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Configuring the RSB Application

APPLICATION NOTE

This Application Note provides procedures for installing and configuring the RSB (Router Status Broadcast) application. This AirLink Container application allows broadcasting of selected router status information (including WAN, GNSS, VPN, and general status details) over UDP at regular intervals, when WAN states change, or both. Selected data items are broadcast (in JSON format) on a specific UDP port on one or more LAN segments. On those LAN segments, you can use a network analyzer (such as tcpdump) to listen for data packets on the UDP port.

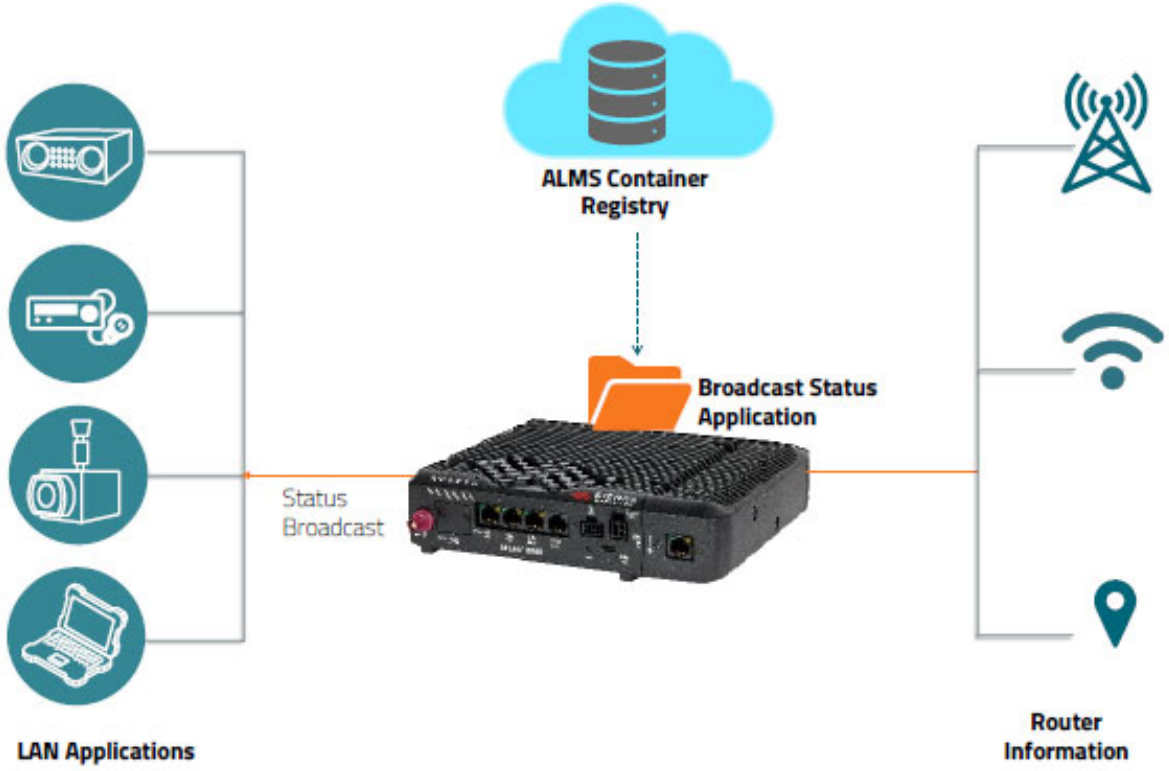


Figure 1: Router Status Broadcast overview

Summary

The steps to set up the RSB Container Application include:

1. Configuring LAN Segments for broadcast (may not be required for all deployments). The container application may need to reside in a particular LAN Segment. In AirLink OS, go to Networking > Zones Settings > LAN Segments to configure the LAN Segment.

   Note: The container application is not associated with a LAN segment until the container has run for the first time. On the first run, the container is always associated with the Default-LAN segment. You can move the container application to a new LAN segment afterwards. See Changing the LAN Segment on page 11.

2. Configuring a Multi-WAN policy that will select the active WAN to be included in the RSB Container Application broadcast. Otherwise, the application will use the Default IPv4 Traffic policy, which is non-configurable. Set your new Multi-WAN policy with a higher priority than Default IPv4 Traffic. In AirLink OS, go to Networking > Multi-WAN Policies to configure.
3. Add a new user for the container (see page 3).
4. Enable Container Applications (see page 4).
5. Configure Registry Access and pull the image from the registry (see page 4).
6. Upload the Container Volume (see page 7).
7. Create the Container Application (see page 8).
8. Verify the application is running (see page 10).
9. Move the application to the correct LAN segment if necessary (see page 11).
10. Add the container components and associated network settings to a template for deployment to other routers (see page 12).

Prerequisites

The application is compatible with AirLink XR80 and XR90 routers running AirLink OS 4.0 or later, and AirLink XR60 routers running 5.0 or later. For all routers, Semtech recommends using 5.0 or the latest available AirLink OS version.

The following procedures assume you have:

- Registered your routers on ALMS (for more information, see the ALMS documentation) under the AirLink Premium offer.

  Note: The application is licensed only for AirLink routers with an active AirLink Premium subscription. You can download the end user license agreement here.

- Configured your routers to have an active WAN connection to the Internet. This is required to pull the container image from the registry, as described in Pull the Application Image on page 4.

  Note: The container image cannot be pulled using the XR80 or XR90 router's LPWA WAN interface.

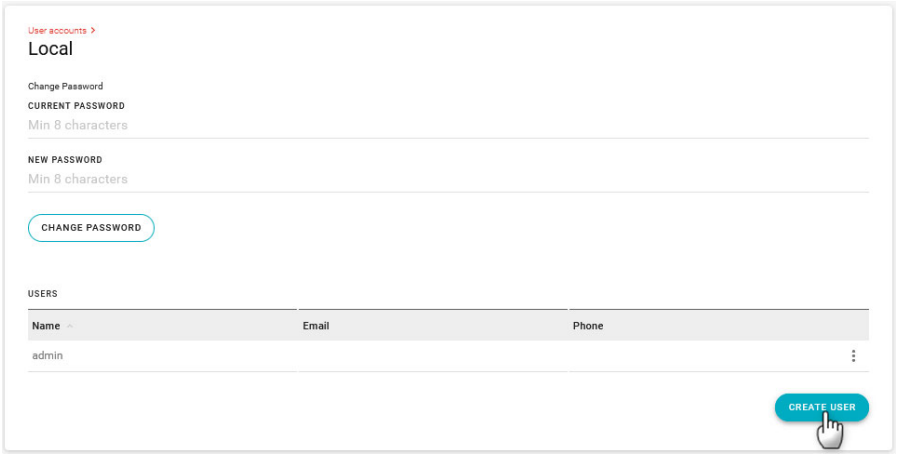
  If you deploy your routers in a private APN environment, ensure the router can access the ALMS servers/infra-structure, and the container repository (along with the ports/protocols required for that download from the repository). For more information, see Pull the Application Image on page 4 and the ALMS documentation.
- Logged in to ALMS or AirLink OS locally. ALMS is the preferred method of deploying the RSB Container App.

- Enabled Broadcast Forwarding (under Networking > LAN Segments) for the LAN the RSB container is on *if the router is part of a multi-LAN setup*. Broadcast forwarding allows other LAN segments to receive the broadcast.

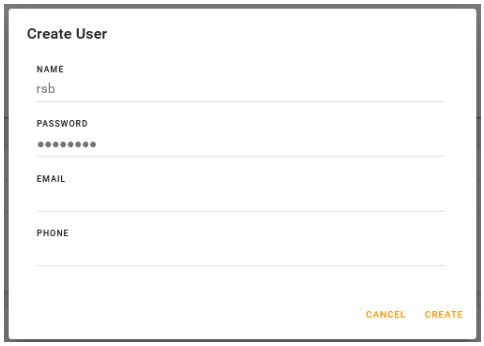
Add a New User

The user defined in this section is used in the RSB application. The credentials must be included in the config file (see Upload the Container Volume on page 7).

1. Go to System > User Accounts > Local.



2. Click Create User. The Create User screen appears.



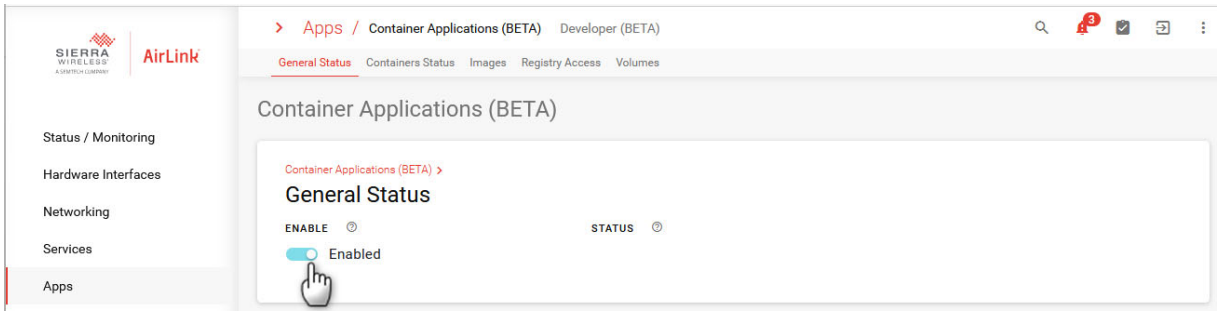
3. Enter a NAME: rsb, for example.
4. Enter a PASSWORD. The password must be at least 10 characters long and meet a minimum of 3 criteria as follows:
   - at least 1 uppercase letter
   - at least 1 lowercase letter
   - at least 1 digit
   - at least 1 non-alphanumeric character.
5. (Optional) Enter the user's EMAIL and PHONE number. These entries are not required for authentication.
6. Click CREATE.

Enable Container Applications

To enable the router to pull the application image and allow applications to run, you must enable the container applications feature on the router.

To enable container applications:

1. In AirLink OS, go to Apps > Container Applications > General Status.
2. Click ENABLE. The switch should display Enabled.

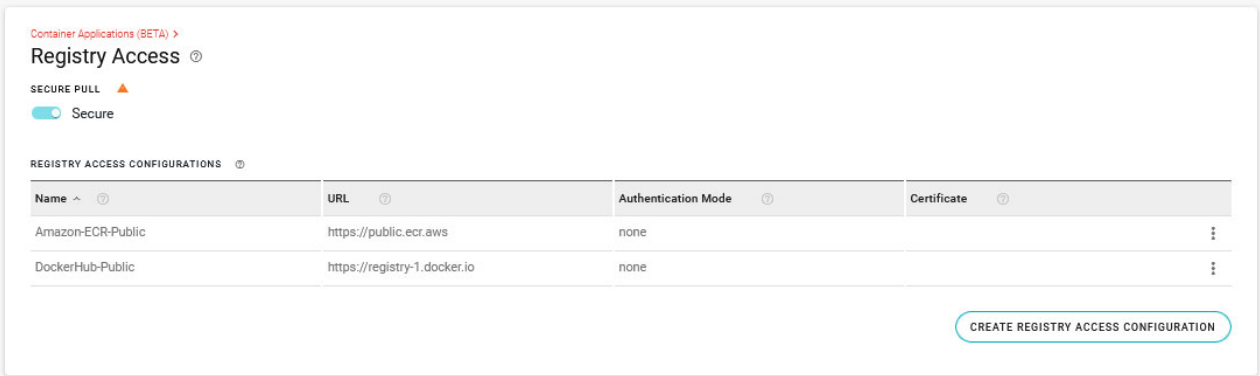


3. Click SAVE.

Pull the Application Image

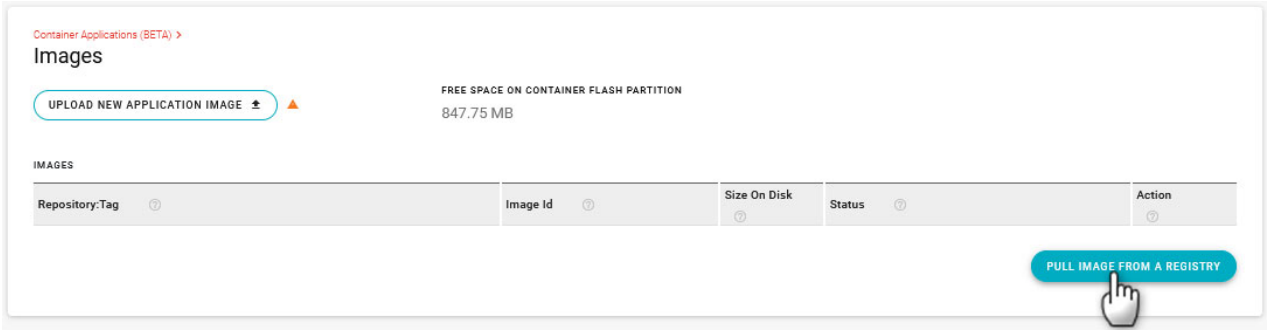
To get the RSB application image, you must go to the Amazon-ECR-Public registry (at https://public.ecr.aws) and pull the image from the registry. Access to this registry is pre-configured in the REGISTRY ACCESS CONFIGURATIONS table.

Note: When using a private APN network, ensure that the router can DNS resolve the FQDN public.ecr.aws *(the URL where the application image is hosted, as described below), and can communicate (outbound initiated) to the resolved URL using HTTPS (on port TCP/443).*



To pull the image from the registry:

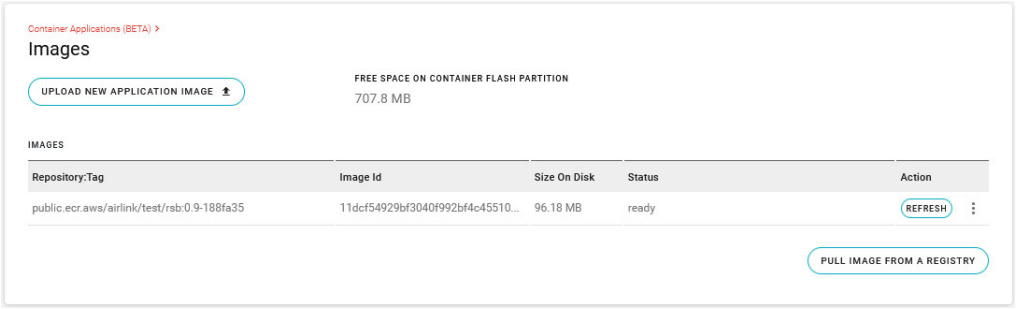
1. Go to Container Applications > Images.
2. Click PULL IMAGE FROM A REGISTRY. The Create Pull Image From A Registry window appears.



3. Enter the image reference. The reference will follow the format airlink/rsb:x.x-xxxnnxx (for example, airlink/rsb:1.0-9e98e4a). You can find the latest version of the application at gallery.ecr.aws/airlink/rsb and copy the image reference link there.
4. Under SELECT REGISTRY CONFIGURATION, click **x** and select the Registry Configuration as shown below.

5. Click CREATE.
6. Click SAVE.

The router begins pulling the application image (you can view progress in the Status column).



Optional: Upload the Application Image

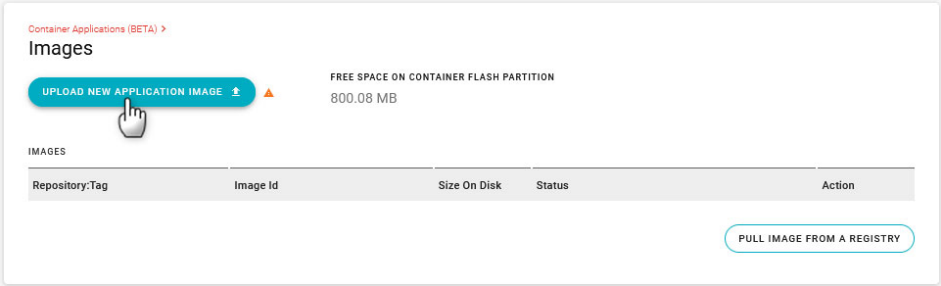
In certain scenarios (debugging, for example), you may need to upload the application image locally (that is, using a laptop connected directly to the router).

You can get the application image (rsb.tar) from Semtech support, or from https://gallery.ecr.aws/airlink/rsb using the docker commands:

- `docker pull public.ecr.aws/airlink/rsb:1.0-9e98e4a`
- `docker save -o <path for generated tar file> <image name>`

To upload the image locally:

1. Go to Container Applications > Images.



2. Click UPLOAD NEW APPLICATION IMAGE.
3. Upload **rsb.tar**.
4. Verify that the image upload was successful, and the image is listed in the IMAGES table.

Note: Uploading the image can take up to 30 seconds.

Note: Locally uploaded images will not be included in templates.

Creating the config file

You must create a config file for the RSB Container Application in order to create a container volume (see Upload the Container Volume on page 7). In creating the config file, you can also select which data to include in the broadcast file, and configure how frequently data is broadcast.

To create the config.tar file:

1. Open the config.json file (the contents of which are attached to this PDF) in a text or code editor.
2. Add your user credentials (name and password). See Add a New User on page 3.
3. Edit the time interval or polling interval if you wish to increase or decrease broadcast or WAN State polling frequency.
4. Edit any LAN configuration settings for your deployment.
5. Enable/disable any broadcastData items you wish. Enter “false” for any data you want to exclude.

   Note: Semtech recommends editing the configuration file as little as possible, using a simple text editor such as Notepad++, which shows hidden characters that may cause problems in the file. Do not try to exclude broadcastData items by deleting any lines from the config.json file. As well, do not add empty lines.

6. Save the config.json file and use a tool like 7-Zip to archive it as a **config.tar** file. This creates the container volume. See Upload the Container Volume on page 7.

   You can also use the following DOS command to convert the config.json file to config.tar:

   ```
   Dos: C:\RSB config file\ tar -cf config.tar config.json <enter>
   ```

Configuration File Details

You may want to modify some of the following items in the configuration file.

Item	Description
lanSegments	The LAN segments the broadcast will be forwarded to. You can remove one or more items from this section, or remove the section entirely.
snat > wanInterface[a]	**See note below.** The WAN interface through which all traffic will be SNAT'd. This must be specified by system name (Ethernet 3, for example), not friendly name.
snat > srcLanSegment[a]	**See note below.** Sets the LAN segment on which traffic will be SNAT'd by packet marking.
snat > dstLanSegment[a]	**See note below.** Traffic on this LAN segment will not be SNAT'd. The source address for this traffic appears as the "real" LAN address.
snat > vip[a]	**See note below.** Sets the source address that will apply to all SNAT traffic.
hardcode version	For Motorola requirements, this must be set higher than 4.3.0.1. Otherwise the broadcast will not be accepted by the receiving device.
friendlyNameMap	Set how the router hardware interface names appear in the broadcast. You might need to give Cellular interfaces friendly names that specify cellular carriers. Example: ▪ XP1 Cellular (system name) > CellCarrierAAA (friendly name) *Note: The friendly name for the VPN is NOT configured in the RSB config file. That friendly name is taken from the VPN tunnel name as configured in Networking > VPN.*
wanPolicyIpv4	Name of the Multi-WAN policy that the application will use to identify which interface is the active WAN. The broadcast will include the highest priority active WAN interface, according to the Multi-WAN policy.

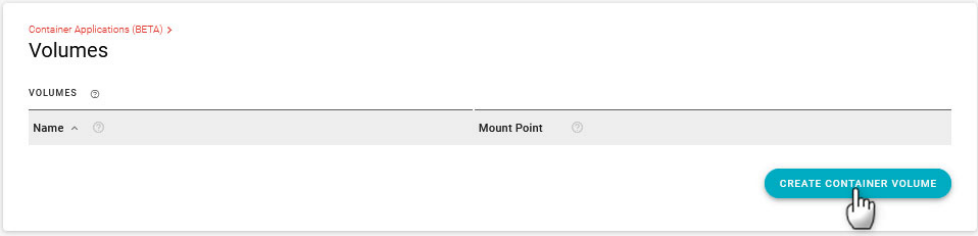
a. SNAT settings are optional, and can be deleted from the configuration file if not required.

Upload the Container Volume

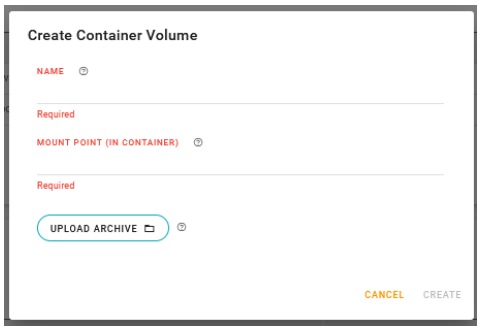
The container volume is where the configuration file will be uploaded. The configuration file, **config.json**, is contained in **config.tar**.

To upload the container volume:

1. Go to Apps > Container Applications > Volumes.



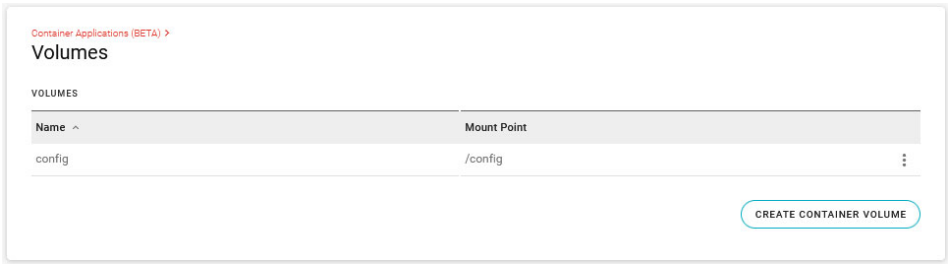
2. Click CREATE CONTAINER VOLUME. The Create Container Volume screen appears.



3. Enter a NAME; **config**, for example.
4. Enter the MOUNT POINT: **/config**

Note: You can configure any name you want, but the mount point must be /config.

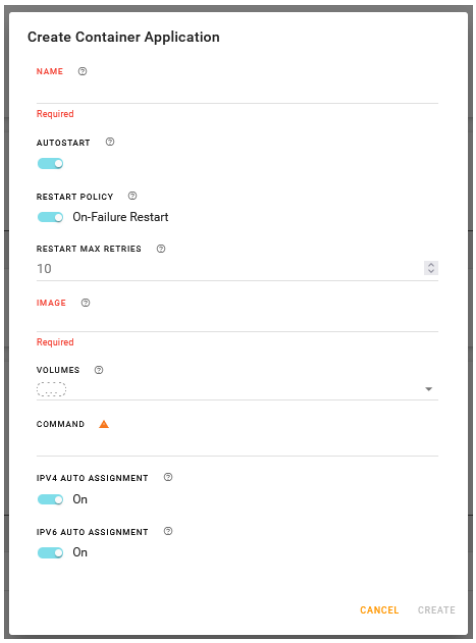
5. Upload the archive: **config.tar**.
6. Click CREATE.
7. Verify that the volume appears in the VOLUMES table.



Create Container Application

1. Go to Container Applications > Containers Status.

2. Click CREATE CONTAINER APPLICATION. The Create Container Application screen appears.



3. Enter a NAME; **rsb**, for example.
4. Set AUTOSTART (enabled by default). Semtech recommends disabling Autostart when deploying the application using a template and the application needs to run on a non-default LAN segment. See Post-Template Application Considerations on page 14.
5. Set the RESTART POLICY that applies when the container stops.
   - When On-Failure Restart is enabled (default), the container is automatically restarted if it terminates due to an error.
   - When No Restart is enabled, the container is never automatically restarted if it terminates unexpectedly. You will need to manually restart the container.

Note: Automatic restart behavior is canceled if the container is stopped by using the STOP button. Automatic restart behavior resumes when the container is started again using the START button or after the router reboots (when AUTOSTART is enabled).

6. Set the RESTART MAX RETRIES. The restart delay is fixed at 1 minute.
7. Under IMAGE, select the container image pulled or uploaded in Pull the Application Image on page 4.
8. Under VOLUMES, select the volume created in Upload the Container Volume on page 7.
9. If you are NOT running at least RSB-1.0/AirLink OS 5.0: Under COMMAND, enter: **./init.sh** . Otherwise, skip this step.
10. Click CREATE.

Verifying the Application is Working

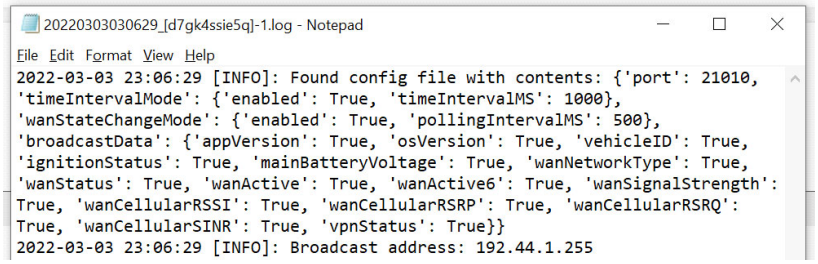
You can use both the AirLink OS interface and Wireshark to verify that you have successfully configured, installed and started the app.

AirLink OS

*Note: If you did NOT enable autostart, you must start the application. To manually start the application, go to **Container Applications > Containers Status**. In the CONTAINER LIST table, click the START button in the Action column.*

1. In the CONTAINER LIST table, check that the Status is **Running**.
2. Click LOGS to view the application log file, as shown below. The LOGS button is not available when viewing AirLink OS in ALMS. Your computer must be directly connected to the router and logged into AirLink OS in order to download container application logs.

With a successful configuration, the logs will state “Found config file with contents”, “Successfully registered...”, “Broadcast mode enabled...” and so on.



Note: After you have confirmed the application is running correctly, Semtech recommends enabling autostart to ensure the application runs after the router is rebooted or powered off/on. To enable autostart, edit the container in the CONTAINER LIST table (click the three dots at the end of the row) and enable AUTOSTART, then click UPDATE and SAVE.

Wireshark

You can also use Wireshark to verify that application data is being sent. Connect a laptop on the appropriate interface/LAN segment, and using Wireshark, filter output on the configured UDP port (port 21010 by default). If you right click on a message and select **Follow UDP** you get a human readable version of the broadcast in progress.

Confirming the LAN Segment

To confirm where the application is running, go to **Hardware Interfaces > General > Configuration**, and view the LAN SEGMENTS table. The application will appear in the **Interface** column. Check the LAN segment the application is running on.

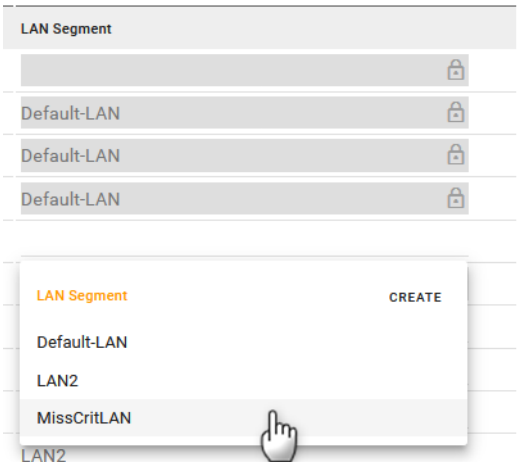
Note: The application does not appear in the LAN SEGMENTS table until it has run successfully. If the application has not started (because autostart was disabled when the template was applied, or the config file contained an error) then the container will not appear in the LAN SEGMENTS table, and you will not be able to change the application's LAN segment, either manually or using a template, as described below. If container autostart was disabled when the template was applied, the application would need to be manually started and then stopped again before it appears in the table.

Changing the LAN Segment

You can change the LAN segment the application runs on if you find the application is not running in the correct LAN segment. Before changing the LAN segment, you must first stop the application (if it was set to Autostart).

To change the LAN segment:

1. Go to **Hardware Interfaces > General > Configuration**, and view the LAN SEGMENTS table.
2. In the LAN SEGMENTS table, look in the **Interface** column to find where the application is running.
3. In the table row that applies to the application, click **x** in the LAN Segment field.
4. Select the new LAN Segment for the application.



5. Click SAVE.

Adding the Container to a Template

For more information on creating templates using ALMS, see the ALMS documentation.

Note: The aim of this procedure is to create a configuration template that can be applied to a fleet of routers. The template can include not only the container settings, but all the settings required to deploy the routers in the field. You can apply a template only to the same router types running the same AirLink OS version as the router on which you created the template (XR90 routers running AirLink OS 5.0.65, for example).

Note: As of AirLink OS 5.0, any custom LAN segments are not included in the template.

To create a device template with the container settings and associated network configuration:

1. In AirLink OS, click the Templates icon ( ) and select **Create template from current configuration**.

2. Add any required passwords to the template.

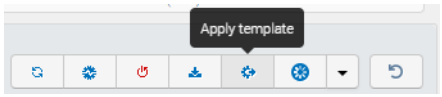
Note: For security reasons, passwords are not automatically saved to a template. You must manually re-enter any passwords that you want to apply to other routers using a template. For example, you may need to duplicate RSB user account credentials (that you set in Add a New User on page 3) across many routers. In that case, you should, while in template mode, edit the account settings, clear the password, re-enter the current password, and then click UPDATE. You can then save/export the template file.

3. Click EXPORT..., select EXPORT TO MY ALMS ACCOUNT and then save the file. Select EXPORT TO FILE if you wish to save the file to your computer.

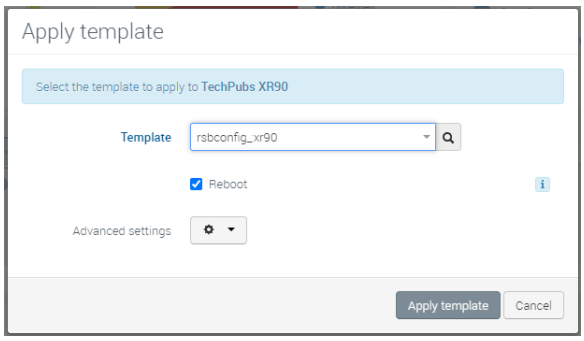
Applying the template

In ALMS, you can apply the template to multiple devices:

1. Go to Monitor > Systems.
2. If necessary, use the Filters to find systems with the same Firmware Name (AirLink OS XR90, for example) and Firmware revision (4.1.26, for example). You can apply a template only to systems with the same Firmware name and revision as the system on which you created the template.
3. Select the systems to which you want to apply the template.
4. Click **Apply template**.

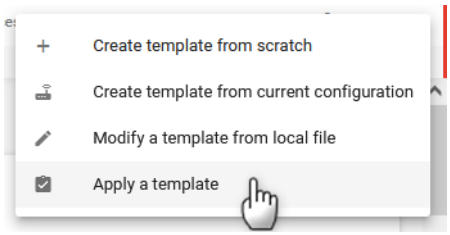


5. Select the template, and then click **Apply template**.



When using AirLink OS locally, you can apply a template to a single router:

1. In AirLink OS, click the Templates icon ( ) and select Apply a template.



2. Browse to the template file (saved to your computer using EXPORT TO FILE as described in Adding the Container to a Template), and then click Open.
3. Click SAVE.

Post-Template Application Considerations

The previous procedure adds the required settings for the router to run the RSB application.

After the template has been applied, the image will automatically download. If the container Autostart feature was enabled, it will automatically start to run.

To view the download progress, go to Container Applications > Images, and view the Status in the IMAGES table ("fetching image config", or "pulling image", for example).

As well, the application, once downloaded, does not appear in any custom LAN segment that might have been included in the template[1]. The application will reside on the Default LAN segment, no matter what LAN segment the application resided on when you created the template. To change the LAN segment, see Changing the LAN Segment on page 11.

1. As of AirLink OS 5.0, the LAN segment is not included in the template.

JSON Data

This section describes the JSON schema used to broadcast the router status, and provides an example broadcast.

Broadcast Router Status—JSON Schema

```
{
    "$schema": "http://json-schema.org/schema#",
    "title": "routerStateBeacon",
    "type": "object",
    "required": ["timestamp"],
    "properties": {
        "timestamp": {
            "type": "object",
            "properties": {
                "date": {
                    "type": "string"
                },
                "time": {
                    "type": "string"
                }
            }
        },
        "appVersion": {
            "type": "string"
        },
        "version": {
            "type": "string"
        },
        "vehicleID": {
            "type": "string"
        },
        "wanState": {
            "type": "array",
            "items": {
                "type": "object",
                "properties": {
                    "friendlyName": {
                        "type": "string"
                    },
                    "networkType": {
                        "type": "string"
                    },
                    "status": {
                    "type": "number"
```

```
            },
            "active": {
            "type": "boolean"
            },
            "active6": {
            "type": "boolean"
            },
            "signalStrength": {
                "type": "number"
            },
            "RSSI": {
                "type": "number"
            },
            "RSRP": {
                "type": "number"
            },
            "RSRQ": {
                "type": "number"
            },
            "SINR": {
                "type": "number"
            }
        }
    }
},
"vpnState": {
    "type": "array",
    "items": {
        "type": "object",
        "properties": {
            "friendlyName": {
                "type": "string"
            },
            "status": {
            "type": "number"
            }
        }
    }
},
"generalInformation": {
    "type": "object",
    "properties": {
        "ignitionOn": {
            "type": "boolean"
        },
```

```
                "mainBatteryVoltage": {
                    "type": "number"
                }
            }
        },
        "gnssStatus": {
            "type": "object",
            "properties": {
                "fix": {
                    "type": "boolean"
                },
                "numberSatellites": {
                    "type": "number"
                },
                "antennaConnected": {
                    "type": "boolean"
                }
            }
        },
        "location": {
            "type": "object",
            "properties": {
                "latitude": {
                     "type": "number"
                },
                "longitude": {
                     "type": "number"
                }
            }
        }
    }
}
```

Router Status Broadcast Example

An example of a router status broadcast output .json file is shown below.

```
{
    "appVersion": "0.9",
    "version": "4.3.0.1",
    "generalInformation": {
        "mainBatteryVoltage": 24.289,
        "ignitionOn": true
    },
        "wanState": [
    {
```

```
        "friendlyName": "LPWA - Out-of-Band Management",
        "networkType": "cellular-4G",
        "status": 1,
        "active": false,
        "active6": false,
        "signalStrength": -101,
        "RSSI": -101,
        "RSRP": -140,
        "RSRQ": -20,
        "SINR": -200.0
    },
    {
        "friendlyName": "CellCarrier AAA",
        "networkType": "cellular-4G",
        "status": 1,
        "active": true,
        "active6": true,
        "signalStrength": -57,
        "RSSI": -57,
        "RSRP": -85,
        "RSRQ": -8,
        "SINR": 14
    },
    {
        "friendlyName": "CellCarrier BBB",
        "networkType": "cellular",
        "status": 0,
        "active": false,
        "active6": false,
        "signalStrength": -200.0,
        "RSSI": -200.0,
        "RSRP": -200.0,
        "RSRQ": -200.0,
        "SINR": -200.0
    },
    {
        "friendlyName": "Ethernet 2",
        "networkType": "ethernet",
        "status": 0,
        "active": false,
        "active6": false
    },
    {
        "friendlyName": "SATWANModem",
        "networkType": "ethernet",
```


"SATWANModem" is an example of a WAN device connected to an Ethernet WAN-configured port on the router. The friendly name represents its function or use.

```
            "status": 1,
            "active": false,
            "active6": false
        },
        {
            "friendlyName": "Wi-Fi Client 2.4GHz",
            "networkType": "wifi",
            "status": 0,
            "active": false,
            "active6": false,
            "signalStrength": -9999
        },
        {
            "friendlyName": "Wi-Fi B 5GHz",
            "networkType": "wifi",
            "status": 0,
            "active": false,
            "active6": false,
            "signalStrength": -9999
        }
    ],
    "vpnState": [
        {
            "friendlyName": "VPN",
            "status": 1
        }
    ],
    "gnssStatus": {
        "antennaConnected": true,
        "numberSatellites": 4,
        "fix": true
        },
    "location": {
        "latitude": -35.04146,
        "longitude": 138.51674
    },
    "vehicleID": "SWI1",
    "timestamp": {
        "date": "05202023",
        "time": "0213"
    }
}
```

Document History

Revision number	Release date	Changes
1	April 2024	First release for AirLink OS 5.0
2	May 2024	Added AirLink Premium requirement and link to EULA
3	October 2024	Added step to enable Container Applications and other edits

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