

M211850EN-C

Administrator Guide

IRIS Focus
Version 2.1



VAISALA

PUBLISHED BY

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1. About This Document

1.1. Version Information

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

Table 1 Document Versions

Document Code	Date	Description
M211850EN-C	June 2016	This document. Third version of this document.
M211850EN-B	May 2016	Second version of this document.
M211850EN-A	January 2016	First version of this document.

1.2. Related Documents

Table 2 Related Documents

Document Code	Name
M211850EN	IRIS Focus Administrator Guide
M211849EN	IRIS Focus User Guide
M211904EN	IRIS Focus Release Notes

1.3. Trademarks

IRIS^(R) is a registered trademark of Vaisala Oyj.

Windows^(R) is either a registered trademark or 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

IRIS Focus provides tools for viewing and analyzing weather data received from weather radars through a web browser quickly and easily.

The displayed data consists of radar products, which are raw signal data from a radar receiver processed to provide information about the current weather conditions. The radar products measure information such as radar signal reflectivity or rain intensity for analysis by meteorologists.

The weather data is overlaid on a geographical vector map that is centered on a selected radar site. Data is gathered from a single weather radar or a network of radar sites. All data is stored for 48 hours, and it can be animated on a timeline.

IRIS Focus provides live and pre-generated radar products, which differ in how they are processed within the IRIS architecture, as well as how they are used by the system end user.

- *Live Radar Products*
Radar signal data that is processed into radar products and displayed in real-time. Live products allow more control over the weather data presentation in the IRIS Focus UI. For example, you can change the reflectivity threshold of the selected radar product in real-time.
- *Pre-generated Radar Products*
Preset radar products defined and produced in IRIS Analysis and displayed by IRIS Focus on request.

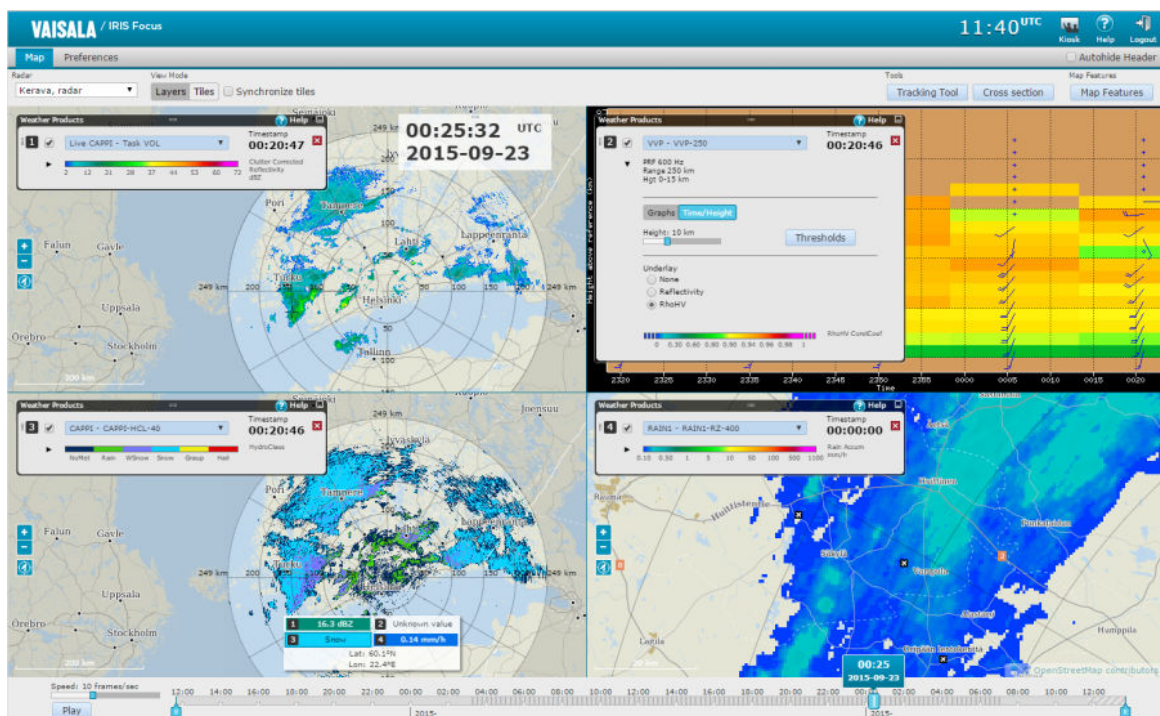


Figure 1 IRIS Focus Main View

More Information

- ▶ [Live Radar Products \(page 37\)](#)
- ▶ [Pre-generated Radar Products \(page 38\)](#)

2.1. IRIS Product Family

IRIS Focus provides an intuitive user experience for professional users, such as meteorologists and analysts. It is closely integrated with [Vaisala Weather Radar Offering](#), where IRIS Focus forms the visualization front-end and other IRIS components handle radar control, radar product generation and data distribution. IRIS Focus retains the proven quality of Vaisala IRIS back-end processing software, while adding a modern user interface.

IRIS Focus runs on a web server that users can connect to in an enterprise intranet or from an external location. Network connections between the IRIS Focus web UI and the data processing back-end go through a secure socket server, a custom protocol over TCP/IP that delivers radar data from the IRIS back-end services to IRIS Focus. The IRIS Focus application polls the server for data and displays it on screen.

The following figure shows a setup where IRIS Focus is used as part of a complete Vaisala weather radar network consisting of 2 radar sites.

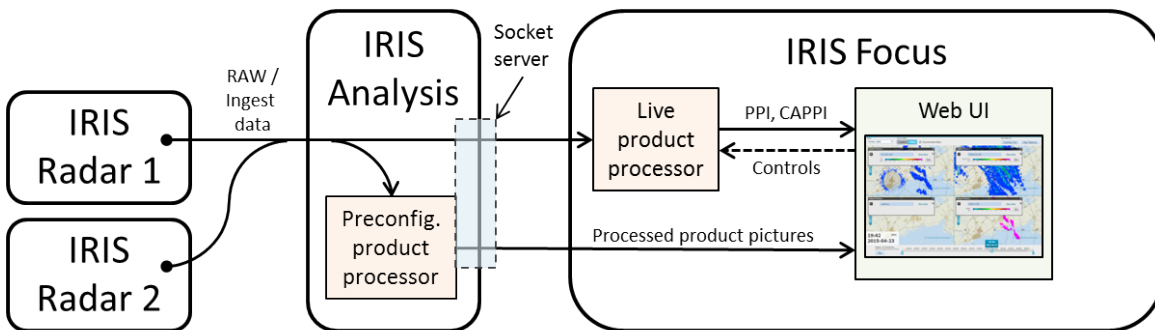


Figure 2 IRIS Focus Data Flow

In this case, IRIS Analysis and IRIS Radar can be considered back-end services for the IRIS Focus front-end interface. IRIS Focus communicates with IRIS Analysis through a secure socket server connection.

The components have the following functions:

- *IRIS Radar* - Operates the radar site and stores data gathered from the radar signals in RAW format.
- *IRIS Analysis* - Receives RAW measurement data from IRIS Radar through an SCP connection and processes it into displayable radar products.
- *IRIS Focus* - Polls pre-generated radar products from IRIS Analysis and displays them on the web interface. Also generates live radar products from RAW data.

2.2. Licensing

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

Vaisala sends the product key to you in an e-mail message 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 sends the key to you by email for future reference.

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

License Options

The IRIS Focus license includes the following:

- **IRIS Vision**
The IRIS Vision license has an unlimited number of seats. If the license is missing: users cannot log in, admins can log in but cannot access the map view.
- **IRIS Focus**
The IRIS Focus license is required to use IRIS Focus features and products. IRIS Focus licensing is based on a floating seat count.

IRIS Focus Seat-based License

IRIS Focus licenses are available for pools of 1, 5, 10, and 20 seats. Licenses are not cumulative. To increase your seat count, you must replace the current license with a new one.

The seat count defines how many users can access IRIS Focus at the same time. When a user logs out, the seat is released and the next user can take it. If a user logs in when all the licenses are reserved, the user is shown IRIS Vision until an IRIS Focus license is released.

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 as they like. If a user opens IRIS Focus in a different browser, they reserve one license for each browser.

More Information

- [User Management \(page 43\)](#)

3. Hardware Requirements

Minimum Hardware Requirements

- Modern 4-core CPU (Intel Xeon E5 series or similar)
- 16GB RAM
- 1 TB HDD

Recommended Hardware Requirements

- Modern 8-core CPU (Intel Xeon E5 series or similar)
- 32GB RAM
- 2x 1 SAS TB HDD in RAID 1 configuration

The pre-installed IRIS Focus system delivery option uses the Dell PowerEdge R430 rack server unit, which meets the recommended hardware setup. See the Dell product data sheet for full specifications.

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.

For optimal performance, Vaisala recommends running IRIS Focus on a dedicated hardware server and not in a virtualized environment.

4. Installation

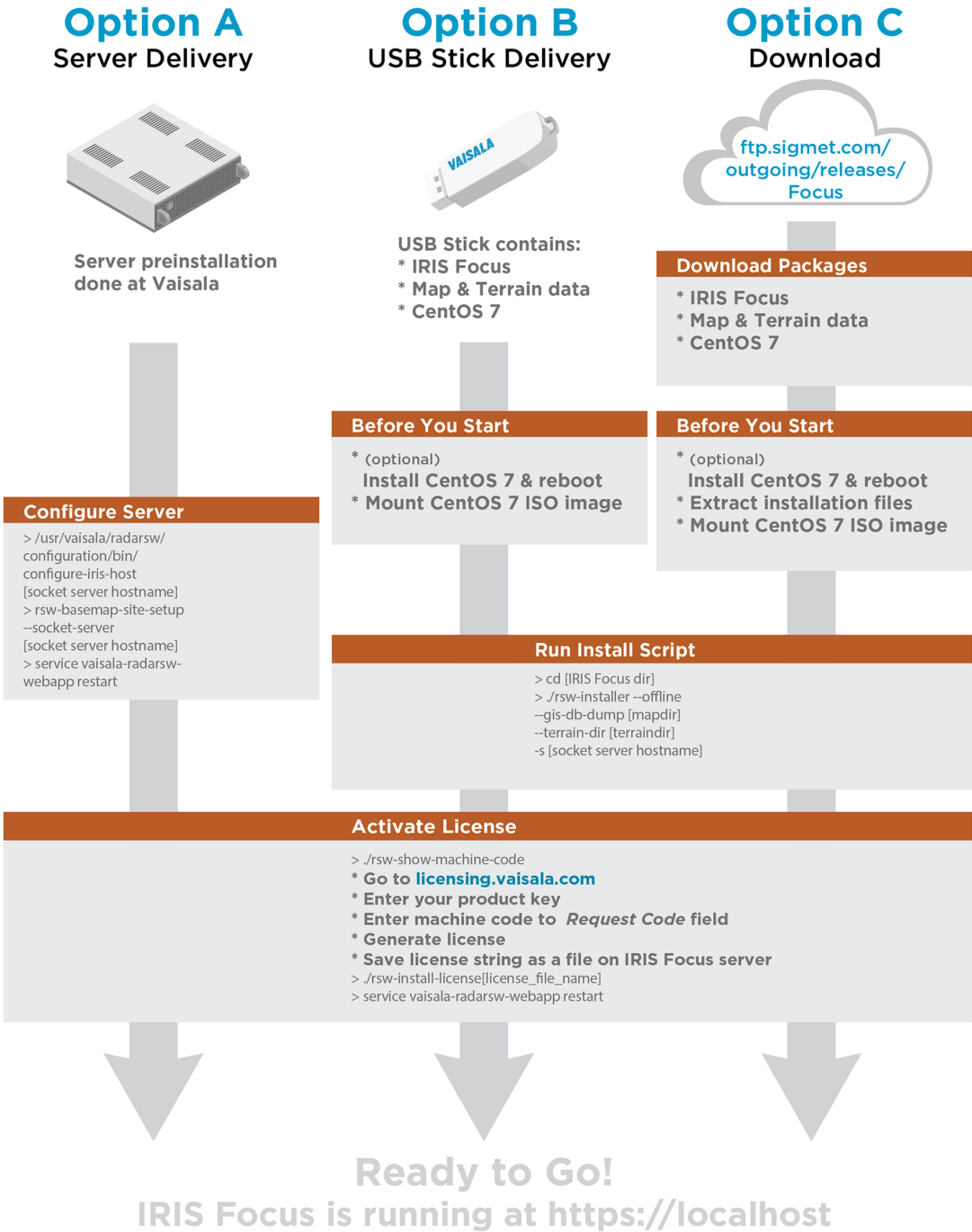


Figure 3 IRIS Focus Delivery Options

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 CentOS 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.

4.1. Downloading Installation Packages

1. Connect to [Vaisala Sigmet server](ftp://ftp.sigmet.com) (ftp://ftp.sigmet.com) using an FTP client. The host server allows read access for anonymous FTP connections.
2. Navigate to `/outgoing/releases/IRIS/Focus/<latest version>`
3. Download the following files:



The files are very large. Use a download tool such as [CrossFTP](#) that allows resuming downloads to fetch the packages.

- a. IRIS Focus web application package: `Vaisala_IRIS_installer-<latest version>.tar`
 - b. Maps directory: `vaisala-iris-maps-v1.zip`
 - c. Terrain data directory: `vaisala-iris-terrain-v1.zip`
4. If you require the Centos installation image, download it from FTP://FTP.SIGMET.COM/OUTGOING/RELEASES/CENTOS/7.1/CENTOS-7-X86_64-VAISALA-1503-01.ISO.



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

5. Unpack all files to a directory on the server, such as `/root/IRIS`. These files occupy approximately 40Gb of space unpacked.

4.1.1. Verifying MD5 hashes

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 by doing the following:

- In CentOS – Use the standard Linux md5sum command line tool that is pre-installed in CentOS: `md5sum [filename]`
- In Microsoft Windows – Use the CertUtil Windows utility that is pre-installed in all Microsoft Windows operating systems from Windows Vista onwards: `certutil -hashfile [filename] MD5`

The hashes should match completely with the reference hashes at the download source. If you see any discrepancies, the downloaded file is likely corrupted.

In those situations, download the mismatching file again.

4.2. Installing CentOS

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

If you do not have a CentOS system running, select an installation image from [Vaisala Sigmet server](http://ftp.sigmet.com/outgoing/releases/centos) (<ftp://ftp.sigmet.com/outgoing/releases/centos>), and see instructions at [Tecmint Linux Guides](http://www.tecmint.com/centos-7-1-installation/) (<http://www.tecmint.com/centos-7-1-installation/>) on how to perform a CentOS installation.

Install CentOS according to the instructions, with the following changes.

- ▶ 1. In **Date & Time**:
 - Set the system clock to Coordinated Universal Time (UTC)
 - Region: Etc
 - City: Coordinated Universal Time

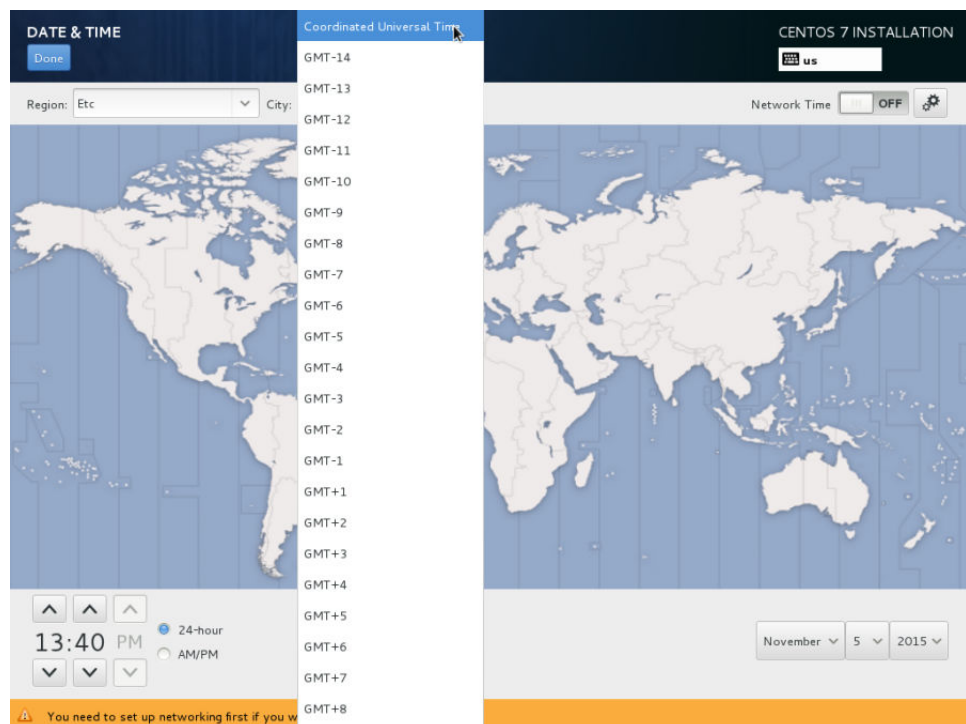


Figure 4 Setting Time Zone

2. In **Software Selection**, set the following software options to install:
- Base Environment type: Server with GUI
 - Add-ons: Java Platform

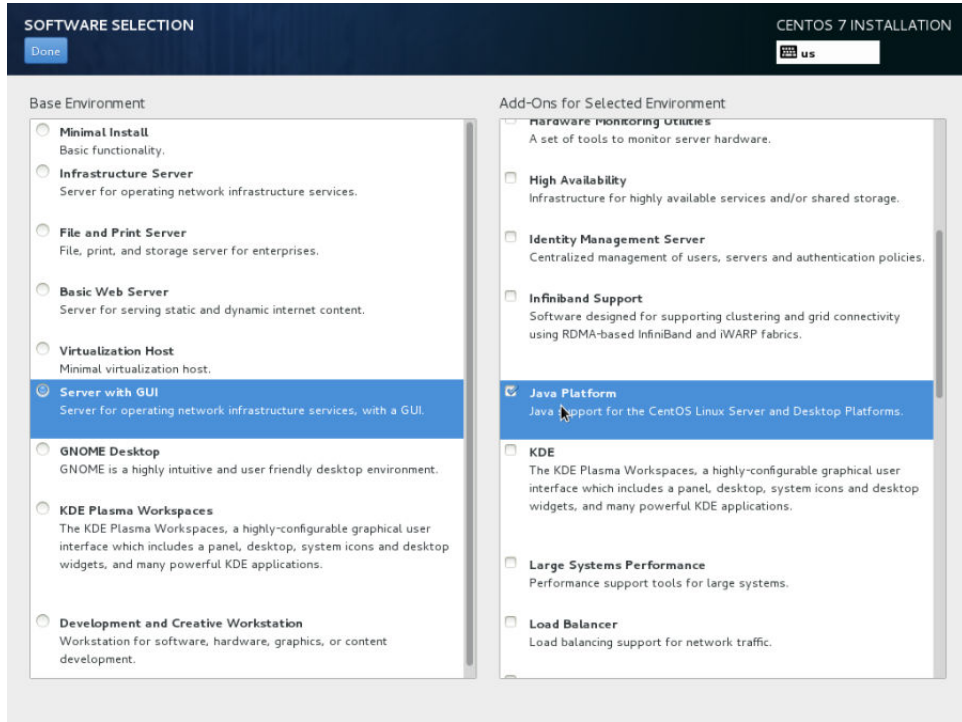


Figure 5 Setting Server Type

3. In **Installation Destination** - Increase the size of the root partition (/):
 - a. Select the hard disk.
 - b. Select **I will configure partitioning**.

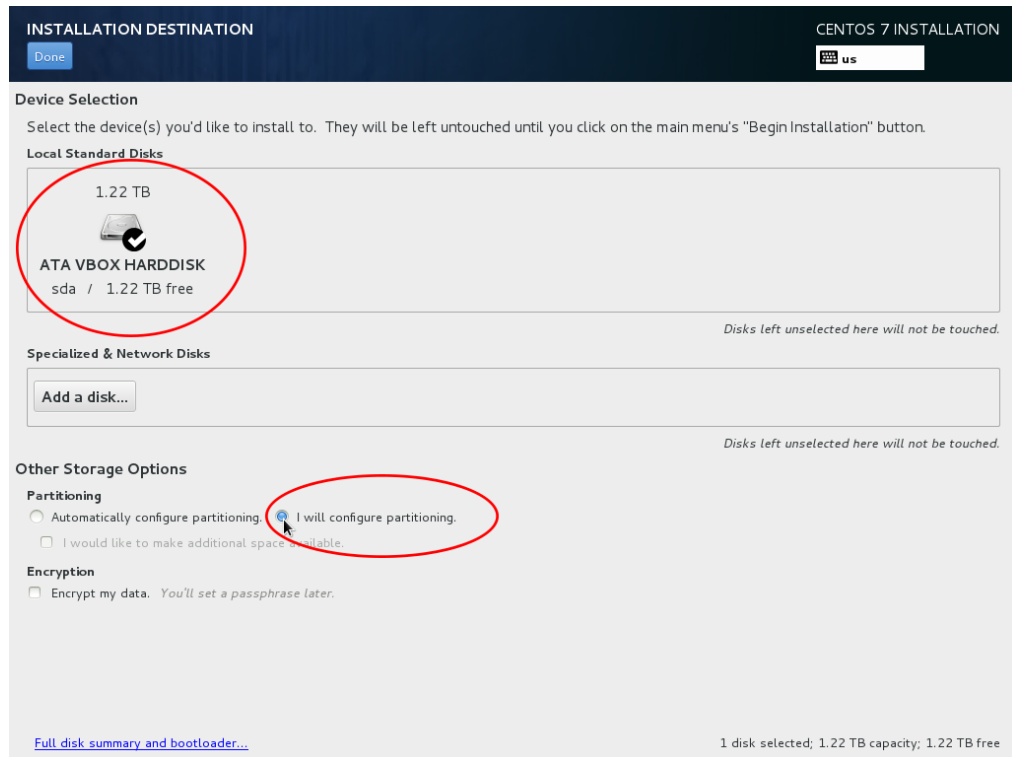


Figure 6 Starting Manual Partitioning 1

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

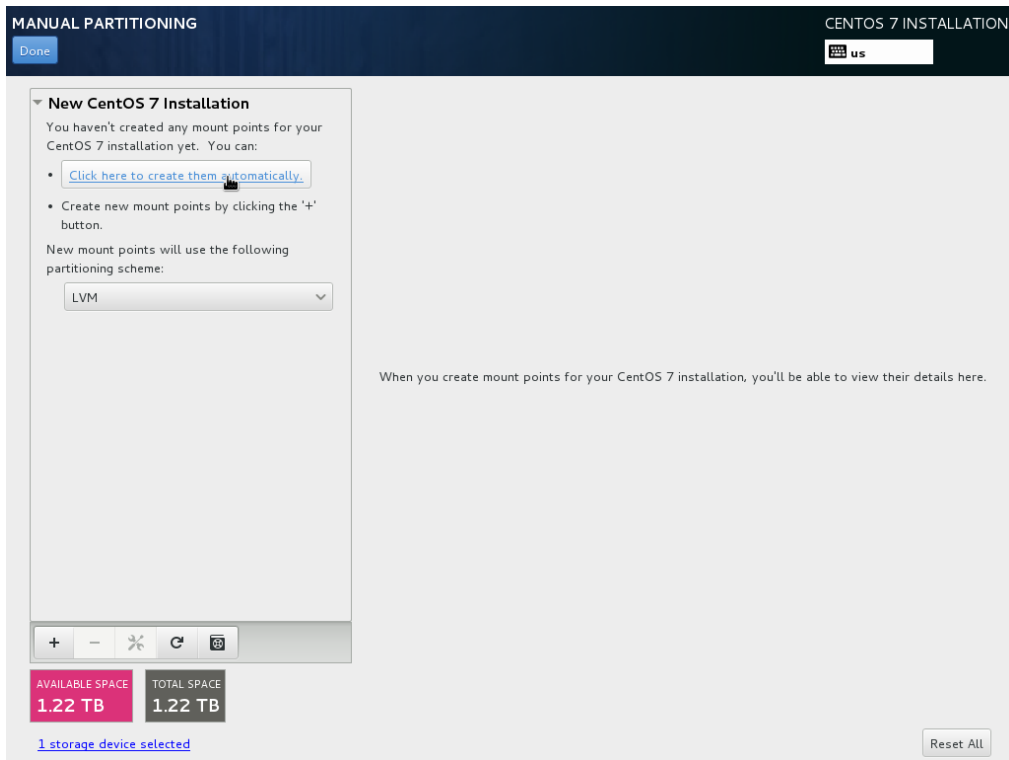


Figure 7 Starting Manual Partitioning 2

5. Select **/home** and under **Desired Capacity**, type **50GB**.

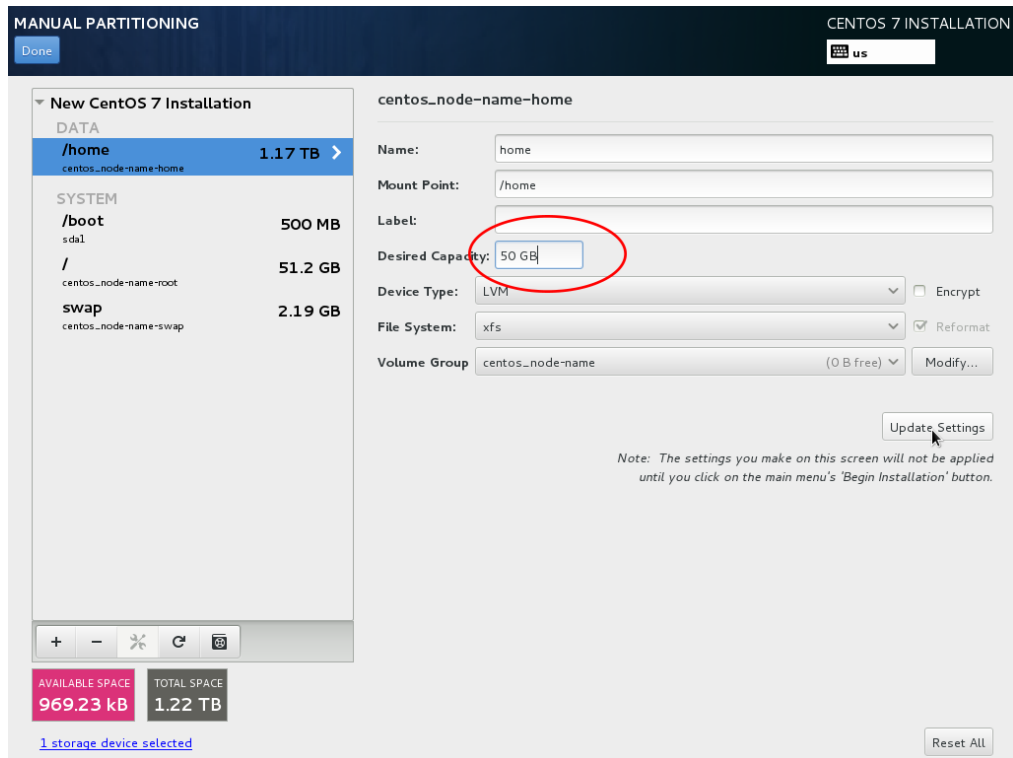


Figure 8 Setting /home Capacity

6. Select **/** and under **Desired Capacity**, type **9999GB**.

7. Select any other dialog box.
The figure changes to cover the available space.

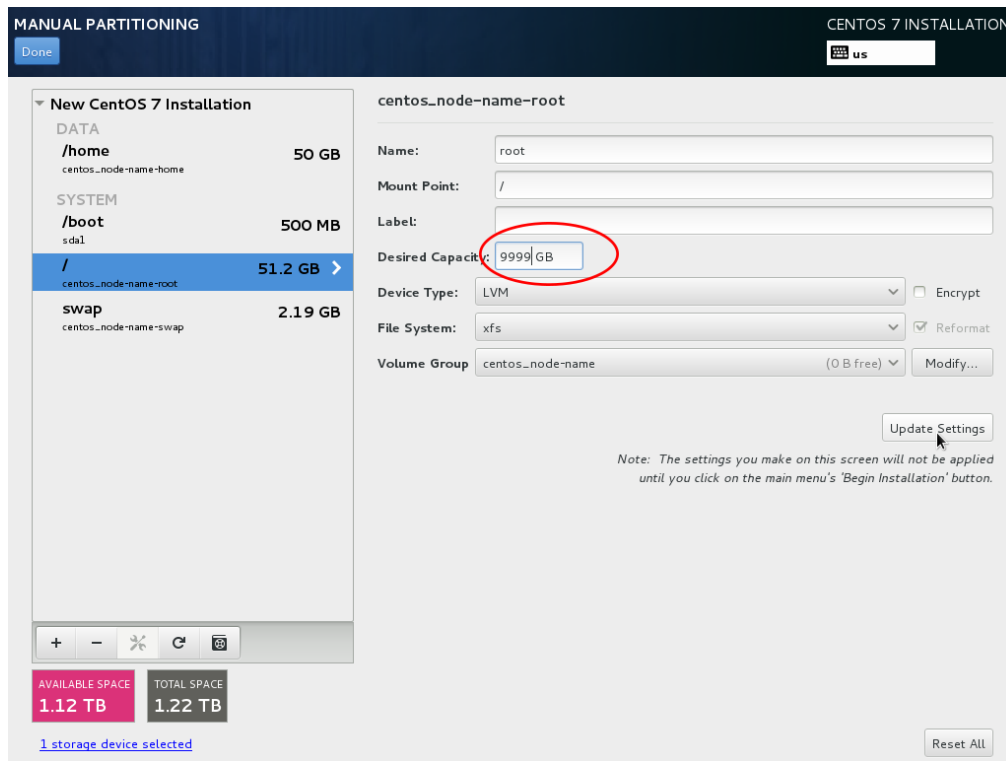


Figure 9 Setting root Capacity

8. Select **Update Settings > Done**.
9. Select **Done > Accept Changes**.

4.2.1. Setting the Root Password

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.

In the **Installation Summary/Initial Settings** page, the text under **Root Password** says **Root password is set**.

4.2.2. Creating CentOS User Accounts

After you have started the CentOS installation, you are prompted to create a non-root user account.

Create an account with the following properties:

- User name: radarop
- Password: [chosen password]

The screenshot shows the 'CREATE USER' screen in the CentOS 7 installation environment. The title bar includes 'CREATE USER' and 'CENTOS 7 INSTALLATION'. A 'Done' button is in the top left. The form contains the following fields and options:

- Full name:** Radar Operator
- Username:** radarop
- Tip:** Keep your username shorter than 32 characters and do not use spaces.
- Make this user administrator
- Require a password to use this account
- Password:** [masked with dots]
- Strength indicator:** A green progress bar is shown, with the word 'Strong' at the end.
- Confirm password:** [masked with dots]
- Advanced...** button at the bottom.

Figure 10 Creating User Accounts

4.2.3. Upgrading Existing CentOS 7 Setups

If you have an existing CentOS 7 system running, you do not have to install a new system from scratch. Updating the necessary packages to support IRIS Focus is enough.

Take a backup of the system before upgrading so that you can restore it in case anything goes wrong.

4.2.3.1. Online CentOS 7 Upgrade

If the server is online, upgrade it to the required CentOS 7.1 level.

1. Login as root
2. Enter the following commands:
 - a. To clean the yum package manager cache directory: **yum clean all**
 - b. To list the lists packages that will be updated: **yum check-update**
 - c. To download and install the packages: **yum update**
This takes some time depending on the amount of packages and network speed.
3. Reboot the system.

4.2.3.2. Offline CentOS 7 Upgrade

Use a USB stick with CentOS 7.1 on it or a mounted CentOS 7.1 ISO to upgrade a system offline.

1. Login as root.
2. Modify the file `/etc/yum.repos.d/CentOS-Base.repo` and comment out all lines under the `[base]` repository by entering a `#` mark at the beginning of each line.
3. Add the following lines under the `[base]` repository:

```
[base]
name=CentOS- Base-Offline
baseurl=file:///mnt/centos71/
enabled=1
gpgcheck=0
```



Make sure `file://` is in front of the mount point in this file. The path `file:///mnt/centos71/` is the mount point of the CentOS 7.1 ISO image. If you use an auto-mounted USB stick, use the `lsblk` command to find the mount point.

4. Run the update steps in [4.2.3.1. Online CentOS 7 Upgrade \(page 21\)](#).

4.3. Prerequisites for Installation

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

- IRIS network, such as an IRIS Analysis instance must be configured correctly to make data from at least one radar site available for IRIS Focus.
- CentOS 7.1 or later DVD/ISO image mounted on your server. The installation script verifies the version of several core system packages during the installation and updates them from the mounted media.
- IRIS Analysis server set up providing radar products through a proprietary socket server connection. The socket server connection is enabled if at least one radar is connected to your IRIS Analysis server, and the IRIS Analysis server has IRIS software version 8.13.6 or newer installed. No further configuration is needed.

The map projection in the IRIS Focus web application depends on having a single radar or a group of radar sites to act as a center point to for map rendering. In most IRIS Focus configurations, the radar product generator is an IRIS Analysis server that has been set up earlier on the radar site.

If you are unsure about the suitability of your IRIS Analysis server, please contact Vaisala.

For information on configuring IRIS Analysis, see *IRIS and RDA Software Installation Manual*.

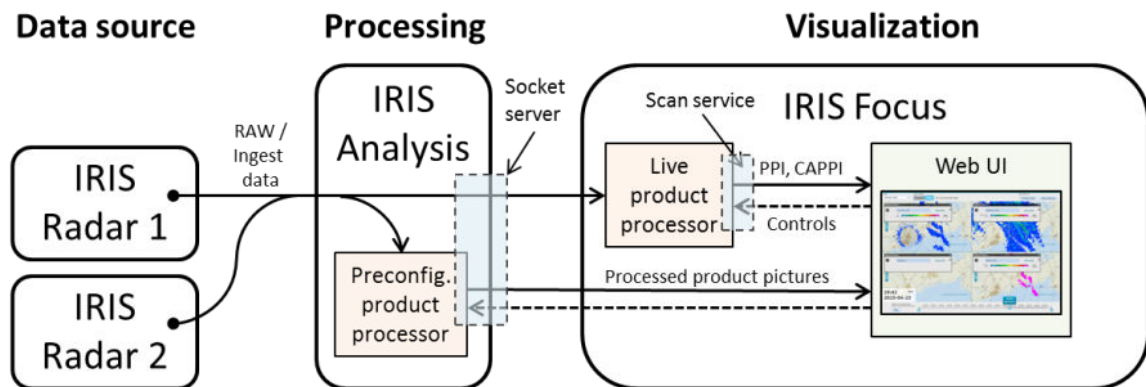


Figure 11 IRIS Products

Radar volume data is fetched from the proprietary Scan Service interface and processed into live radar products within the IRIS Focus application. However, the Scan Service does not have to be active during installation.

More Information

- [Setting up Scan Service \(page 25\)](#)

4.4. Installing IRIS Focus Components

Make sure you have a CentOS 7 server system set up, and that you have received the IRIS Focus installation files either as a USB delivery or as a download.

All IRIS Focus components are installed at the same time. You must have the IRIS Focus application installer, map data package, and terrain data package available before you start the installation.

1. Mount the CentOS 7.1 USB stick or DVD.
Although CentOS 7 is already set up, the IRIS Focus installer relies on some packages that are provided by the CentOS repository.
2. Unpack the contents of the IRIS Focus installation file on the server's hard disk drive, for example to the `/root/IRIS` directory.
3. Login as root.
4. Navigate to the directory where you downloaded the files.

5. Launch the **./rsw-installer** script.
The install script requires the following parameters:

```
./rsw-installer --offline --gis-db-dump [maps directory] --terrain-dir  
[terrain directory] -s [socket server hostname]
```

- **--gis-db-dump** - location for the map data
- **--terrain-dir** - location for the terrain data
- **-s** - URL of the socket server that provides radar product data from IRIS Analysis

The script proceeds automatically and installs all necessary services, user accounts and modules required for running IRIS Focus.

Note that 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.

During installation, the following services are created and started:

- **monit** - Monitoring tool for Unix systems and processes
- **HAProxy** - Encodes outgoing traffic with HTTPS encryption
- **vaisala-radarsw-webapp** - IRIS Focus web application
- **vaisala-radarsw-geoserver** - Map engine for caching and generating base map layers
- **vaisala-radarsw-scan-updater-service** - Listener for Scan service
- **vaisala-radarsw-scan-http-service** - HTTP server for Scan service

The following users are created:

- **radarweb** - Restricted user account for running the IRIS Focus web application
- **radarscan** - Restricted user account for running the Scan Service database
- **radargeo** - Restricted user account for running the GeoServer map engine

4.5. Security Settings

IRIS Focus server has a pre-configured firewall.

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

- SSH can be used for configuration
- HTTP port is used 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.

Firewall is configured through CentOS firewalld system. For more information, see https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Security_Guide/sec-Using_Firewalls.html.

4.6. Setting up Scan Service

Scan Service is a service running on the IRIS Focus server that receives radar scan volume data (stored in RAW file format) from the IRIS Analysis server and generates live radar products from the data in real-time. Scan Service is not required for IRIS Focus to function, but all IRIS Analysis installations support creating radar product data streams for Scan Service so you should always also configure the Scan Service when you install IRIS Focus.

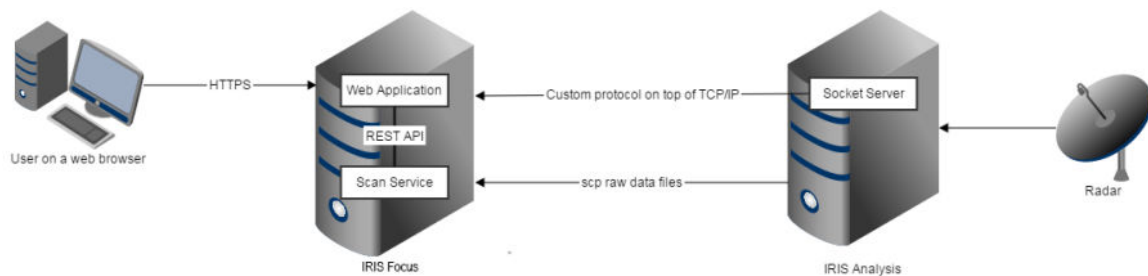


Figure 12 Radar Data Delivery Paths

Setting up the Scan Service connection requires that you have root access to both the IRIS Focus and the IRIS Analysis server. During installation, IRIS Focus sets up all necessary services, databases and user accounts for processing RAW data, but IRIS Analysis must be configured to send the RAW files to the correct location before IRIS Focus can use them. This is done by setting the target location on IRIS Focus server as a network Output Device in IRIS Analysis. The target location on IRIS Focus server is `/srv/vaisala/radarsw/product_raw` directory, owned by the radarscan user.

As the RAW files on the IRIS Analysis server are handled by the local root user and RAW files on the IRIS Focus server by the local radarscan user, you must add the IRIS Analysis root account's public SSH key to the IRIS Focus radarscan accepted keys list.

4.6.1. Setting up Scan Service On IRIS Analysis server

- ▶ 1. Log on to IRIS Analysis server as root.
2. Open IRIS setup on the command line: `setup&`
3. Select the **Output** tab.

4. Add a new output device with the following settings



Figure 13 IRIS Analysis Output Settings

- a. Device type: Network
 - b. Filename format: Native
 - c. Target directory: /srv/vaisala/radarsw/product_raw
 - d. User name: radarscan
 - e. Host name: [IRIS Focus server]
5. To close the Output setup, select **File > Close**.
 6. Select **File > Save** and exit.
 7. Restart IRIS on the command line with the following commands: `qiris` and `siris`
 8. Read the contents from the root account's public SSH key: `cat /root/.ssh/id_dsa.pub`
 9. Store the printed key string on a file or on the computer clipboard for later use.

10. Launch a one-time SSH connection to the IRIS Focus server.
This saves IRIS Focus server's hostname in the IRIS Analysis server's `known_hosts` file. `ssh [IRIS Focus server IP address]`

4.6.2. Setting up Scan Service On IRIS Focus server

- ▶ 1. Log in to IRIS Focus server as root.
- 2. If the `/srv/vaisala/radarsw/product_raw` directory does not exist, create it with the command:
`mkdir /srv/vaisala/radarsw/product_raw`
- 3. Set directory owner as `radarscan` in the `radarsw` user group with the command:
`chown radarscan:radarsw /srv/vaisala/radarsw/product_raw`
- 4. Edit the `radarscan` user's authorized SSH keys store with the command:
`nano /var/lib/radarscan/.ssh/authorized_keys`
- 5. Append contents you copied from the IRIS Analysis server root account's public key to `authorized_keys`, after the last entry.
This enables file transfer from IRIS Analysis root account to IRIS Focus `radarscan` user.
- 6. Check that the RAW files appear in the `/srv/vaisala/radarsw/product_raw` directory on the IRIS Focus server.
A Scan Service updater service records metadata of the files in an SQLite database, which is in turn accessed by the IRIS Focus web UI when it generates live radar products from the data.

4.7. Verifying IRIS Focus Installation

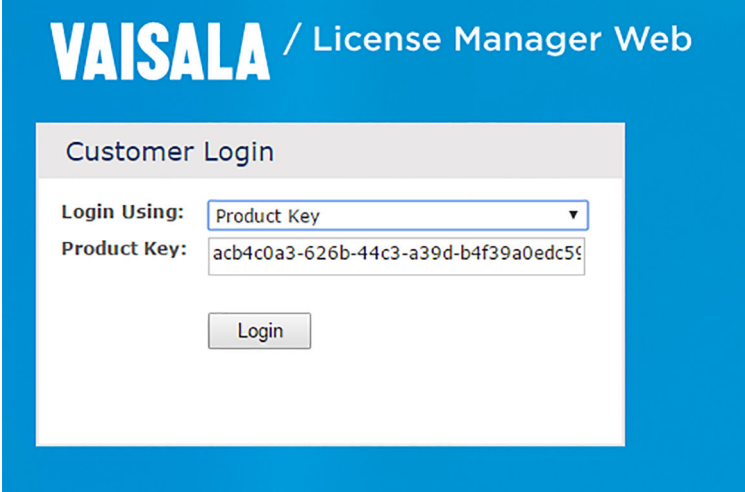
After the installation steps are complete, verify the installation.

- ▶ 1. Restart the server.
IRIS Focus web application is set to launch automatically when the server starts. The web UI 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`
- 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** and **Cross Section** buttons are visible in the application UI.
This verifies that IRIS Focus features are enabled.

5. Enable the grid lines from **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. (optional) If you also configured Scan Service, select **Add Product** and add a new Live PPI or Live CAPPI product.
You should see weather data from the selected time on the screen.

4.8. Activating License – Online

1. Run the **rsw-show-machine-code** command on the IRIS Focus server to get the locking code specific to the server hardware.
2. Go to Vaisala License Manager Web at <https://licensing.vaisala.com> and select **Product Code** in the **Login Using** field.



VAISALA / License Manager Web

Customer Login

Login Using: Product Key ▼

Product Key: acb4c0a3-626b-44c3-a39d-b4f39a0edc59

Login

3. Enter your product code and select **Login**.

- Input the locking code in the **Request Code** field.

Generate License Change Language ▾

EID: 01e4f9****

▼ Enter Quantity

Product	Remaining Quantity	Quantity
IR15 2.0	1	1

* Request code:

Remarks:

- Select **Generate**.
A popup window with the license string opens.

License Certificate

Contact: Customer: Vaisala Oyj - 327799

List of Activations

Product Key	Name	AID	Quantity	Remaining Quantity
31e6b594-9499-4c3a-859a-43ceeb6aba62	IR15 2.0	3e667d27-dfc3-454d-afcb-3c6cb668f90d	1	0

License String

```
*E
WLYnnQhM4bu27hvFNEW.3y22kDpWYJWd8R0f6WTUhvL0Bh6tIAFHDqjmiBnkgz.rLwdmlmQALF2fnAeoRgS9a0LA.pI0L
Ok5TR79ouP3EAWWf.7leoW45kq$KN9ofQ7z2H35Sd3ZrJpJwGseRnEz80Gvfo# "IRIS_Focus" version "", expires Midnight
of Jan 1, 2011, exclusive##AID=3e667d27-dfc3-454d-afcb-3c6cb668f90d
```

- Select **Save to File** to save the license string to a file on disk.
The file is saved by default with the name `lserverc`.
- Install the license with the **rsw-install-license <location-of-the-license-file>** command.
- Restart the IRIS Focus web application with the **service vaisala-radarsw-webapp restart** command.
- Log in to IRIS Focus using an administrator account.
- Select **Admin > System > Licensing Management** to view information about the license (seats, end date, and start date).

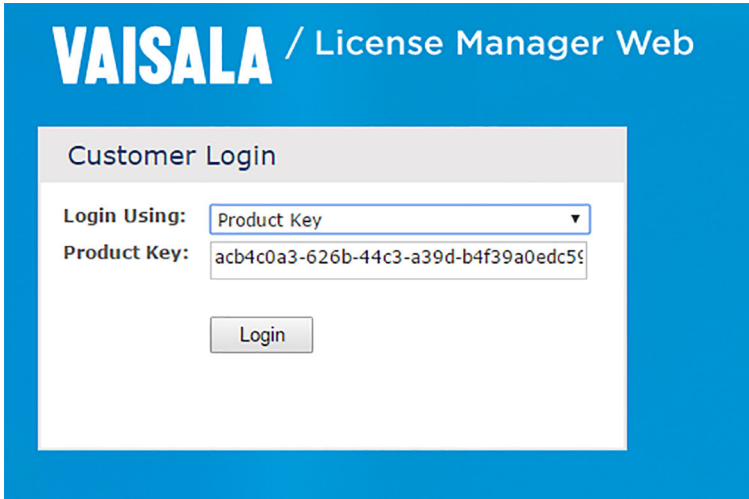
More Information

- ▶ [Licensing \(page 9\)](#)

4.9. 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 another online computer and then transfer the license file to the IRIS Focus server.

- ▶ 1. Run `rsw-show-machine-code > [filename]` command on the IRIS Focus server to get the product code specific to the server hardware. This stores the product code string in a file.
- 2. Copy the file to a removable media and transfer it to the online computer.
- 3. Go to Vaisala License Manager Web at <https://licensing.vaisala.com> and select **Product Code** in the **Login Using** field.



VAISALA / License Manager Web

Customer Login

Login Using: Product Key

Product Key: acb4c0a3-626b-44c3-a39d-b4f39a0edc59

Login

- 4. Enter your product code and select **Login**.

- Input the locking code in the **Request Code** field.

Change Language ▾

Generate License

EID: 01e4f9****

▼ Enter Quantity

Product	Remaining Quantity	Quantity
IR15 2.0	1	1

* Request code:

Remarks:

Generate Close

- Select **Generate**.
A popup window with the license string opens.

License Certificate

Contact: Customer: Vaisala Oyj - 327799

List of Activations

Product Key	Name	AID	Quantity	Remaining Quantity
31e6b594-9499-4c3a-859a-43ceeb6aba62	IR15 2.0	3e667d27-dfc3-454d-afcb-3c6cb668f90d	1	0

License String

```
*E
WLYnnQhM4bu27hvFNEW.3y22kDpWYJWd8R0f6WTUhvL0Bh6tIAFHDqjmiBnkgz.rLwdmlmQALF2fnAeoRgS9a0LA.pI0L
Ok5TR79ouP3EAWWf.7leoW45kq$K9ofQ7z2H35Sd3ZrJpJwGseRnEz80Gvfo# "IRIS_Focus" version "", expires Midnight
of Jan 1, 2011, exclusive##AID=3e667d27-dfc3-454d-afcb-3c6cb668f90d
```

4

Save to File Append To File Back to List

- Select **Save to File** to save the license string to a file on disk.
The file is saved by default with the name `lserverc`.
- Copy the license file to a removable media, such as a USB stick, and transport the file to the IRIS Focus server.
- Install the license with the **rsw-install-license <location-of-the-license-file>** command.
- Restart the IRIS Focus web application with the **service vaisala-radarsw-webapp restart** command.

More Information

- [Licensing \(page 9\)](#)

5. Upgrade

5.1. Upgrading IRIS Focus

The following instructions assume you are upgrading from IRIS Focus 2.0 to IRIS Focus 2.1



IRIS Focus 2.1.0 requires a new license. If you do not yet have a license, please contact your Vaisala sales representative.

- ▶ 1. Login as **root**.
2. Backup the system configuration.
See [7.12.1. Making a Manual Back-up \(page 49\)](#).
3. Insert the upgrade USB stick.
4. Copy the file *Vaisala_IRIS_installer-2.1.tar* from the USB stick to the server's hard disk drive, for example to the */root* directory.
5. Extract the file: `tar -xvf Vaisala_IRIS_installer-2.1.tar`
6. Change to the directory created in the previous step:
`cd Vaisala-IRIS-Focus-v2.1.0--55`
7. Run: **./rsw-upgrade**



To view installation command line options, run: **./rsw-upgrade -h**

8. Verify the upgrade by running: **rpm -qa | grep vaisala**
Check that the rpm name is version 2.1.
9. Activate the IRIS Focus license.
Depending upon whether or not your server is connected to the internet, see:
 - [4.8. Activating License – Online \(page 28\)](#)
 - [4.9. Activating License – Offline \(page 30\)](#)

6. IRIS Focus Architecture

IRIS Focus reads data in various formats produced by weather radar signal processors.

Usually this data is relayed to IRIS Focus through the signal processing and analysis component IRIS Analysis either as pregenerated radar products or as radar scan source data files which are processed and displayed as radar products by IRIS Focus.

IRIS Focus only accepts a single data source as its socket server. IRIS Analysis can be connected to an unlimited number of radar sites and relay their radar products to IRIS Focus.

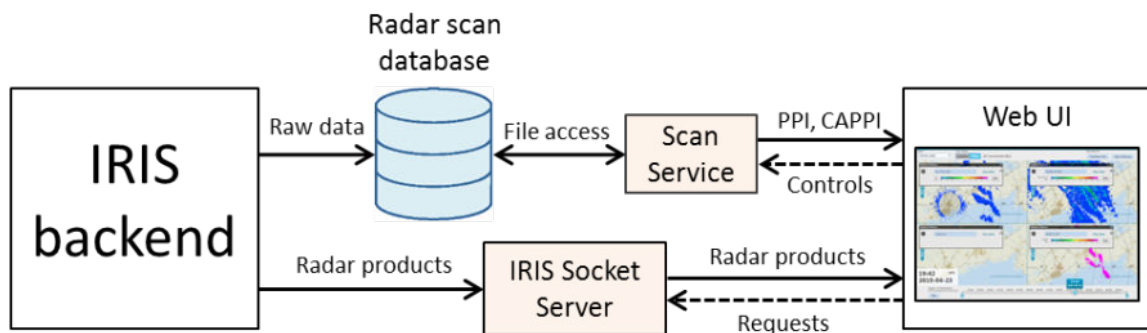


Figure 14 IRIS Focus Architecture

Each radar 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 radar products are drawn on top of them. The user can change the order of radar product layers in real-time.

Most radar products have editable color scales. Color scales are stored as JSON objects on the IRIS Focus server and can be reused.

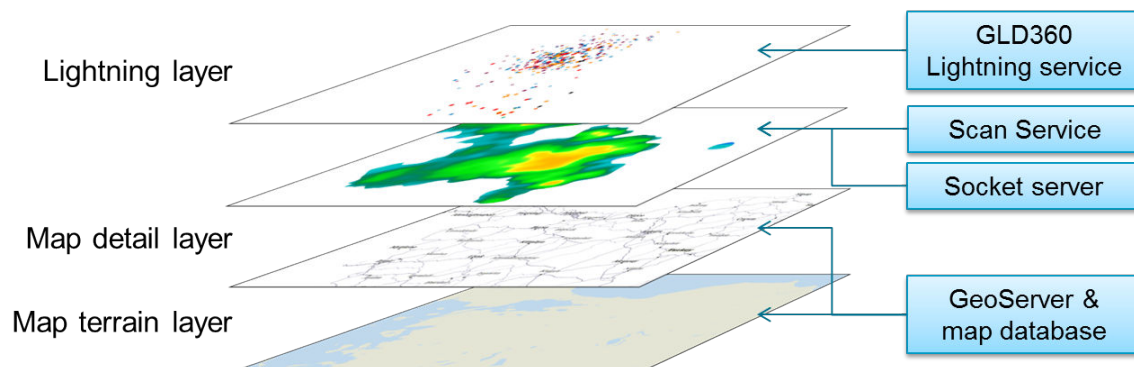


Figure 15 IRIS Focus Layers

6.1. GeoServer and Maps

The map engine in IRIS Focus uses GeoServer architecture. When reading data from a single radar site, GeoServer renders the map using Azimuthal Equidistant projection, which means that all directions and distances are correct when measured from the point of origin, which is the radar site in this case. When reading data from a composite of multiple radar sites, Web Mercator projection is used.

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 16 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 256x256 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 `http://localhost:34180/geoserver`. The default management account name is `admin` and the password can be found in the 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.

6.2. Live Radar Products

When displaying live radar products, IRIS Focus fetches raw radar measurement data from the back-end and processes it in real-time. This provides hands-on control over the radar product parameters.

The full raw radar volume data is stored for 48 hours and can be used for on-demand product generation later.

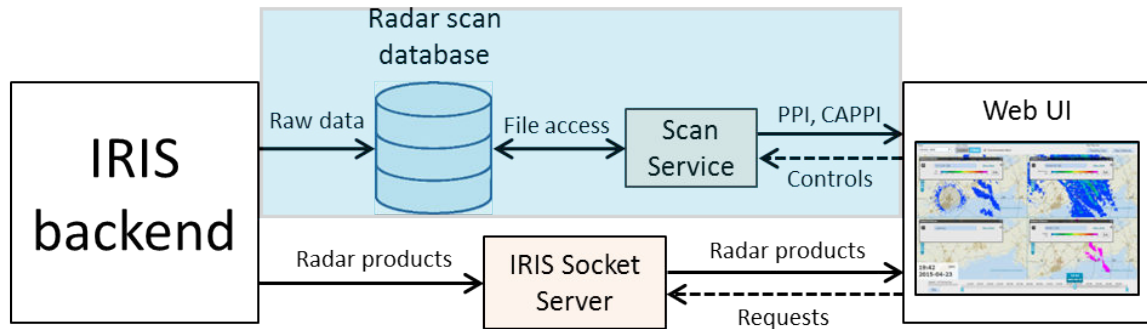


Figure 17 Live Product Components

Data for live products comes directly from the RAW format files produced by the IRIS backend.

IRIS Focus reads the RAW data through the Scan Service, which is a read-only HTTP/REST interface that operates on the IRIS Focus server in port 34280.

The data for the interface is read from a local sqlite3 database on the IRIS Focus server that contains the RAW data files for the configured live products.

When you select a live radar product in IRIS Focus, the web application accesses the database and fetches the required data, not only for the current situation but for the whole recorded segment up to 48 hours. The data is then processed live in IRIS Focus and can be animated similarly to pregenerated radar products.

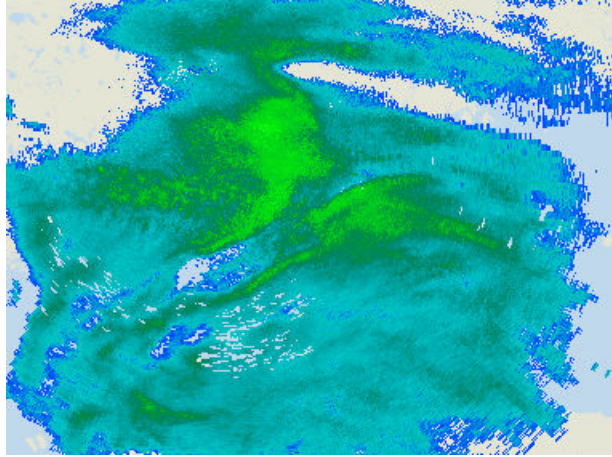


Figure 18 Radar Product Visualized

6.3. Pre-generated Radar Products

Pregenerated radar products are generated by the back-end signal processing components of IRIS Analysis. IRIS Focus reads the list of products, and allows you to select which of them to display on the IRIS Focus map view.

The radar products and their settings are defined in the back-end, and only displayed in IRIS Focus. They cannot be edited in the IRIS Focus map view.

There is no upper limit to the number of pregenerated radar products that IRIS Focus can have.

The raw volume data is not stored for later processing. All the information that is not used in radar product generation is lost.

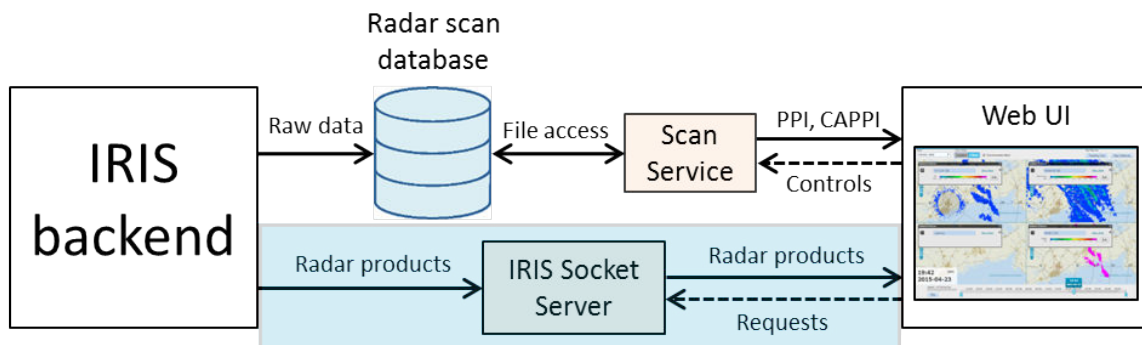


Figure 19 Pre-generated Radar Product Components

The radar products are rasterized into 2D bitmap images, based on the back-end signal processing settings. The images are sent to IRIS Focus web UI through the IRIS Socket Server interface, which is the internal communication channel between the IRIS Focus web UI and the back-end processing software. The Socket Server uses TCP port 30735 to communicate with IRIS Focus.

When you select a specific pregenerated product in IRIS Focus, IRIS Focus polls the Socket Server and loads the image.

The resolution of pregenerated radar products is limited by the capacity of the processing module that produces them. For example, IRIS Analysis has the following limitations:

- Max number of **bins** in any **ray** at any time: 4200
- Max number of **rays** in a sweep: 1024
- Max number of **moments** recorded in a **sweep**: 16
- Max number of **sweeps** per **scan**: 40

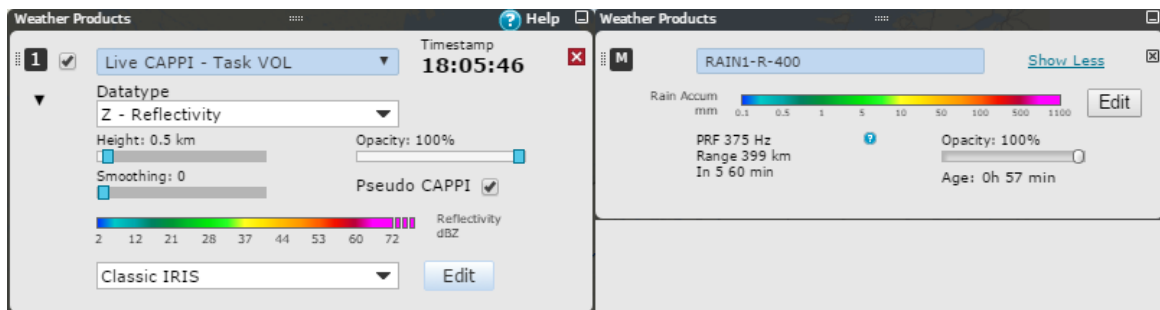


Figure 20 Radar Product Settings Panels

6.4. 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 selectable lightning layer in the web UI. From the user's perspective, the lightning layer is similar to other weather product layers.

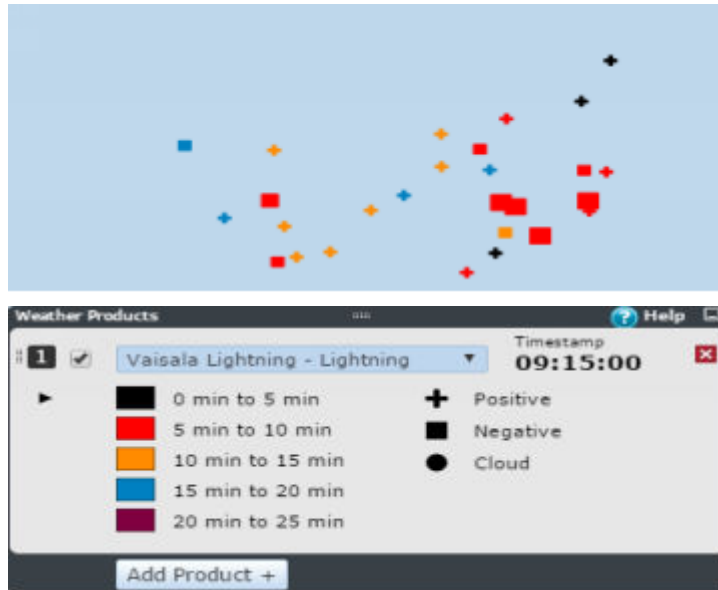


Figure 21 Lightning Layer and Controls

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

- ▶ 1. Log on to the IRIS Focus server as root.
2. Type the command:
rsw-lightning-configure -r [admin username] -p [admin password] -s https://storm.vaisala.com/geolegends/ltg_combined_25.sld
3. Edit the configuration file `vsoweb-override.ini:nano /etc/vaisala/radarsw/configuration/vsoweb-override.ini` to contain a reference to the Vaisala GLD360 URL you received:

```
lightning.wms.url = [URL from GLD360]
```

4. Restart the IRIS Focus web application service:
service vaisala-radarsw-webapp restart

6.5. Web Application

The IRIS Focus web application can be accessed with current Internet Explorer, Mozilla Firefox, and Google Chrome browsers.

It only accepts HTTPS connections, and all requests to the standard HTTP port are redirected to the HTTPS port 443.

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.

Settings

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

Map and terrain data are stored in the same database.

Certificates

The web application comes with a self-signed SSL certificate that secures the connection between the IRIS Focus server and the user's web browser. However, 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, but you should consider acquiring and using a trusted 3rd party certificate, especially if you plan to offer access to IRIS Focus outside your organization.

For information on installing SSL certificates, see [Jetty SSL Configuration](https://wiki.eclipse.org/Jetty/Howto/Configure_SSL) at the Eclipse wiki (https://wiki.eclipse.org/Jetty/Howto/Configure_SSL).

7. Administration

7.1. User Management

Access to different features in IRIS Focus depends on what roles have been enabled for a user account. For example, the administration features are available to user accounts with administrator role.

IRIS Focus uses the following roles:

- *administrator* - Can access administration features
- *focus* - Can access the full IRIS Focus feature set
- *kiosk* - Can only access the non-interactive full screen Kiosk mode
- *poweruser* - Not used
- *user* - Can access limited application features



To enable all IRIS Focus features for an account, set both *user* and *focus* roles for that account.

IRIS Focus builds on earlier Vaisala IRIS software. The release preceding IRIS Focus was IRIS Vision, which is included in IRIS Focus as a limited environment that users without a *focus* role or a valid IRIS Focus license can use. A user account that has *user administrator* or role without *focus* role set enters the IRIS Vision mode. IRIS Vision does not include features such as cross-section or live radar products.

Each logged-in user account with *focus* role reserves one IRIS Focus seat from the license pool. When the user logs out, the seat is released. If a user with *focus* role logs in and there are no IRIS Focus seats left, the user enters the restricted IRIS Vision mode. When a seat is again available, the user receives a pop-up message that offers the option to switch to IRIS Focus.

Each user account belongs to one or more organizations. Each organization can have a subscription to a selected software for a selected number of users. However, you can use organizations to create subgroups that have separate license pools and manage the license availability that way.



By default, an *administrator* account does not have the *focus* role set to avoid reserving an IRIS Focus license when performing administration tasks.

More Information

- [Licensing \(page 9\)](#)

7.1.1. Managing User Accounts

1. Log in with an *administrator* account
2. Select **Admin** in the upper right corner.
The **Users** window opens with tools for adding, editing, and deleting users.

7.1.2. Creating User Accounts After First Install

After a fresh installation, start creating user accounts.

1. Choose which organization you want to create your users in:
 - Use the default **root** organization.
 - For more control over license seat allocation, create a new organization in the **Organizations** tab.
2. Subscribe the organization to a license pool in the **Application Subscriptions** tab:
 - a. Select the *radarsw* organization.
 - b. Enter the validity period.
 - c. Enter the maximum allocated users (licenses).

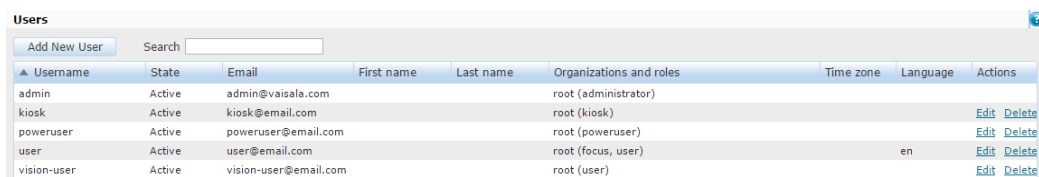
The screenshot shows a dialog box titled "Add Application Subscription". The dialog contains the following fields and values:

Field	Value
Code	IRIS Focus
Description	Subscription to IRIS Focus
Organization	Example Inc.
Application	radarsw
Start date	2015-10-21
End date	2016-10-21
Max number of users	5

At the bottom right of the dialog, there are "Save" and "Cancel" buttons.

3. Add users to the organization in the **Users** tab:
 - a. Add user details.
 - b. Select an organization for user.
 - c. Add roles to user
 - d. Add both focus and user roles to make IRIS Focus features available.
 - e. To select multiple roles, press **CTRL**.

The default administrator account does not have the focus role set. This is to avoid reserving an IRIS Focus license when performing administration tasks.



Username	State	Email	First name	Last name	Organizations and roles	Time zone	Language	Actions
admin	Active	admin@vaisala.com			root (administrator)			
kiosk	Active	kiosk@email.com			root (kiosk)			Edit Delete
poweruser	Active	poweruser@email.com			root (poweruser)			Edit Delete
user	Active	user@email.com			root (focus, user)		en	Edit Delete
vision-user	Active	vision-user@email.com			root (user)			Edit Delete

Figure 22 Users List

7.1.3. Removing User Accounts

When IRIS Focus user accounts are removed from the system database using the **Admin** user management functions, the user name of the deleted account remains in the system. 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 a similar user name as an existing one. This applies even when the account has been deleted earlier.

7.2. Adding/Removing Radars

When new radar sites are added or removed as data sources on the IRIS Analysis server, radar settings on the IRIS Focus server must be re-synchronized. Settings requiring updates include updating the radar site location in GeoServer and calculating new map projections.

- ▶ 1. Run radar site setup script: **rsw-basemap-site-setup --socket-server [socket_server_host_name]**
- 2. Restart the IRIS Focus web application service: **service vaisala-radarsw-webapp restart**

7.3. systemd

systemd and its logging daemon **journald** are CentOS 7 components that manage system services.

systemd manages more functionality than its predecessors, and some of the mechanisms, such as accessing certain log files, have changed.

In CentOS 7, system logs are not directly accessible as files. Instead, they are read with the **journalctl** command.

7.4. 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**.

7.5. 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**.

7.6. 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-radar-sw-webapp**

7.7. GeoServer

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

In the command line, the GeoServer service is called **vaisala-radar-sw-geoserver**

7.8. Scan Service

Scan Service is the HTTP/REST interface that provides raw data for live radar products.

In command line, Scan Service runs 2 separate services:

- **vaisala-radar-sw-scan-updater-service** - Listener for Scan service
- **vaisala-radar-sw-scan-http-service** - HTTP server for live radar products that are queried from the IRIS Focus web application

7.9. Stopping, Starting, and Restarting Services

In CentOS 7, services are stopped, started, and restarted with the **service** **[servicename] stop / start / restart** command.

To use the **service** command, you must be 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

- **service monit stop**
- **service vaisala-radarsw-webapp stop**

Starting the service

- **service vaisala-radarsw-webapp start**
- **service monit start**

Restarting the service

- **service vaisala-radarsw-webapp restart**

7.10. Logging

IRIS Focus log files are stored in directory */var/log/vaisala/radarsw/webapp*, which contains:

- Application error log: *webapp.log*
- Information about application performance: *webapp-metrics.log*

Older logs are rolled over to separate files and zipped automatically in *.gz* files. No log files are deleted automatically.

The logging configuration file is in */etc/vaisala/radarsw/configuration/logback.xml*.

7.10.1. Reading System Service Logs

When diagnosing issues with the IRIS Focus server, you may need to access the log files from system services using the CentOS 7 Journal tool:

```
journalctl -u [service-name] -l -f --no-pager
```


Some useful options for `journalctl` are:

- `-u` for showing log entries for a given service
- `-n` for showing only a given number of recent log lines
- `-f` for following new log entries being logged
- `--no-pager` for not using a pager program such as `less` for the output
- `-l` to print out full log lines and not ellipsize (shorten) them.

For more information, type **man journalctl** in CentOS 7, or *Using the Journal* at [RHEL System Administrators Guide](https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/System_Administrators_Guide/s1-Using_the_Journal.html) (https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/System_Administrators_Guide/s1-Using_the_Journal.html)

7.11. File Locations

Table 3 IRIS Focus Application and Configuration Files

File or Directory	Description
<i>usr/vaisala/radarsw/configuration</i>	Configuration files for helper applications used in IRIS Focus maintenance.
<i>/etc/vaisala/radarsw/configuration</i> <ul style="list-style-type: none"> • <i>vsoweb-override.ini</i> Connection settings for socket server, lightning layers, and so on. • <i>gis-override.ini</i> GeoServer database settings. • <i>logback.xml</i> Logging level settings. • <i>radar_centers.properties</i> List of stored radar site center points. • <i>color_scales</i> Stores all color scales in IRIS Focus as JSON objects. 	Configuration files for in IRIS Focus module settings. The files listed here are the most important. <div style="border: 1px solid gray; padding: 10px; margin-top: 10px;">  <p>CAUTION! Some settings have a default config file and an override file, such as <i>gis-config.ini</i> and <i>gis-override.ini</i>. In those cases, always edit the override file.</p> </div>
<i>/var/lib/radarweb</i>	Home directory of the radarweb user. The IRIS Focus Web Application is deployed here.
<i>/var/lib/radarscan</i>	Home directory of the radarscan user. The RAW files for the Scan Service database are stored here.
<i>/var/log/vaisala/radarsw</i>	Log files from IRIS Focus web application
<i>/var/lib/radarscan/scans.sqlite</i>	SQLite database that contains information on radar volume scans used in the Scan Service

7.12. 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.

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 backup script stores the server configuration and application settings database. 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-2015-09-2102-30-01.tar.gz`

7.12.1. Making a Manual Back-up

1. Log in 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-<timestamp>.gz`

7.13. Restoring from Backup

1. Login as **root**.
2. Stop the IRIS Focus web application and Monit service: **`service vaisala-radarsw-webapp stop service monit stop`**
3. Take a backup of the current configuration: **`usr/vaisala/radarsw/backup/bin/do-backups`**
4. Drop the current database with the `rsw-db-tool` utility: **`rsw-db-tool drop-db`**
5. Recreate an empty database: **`rsw-db-tool create-db`**
6. Switch to the database user account `postgres`: **`su - postgres`**
7. Restore the database contents from a backup file by reading the file contents into the standard output stream and inserting them in the IRIS Focus database `wxdb2`:

```
gzip --decompress --to-stdout /srv/vaisala/radarsw/backup/database/
database-<timestamp>.gz | psql --set ON_ERROR_STOP=on --single-transaction
wxdb2
```

8. Exit the `postgres` user shell: **`exit`**

9. Start the IRIS Focus web application and Monit service:

```
service vaisala-radarsw-webapp start service monit start
```

7.14. 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.

7.15. 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.

More Information

- ▶ [Licensing \(page 9\)](#)

7.16. Licensing on Systems with Mirrored HDDs (RAID 1 or RAID 5)

IRIS Focus licenses are mapped, among other parameters, to hard disk IDs. Removing or replacing one hard disk in a RAID array can cause unexpected behavior, and you should renew your license as a precaution when doing so. Contact your Vaisala customer representatives for further instructions.

More Information

- ▶ [Licensing \(page 9\)](#)

8. Troubleshooting

8.1. Missing Or Broken Live Radar Products

If you encounter issues with live radar products, make sure the RAW files are delivered to the directory `/srv/vaisala/radarsw/product_raw` on the IRIS Focus server.

If you do not see any new files in the directory, it means that IRIS Analysis cannot push them to the directory. Make sure that the configuration in IRIS Analysis matches that described in [4.6. Setting up Scan Service \(page 25\)](#).

If there are recent files but corresponding live radar products are not displayed in the IRIS Focus web application, there may be errors in the Scan Service system services. Check their status with the following commands and restart the services if needed:

- **service vaisala-radarsw-scan-updater-service status**
- **service vaisala-radarsw-scan-http-service status**

If the services are healthy and running, but live radar products are still not displayed, stop the Scan Service system services and remove the radar scan information database. IRIS Focus automatically creates a fresh database and starts populating it with new data, starting from the most recent scan file.

- **service vaisala-radarsw-scan-updater-service stop**
- **service vaisala-radarsw-scan-http-service stop**
- **rm /var/lib/radarscan/scans.sqlite**
- **service vaisala-radarsw-scan-updater-service start**
- **service vaisala-radarsw-scan-http-service start**

8.2. Lightning Layer Empty

If the lightning 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 AviCast 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.

8.3. Lightning Layer Missing

If you have subscribed to Vaisala AviCast GLD360 lightning detection service, and you do not see the lightning layer available in the IRIS Focus application UI after running the `rsync-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:

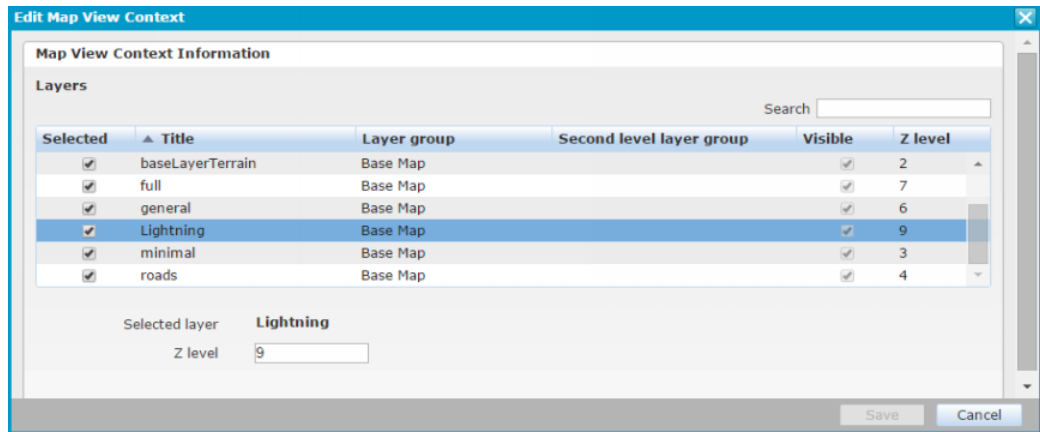
The screenshot shows the 'Edit Map Layer' dialog box with the following configuration:

- Title:** Lightning
- URL:** /lightning
- Layer:** lightning:ltg_combined_25
- Base layer:**
- Transparent:**
- MIME type:** image/png
- Layer Style:**
 - Append SLD to request:**
 - SLD URL:** https://storm.vaisala.com/geolegends/ltg_combined_25.sld
 - Name:** ltg_combined_25.ltq_types

Buttons: Save, Cancel

- a. **URL:** /lightning
 - b. **Layer:** lightning:ltg_combined_25
 - c. **Transparent:** Checkbox checked
 - d. **SLD URL:** https://storm.vaisala.com/geolegends/ltg_combined_25.sld
 - e. **Name:** ltg_combined_25.ltq_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.

Glossary

Bin

A single sample of weather data detected at a known direction, altitude, and distance from the radar site. The radial size of a bin depends on and decreases with distance, so bins further from the radar site cover a larger area than nearby bins.

Hydrometeor

A particle of condensed water vapor in the atmosphere. Rain, snow, and hail are examples of hydrometeors.

Nowcasting

Weather forecasting within the next 6 hours.

PRF

Pulse Repetition Frequency measured in Hz (pulses per second). When measuring PRF, a [Pulse \(page 55\)](#) contains transmit, receive, and dead time phases. PRF affects [Range folding \(page 55\)](#) and [Velocity folding \(page 55\)](#) detection. Normal PRF values for Doppler radars are up to 1000 Hz. Vaisala radars generally operate around 400-700 Hz. In Vaisala IRIS products, PRF limits the area displayed in radar images and the maximum measurable wind speed.

Pulse

A short burst transmission signal sent by the radar, used to measure the weather activity in atmosphere. The reflection measurements from a pulse are sorted into bins. See also [Bin \(page 55\)](#).

Range folding

Radar signal echoes from outside the radar maximum range that are incorrectly displayed within the radar measurement area. Also called range aliasing.

Sweep

A collection of pulses at a constant elevation as the radar rotates around its axis 360°. After a sweep, the radar usually changes its elevation and starts a new sweep. Each sweep typically contains the same number of bins independent of the elevation. See also [Bin \(page 55\)](#).

Velocity folding

Erroneous readings due to particles in the measurement area exceeding the maximum velocity detection threshold of the radar system. The measured velocity "wraps around" to the other end of the scale, resulting in discontinuous readings. Also called velocity aliasing.

Volume

Complete set of raw measurement data collected from sweeps, that is used to calculate a model of the atmosphere. The maximum volume is half of a sphere (from 0° elevation upwards), but other shapes are more typical.

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Technical Support



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

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

For Vaisala Service Center contact information, see www.vaisala.com/servicecenters.

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.

Recycling



Recycle all applicable material.



Follow the statutory regulations for disposing of the product and packaging.

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