password
--admin-user	Assign a non-default admin user
-c --config-dir	Configuration directory

Option	Description
-cow	The `cors-origin-whitelist (-cow)` switch determines the value of the `Access-Control-Allow-Origin` header. It must have the same value as the root application URL. In the installation command, `<root application URL>` corresponds to the hostname. The default value is the installation machine name. If the hostname changes, you also need to change the `security.cors.origin.whitelist` parameter value in the *`vsoweb-override.ini`* file, and restart the application.
--deactivate-admin	Deactivate the admin account after running this script. Not needed for standard installations.
-d --dry-run	List the steps that will be run (without running them)
-g --geoserver-config-url	GeoServer configuration endpoint (default: http://localhost:34180/geoserver)
-gis-db-dump	Location of map files
-h or --help	Show help information
--lightning	Allow configuration for lightning provider
--no-prompt	Fails (exits) on error without user confirmation
--offline	Disable online AlmaLinux base repository and require a local AlmaLinux base repository
--online	Allow online AlmaLinux base repository
--pg-data-dir	Use an alternative Postgres data directory location
--radar	Allow configuration for radar provider
-s	Socket server host
--skip-geoserver-installation	Do not install map server
--skip-geoserver-site-configuration	
--skip-os-version-check	Force the installation on a AlmaLinux version other than directly supported
--skip-terrain	Do not install terrain detail to the map server
--terrain-dir	Location of terrain files

Option	Description
--tlp TLP_ADDRESS	Address of the Total Lightning Processor
--wms -w	Basemap WMS address (default: /wms)

5.6 Installing IRIS Focus patch

If the delivery includes a separate patch file, first install the main version, and then the patch file.

The patch file is located in a separate folder on the USB stick.

In these instructions, **x.x** is the number of the version/patch.

1. Log in as **root**.
2. Copy the patch file **Vaisala_IRIS_installer-7.x.x.tar** and ***README.txt*** from the USB stick to a temporary directory.
3. Extract the tar file:

   ```
   tar -xvf Vaisala_IRIS_installer-7.x.x.tar
   ```

4. Follow the instructions in the ***README.txt*** to run the upgrade script.

5.7 Installing IRIS Focus components

The script automatically installs all necessary services, user accounts, and modules required to run IRIS Focus. The services start automatically.

For the list of IRIS Focus services and users, see IRIS Focus services and users (page 89).

1. Make sure you have an AlmaLinux server system set up, and that you have received the IRIS Focus installation files either as a USB delivery or as a download.
2. Make sure you have the IRIS Focus application installer, map data package, and terrain data package available.

   These are required because all IRIS Focus components are installed at the same time.
3. Mount the AlmaLinux ISO image. This was downloaded previously or provided on a USB stick.

   Although AlmaLinux is already set up, the IRIS Focus installer relies on some packages that are provided by the AlmaLinux repository.
4. Log in to the server as **root**.

5. Unpack the contents of the IRIS Focus installation file on the server, for example to the */srv/* directory.

   These files occupy approximately 40 Gb of space unpacked.

6. Navigate to the directory where you downloaded the files.
7. Launch the **`./rsw-installer`** script.

   The install script requires the following parameters:

   ```
   ./rsw-installer --offline --gis-db-dump [maps directory] --terrain-dir
   [terrain directory] --lightning -cow <root application URL>
   ```

   - **`--gis-db-dump`** – location for the map data
   - **`--terrain-dir`** – location for the terrain data
   - **`--lightning`** – use this parameter if you are connecting a Total Lightning Processor system to IRIS Focus

The install process can take a significant amount of time, especially as the application database is first populated with map data.
Do not abort the installation if you do not see progress in a single step for up to 1 hour.

5.8 Installing Storm Intensity layer

To add the **Lightning Storm Intensity** WMS layer to IRIS Focus, run the following command immediately after the initial installation of IRIS Focus:

```
/usr/vaisala/radarsw/configuration/bin/configure-map -u /wms --add-ltz-wms
admin <admin password>
```

The **`configure-map`** script resets all the map layers, so that if you have installed any third-party WMS layers, they are deleted. Therefore, it is easiest to install the **Lightning Storm Intensity** layer right after installation with this script. However, if you choose to add this layer after having already added third party WMS layers and you want to keep them, use the following command instead of the **`configure-map`** script:

```
rsw-layer-add --layername "Lightning Storm Intensity" --layerurl /ltzwms \
  --layer
"futurelightning:storm_intensity,futurelightning:storm_centroid_path_10min_all"
 \
  -o 120 -rr 600 -c -m "storm,density" \
  -s "http://localhost:9973/geoserver/www/strike-intensity-tracking.sld" \
  --uiheight 70 -d  -r admin -p <admin password>
```

5.9 Security notes

Follow the industry security standards while deploying IRIS Focus into an internal network. Only allow access to ports 80 and 443 from the Internet.

5.9.1 SELinux

If IRIS Analysis is not required to be installed on the same Focus server, then SELinux may be left enabled (as is the default behaviour in AlmaLinux).

5.9.2 Running OS hardening scripts

IRIS Focus includes a small set of example scripts to help secure the AlmaLinux operating system. You may run these "OS hardening scripts" after reviewing and/or modifying the specific items found in the associated security-scripts directory.

Table 7 Hardened areas

Hardened area
Install AIDE (Advanced Intrusion Detection Environment)
Restrict core dumps
Set permissions for `grub` configuration
Set default Message of the Day
Configure Chrony NTP
Configure TCP Wrappers
Strengthen log file permissions
Strengthen `Cron` configuration
Lockout for failed login attempts
Password suffiency
Strengthen file permissions
Enable SSH issue banner
Disable IPv6
Remove support for unneeded file system types: `cramfs`, `freevxfs`, `jffs2`, `hfs`, `hfsplus`, `squashfs`, `udf`, `vfat`, `dccp`,`sctp`, `rds`, `tipc`, `cups`, `avahi-daemon`

1. Navigate to the directory where you downloaded the installation files.

2. Type the command:

```
./rsw-harden-os
```

   The command executes the bash scripts in the */release/security-scripts* directory.

3. Reboot the server.

5.10 Activating license

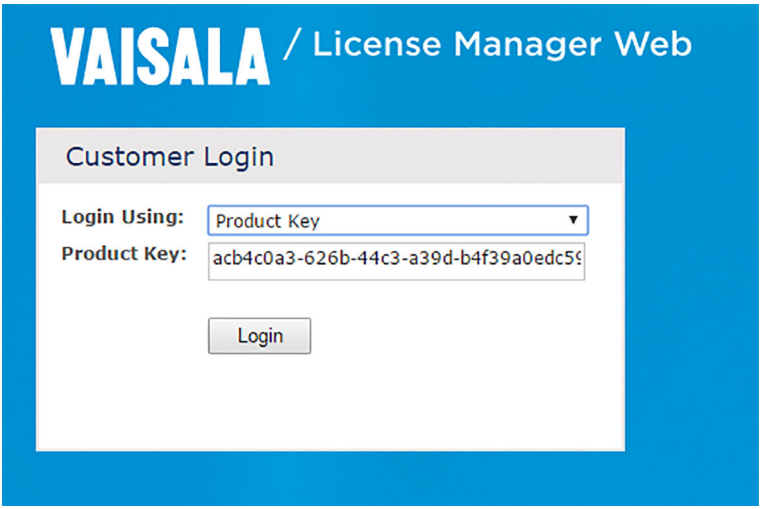
IRIS Focus provides several ways to activate the IRIS Focus software license on the server: with a USB license key, online, or offline without the USB license key.

5.10.1 Activating license – online

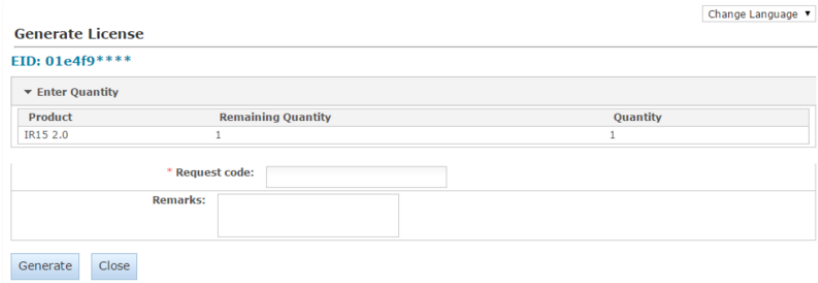
If you are using a USB license key, first insert the USB drive in the server for the license to work. See Using the USB license key (page 47).

1. Log in to the server as **root**.
2. Run the **rsw-show-machine-code** command on the IRIS Focus server to get the locking code specific to the server hardware.

3. Go to Vaisala License Manager Web at https://licensing.vaisala.com and select **Product Key** in the **Login Using** field.

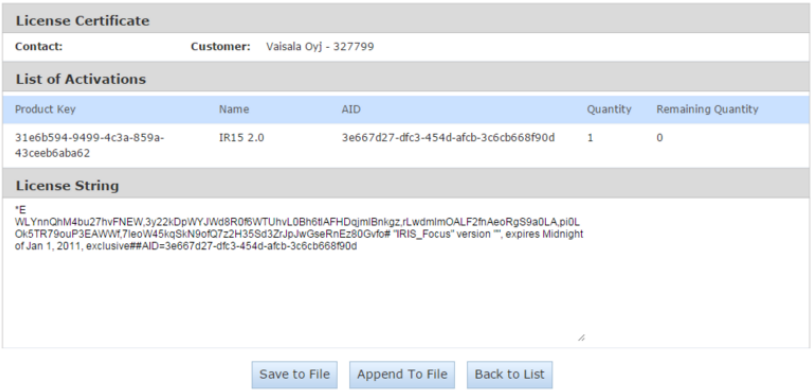


4. Enter your product key and select **Login**.
5. Enter the locking code in the **Request Code** field.



6. Select **Generate**.

   A popup window with the license string opens.



7. Select **Save to File** to save the license string to a file on disk.

   The file is saved by default with the name *lservrc*.

Alternatively, use an SSH client to copy and paste the license string to a *.txt* file on the server.

8. Install the license with the **rsw-install-license <location-of-the-license-file>** command.
9. Restart the `vaisala-radarsw-webapp` service by typing:

```
systemctl restart vaisala-radarsw-webapp
```

10. Log in to IRIS Focus using an administrator account.
11. Select **Admin > System > Licensing Management** to view information about the license (seats, end date, and start date).

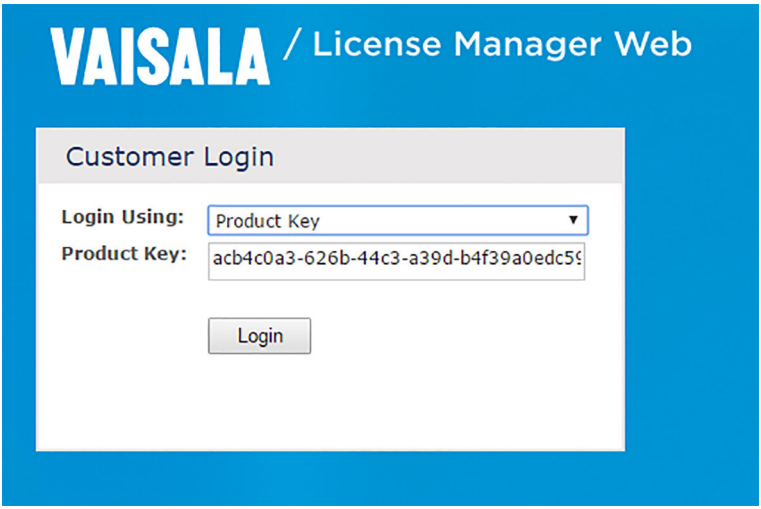
5.10.2 Activating license – offline

If the server running IRIS Focus is not connected to internet, you must activate the license by entering the IRIS Focus server locking code in **Vaisala License Manager Web** using an online computer. Then transfer the license file to the IRIS Focus server.

If you are using a USB license key, first insert the USB drive in the server for the license to work. See Using the USB license key (page 47).

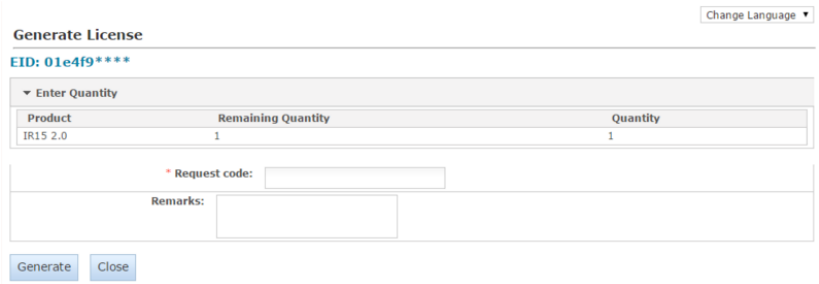
1. Run `rsw-show-machine-code > [filename]` command on the IRIS Focus server to get the product key specific to the server hardware.

   This stores the product key string in a file.
2. Copy the file to a removable media, such as a USB stick, and transfer it to the online computer.
3. Go to Vaisala License Manager Web at https://licensing.vaisala.com and select **Product Key** in the **Login Using** field.



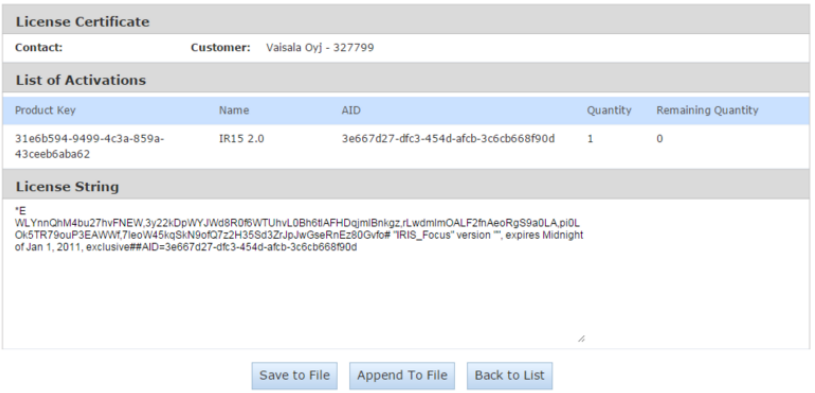
4. Enter your product key and select **Login**.

5. Enter the locking code in the **Request Code** field.



6. Select **Generate**.

   A popup window with the license string opens.



7. Select **Save to File** to save the license string to a file on disk.

   The file is saved by default with the name *`lservrc`*.

Alternatively, use an SSH client to copy and paste the license string to a *`.txt`* file on the server.

8. Copy the license file to a removable media and transport the file to the IRIS Focus server.
9. Install the license with the **`rsw-install-license <location-of-the-license-file>`** command.

5.11 Using the USB license key

The IRIS Focus license key can be provided on a USB drive. With the USB drive, you can transfer the license from one server to another.

After installing IRIS Focus, activate the license by linking the USB drive to the license file provided by Vaisala as described below.

For the license to remain active, the USB must remain in the server after completing this procedure.

If you transfer the license to another server, perform the activation procedure on the new server.

1. Insert the USB in the server machine.
2. Install the license with the following command:

   ```
   # rsw-install-license /srv/focus_license.txt
   ```

3. Restart the IRIS Focus web application:

   ```
   systemctl restart vaisala-radarsw-webapp
   ```

4. Log in to IRIS Focus using an administrator account.
5. Select **Admin > System > Licensing Management** to view information about the license (seats, end date, and start date).

5.12 Connecting the TLP system

Follow this procedure to add the **Total Lightning Processor** system to the IRIS Focus system to retrieve lightning data.

These steps are typically done automatically by the `./rsw-installer` script when you include the `--lightning` option. You only need to perform these steps if you did not include the `--lightning` option when running `./rsw-installer`. Otherwise, you can skip to section Configuring the TLP for IRIS Focus (page 48).

1. To enable lightning in the Web application, edit the *vsoweb-override.ini* configuration file in the */etc/vaisala/radarsw/configuration* directory. Change (or create, if not present) the `[PROVIDERS]` section to the following:

   ```
   [PROVIDERS]
   lightning.enabled = true
   ```

2. Restart the Web application by typing:

```
systemctl restart vaisala-radarsw-webapp
```

3. Configure the firewall.

   The **Total Lightning Processor** connects to the Kafka data broker on port **9094** on the IRIS Focus system. If you are running the **`firewalld`** service, configure the firewall to allow this connection.
   Example: If the TLP system IP address is **`10.55.11.2`**, run the following firewall commands on the IRIS Focus system to allow **`10.55.11.2`** access to port **9094**:

```
firewall-cmd --permanent --zone=public --add-rich-rule='rule family="ipv4"
source address="10.55.11.2/32" port protocol="tcp" port="9094" accept'

firewall-cmd --reload
```

4. Configure the **Total Lightning Processor**.

   At this point, the IRIS Focus system should be set up and ready for lightning data provided by the Total Lightning Processor. Follow the instructions in Configuring the TLP for IRIS Focus (page 48) to start the flow of lightning data from the TLP to IRIS Focus.

5.13 VHF or high data rate adjustments

If your TLP system will be providing lightning data at very high data rates, the lightning cache size of the lightning-websocket service should be increased. If you expect that your lightning data may exceed more than 100 000 events a day, you should increase the lightning cache size as indicated in section Increasing buffer capacity for lightning data (page 55).

5.14 Configuring the TLP for IRIS Focus

If you have the **Total Lightning Processor** (TLP) system that will be providing lightning data to IRIS Focus, you need to add a new service to the TLP system to push the lightning data into the kafka data broker service running on the IRIS Focus system. Your TLP must be running version 1.2.7 or later.

In the following procedure, you need the directory */opt/vai/tlp/etc*. If it does not exist, install it:

1. Log in to your TLP system as **`root`** user, or use the **`su`** or **`sudo`** command to gain root access.
2. Run the command:

```
dnf install -y vaisala-tlp-to-kafka
```

5.14.1 Verifying the installation of vaisala-tlp-to-kafka package

Before configuring a TLP system to send information to the Kafka data broker running on IRIS Focus, verify that the necessary software packages have been installed.

1. Log into your TLP system using the **root** user account.
2. Run the following command to make sure the necessary software packages are installed:

```
rpm -q vaisala-tlp-to-kafka || dnf install -y vaisala-tlp-to-kafka
```

5.14.2 Changing `regstatd2` report frequency

The `regstatd2` service generates a regional network health report periodically that is used to provide the **Network Health** product layer on IRIS Focus. In a default installation, the `regstatd2` service updates this report once an hour. It is recommended that you configure `regstatd2` on the TLP to produce this report at a more frequent 10-minute interval.

1. Log into your TLP system using the `vops` user account.
2. Go to the *`regstatd2.cfg`* file in the */opt/vai/tlp/etc* directory.
3. Edit the file to set the `updateIntervalMinutes` parameter to 10 minutes by typing:

```
updateIntervalMinutes   10
```

4. Stop the `regstatd2` service by typing:

```
lpstart stop regstatd2
```

5. Start the `regstatd2` service again by typing:

```
lpstart start regstatd2
```

5.14.3 Adding the `tlp-to-kafka` service

This instruction applies to TLP 1.2.7.

In IRIS Focus 7, the access to the Kafka cluster is on a different port than it was in Focus 6. Access now requires an authentication token. The details are described in step 5.

The steps below require that the `vaisala-tlp-to-kafka` package is installed on your TLP system. If this package is missing, you can install it by logging in as the `root` user and running:

```
dnf install -y vaisala-tlp-to-kafka
```

1. Log into your TLP system using the **vops** user account.
2. Go to the *startup.cfg* file in the */opt/vai/tlp/etc directory*.
3. Add the following line to the file:

   ```
   core n java tlp-to-kafka -jar /opt/vai/tlp/lib/tlp-to-kafka.jar
   ```

4. Edit the *tlp-to-kafka.cfg* file in the */opt/vai/tlp/etc* directory according to how you want the lightning events to be sent to IRIS Focus:

   - If you want the lightning events sent to IRIS Focus to be composite flash events produced by the TLP, set the **lp.tokafka.smqLightning** parameter to **"smq://fdata"**.
   - If you want the lightning events sent to IRIS Focus to include the individual lightning strokes produced by the TLP, set the **lp.tokafka.smqLightning** parameter to **"smq://RLFxStrokeData"**.
   - You can use any shared memory queue of lightning data as the source for IRIS Focus. For example, if your TLP system is producing solutions from both VHF and LF based lightning sensors you can use the standard VHF event queue **"smq://sdata3d"**, the standard VHF flash queue **"smq://fdata3d"**, a merged data set **"smq://tldata or smq://wmdata"**, or some customer filtered queue. If you choose a data set that includes VHF data, you will need the *IRIS_VHF_LGT* feature enabled in your IRIS Focus license. Depending on your use cases for IRIS Focus, there may be limited use of the forwarding all of the raw VHF data points available in the **"smq://sdata3d"** shared memory queue as there can be many VHF event points for each lightning discharge.
   - If you have the **Lightning Threat Zone** feature licensed, make sure that the lightning data source you select includes LF or VLF data. The **Lightning Threat Zone** engine ignores all VHF lightning events in the data stream and only uses the LF and VLF events that is sees in the data stream.

   To set the value, type:

   ```
   lp.tokafka.smqLightning <parameter-value>
   ```

   For example:

   ```
   lp.tokafka.smqLightning "smq://RLFxStrokeData"
   ```

5. Access to the Kafka cluster requires an authentication token. The authentication token is randomly generated during the IRIS Focus 7 installation, and it is used in the password field.

   a. To find the value of this token, run the following command as **root** on the IRIS Focus system (in the example output below, the token is **L5KpD55KqxI7kGUuM0mQrmCh9QqONKI4**)

   ```
   [root@iris-focus ~]# grep kafka.*.ScramLoginModule /etc/vaisala/
   focus/k8s/vaisala-focus.yaml | head -1
               config:
   org.apache.kafka.common.security.scram.ScramLoginModule required
   username="focus-kafka" password="L5KpD55KqxI7kGUuM0mQrmCh9QqONKI4";
   [root@iris-focus ~]#
   ```

   b. When you have identified the fully qualified domain name and the authentication token for the IRIS Focus connection, go to the */opt/vai/tlp/etc* directory on the TLP system, locate the *kafka-producers.properties* file there, and change the lines as follows:

   ```
   bootstrap.servers=helsinki.rd.vaisala.com:9094
   security.protocol=SASL_PLAINTEXT
   sasl.mechanism=SCRAM-SHA-512
   sasl.jaas.config=org.apache.kafka.common.security.scram.ScramLoginModule
    required \
      username="focus-kafka" \
      password="L5KpD55KqxI7kGUuM0mQrmCh9QqONKI4";

   # How many acknowledgements are required before considering the request
   complete



   acks=all
   ```

   This example assumes that the fully qualified domain name of the IRIS Focus server is *helsinki.rd.vaisala.com* and that the randomly generated authentication token generated on the IRIS Focus server is **L5KpD55KqxI7kGUuM0mQrmCh9QqONKI4**. Make the appropriate substitutions for your installation.

6. Start the **tlp-to-kafka** service by typing:

   ```
   lpstart start tlp-to-kafka
   ```

The **tlp-to-kafka man** page provides more information on configuring and running the **tlp-to-kafka** service on a TLP system.

5.15 Verifying IRIS Focus installation

1. Check that the web user interface is running at the default HTTPS port, and the following default user accounts have been created in IRIS Focus during installation:

   - Username: `admin` / password: `admin123`
   - Username: `user` / password: `user123`

   Vaisala recommends changing the passwords after the installation.

2. Access the IRIS Focus web UI by opening a browser on the IRIS Focus server and navigating to *`https://localhost`*.

   You should see the login screen for IRIS Focus web application.

3. Log in with the default IRIS Focus user account.

   Make sure the application loads, and the map view is displayed.

4. Verify that **Tracking Tool** button is visible in the application UI.

   This verifies that IRIS Focus features are enabled.

5. Enable the grid lines by selecting **Map Features Lat/lon grid**.

   Depending on where the map view is centered, you should see slightly distorted grid lines that are leading away from the equator. This verifies that the map projection is correct.

6. Verify that you can add the lightning-related **TimeSpan** and **Network Health** products to the map. If there is lightning occurring, check that you can see lightning data appearing on the map, as well as the regional health of your lightning network.

   If you have just completed the installation, it may take a while until the first network health report arrives.

6. Configuration

6.1 Configuring vsoweb-override.ini file

Use this procedure to change the following settings:

`radar.enabled = true/false`

`lightning.enabled = true/false`

`iris.socket.server.host`

`security.cors.origin.whitelist`

1. Go to the */etc/vaisala/radarsw/configuration* directory.
2. To update any entry in the *vsoweb-override.ini* file, use the command:

```
configure-vsoweb-ini
```

Example:

```
$/usr/vaisala/radarsw/configuration/bin/configure-vsoweb-ini --radar false --
lightning true --cors-origin-whitelist localhost --iris_host
iris_server.mydomain.com
```

6.2 Running nowcasting on a different server

Making use of the nowcasting, the load on your nowcast service may cause performance issues: IRIS Focus may become slower in returning results to users.

You can compensate for this by moving nowcasting to a separate server.

On the new (blank AlmaLinux, non-Focus) machine that will have the nowcast server on it, do the following steps:

1. Setup firewall rules first.
2. Set **ALLOW_IP** to IP address of machine that needs to access nowcast, or set to nothing to allow all machines access:

```
declare ALLOW_IP=""
declare -i ALLOW_PORT=31004
if systemctl status firewalld &> /dev/null && (( ALLOW_PORT > 0 )); then
if [ "${ALLOW_IP}" != "" ]; then
```

3. Limit access to just the machine specified:

```
firewall-cmd --permanent --zone=public --add-rich-rule="rule family=
\"ipv4\" source address=\"${ALLOW_IP}/32\" port protocol=\"tcp\" port=\"$
{ALLOW_PORT}\" accept" else
```

4. Allow everyone access instead:

```
firewall-cmd --permanent --add-port="${ALLOW_PORT}/tcp"
fi
fi
firewall-cmd --reload
```

5. scp the *cloud-nowcast-service.tar* from the *<Focus installation files dir>/k8s/images* to the nowcast server machine:

```
scp root@<Focus_machine>:/Focus_installation_files/k8s/images/cloud-
nowcast-service.tar .
```

6. Load and create nowcast container:

```
podman image load < cloud-nowcast-service.tar
podman run --name nowcast -d -p 31004:31004 com.vaisala.fire/cloud-nowcast-
service:7.x.x /app/bin/nowcast-server 31004
```

   where **x.x** is the number of the version/patch.

7. Check that you can reach nowcast on local server:

```
curl --request POST http://localhost:31004/focus-nowcast/api/v2/health;
echo
```

   You should see the following output:

```
{"status":"UP"}
```

8. To manage with **systemd**, use these commands:

```
podman generate systemd --new --name vaisala-radarsw-nowcast >| /etc/
systemd/system/vaisala-radarsw-nowcast.service
chmod 644 /etc/systemd/system/vaisala-radarsw-nowcast.service
systemctl enable --now vaisala-radarsw-nowcast
systemctl status vaisala-radarsw-nowcast
```

9. Any time firewall rules are changed, you need to restart the nowcast service with the following command:

```
systemctl restart vaisala-radarsw-nowcast
```

   a. Example on restarting without system control:

```
podman stop nowcast
podman start nowcast
```

10. To view the log, use the following command:

```
podman logs nowcast
```

11. On the IRIS-Focus machine, check that you can reach nowcast from remote server:

```
curl --request POST http://<nowcast_machine>:31004/focus-nowcast/api/v2/
health; echo
```

    You should see the following output:

```
{"status":"UP"}
```

12. Change the line in *vsoweb-override.ini* (use the hostname where the nowcast is):

    nowcast.http.server.url = http://*<Focus_machine>*:31004/focus-nowcast/api/v2/mvf/

13. Restart the webapp with this command:

```
systemctl restart vaisala-radarsw-webapp
```

6.3 Increasing buffer capacity for lightning data

The **lightning-websocket** service provides lightning events to the web browser. For performance reasons, the lightning events are kept in a cache so that data may quickly be provided to end users. The factory default configuration sets the size of this cache so that it can hold up to 700,000 events. This is typically a large enough number to provide up to a week's worth of historical data for high precision lightning networks that use LF signal processing to detect the electrical discharge of each lightning event.

VHF lightning detection networks detect events related to the channel that the electrical discharge of a lightning event flows through, rather than the the single discharge that flows through the channel. VHF lightning detection networks typically provide several events for each discharge and produce a lot of lightning data. If you connect IRIS Focus to a lightning data feed containing events produced by a VHF lightning detection network, the default cache size of 700,000 events will probably be too small. In that case, increase the size of the cache.

Increasing the cache size causes an increase of the memory requirements on your server, and causes a longer initialization time of the **lightning-websocket** service, as it loads its cache from the Kafka cluster at the startup. You may need to add or allocate more RAM to the system if you increase the cache size to a very large size.

1. Go to the *vaisala-focus-lightning.yaml* file in the */etc/vaisala/focus/k8s* directory.

   The size of the cache is controlled by two parameters (the example shows the default values):

   ```
   # Internal lightning cache configuration, total capacity is count * size
       lightning.cache.buf.count = 701
       lightning.cache.buf.size = 1000
   ```

2. To increase the cache size from 700,000 to 10,000,000, change the **lightning.cache.buf.count** parameter to 10001 using a text editor:

   ```
    # Internal lightning cache configuration, total capacity is count * size
       lightning.cache.buf.count = 10001
       lightning.cache.buf.size = 1000
   ```

   Alternatively, you can change the size from the command line:

   ```
   sed -e 's,^\(    lightning.cache.buf.count\).*,\1 = 10001,' -i /etc/
   vaisala/focus/k8s/vaisala-focus-lightning.yaml
   ```

3. To stop the **lightning-websocket** service and apply the changes, run the following commands:

   ```
   kubectl delete --namespace vaisala-focus-lightning deployment/lightning-
   websocket
   kubectl apply -f /etc/vaisala/focus/k8s/vaisala-focus-lightning.yaml
   ```

   Kubernetes will start the **lightning-websocket** service when the *vaisala-focus-lightning.yaml* file is applied.

6.4 Configuring alert notifications

IRIS Focus can send notifications to users when weather alerts are triggered. In addition, IRIS Focus can send notifications about technical alerts to users with **administrator** role.

Configure the email and SMS settings for the system so that it can send notifications.

For SMS gateway, IRIS Focus supports MessageBird (https://www.messagebird.com.) IRIS Focus also supports email-to-text services.

1. Log in to the IRIS Focus web application as **`administrator`**.
2. Select **Admin > System > Notification settings**.
3. Fill in the required parameters for email and SMS notification message service.
4. To test the email and SMS service, enter the address or phone number in the **Email verification** or **SMS verification** field, and select **Send**.

   You must save your settings before sending the test message.

6.4.1 Editing default messages for weather alerts

Write the default content for the notification messages that users receive when weather alerts are triggered. When users set notifications for their own areas of interest, they can either use the default content or replace it with their own message text.

Select whether users by default receive a notification when the alert is cleared. Users can change this in their personal settings.

If some recipients' phones do not support HTML formatting, use the plain-text email message fields.

Depending on the service provider, SMS messages that exceed the limit of 160 characters may get broken up into multiple messages.

1. Log in to the IRIS Focus web application as **`administrator`**.
2. Select **Admin > System > Weather alert default messages**.
3. Fill in the email and SMS fields.

   You can select macros that will fill in the message with predefined values when the message is sent. The content can be, for example, the name of the area of interest and severity of the alert.

Table 8 Email message field

Field	Description
Email to	Default: the address set for the user account of the user who created the area of interest. If the user only has the **focus** user role, then only the user can receive the notification. If the user has the **poweruser** role, the user can add other recipients.
Email subject	You can use macros to fill in information, such as the severity of the alert and the name of the area of interest.
Email text (HTML)	The content of the email. You can use macros to fill in information.
Email text (plain text)	The content of the email. You can use macros to fill in information. Use this field if the recipients' devices do not support HTML. If you are using an email-to-SMS service, and some recipients' phones do not support HTML formatting, use the SMS message fields instead of the email message fields.
Email subject when cleared	The subject of the email that is sent when the alert is cleared. You can use macros to fill in information.
Email text when cleared (HTML)	The content of the email that is sent when the alert is cleared. You can use macros to fill in information.

Field	Description
Email text when cleared (plain text)	The content of the email that is sent when the alert is cleared. You can use macros to fill in information. Use this field if the recipients' devices do not support HTML. If you are using an email-to-SMS service, and some recipients' phones do not support HTML formatting, use the SMS message fields instead of the email message fields.

Table 9 SMS message fields

Field	Description
Send to	Default: the number set for the user account of the user who created the area of interest. If the user only has the **focus** user role, then only the user can receive the notification. If the user has the **poweruser** role, the user can add other recipients.
SMS text	You can use macros to fill in information, such as the severity of the alert, and the name of the area of interest. Character limit: 160 Messages that exceed the character limit (160 characters) will be broken up into multiple messages.
SMS text when cleared	The content of the SMS that is sent when the alert is cleared. You can use macros to fill in information.

6.4.2 Editing messages for technical alerts

You can configure IRIS Focus to send notifications about technical alerts to users with `administrator` role. Technical alerts include, for example, alerts about dataflow problems.

You can view information about the technical alerts in the **Alert history** view, if you have a `focus` user role.

Set the content of the notification messages:

1. Log in to the IRIS Focus web application as **`administrator`**.
2. Select **Admin > System > Technical alert default messages**.
3. Fill in the required parameters for email and SMS notification messages.

If you want to receive notifications, they must be enabled in you personal **Preferences**

6.5 Setting up housekeeping for events and alerts database

You can set IRIS Focus to clean the alerts database when it is getting full, and to give an alert when the database load is approaching the database size limit. By default, this feature is enabled. The database size limit is set automatically depending on the partition/disk size reported by the operating system during the installation, but you can change this limit. The default is 10% of the hard disk partition. By default, the database is installed in the */srv* partition.

You can select the limit that triggers the alert. The default is 90% of the size limit. You can also set the clean-up target. The clean-up target tells how many of the latest alerts will be kept in the database.

If you want to save the old alerts, do one of the following when you get the alert about the approaching clean-up:

- Take a manual backup of the database.
- Add disk space to the partition. Restart the webapp after this.
- Increase the configured database size limit (%). Restart the webapp after this.

The alerts that are erased from the database during the clean-up are also deleted from the **Alert history** table. This means that if an alert has persisted for a long period time, and the housekeeping has erased alerts from that period, you will only see the latest timestamps for the alert.

1. Log in to the server as **`root`**.
2. Go to the *`vsoweb-override.ini`* file in the */etc/vaisala/radarsw/configuration* directory.
3. Set the maximum percentage of disk partition to use (database size limit) by setting the value:

   ```
   events.alerts.housekeeping.trigger.partition.percentage
   ```

4. Set the limit that triggers the alert (percentage of the maximum number of alerts) by setting the value:

   ```
   events.alerts.housekeeping.alert.percent.full
   ```

5. Set the clean-up target by setting the value:

```
events.alerts.housekeeping.target.limit
```

6. If you want to disable the database housekeeping, set the following key to **`false`**:

```
events.alerts.housekeeping.do.housekeeping = false
```

7. If you want to disable the alerts for housekeeping, set the following key to **`false`**:

```
events.alerts.housekeeping.alert.before = false
```

8. Restart the web application.

6.6 Scheduling image exports from IRIS Focus

If you want to share interesting weather events on, for example, your website, use a `REST POST` method to schedule image exports from IRIS Focus saved views.

CAUTION! Depending on setup of the target website, the image export can be a bit slow. Take this into account when planning your export volumes and schedules.

6.6.1 Exporting images as .png files

Use this procedure to export images as .png files.

1. In the IRIS Focus **Map** view, set-up the view you want to save.

   For example, you can save the settings for:
   - **Weather Products**
   - Map tools such as the cross-section and tracking tools
   - Zoom level

2. Select **Saved Views > Save**.
3. Name the view and select **Save**.

   The new view is added to the **Saved Views** list for your future use.

4. Configure your web server to access the IRIS Focus image export service:

```
@Request: POST <your IRIS Focus URL>/focus-webapp/api/v2/image-export/
getImage
@Produces: "image/png"
```

5. Configure the following parameters:

Parameter	Description
`username`	For security reasons, Vaisala recommends that you configure a specific user for exporting images.
`password`	IRIS Focus password for the user.
`time`	Time, in ISO-8601 format: `2021-06-18T17:55:23.000Z`
`widthPx`	Width of the exported image, in pixels.
`heightPx`	Height of the exported image, in pixels.
`savedViewName`	The name of the saved view you created in step 3.
`savedViewUser`	Optional value. Used if you configure a specific user for exporting images (recommended).

6. Instead of step 4 and step 5, you can run the export from the command line by creating a script and setting-up a **cron** job. For example:

   a. Create a Python script for the image export such as the following:

```
#!/usr/bin/python
# -*- coding: utf-8 -*-
from requests_futures.sessions import FuturesSession
import datetime
APP_URL = "your_url_here"
IMAGE_EXPORT_LOC = "/focus-webapp/api/v2/image-export/getImage"
FILE_PATH = "/path/to/image.png"
USERNAME = "username_here"
PASSWORD = "password_here"
TIME = datetime.datetime.utcnow().isoformat()
WIDTH = "1000"
HEIGHT = "700"
VIEW = "view_name_here"
def main():
    session = FuturesSession()

    req_params = {"username": USERNAME, "password": PASSWORD, "time":
TIME, "savedViewName": VIEW, "widthPx": WIDTH, "heightPx": HEIGHT}

    future_one = session.post(APP_URL + IMAGE_EXPORT_LOC,
params=req_params)

    # wait for the request to complete, if it hasn't already
    res = future_one.result()
    print('{0}  response status: {1}'.format(TIME, res.status_code))

    if res.status_code == 200:
      with open(FILE_PATH, 'wb') as f:
          f.write(res.content)

if __name__ == '__main__':
    main()
```

   Although the example **image-export.py** script saves only one snapshot, you can edit it to loop a set number of times and get multiple snapshots at a time.

   b. Type **crontab -e** in the terminal and add, for example, the following line to the *crontab* file (add your own paths and arguments).

```
*/15 * * * * /usr/bin/python
        /path/to/script/image-export.py >> /path/to/log/export.log 2>&1
```

   This executes the **image-export.py** script every 15 minutes and saves a single snapshot as a PNG file to the server.

6.6.2 Exporting images as .geotiff files

You can also export images as geoTIFF files.

The procedure is otherwise similar to Exporting images as .shp files (page 64), but to configure your web server to access the IRIS Focus image export service, use the following command:

```
@Request: POST <server-name>/focus-webapp/api/v2/image-export/geotiff
@Produces: "image/tiff"
```

The image is exported as a *.tiff* file.

Note that you can use the sample Python script shown in Exporting images as .shp files (page 64) to grab geotiff files by setting the TYPE to "geotiff".

6.6.3 Exporting images as .shp files

Use this procedure to export images as shape files (.shp). The output is a zip file containing all the files for the shape file.

1. In the IRIS Focus **Map** view, set-up the view you want to save.

   For example, you can save the settings for:
   - **Weather Products**
   - Map tools such as the cross-section and tracking tools
   - Zoom level
2. Select **Saved Views > Save**.
3. Name the view and select **Save**.

   The new view is added to the **Saved Views** list for your future use.
4. Configure your web server to access the IRIS Focus image export service:

   ```
   @Request: POST <server-name>/focus-webapp/api/v2/image-export/shp
   @Produces: "application/octet-stream"
   ```

   The image is exported as a zip file.

5. Configure the following parameters:

Parameter	Description
`username`	A valid IRIS Focus username. For security reasons and for smooth user experience, Vaisala recommends that you configure a specific user for exporting images. If you are using the username of an active user, and that user is logged when a scheduled export takes place, the user will get logged out, because a user cannot be logged in from two machines at the same time.
`password`	IRIS Focus password for the user.
`time`	Time, in ISO-8601 format: `2021-06-18T17:55:23.000Z`
`savedViewName`	The name of the saved view you created.
`savedViewUser`	Optional value. Used if you configure a specific user for exporting images (recommended).

6. Instead of steps 4 and 5, you can run the export from the command line by creating a script and setting-up a `cron` job. For example:

   a. Create a Python script for the image export such as the following:

```
#!/usr/bin/python3
from requests.sessions import Session
from datetime import datetime, timedelta

# Change to host name of IRIS Focus if run externally
APP_URL = "https://localhost"

# User account to login with to render image
USERNAME = "image-export"
PASSWORD = "USER_PASSWORD"

# Name of saved view and user account that created the saved view
VIEW = "SAVED_VIEW_NAME"
VIEW_USER = "USER_THAT_SAVED_VIEW"

# You can change these values
OUTPUT_DIR = '.'   # Directory to write output file to
FILE_BASE_NAME = "image-export" # Name of file sans extension
SSL_VERIFY = False # Set to True if you have a valid certificate
TYPE = "shp"       # Can be "shp" or "geotiff"

# Example of backing up 5 minutes from "now" (no data at time causes
404)
TIME = datetime.utcnow() - timedelta(days=0, hours=0, minutes=5)

def main():
    ext = ".tiff"
    if TYPE == "shp":
        ext = ".zip"
    file_path = OUTPUT_DIR + "/" + FILE_BASE_NAME + ext
```

```
    session = Session()
    time_str = TIME.isoformat()
    url  = APP_URL + "/focus-webapp/api/v2/image-export/" + TYPE
    req_params = {"username": USERNAME, "password": PASSWORD,
                  "time": time_str,
                  "savedViewName": VIEW, "savedViewUser": VIEW_USER}
    res = session.post(url, params=req_params, verify=SSL_VERIFY)
    print('{0} response status: {1}'.format(time_str, res.status_code))
    if res.status_code == 200:
        with open(file_path, 'wb') as f:
            f.write(res.content)
        print('Created file: {0}'.format(file_path))

if __name__ == '__main__':
    main()
```

Although the example **image-export.py** script saves only one snapshot, you can edit it to loop a set number of times and get multiple snapshots at a time.

b. Type **crontab -e** in the terminal and add, for example, the following line to the *crontab* file (add your own paths and arguments).

```
*/15 * * * * /usr/bin/python3
        /path/to/script/image-export.py >> /path/to/log/export.log 2>&1
```

This executes the **image-export.py** script every 15 minutes and creates a single ZIP file containing the shape file components.

7. System administration

7.1 User roles

A user's access to IRIS Focus features depends on the roles assigned to the user. For example, the administration features are available to user accounts with the **administrator** role. A user may have several user roles, and when they log in, they have the features of all their roles available.

User roles can be divided into two categories:

- **Focus** roles are needed for full-scale remote sensing data visualization. Logging in with a **Focus** role reserves a seat from the license seat pool.
- System roles are needed for system purposes. They do not reserve seats from the pool, and they do not offer the full-scale features. For full-scale features, the user also needs a **Focus** role.

Focus roles

Focus roles reserve a **Focus** seat from the license seat pool when logging in.

Table 10 Focus roles

Focus Lightning In the **Add user** screen, this role is called **focus-lightning**.	Can access the full IRIS Focus feature set for visualizing lighting data, such as: • Configuring product generation • Using data analysis tools, like Tracking tool • Creating personal areas of interest and monitoring these areas for weather events created by **poweruser**

IRIS Focus Light

A user without a **focus** role enters the *IRIS Focus Light* view when logging in.

IRIS Focus Light view consists of a predefined map view with limited features. The following features are available:

- View one predefined weather product at a time
- See areas of interest with active alerts highlighted in the alert severity color when viewing current data
- View WMS map layers
- View the animation timeline
- View the cursor tool
- Edit color scales
- Select map features
- Use the **Ruler Tool**
- Change user preferences

IRIS Focus Light view has an unlimited number of seats. If there are no *IRIS Focus* license seats available, the user will be logged in with an *IRIS Focus Light* license. If the licence is missing, users cannot log in. This could happen, for example, if the USB license key has been removed or if this is a new installation, not from the factory, that requires an e-mail be sent to Vaisala to retrieve the license.

Seat allocation and restrictions

A user with a **Focus Lightning** role reserves one of the *IRIS_Focus_Lightning* seats associated with the license.

When the user logs out, the seat is released.

If a user with one of the **Focus** roles (**Focus Lightning**) logs in and there are no seats available, the user is directed to the IRIS Focus Light view. When an *IRIS Focus* license is available, the user is provided with an opportunity to switch to the full-scale IRIS Focus view.

System roles

System roles are needed for various system management tasks and functionalities. System roles do not reserve a Focus seat from the seat pool.

When logging in, a user that has one or more of these roles, but no **Focus** role, enters the *IRIS Focus Light* view.

Table 11 System roles

Role	Description
administrator	Can access all administration features, such as: • User and licensing management • Map management and configuration • Alert notification settings (email and SMS) • Dataflow monitoring Users with an **administrator** role must belong to the **root** organization.
poweruser	Can access **poweruser** features: • Can create new weather events • Can create places of interest that are visible to all users in an organization, and adding weather events to monitor on these areas. • Can select an organization-level map projection.
user	Can access various features of the base software. This role must be assigned as an additional role to every user account with **focus**, **poweruser**, or **kiosk** role.
kiosk	Identical to the **User** role with the exception that an account with the **Kiosk** role will not be automatically logged out after a period of inacivity.

Considerations for assigning user roles

- `user` role should be assigned to every user account, even if they also have other roles.
- To create users that always enter the *IRIS Focus Light* view (so-called "'Light users"), only assign system roles to these users. Do not assign Focus roles to them.
- Users with the `poweruser` role also need a `focus` role to access the full set of IRIS Focus features.
- To avoid reserving a `focus` license when performing administration tasks, the default `administrator` account does not have the `focus` role.
- To see both weather radar and lightning data, a user must have both `Focus Lightning` and `Focus Weather Radar` roles.

7.1.1 Managing user accounts

1. Log in to the IRIS Focus web application as `administrator`.
2. Select **Admin** in the upper right corner.
3. Select **Users** to add, edit, or delete users.
4. If you change the user's role, the change won't take effect while the user is logged in. To log out the user, go to the **Logged In Users** tab, and in the **Actions** column, select **Log out user**.

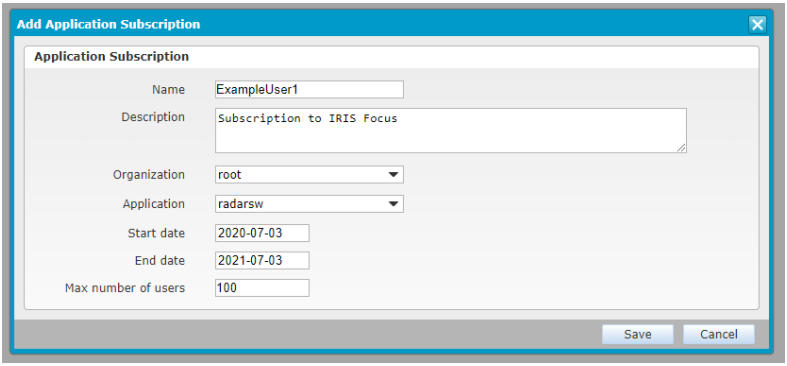
7.1.2 Creating user accounts after first install

After a fresh installation, create the user accounts.

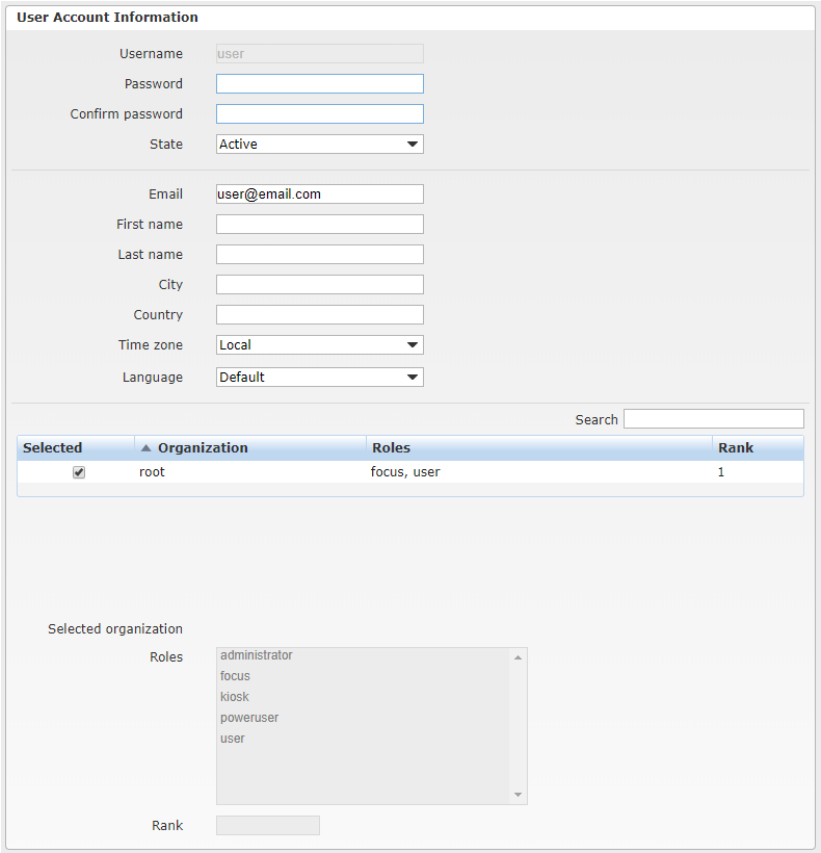
1. Log in to the IRIS Focus web application as `administrator`.
2. Select **Admin > Organizations**.
3. Choose which organization you want to create your users in:
   - Use the default `root` organization.
   - If you require more control over license seat allocation, create a new organization in the **Organizations** tab.

Users with an `administrator` role must belong to the `root` organization.

4. In the **Application Subscriptions** tab, subscribe the organization to a license pool.
   a. Select the `radarsw` organization.
   b. Enter the validity period.
   c. Enter the maximum allocated users (licenses).



5. To add users to the organization, select **Admin > Users > Add New User**.



a. Add user details.

b. Select an organization for user.

   If a user account belongs to multiple organizations, the user roles are applied according to the organization that has the highest **Rank**.

6. Assign roles to the user.

   To avoid reserving an IRIS Focus license when performing administration tasks, the default administrator account does not have the `focus` role.

   a. In the organization list pane, make sure the organization is highlighted.
   b. In the **Roles** pane, select the role.

      To assign multiple roles to a user account, press **SHIFT**+**CTRL** and select roles from the list.
   c. To enable IRIS Focus features for a user account, select both the `user` and `focus` roles.
   d. To enable advanced IRIS Focus features such as creating event criteria and organization-level places of interest for an account, select the `poweruser` role.

7.1.3 Removing user accounts

1. Log in to the IRIS Focus web application as `administrator`.
2. Select **Admin > User > Users**.
3. Select a user and then **Delete**.

   The user is no longer listed as a user in IRIS Focus. However, the user name of the deleted account remains in the system database. This keeps log files intact, as references to deleted users remain in the audit logs.
   IRIS Focus does not allow you to create a new user with the same username as an existing one. This applies even when the account has been removed earlier, because the account name remains in the database.

7.1.4 Unlocking administrator account

If an `administrator` account is accidentally locked, unlock it as follows:

1. Log in to the server as `root`.
2. Run the following command:

```
rsw-db-tool reset-admin-password
```

7.2 Managing organizations

Each user account belongs to one or more organizations. You can use organizations to manage:

- Subscriptions to selected software to a selected number of users.

- License availability for subgroups with separate license pools.

Users with an `administrator` role must belong to the `root` organization.

7.3 Managing passwords

1. Log in on an account that has `administrator` rights.
2. Go to **Admin > User management > Password settings**.
3. To select custom password settings, select **Custom**, and fill in the fields.

7.4 Map management

The standard installation of IRIS Focus includes a complete world map that is suitable for most scenarios.

The map consists of separate layers that are further separated into base layers and non-base layers. One base layer and one non-base layer are always rendered on the screen. Typically, base maps contain the underlying terrain and the non-base layers contain additional details that can be displayed on top of the base map.

Map data is served to the IRIS Focus web interface by GeoServer map server using Web Map Service (WMS) protocol. To improve performance, instead of calling for new map data each time the map view changes, the maps are cached in pre-rendered PNG tiles using GeoWebCache.

Administrators can add custom map layers or edit existing layers.

IRIS Focus users can select which map layers they see in the **Map** view, and edit the view by selecting **Map Features**.

7.4.1 Adding and editing map layers

1. Log in to the IRIS Focus web application as `administrator`.
2. Select **Admin > Map > Map Layers**.

   The **Map Layers** view lists the available map data layers. Each layer has the following properties:
   - **Base layer** - Enable to set this layer as a base layer
   - **Title** - Layer name
   - **Type** - WMS layers
   - **URL** - Address for the WMS server
   - **Layer** - Title of the layer on the server

3. To add a new layer, select **Add New Layer**.
   a. Type the layer information, including **Title**, **URL**, and **Layer**.
   b. Define map layer properties such as:
      - **Transparent** - Enable to use PNG or GIF alpha channel for transparency
      - **MIME type** - Select image type
   c. If you want to use a dark version of the layer with the dark mode map, create a separate dark layer with the same name, and append "`_dark`" at the end of the name. This name will be automatically requested when the user selects the dark map mode in the **Map Features** panel.

   When you are adding a WMS layer from an external source, note the following:
   - Get the URL from the layer provider.
   - You can set any values for **Realtime offset** and **Refresh rate**, but if the exact value is not available from the layer provider, the system will give you a time closest what you defined.
   - In order for the system to query for the cursor tool data, check the **Usable in map cursor tool** checkbox.
   - **Layer style** defines the availability of the color legend in the map view. IRIS Focus supports both `.sld` files and WMS methods of providing the legend.
   - If you do not want the layer to be visible to users, after adding a layer, go to the **Map View Contexts** screen, and uncheck the **Visibility** checkbox.
   - The user can see the added external WMS layer in the **Add Product** drop-down list of the **Weather Products** pane.
4. To edit a layer, select **Edit** for that layer and make your changes.

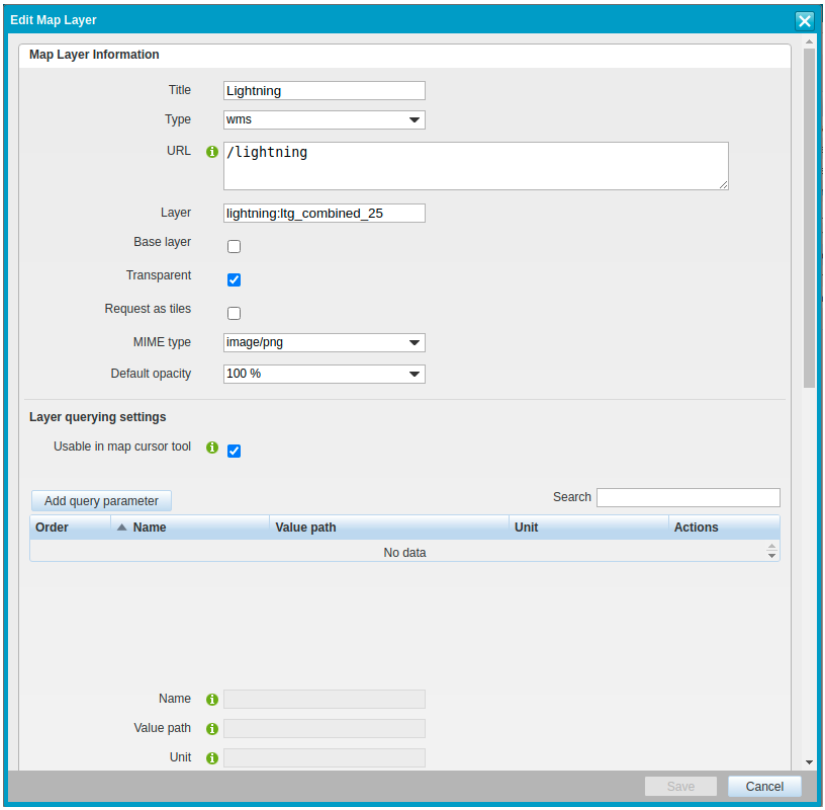
   The **Map Layer Information** window for that layer opens.
5. Select **Save**.

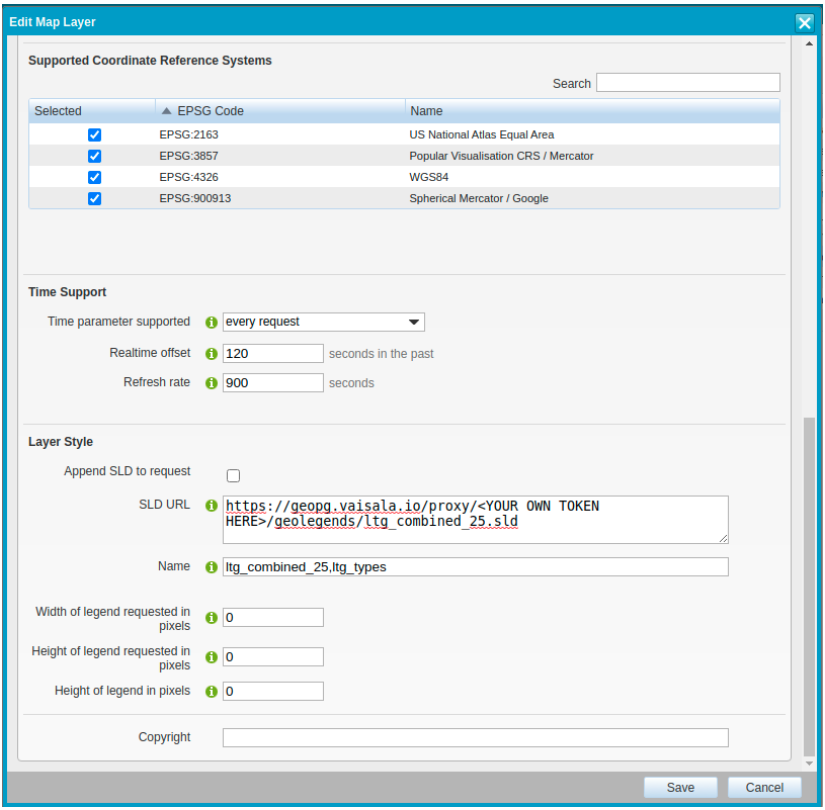
7.4.2 Adding GLD360 lightning layer

To take the GDL360 lightning layer into use, the IRIS Focus server must be online and your organization must have an active subscription to GLD360 data. For information on subscribing to GLD360 data, contact Vaisala Lightning Data Services.

1. Log in to the IRIS Focus web application as `administrator`.
2. Select **Admin > Map > Map Layers**.
3. Select **Add New Layer**.

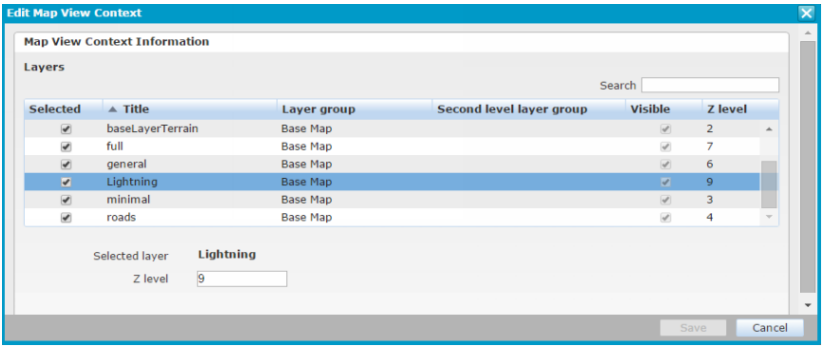
4. In **Map Layer Information**, enter the following values on the layer properties:
   a. **URL**: `/lightning`
   b. **Layer**: `lightning:ltg_combined_25`
   c. **Transparent**: Checkbox selected
   d. **Usable in map cursor tool**: Checkbox selected
   e. **SLD URL**: https://storm.vaisala.com/geolegends/ltg_combined_25.sld
   f. **Name**: `ltg_combined_25.ltg_types`





5. Select **Save**.
6. Select **Map > Map View Contexts**
7. Edit the default map context **TheMap**.

8. Select the newly created lightning layer and set its **Z level** higher than all base map layers in the map context.



In the web application, the new layer is listed in the product selection list.

7.4.3 Map View Context

The **Map View Contexts** view lists all defined maps.

Only the default **TheMap** context is available. Perform all map layer customization in the default **TheMap** context. Do not create new map contexts for custom map layers.

To edit **TheMap**, select **Edit**.

- To make a map layer available for users in the map view, select the **Selected** checkbox in the **Edit Map View Contexts**.
- To set the order in which multiple map layers are rendered on screen, change the **Z level** of map layers.
  The lowest number is rendered first, and higher numbers rendered on top of that.

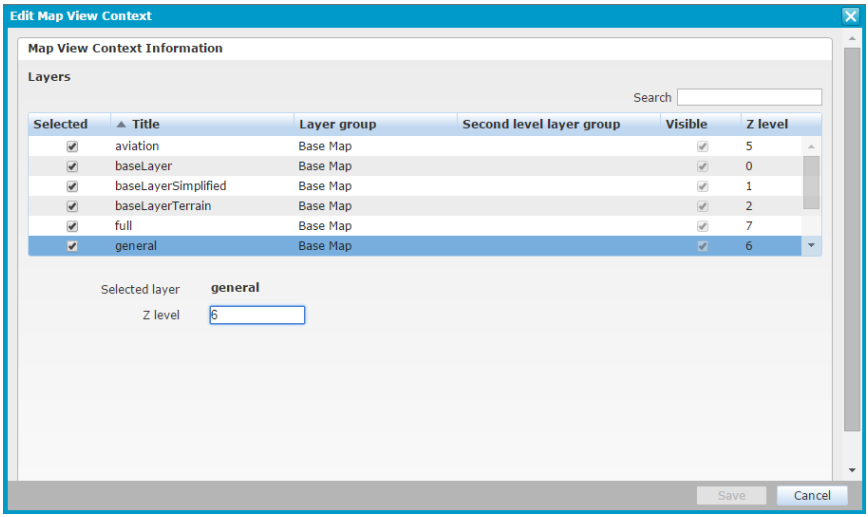


Figure 9 Editing the Map Context

7.4.4 Adding external map layers

You can import an external map layer, such as a shapefile, into Geoserver for IRIS Focus to display on the map.

For information on adding WMS layers from external sources, see Adding and editing map layers (page 74).

1. Make sure you have a shapefile (`.shp`) available.

   For an example resource with shapefiles available for download, see the WGS84 projection examples at:
   https://osmdata.openstreetmap.de/data/coastlines.html
2. Use an `scp` client or similar application to copy the shapefile to a directory on the IRIS Focus server such as `/srv/`.
3. Login to the server as `radarop`.
4. Open the file: `/etc/vaisala/radarsw/configuration/gis-override.ini`
5. Copy the `geoserver.admin.password` .

   This password is autogenerated during installation.

6. Using a browser, login to IRIS Focus Geoserver at:

   http://<IRIS_Focus_server_name>:34180/geoserver/web/
   Login using the username **`admin`** and the password you copied earlier.

   > Depending on your own network configuration you may need to do this at the server, over a remote console, or by using your local browser.

7. Add a new **Store**:
   a. Select **Stores > Add New Store**.
   b. Choose the data source:

      Shapefile - ESRI(tm) Shapefiles (*.shp)

   c. Select the following (the following list shows example values).

      - **Workspace**: `Vaisala`
      - **Data Source Name**: `coastlines`
      - **Description**: leave blank
      - **Shapefile location**: browse to the shapefile
        For example: `\files\lines.shp`

   d. Leave the other fields as default.
   e. Select **Save**.
8. Publish the layer:
   a. Check that the **New Layer** menu opens.
   b. If the **New Layer** menu does not open automatically, select **Layers > Add New Layer**.
   c. In the **Add layer from** list, find the new layer.
   d. Select **Publish**.

   The **Edit Layer** menu shows the new layer name. For example, `vaisala:coastlines`.
9. In the **Edit Layer** menu:
   a. Leave all inputs as they are except:

      - **Name**: `coastlines`
      - **Title**: `coastlines`
      - **Coordinate Reference Systems > Declared SRS**
      - Select **Find** and search for `4326 (WSG 84)`.

   b. To fill the bounding boxes, select **Compute from data** and **Compute from native bounds**.
   c. Select **Save**.

10. Select **Layer Groups**.
    a. Select an existing layer group (for example, `vai_full_en`) and then select **Add Layer**.
    b. Find the new layer and add it.

       The layer is now listed in the **Layers** table.
    c. Select **Save**.
11. Login to IRIS Focus as a user.
12. To confirm that the new layer is visible, select **Map Features > Map Detail > Full Detail**.

7.5 Creating alert message log files

You can configure the system to create and send log files that contain information about each triggered alert. You can use these files, for example, in your message distribution systems to send alerts through channels not covered by the alert notification system.

The log files contain single-line JSON messages for each alert. The logs are created hourly. Messages are logged to an open log file as they appear. A delayed message may appear in a later log file.

You can customize the service: for example, how often new log files are created or whether empty log files are created.

By default, the log files are stored in the */srv/pv/log/alerts* directory.

There is no automated clean up of log files.

The service attempts to backfill using Kafka's group ID. You can take the service down for several minutes, and when you bring it back, it recovers any log messages that appeared during the outage and appends them to the active log file.

1. To enable the service, run the following command:

```
install -D -d /srv/pv/log/alerts
kubectl create -f /etc/vaisala/focus/k8s/vaisala-focus-alert-logger.yaml
```

2. To customize the service, modify the configuration file:

```
vi /etc/vaisala/focus/k8s/vaisala-focus-alert-logger.yaml
```

3. To disable the service, run the following command:

```
kubectl delete -f /etc/vaisala/focus/k8s/vaisala-focus-alert-logger.yaml
rm -fr /srv/pv/log/alerts # This is optional if you want to clear all
alert files
```

7.6 Installing a CA certificate

The web application comes with a temporary, self-signed SSL certificate that secures the connection between the IRIS Focus server and the user's web browser.

Consider acquiring and using a trusted certificate from a certificate authority (CA), especially if you plan to offer access to IRIS Focus outside your organization.

1. Acquire a certificate that has been signed by a trusted authority.

   This is usually done by an IT department or an external organization, who purchase the certificate from an external certificate authority (CA). You can use any trusted certificate authority.

   a. Create a certificate signing request (CSR).

      - The CN (Common Name) attribute is currently neither required and nor sufficient, so the certificate signing request must include the SAN attribute, with the DNS name of the service.
      - For details, contact the certificate authority that you are going to use.

   b. Send the CSR to the certificate authority to be signed.

   c. The certificate authority provides the certificate.

2. Back-up your current configuration by running:

```
run /usr/vaisala/radarsw/backup/bin/do-backups
```

   This backs up all the configuration files as a *.tar* file to */srv/vaisala/radarsw/backup/configuration*.

3. Install a copy of your certificate *pem* file under the */etc/vaisala/radarsw/webapp-proxy/certificates* directory.

   Give the file a name to match the host name that your users will use. Example: if your users connect to https://focus.acme.com/, use *focus.acme.com.pem* as the name for the pem file. IMPORTANT:

   CAUTION! Do NOT replace or remove the *localhost.pem* file in the directory, as this is required for inter-service connections.

   Use the following command:

   ```
   install -m 400 -o haproxy -g root focus.acme.com.pem /etc/vaisala/radarsw/
   webapp-proxy/certificates/focus.acme.com.pem
   ```

4. *Optional*: If you have other files related to the *pem* file that you want to keep organized, you can install them in the same directory. This is optional, as haproxy should ignore them. For example, if you have a *crt* and *key* file that correspond to your *pem* file, you can install copies of them:

   ```
   install -m 400 -o haproxy -g root focus.acme.com.crt /etc/vaisala/radarsw/
   webapp-proxy/certificates/focus.acme.com.crt
   install -m 400 -o haproxy -g root focus.acme.com.key /etc/vaisala/radarsw/
   webapp-proxy/certificates/focus.acme.com.key
   ```

5. Edit the */etc/haproxy/haproxy.cfg* configuration file so that the proxy server knows to offer the "*focus.acme.com.pem*" certificate to users that connect to "https://focus.acme.com/" and the *localhost.pem* certificate to local services that connect to "https://localhost/". To do this:

   a. Comment out the bind configuration line that binds all hosts to the same certificate file. To do this, insert a "#" symbol at the start of the line.

      In other words, change this line:

      ```
      bind *:443 ssl crt /etc/vaisala/radarsw/webapp-proxy/certificates/
      localhost.pem no-sslv3 ciphers EDH+aRSA+AESGCM:EDH+aRSA+AES:DHE-RSA-
      AES256-SHA:EECDH+aRSA+AESGCM:EECDH+aRSA+AES:ECDHE-RSA-AES256-SHA:ECDHE-
      RSA-AES128-SHA:RSA+AESGCM:RSA+AES+SHA:DES-CBC3-SHA:-DHE-RSA-AES128-SHA:!
      aNULL:!eNULL:!LOW:!MD5:!EXP:!PSK:!DSS:!RC4:!SEED:!ECDSA:!ADH:!IDEA
      ```

      to the following:

      ```
      #  bind *:443 ssl crt /etc/vaisala/radarsw/webapp-proxy/certificates/
      localhost.pem no-sslv3 ciphers EDH+aRSA+AESGCM:EDH+aRSA+AES:DHE-RSA-
      AES256-SHA:EECDH+aRSA+AESGCM:EECDH+aRSA+AES:ECDHE-RSA-AES256-SHA:ECDHE-
      RSA-AES128-SHA:RSA+AESGCM:RSA+AES+SHA:DES-CBC3-SHA:-DHE-RSA-AES128-SHA:!
      aNULL:!eNULL:!LOW:!MD5:!EXP:!PSK:!DSS:!RC4:!SEED:!ECDSA:!ADH:!IDEA
      ```

   b. Enable the two bind configuration lines that configure haproxy to use two separate certificates. To do this, uncomment two lines in the file, and change MY_DOMAIN to your fully qualified host name that users connect to ("focus.acme.com" in this example).

      Change:

      ```
      #  bind MY_DOMAIN:443 ssl crt /etc/vaisala/radarsw/webapp-proxy/
      certificates/MY_DOMAIN.pem no-sslv3 ciphers EDH+aRSA+AESGCM:EDH+aRSA
      +AES:DHE-RSA-AES256-SHA:EECDH+aRSA+AESGCM:EECDH+aRSA+AES:ECDHE-RSA-
      AES256-SHA:ECDHE-RSA-AES128-SHA:RSA+AESGCM:RSA+AES+SHA:DES-CBC3-SHA:-
      DHE-RSA-AES128-SHA:!aNULL:!eNULL:!LOW:!MD5:!EXP:!PSK:!DSS:!RC4:!SEED:!
      ECDSA:!ADH:!IDEA
      #  bind localhost:443 ssl crt /etc/vaisala/radarsw/webapp-proxy/
      certificates/localhost.pem no-sslv3 ciphers EDH+aRSA+AESGCM:EDH+aRSA
      +AES:DHE-RSA-AES256-SHA:EECDH+aRSA+AESGCM:EECDH+aRSA+AES:ECDHE-RSA-
      AES256-SHA:ECDHE-RSA-AES128-SHA:RSA+AESGCM:RSA+AES+SHA:DES-CBC3-SHA:-
      DHE-RSA-AES128-SHA:!aNULL:!eNULL:!LOW:!MD5:!EXP:!PSK:!DSS:!RC4:!SEED:!
      ECDSA:!ADH:!IDEA
      ```

      to the following (remove the leading comment character, and change MY_DOMAIN to your fully qualified host name):

```
bind focus.acme.com:443 ssl crt /etc/vaisala/radarsw/webapp-proxy/
certificates/focus.acme.com.pem no-sslv3 ciphers EDH+aRSA+AESGCM:EDH
+aRSA+AES:DHE-RSA-AES256-SHA:EECDH+aRSA+AESGCM:EECDH+aRSA+AES:ECDHE-RSA-
AES256-SHA:ECDHE-RSA-AES128-SHA:RSA+AESGCM:RSA+AES+SHA:DES-CBC3-SHA:-
DHE-RSA-AES128-SHA:!aNULL:!eNULL:!LOW:!MD5:!EXP:!PSK:!DSS:!RC4:!SEED:!
ECDSA:!ADH:!IDEA
bind localhost:443 ssl crt /etc/vaisala/radarsw/webapp-proxy/
certificates/localhost.pem no-sslv3 ciphers EDH+aRSA+AESGCM:EDH+aRSA
+AES:DHE-RSA-AES256-SHA:EECDH+aRSA+AESGCM:EECDH+aRSA+AES:ECDHE-RSA-
AES256-SHA:ECDHE-RSA-AES128-SHA:RSA+AESGCM:RSA+AES+SHA:DES-CBC3-SHA:-
DHE-RSA-AES128-SHA:!aNULL:!eNULL:!LOW:!MD5:!EXP:!PSK:!DSS:!RC4:!SEED:!
ECDSA:!ADH:!IDEA
```

6. Save your changes and restart the haproxy service:

```
systemctl restart haproxy
```

The *haproxy.cfg* file contains security and service mappings specific to each release of IRIS Focus. When you upgrade IRIS Focus to a newer release, you will likely need repeat steps 5 and 6 to enable your certificate.

7.7 Backing-up system configuration

IRIS Focus is backed up automatically using a daily configuration and database backup job that are run at 02:30 AM server time. On factory settings, the server uses UTC as the time zone.

The backup script stores the server configuration and application settings database.

Automatic back-up

Backup is done by the cron job `/etc/cron.d/vaisala-radarsw-backup-cron` that launches the `/usr/vaisala/radarsw/backup/bin/do-backups` script.

The created backup files are zipped and stored in the following directories:

- `/srv/vaisala/radarsw/backup/configuration`
- `/srv/vaisala/radarsw/backup/database`

Backups are kept for 180 days, after which they are deleted.

Each backup file includes a timestamp in the format:

```
radarsw-configuration-2019-09-05T06-48-26.tar.gz
```

7.7.1 Making a manual back-up

1. Log in to the server as **root**.

2. Run: **`/usr/vaisala/radarsw/backup/bin/do-backups`**
3. Check that new files are created in the following directories:

   ```
   /srv/vaisala/radarsw/backup/configuration/radarsw-configuration-
   <timestamp>.tar.gz
   ```

   ```
   /srv/vaisala/radarsw/backup/database/database-wx-<timestamp>.gz
   ```

   ```
   /srv/vaisala/radarsw/backup/database/database-vsp-<timestamp>.gz
   ```

   Each backup file includes a timestamp in the format:

   ```
   radarsw-configuration-2019-09-05T06-48-26.tar.gz
   ```

7.8 Restoring from backup

1. Log in to the server as **`root`**.
2. Stop the Monit service:

   ```
   systemctl stop monit.service
   ```

3. Stop the IRIS Focus web application:

   ```
   systemctl stop vaisala-radarsw-webapp.service
   ```

4. Stop all services which might access the database.

   ```
   kubectl delete -f /etc/vaisala/focus/k8s/vaisala-focus.yaml
   ```

5. (Optional) Run the backup script:

   `/usr/vaisala/radarsw/backup/bin/do-backups`
   Database backups for the wx and vsp databases will be in */srv/vaisala/radarsw/backup/database*. Move a copy to a remote host if reinstalling or otherwise reimaging the machine.
6. Drop the current database with the **`rsw-db-tool`** utility:

   ```
   rsw-db-tool drop-db
   ```

7. Drop the current database with the **rsw-vsp-db-tool** utility:

```
rsw-vsp-db-tool drop-db
```

8. Recreate an empty wx database:

```
rsw-db-tool create-db
```

9. Recreate an empty vsp database:

```
rsw-vsp-db-tool create-db
```

10. Copy your database backup files back to the Focus server and restore the database contents by reading the file contents into the standard output stream and inserting them in the IRIS Focus databases:

```
gzip --decompress --to-stdout /radarsw-database-vsp-2019-10-12T07-54-50.gz
| psql -d vsp_v1 -U vsp_user -h localhost
gzip --decompress --to-stdout /radarsw-database-wx-2019-10-12T07-54-50.gz
| psql -d wxdb2 -U wxuser -h localhost
```

11. Restart services which might use database.

```
kubectl apply -f /etc/vaisala/focus/k8s/vaisala-focus.yaml
```

12. Start the IRIS Focus web application:

```
systemctl start vaisala-radarsw-webapp.service
```

13. Start the Monit service:

```
systemctl start monit.service
```

7.9 Server management software

If you are running server management software on your IRIS Focus server, make sure the management software's settings do not interfere with your intended network settings.

For example, in Dell PowerEdge servers, the integrated Dell Remote Access Controller (iDrac) sets a default static IP address for the server when it is first deployed.

On Vaisala preconfigured IRIS Focus systems, iDrac is disabled by default.

7.10 Licensing on server restart

Active sessions and their licenses are not stored when the IRIS Focus server is shut down.

When the server restarts, the licensing seats are allocated from scratch to users who log in. The total number of seats in the license pool is unaffected.

7.11 Reactivating the license after server upgrade

The product key in the IRIS Focus license is server-specific. If you upgrade your server, you must request a new service key and activate the new license.

1. Contact Vaisala and request a new server key.
2. Install IRIS Focus using the instructions in this guide.
3. Reactivate the license.

   Depending upon whether or not your server is connected to the internet, see:
   - Activating license – online (page 42)
   - Activating license – offline (page 44)

8. IRIS Focus services and users

The following tables list the IRIS Focus users and IRIS Focus services running on `systemd`, `Docker`, and `Kubernetes`.

Table 12 IRIS Focus users

User	Description
`radardminput`	Restricted user account for running the Data Manager input service.
`radarop`	Non-root user account typically included.
`radarweb`	Restricted user account for running the IRIS Focus web application.
`warnreader`	Restricted user account for running the warn reader service.

Table 13 IRIS Focus `systemd` services

Service	Description
`chronyd`	Maintains time synchronization.
`containerd`	Service required to run container based services.
`docker`	Engine for running services in Docker compatible images.
`microk8s`	Collection of systemd services to run a Kubernetes cluster.
`monit`	Monitoring tool for Unix systems and processes.
`nfs-server`	Provides NFS abstraction to directories on file system
`HAProxy`	Encodes outgoing traffic with HTTPS encryption.
`vaisala-radarsw-webapp`	IRIS Focus web application.
`vaisala-radarsw-usbdaemon`	System service to read Sentinel license key on systems using the USB license key.

Table 14 IRIS Focus `Docker` services

Service	Description
`postgis`	Postgresql database server with GIS extensions.

Service	Description
`redis`	A data structure store for shared information.
`kafka`	Kafka data broker service for lightning
`zookeeper`	A manager service required by kafka data brokers
`postgis95`	Database service required by the geoserver container
`geoserver`	GeoServer service that provides map tile images for IRIS Focus

Table 15 IRIS Focus `Kubernetes` services

Namespace	Name	Description
`vaisala-focus`	`authentication-service`	Authenticates requests for service.s
`vaisala-focus`	`data-manager-service`	Handles requests for radar data.
`vaisala-focus`	`documentation-service`	Handles requests for static documents.
`vaisala-focus`	`licensing-service`	Determines whether a feature is licensed or not.
`vaisala-focus`	`notification-service`	Provides external notifications via email and SMS.
`vaisala-focus`	`nowcast-service`	Provides nowcasting information to IRIS Focus
`vaisala-focus`	`router-service`	Used to route traffic between outside world and Kubernetes services.
`vaisala-focus-data-access`	`input-service`	Injects radar data from IRIS Analysis into Data Manager
`vaisala-focus-data-access`	`warn-reader`	Injects warn products from IRIS Analysis into IRIS Focus
`vaisala-focus-lightning`	`lightning-websocket`	Provides WebSocket service for external browsers displaying real-time lightning data.
`vaisala-focus-logging`	`alert-logger`	Optional. Records JSON alert records posted to Kafka broker to rolling files.
`vaisala-focus-logging`	`grafana-service`	Provides a tool to view Kubernetes metrics and logs.

Namespace	Name	Description
vaisala-focus-logging	loki-service	Stores logs and provides viewer.
vaisala-focus-logging	prometheus-service	Event monitoring end alert tool.
vaisala-focus-logging	promtail-daemonset	Provides log information to the grafana service
vaisala-focus-logging	zipkin-service	Distributed tracing system used for troubleshooting latency issues.

8.1 systemd

systemd and is an AlmaLinux component that manages system services.

Several of the services that were running under **systemd** in earlier IRIS Focus releases, are now run as Docker or Kurbernetes services.

8.1.1 GeoServer

GeoServer is used for caching and generating the base map layers.

The GeoServer service is provided by the **geoserver** and **postgis95** docker containers.

8.1.2 IRIS Focus web application

This is the main web UI of the IRIS Focus system.

In the command line, the IRIS Focus web application service is called **vaisala-radarsw-webapp**.

8.1.3 HAProxy

HAProxy is a proxying tool that IRIS Focus uses for traffic forwarding within the system and HTTPS encryption for outgoing traffic.

In the command line, the HAProxy service is called **haproxy**.

8.1.4 Monit

Monit is a watchdog tool for monitoring Unix systems and processes. IRIS Focus uses Monit to automatically restart the application or a related process or service if it becomes unstable.

If you do maintenance work that requires you to take the application down, you must first stop Monit before proceeding further, and restart it after maintenance.

In the command line, the Monit service is called **monit**.

8.2 Kubernetes

Starting from IRIS Focus 7.0, several services in IRIS Focus run on Kubernetes.

8.2.1 Managing Kubernetes services

These are the common use cases when managing Kubernetes services in IRIS Focus:

- Viewing service state (k9s or kubectl)
- Restart services (k9s or kubectl)
- Configuring services (kubectl)
- Remove and install services (kubectl)
- Viewing service logs (k9s or kubectl)

There are several command line tools that are used to manage Kubernetes services. These tools can be used in a local terminal window or remotely over an SSH connection.

Table 16 Command line tools

Command line tool	Purpose
k9s	An interactive command line tool used to manage the containers running in a Kubernetes cluster
kubectl	A command line tool to manage the containers running in a Kubernetes cluster
microk8s	A command line tool specific to managing the microk8s implementation of Kubernetes

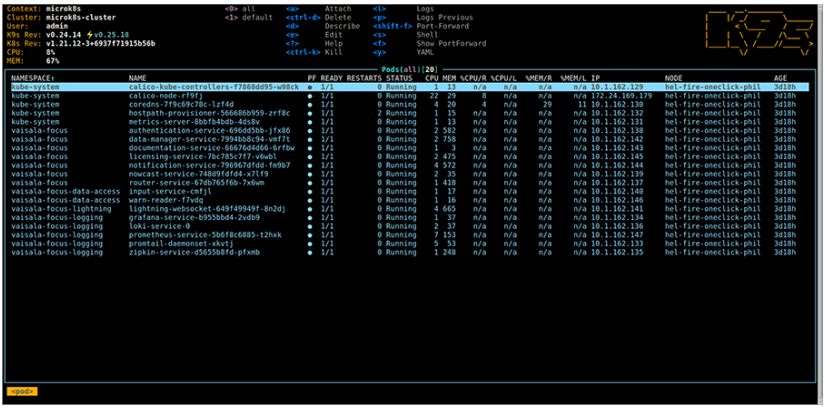
8.2.1.1 Viewing service state in Kubernetes

The k9s utility can be used to quickly show the status of services running in the Kubernetes cluster.

1. To start the k9s utility, log in as the **root** user and run this command:

```
k9s
```

You should see a screen that you can navigate with the arrow keys that list the IRIS Focus containers running in the Kubernetes cluster. They should all be “blue” and in the READY state as shown below.



2. To exit out of k9s, press **CTRL+C**.

8.2.1.2 Restarting a service running in Kubernetes

If you need to restart a service that runs on Kubernetes, do the following:

1. Log in as the **root** user and run k9s to bring up the status overview.
2. Switch to the **Pods** view if necessary (most likely you will already be in **Pods** view).
3. Press the “0” key to show ALL the containers.
4. Use the up and down arrow keys to highlight the service you want to restart.
5. Press **CTRL+D** to delete the current instance of the service.

   As soon as you delete the service, the Kubernetes cluster should detect that it is missing one of the required services and start up a new instance for you.

6. Alternatively, you can use the **kubectl** command to restart a service if you know the namespace and name of the service you want to restart.

   For example, if you would like to restart the nowcast-service that runs in the vaisala-focus namespace, you can run the following commands to determine the full address of the Kubernetes pod running the nowcast-service:

   ```
   kubectl get --namespace vaisala-focus pods | grep nowcast-service
   ```

   You will see the following output:

   ```
   nowcast-service-748d9fdfd4-wg8ld         1/1     Running
   0          2m51s
   ```

7. Once you know the full address of the pod *(nowcast-service- 748d9fdfd4-wg8ld)*, you can restart it by using this command:

   ```
   kubectl delete --namespace vaisala-focus pod/nowcast-service-748d9fdfd4-
   wg8ld
   ```

   You will see the following output:

   ```
   pod "nowcast-service-748d9fdfd4-wg8ld" deleted
   ```

8. You can then verify that a new instance was (or is being) created using the **kubectl** command. For example, we ran the **kubectl** command below quickly enough to see that Kubernetes had started a new instance of the nowcast-service (nowcast-service-748d9fdfd4-r8lph) and was terminating the old instance (nowcast-service-748d9fdfd4-wg8ld):

   ```
   kubectl get --namespace vaisala-focus pods | grep nowcast-service
   ```

   You will see the following output:

   ```
   nowcast-service-748d9fdfd4-wg8ld         1/1     Terminating
   0          4m12s
   nowcast-service-748d9fdfd4-r8lph         1/1     Running
   0          23s
   ```

8.2.1.3 Configuring Kubernetes services

There are several YAML configuration files found under the */etc/vaisala/focus/k8s* directory that are used to configure groups of services that run on an IRIS Focus server. You do not typically need to modify the configuration found in these files.

1. If you receive instructions from Vaisala to make changes, use the **`kubectl`** command to apply your changes to the running Kubernetes cluster.

   For example, if you have made modifications to the *`vaisala-focus-lightning.yaml`* file that configures the services related to sending lightning data to the web browser, you would run the following command to apply your changes to the Kubernetes cluster:

   ```
   kubectl apply -f /etc/vaisala/focus/k8s/vaisala-focus-lightning.yaml
   ```

   Applying changes to the Kubernetes cluster will often only update the configmap objects in the cluster. The services that read their configuration values from these Kubernetes configmap objects will need to be restarted.

8.2.1.4 Removing and installing Kubernetes services

There are several YAML configuration files found under the */etc/vaisala/focus/k8s* directory that are used to configure groups of services that run on an IRIS Focus server.

1. For example, to remove the services related to sending lightning data to the web browser, you can run this command:

   ```
   kubectl delete -f /etc/vaisala/focus/k8s/vaisala-focus-lightning.yaml
   ```

2. If you change your mind and want to restore the services related to sending lightning data to the web browser, you can run this command:

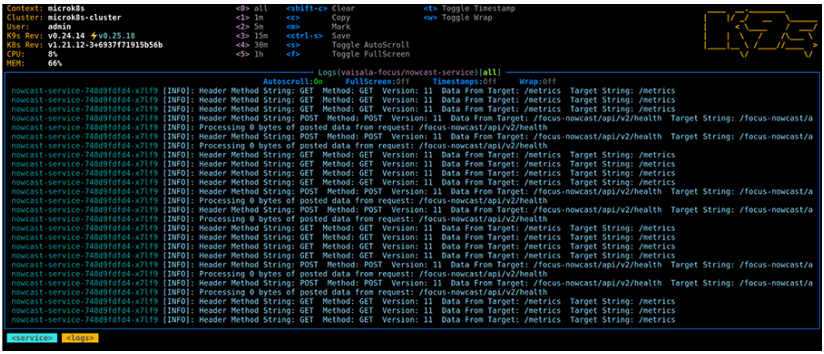
   ```
   kubectl apply -f /etc/vaisala/focus/k8s/vaisala-focus-lightning.yaml
   ```

   Typically, we do not recommend doing this in normal operations as it is more severe than restarting an individual service. However, this may be necessary when troubleshooting or when major changes have been made to one of the YAML configuration files.

8.2.1.5 Viewing logs from Kubernetes services

The k9s tool makes it easy to view the latest logs from Kubernetes services.

1. Use the arrow keys to highlight the service you are interested in and then press the **l** key to view the logs. This Figure shows k9s in log viewing mode:



2. While k9s is very handy for a quick look, you can also use the **kubectl** command.

   The **kubectl** command is particularly useful when you want to post process the logs with a grep. To use the **kubectl** command, you need to know the namespace of the service deployment.
   As an example, the following command will monitor the log output of the nowcast-service running in the vaisala-focus namespace:

```
kubectl logs --tail=20 -f --namespace vaisala-focus deployment/nowcast-
service
```

   You will see the following output:

```
[INFO]: Header Method String: POST  Method: POST  Version: 11  Data From
Target: /focus-nowcast/api/v2/health  Target String: /focus-nowcast/api/v2/
health
[INFO]: Processing 0 bytes of posted data from request: /focus-
nowcast/api/v2/health
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: POST  Method: POST  Version: 11  Data From
Target: /focus-nowcast/api/v2/health  Target String: /focus-nowcast/api/v2/
health
[INFO]: Processing 0 bytes of posted data from request: /focus-
nowcast/api/v2/health
[INFO]: Header Method String: POST  Method: POST  Version: 11  Data From
Target: /focus-nowcast/api/v2/health  Target String: /focus-nowcast/api/v2/
health
[INFO]: Processing 0 bytes of posted data from request: /focus-
nowcast/api/v2/health
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: POST  Method: POST  Version: 11  Data From
Target: /focus-nowcast/api/v2/health  Target String: /focus-nowcast/api/v2/
```

```
health
[INFO]: Processing 0 bytes of posted data from request: /focus-
nowcast/api/v2/health
[INFO]: Header Method String: POST  Method: POST  Version: 11  Data From
Target: /focus-nowcast/api/v2/health  Target String: /focus-nowcast/api/v2/
health
[INFO]: Processing 0 bytes of posted data from request: /focus-
nowcast/api/v2/health
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
[INFO]: Header Method String: GET  Method: GET  Version: 11  Data From
Target: /metrics  Target String: /metrics
^C
```

3. To get a listing of the many **`kubectl logs`** command options, you can run it using the **`–help`** parameter:

```
kubectl logs --help
```

8.2.2 Lightning WebSocket service

Lightning WebSocket service is responsible for pushing lightning data to the user's browsers when connected to the IRIS Focus web application.

The service runs on Kubernetes and is called **`lightning-websocket`**.

8.3 Docker

Starting from IRIS Focus 7.0, several services in IRIS Focus run on Docker.

8.3.1 Kafka data broker

The Kafka data broker is used by the external **Total Lightning Processor** system to push lightning data into the IRIS Focus system so that local services (for example, **`lightning-websocket`**) can access it.

The Kafka data broker service is provided by the **`kafka`** docker container.

8.3.2 Kafka manager

The Kafka data broker supports running in a cluster configuration where multiple systems are interconnected. The Kafka manager service is used to manage all of the Kafka data broker service instances in a cluster. This service is required even if you are running a single instance of the Kafka data broker, which is typical for IRIS Focus.

The Kafka manager service is provided by the **`zookeeper`** docker container.

8.4 Stopping, starting, and restarting services

You should only need to start or stop a service during certain troubleshooting cases. These cases are described step-by-step in the *Troubleshooting* section. In normal circumstances the services are always running.

In AlmaLinux, services are stopped, started, and restarted with the **`systemctl stop / start / restart [servicename]`** command.

To use the **`systemctl`** command, you must be a logged in as the **`root`** user.

The following example shows how to stop, start and restart the IRIS Focus web application service. Note that the **`monit`** service starts along with the web application.

Stopping the service

- **`systemctl stop monit`**
- **`systemctl stop vaisala-radarsw-webapp`**

Starting the service

- **`systemctl start vaisala-radarsw-webapp`**
- **`systemctl start monit`**

Restarting the service

- **`systemctl restart vaisala-radarsw-webapp`**

9. Security

9.1 Encryption

Communication between the browser and the web application is encrypted.

Other data traffic within the IRIS Focus application server is unencrypted.

IRIS Focus uses Jetty as web server software, and HAProxy for handling HTTPS encryption. SSL encryption has been disabled in HAProxy, and only TLS encryption is supported.

9.2 Certificates

The web application comes with a temporary, self-signed SSL certificate that secures the connection between the IRIS Focus server and the user's web browser.

Although the browser displays a security warning in the browser when you try to access the web application, you can use the application normally even with the warning.

Consider acquiring and using a trusted certificate from a certificate authority (CA), especially if you plan to offer access to IRIS Focus outside your organization.

More information

- Installing a CA certificate (page 82)

9.3 Security settings

Please follow industry security standards while deploying IRIS Focus into an internal network. Care should be taken to allow access to only ports 80 and 443 from the internet.

The IRIS Focus server has a pre-configured firewall.

Ports for SSH access (22), HTTP (80), HTTPS (443), and Kafka (9094) are intentionally open.

- Use SSH for configuration.
- HTTP port is for redirecting to HTTPS.
  The application is always used over HTTPS.

The server requires access to HTTP and HTTPS for end users. If the system is accessed through the internet, you should restrict internet access to the SSH port from the internet to improve system security.

The firewall is configured through the AlmaLinux 8.4 firewall system.

Port 9094 is only opened if the Kafka service is running. The **Total Lightning Processor** uses this port when pushing lightning data into the Kafka data broker running on the IRIS Focus Server. See Connecting the TLP system (page 47) for details on configuring the `firewalld` rule so that only the TLP system is allowed access to this port.

9.4 Removal of X Window System

For customer convenience, Vaisala ships IRIS Focus with a graphical desktop environment installed. IRIS Focus does not require a graphical desktop environment to run. Having a graphical desktop environment and the X server in particular is sometimes regarded as a security concern.

Use the following commands to configure the system to run in console mode and remove the X server and graphical desktop environment:

```
systemctl set-default multi-user
systemctl isolate multi-user
dnf remove --noauto xorg-x11*
```

CAUTION! Do not do this if you are running applications other than IRIS Focus on the same system that do require a graphical environment such as IRIS Analysis.

10. Troubleshooting

10.1 Sending logs to Technical support

When you contact Technical support (page 119), be ready to send IRIS Focus logs to the technical support personnel. For retrieving logs, do the following steps:

1. Log into the IRIS Focus server as **root**.
2. Run the command:

```
rsw-tar-logs
```

3. Send the resulting tar file in /tmp to Vaisala for analysis.
   The file should be in the form *rsw-tar-logs-<date>-<time>.tar*, for example: *rsw-tar-logs-2022-04-28-16-28-51.tar*.

10.2 Notification sound is not played when an alert is triggered

Some web browsers (for example, Mozilla Firefox and Google Chrome) by default block sounds on web pages until the user interacts with the page. Thus, in some cases, the web page may not play the alert notification sounds in IRIS Focus. This may occur, for example, if a user automatically logs into IRIS Focus by clicking the browser reload button while logged in. When the user has logged into IRIS Focus through the normal login, this issue should not occur.

To make sure users hear the sound notifications right away when alerts are triggered, enable the web browser to play sounds by default.

10.3 Slowness in system with a high volume of lightning data

When heavy lightning occurs for a long period of time, and it is visualized with the **TimeSpan**product, the number of lightning icons on the map can increase dramatically. This may cause a performance degradation in the client (browser) of IRIS Focus. This may happen, for example, when the time frame for **TimeSpan** is very long.

To fix the performance issue, shorten the time frame for viewing the data, or zoom in on the map to show fewer icons.

10.4 No connection/data from the TLP

If there are problems in the TLP data connection, try the following troubleshooting procedures.

1. Check the status of the IRIS Focus related services.
   a. Log in to IRIS Focus as the **root** user.
   b. Check the status of the services related to the incoming TLP lightning data with the following commands:

```
kubectl get --namespace vaisala-focus-lightning deployments/lightning-
websocket
docker ps --filter name=kafka --filter name=zookeeper
```

2. Check the status of the TLP related services:
   a. Log into the TLP system as the **vops** user.
   b. Use the **lpstart** command to verify that the **tlp-to-kafka** service is running:

```
lpstart details tlp-to-kafka
```

3. Check services and processes with the **netstat** command:
   a. Use the **netstat** command on the IRIS Focus system and **grep** on port 9094:

```
netstat -tnap | grep 9094
```

   You should see the Kafka process listening on port 9094, and an established connection to port 9094 with the IP address of your TLP system.
   b. If you do not see an established connection from the TLP system, verify that the **tlp-to-kafka** service is running on the TLP system, and that the ***kafka-producer.properties*** file in the */opt/vai/tlp/etc* directory has the correct IP address for your IRIS Focus server set in the **bootstrap.servers** parameter.
   c. Use the **netstat** command on the IRIS Focus system and **grep** on port 30100.

```
netstat -tnap | grep 30100
```

   You should see the **vaisala-iris-lightning-ws** service listening on port 30100, and an established connection to port 30100 with the proxied IP address **127.0.0.1** for each user connected to the IRIS Focus web application.

10.5 Network Health updates missing

If you are getting infrequent updates of the **Network Health** product, or no updates at all, try the following troubleshooting procedures.

1. Check that the **regstatd2** service is running on the TLP system.
2. Check that the ***regstatd2.cfg*** configuration file in the */opt/vai/tlp/etc* directory has the **updateIntervalMinutes** parameter set to 10 minutes.

10.6 Check disk space usage of Kafka

The Kafka service keeps an archive of historical data in the */var/lib/kafka* directory. Use the**df** command to check that the partition has space left.

```
df -h /srv/container/mnt/kafka
```

10.7 Taking a snapshot gives server error

If, when taking a snapshot or requesting an image via URL, the server times out or gives server error, there may be a problem with the **image-export** user account.

1. Check that the application log shows the error:

   ```
   Login failed for username image-export
   ```

2. Log in to the IRIS Focus web application as **administrator**.
3. Check that the **image-export** user password matches the password listed in *vsoweb-override.ini*.

10.8 GLD360 lightning layer empty

If you have subscribed to Vaisala GLD360 lightning detection service, and the layer exists in your IRIS Focus application, but you do not see any lightning strikes, verify the following requirements:

1. Check that lightning strikes have occurred at the time of observation.
2. Check that the configuration file */etc/vaisala/radarsw/configuration/vsoweb-override.ini* contains the following line:

   ```
   lightning.wms.url = [URL received from Vaisala]
   ```

3. Check that your subscription to Vaisala GLD360 service is active.

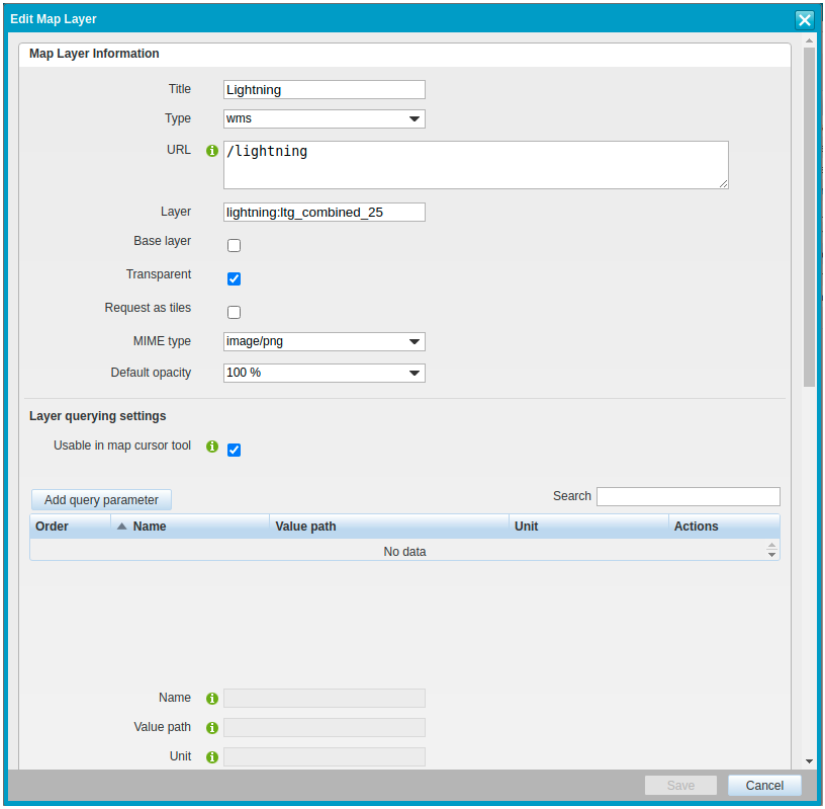
If you modify the configuration file, you must restart the vaisala-radarsw-webapp service with the **service vaisala-radarsw-webapp restart** command.

10.9 GLD360 lightning layer missing

If you have subscribed to Vaisala GLD360 lightning detection service, and you do not see the lightning layer in the IRIS Focus user interface after running the `rsw-lightning-configure` script, add the lightning layer manually.

1. Log in to IRIS Focus with an administrator account and select **Admin**.
2. Select **Map > Map Layers**.
3. Select **Add New Layer**.

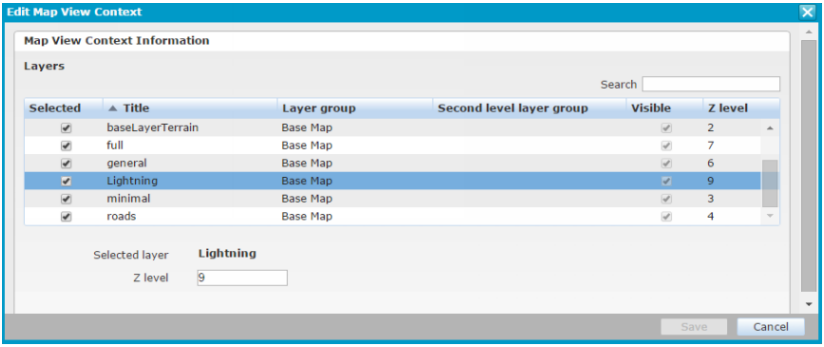
4. In **Map Layer Information**, enter the following values on the layer properties:



   a. **URL**: `/lightning`
   b. **Layer**: `lightning:ltg_combined_25`
   c. **Transparent**: Checkbox selected
   d. **SLD URL**: https://tsm.vaisala.com/geolegends/ltg_combined_25.sld
   e. **Name**: `ltg_combined_25.ltg_type`
5. Select **Save**.
6. Select **Map > Map View Contexts**
7. Edit the default map context **TheMap**.

8. Select the newly created lightning layer and set its **Z level** higher than all base map layers in the map context.

   Z level defines the drawing order of the layers on the map. Higher values are always drawn on top.



In the web application, the new layer is listed at the bottom of the radar product selection list.

10.10 Identifying IRIS Focus software version

Before contacting Vaisala technical support about an issue, check which version of IRIS Focus you have on your system.

1. In the terminal window, run:

```
rpm -qa --qf '%{NAME} %{VERSION}\n' | grep 'vaisala-radarsw-webapp'
```

10.11 Uninstalling IRIS Focus

Use this procedure to recover from a failed installation that is stuck in a state where it cannot be resumed.

CAUTION! The `rsw-uninstaller` script completely removes IRIS Focus, including all data and configurations.

CAUTION! The `rsw-uninstaller` script removes `Postgres` and all databases.
If you share the system with other software that uses `PostgreSQL`, do not run the script -- it also removes `PostgreSQL` databases not related to IRIS Focus.

1. Navigate to the directory containing the IRIS Focus installation files.
2. Run: **`./rsw-uninstaller`**

   When prompted, confirm that you want to run the script.
   The script removes all users, configurations, and data from the system so that you can rerun the installation.

Appendix A. File locations

Table 17 IRIS Focus application and configuration files

File or directory	Description
/etc/vaisala/radarsw/configuration • *gis-override.ini* GeoServer database settings. • *logback.xml* Logging level settings. • *radar_centers.properties* List of stored radar site center points.	Configuration files for IRIS Focus module settings. The files listed here are the most important. **CAUTION!** Some settings have a default config file and an override file. For example: • *gis-config.ini* • *gis-override.ini* When needed, edit the override file.
/etc/vaisala/radarsw/configuration/vsoweb-override.ini	Connection settings for socket server, lightning layers, and so on.
/etc/vaisala/lightning/iris-lightning-ws.properties	Kafka configuration file for the **vaisala-radarsw-webapp systemd** service.
/etc/vaisala/lightning/iris-lightning-ws.kafka.properties	The configuration file used by the **vaisala-radarsw-webapp** service when configured to connect to a Kafka data broker for its lightning data. The default configuration will connect to the Kafka data broker running on the IRIS Focus system. Normally, the user does not need to adjust this.
/etc/vaisala/lightning/lightning.simu.properties	Used to configure how simulated lightning events are produced when the **lightning-websocket**service is configured in simulation mode.
/etc/vaisala/lightning/regionstatus.simu.properties	Used to configure how simulated lightning events are produced when the **vaisala-radarsw-webapp** service is configured in simulation mode.
/etc/vaisala/lightning/regionstatus.template.json	Template network health report used when the **vaisala-radarsw-webapp** service is configured in simulation mode.
/usr/vaisala/radarsw/configuration	Configuration files for helper applications used in IRIS Focus maintenance.
/var/lib/radarweb	Home directory of the **radarweb** user. The IRIS Focus Web Application is deployed here.
/var/lib/radardm	Home directory of the **radardm** user.

File or directory	Description
/var/lib/radardminput	Home directory of the **radardminput** user.
/srv/vaisala/radarsw/datamanager/input	Files sent from an IRIS Analysis server are copied here. The data manager input service processes files copied here.
/srv/vaisala/radarsw/datamanager/storage	This is where data manager stores polar or **RAW** data.
/var/log/vaisala/radarsw	Log files from IRIS Focus web application

Appendix B. Map layer configuration options

Table 18 Map layer configuration options

Option	Description	WMS layer only
Map Layer Information	Defines basic map settings, such as the title and the URL address of the Web Map Service (WMS).	--
Title	Title of the layer. Visible in the layer selection list.	--
Type	• `wms`: generic GIS services such as base maps or raster-type forecast data • `google`: Google base maps • `marker`: observations from stations configured using the JX source service on the map.	--
URL	Address of the WMS service.	✔
Layer	Name of the layer in the map server. If using GeoServer, usually `workspace:layer`.	--
Base layer	Select if the layer is a base map.	--
Transparent	Select for WMS to request a transparent background for the layer.	✔
Request as Tiles	Use if the map layer should be requested as tiles. Usually selected for base maps.	✔
MIME type	Map image type. Change if the service does not support the default *`image/png`*.	✔
Default opacity	Not used in IRIS Focus.	--
Layer query settings		--
Supported Coordinate Reference Systems	Select supported coordinate reference systems for the layer.	--
Time Support	Configure for layers using time dimensions.	✔
Coverage	Maximum bounding box for the layer.	✔
Layer style	For advanced configurations, add SLD (Styled Layer Descriptor) parameters.	--

Option	Description	WMS layer only
Realtime offset	Defines the offset from the current time in which to make the request for the latest data. Sometimes, when requesting the latest time from a WMS service, there is no data available because the WMS service provider is collecting and processing the data for the latest time, so it is useful to set an offset. Supported values are 0...3600 seconds. To use this parameter, set the system to always use time parameter support.	
Refresh rate	Defines the interval of the time ticks on the histogram. This defines how often the system makes data requests. The interval always starts on the hour. Supported values are 10...86400 seconds. To use this parameter, set the system to always use time parameter support.	
Request width	Controls the legend graphic request parameters.	✔
Request height	Controls the legend graphic request parameters.	✔
Display height	Defines the size of the color legend graphic on the display in case the original graphic is too large.	✔

Glossary

alarm
An alarm is an alert of highest severity.

alert
Alert is a state that requires user intervention or recognition. Different types of alerts include alarms, warning, and informational alerts.

area of interest
An area of interest is a geographical area that you can monitor for weather events. If the system detects a weather event within an area of interest, it generates an alert.

Data Manager
The raw volume data from the radar signal processor is stored in Data Manager, which makes the data available to the IRIS Focus user interface. Through Data Manager, IRIS Focus can read raw volume data and generate on-demand radar products in real time.

event
See weather event.

k9s
An easy to use tool for exploring and controlling a Kubernetes cluster.

Kubernetes (k8s)
General name for managing a collection of containers (services) running on a computer (conductor of the programs running on the computer).

lightning strike
In IRIS Focus, a *lightning strike* refers to either a flash or a lightning stroke, depending on the configuration of the TLP.

microk8s
The implementation of Kubernetes run on IRIS Focus.

pin
Pins on a map indicate points of interest with reference points and labels.

place of interest
A location on the map that is either a single point (pin) or a larger area. See area of interest and pin.

pre-configured products
Pre-configured products are products with default settings used for advanced data visualization such as nowcasting, warnings, or multilayer products.

radar product
Radar products are raw signal data from a radar receiver processed to provide information about current weather conditions. Radar products are calculated from ingest files that are collected during the execution of radar tasks. Products may be data, pictures, or text. For example, **PPI** and **RHI**.

TLP
See Total Lightning Processor.

Total Lightning Processor
Total Lightning Processor (TLP) is the central processor of a Vaisala Lightning Detection System, which uses multiple, remote sensors to detect lightning. Each sensor sends its data to the central processor.

warning
A warning is an alert of medium severity.

weather event
A user-defined set of weather-related criteria. When an event occurs on the map, it is shown as an icon. When an event occurs within an area of interest, it triggers an alert.

weather product
Weather products are raw signal data from the TLP or from a radar receiver that are processed to provide information about current weather conditions. Weather products are displayed as layers in IRIS Focus.

WMS
Web Map Service protocol

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Warranty

For standard warranty terms and conditions, see www.vaisala.com/warranty.
Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

Technical support

Contact Vaisala technical support at helpdesk@vaisala.com. Provide at least the following supporting information as applicable:

- Product name, model, and serial number
- Software/Firmware version
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see www.vaisala.com/support.

Recycling

Recycle all applicable material according to local regulations.

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