TARANA

BROADBAND REINVENTED

TCS Release Notes for CBRS 2022-10

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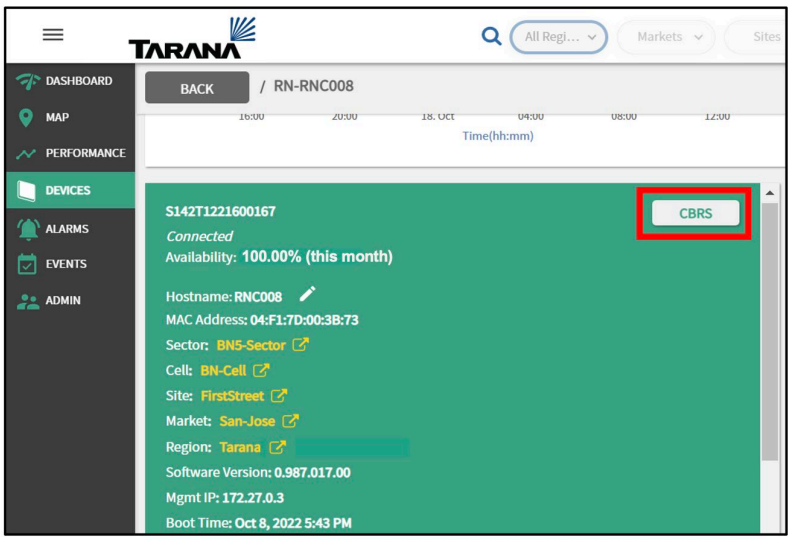
This document is intended for use by Tarana customers and their employees who use Tarana Cloud Suite (TCS) to monitor, manage, and troubleshoot a Tarana G1 network, which consists of Tarana Base Nodes and Remote Nodes (BNs and RNs). G1 BNs and RNs use the unlicensed spectrums 5 GHz and 3 GHz (CBRS).

Note: For the most up-to-date documentation and videos, see our support portal at: https://support.taranawireless.com/hc/en-us

CBRS UI Card Enhancements

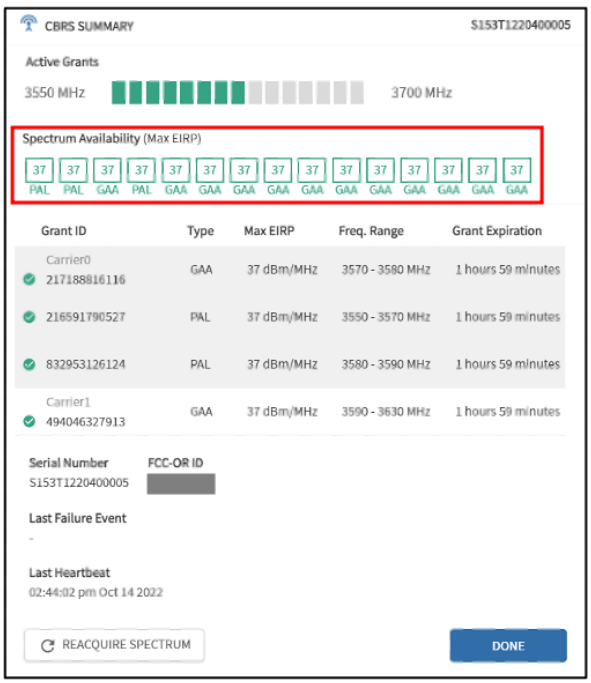
Customer Application

TCS users can now find additional information in the CBRS summary window for both the RN and BN. This window is found by clicking on 'CBRS' in the top left corner of the green Device Summary card in the device's individual device page. The 'CBRS' button is also an indicator for the status of the CBSD. In case of any error conditions such as registration or grant failures, the button will turn red to alert the user.

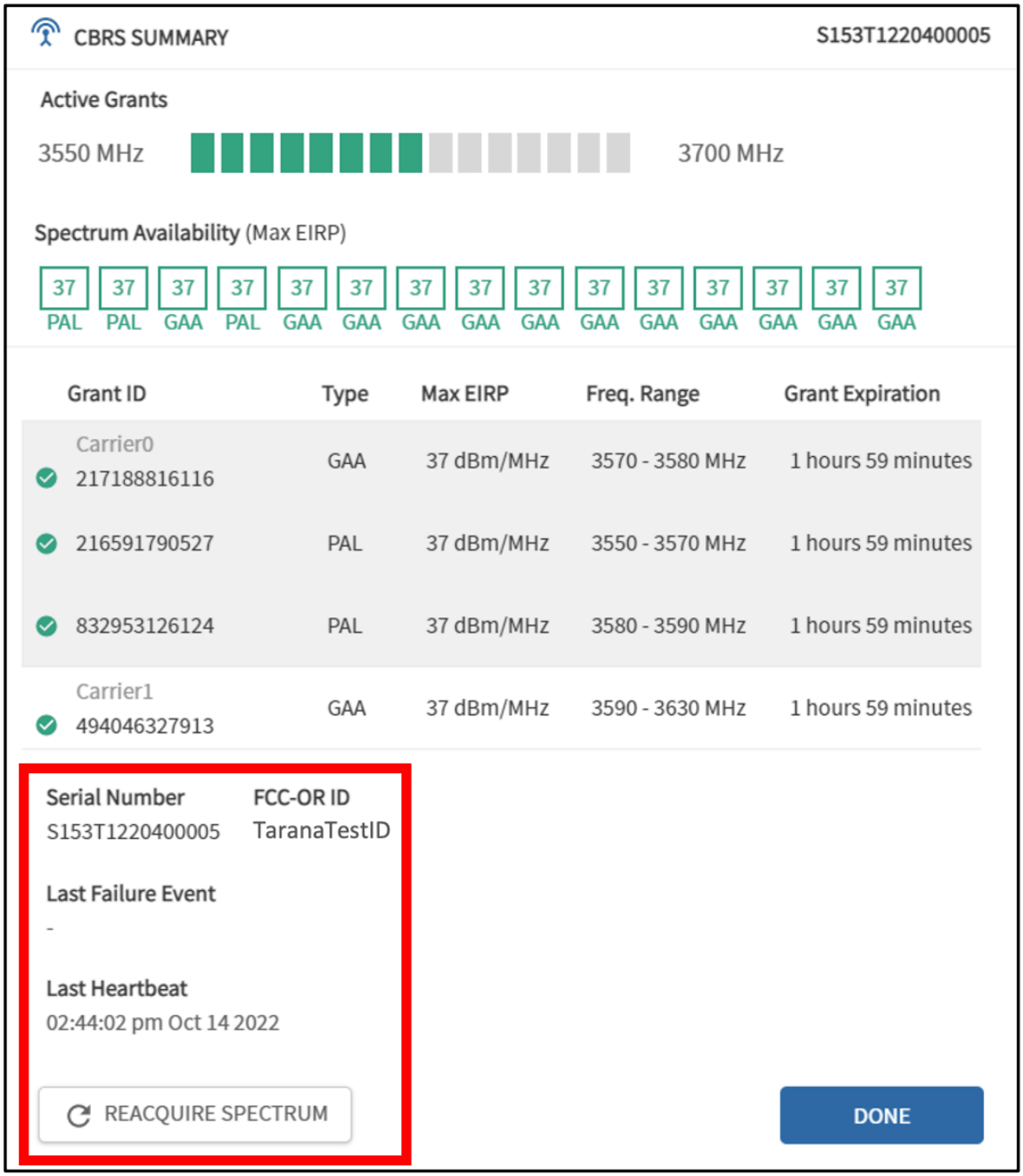


Feature Description

The BN now displays Spectrum Availability, which includes the maximum EIRP for each grant and labels each as PAL or GAA.



The CBRS Summary window now shows the Last Failure Event and Last Heartbeat listed with corresponding timestamps for both the BN and RN. There is also an option to reacquire spectrum.



PAL Support

Customer Application

Tarana devices now support Priority Access License (PAL) frequencies. Operators who have purchased PAL licenses and have them enabled with the SAS vendor will now be able to receive PAL grants. PAL grants in the CBRS band have a higher priority than General Authorized Access (GAA) grants. Each PAL grant consists of a 10-MHz channel within the 3550-3650 MHz portion of the CBRS band.

To maximize the spectrum (up to 80 MHz) utilized by a device, it is necessary to use a combination of both PAL and GAA grants. This upgrade enables multi-grant support which allows for the interleaving of both PAL and GAA grants.

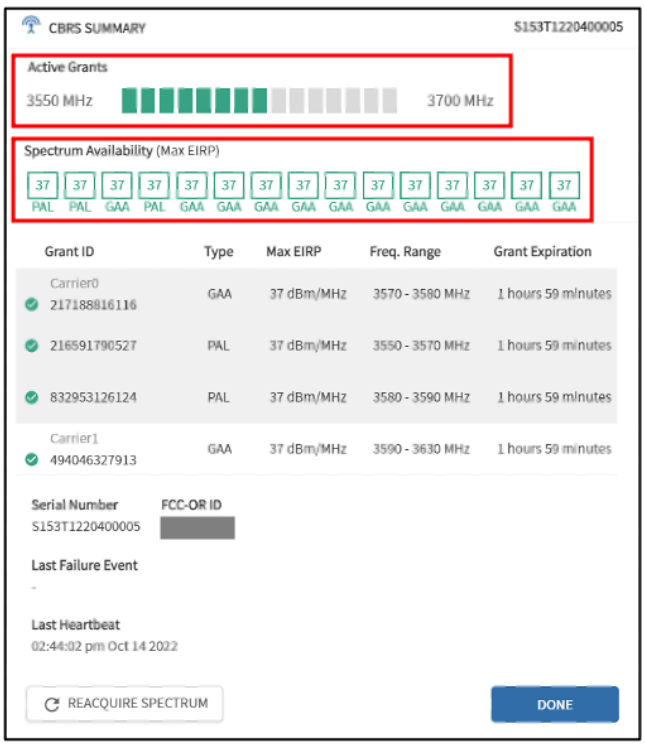
The CBRS Spectrum Access System (SAS) utilized by the TCS Operator will verify that the Citizens Broadcast Radio Service Device (CBSD) is properly registered for the PAL frequencies and will appropriately authorize and assign their use. The SAS will also ensure proper interference protection from GAA users in areas where there are PAL grants.

Feature Description

The assigned PAL grants can be seen by going into the BN's individual device page and clicking the CBRS button in the green information card.

The actual grants allocated to the device can be seen at the top of the window under Active Grants. Details about available PAL vs. GAA grants, including the maximum EIRP of each, can be seen under Spectrum Availability and are labeled either PAL or GAA.

In the event of activation of a Dynamic Protected Area (DPA), the Tarana Domain proxy (DP) will automatically request new grants for the affected devices.



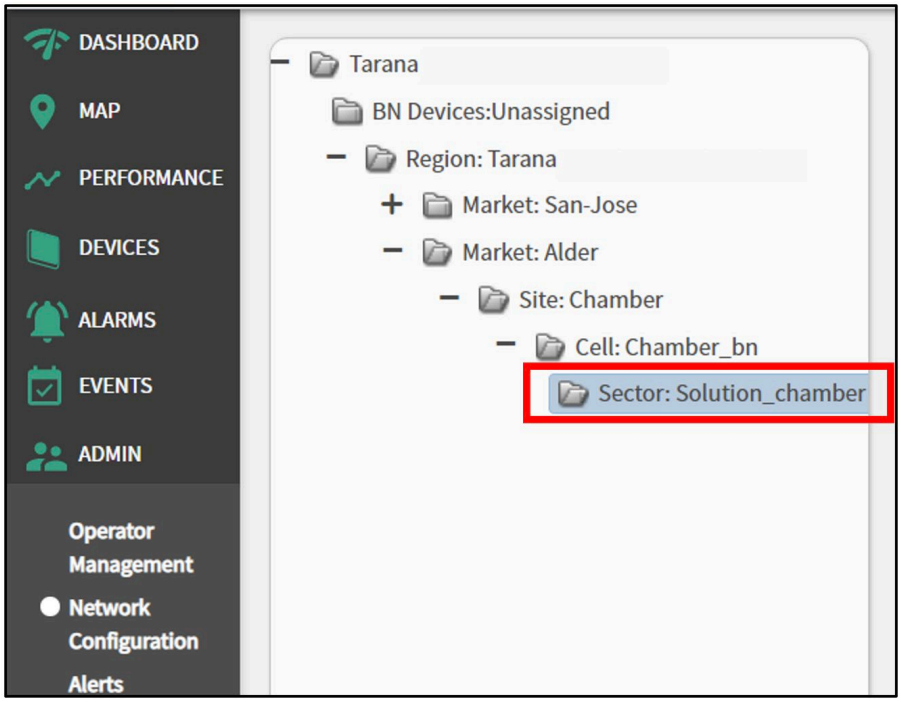
Spectrum Management: Preferred and Excluded Frequencies

Customer Application

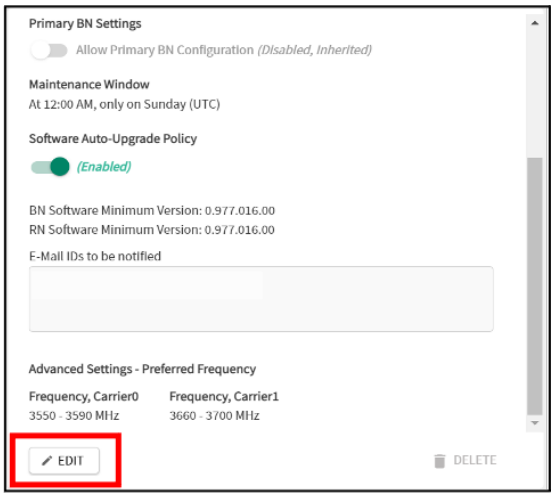
There is now an option that allows TCS users with OP Admin rights to manage CBRS frequencies on Tarana devices.

Feature Description

Configure this feature in TCS under Admin> Network Configuration at the Sector.

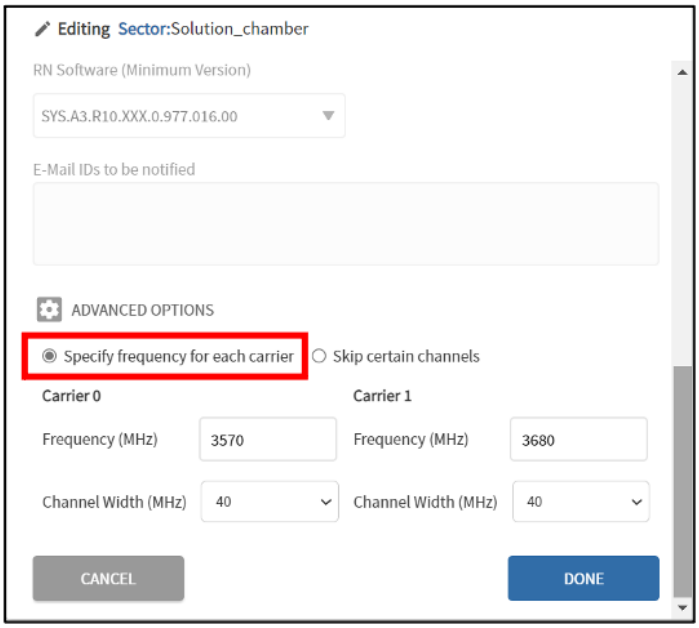


Click the Edit button at the bottom of the Sector configuration window.

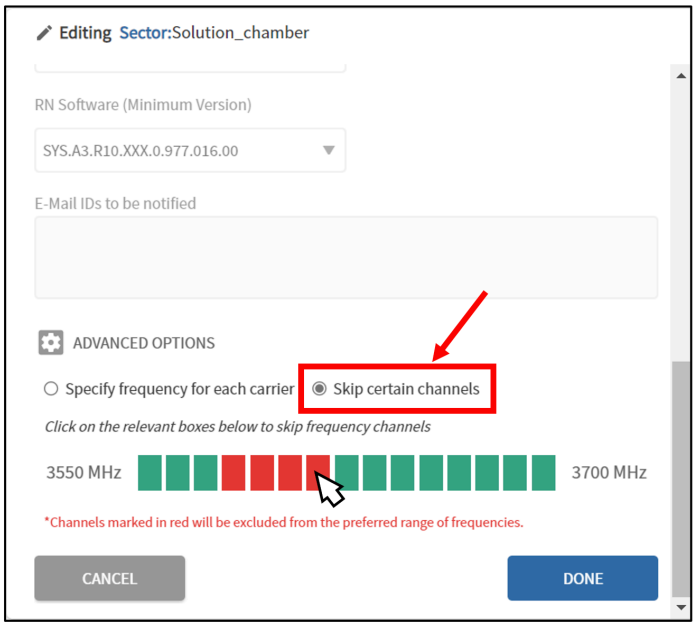


Under Advanced Options, one of two selections can be made for spectrum management. The first option allows a specific center frequency and width to be set for each carrier. When choosing width, it is important to ensure the edge of the carrier does not overlap with an unavailable grant, or go beyond the CBRS band.

Note: The center frequency must be chosen based on the carrier width. For widths of 10 MHz and 30 MHz, the center frequency should be odd multiples of 5 MHz and for widths of 20 MHz and 40 MHz, it must be even multiples of 5 MHz. Both center frequency and width must be provided for preferred frequency setting below.

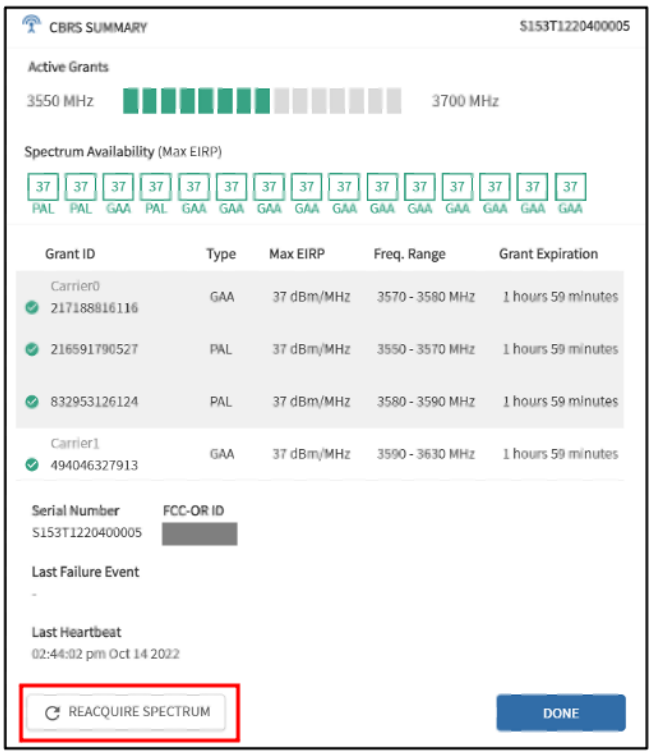


The second option allows 10-MHz increments of the frequency band to be blocked from use. Select "Skip certain channels" and then click on the relevant green grant boxes. The red boxes indicate channels that are blocked.



After configuring the preferred or excluded (skip) frequencies spectrum must be reacquired.

From this BN's individual device page, click on CBRS in the green information card and click Reacquire Spectrum in the CBRS Summary window. This is service-affecting, as any associated RNs will lose their connection until the BN reacquires spectrum. The new grants will be visible on this card after 30 sec.



Note:

1. Reacquire spectrum can be used for either BN/RN to request new grants in case of any grant failures.
2. Reacquiring spectrum on the BN will cause all links (RN) on that sector to go down.
3. Reacquiring spectrum on the RN will impact the given RN link (there is a UI bug which shows incorrect message for the RN stating it will impact all links on the sector, please ignore this message).

Known Limitations: CBRS

Description	Workaround
BN will not be able to accept RN connections if it only has grant on Carrier1	Set Preferred Frequency (from Spectrum Management) and trigger 'REACQUIRE SPECTRUM'
RNs will not be able to connect to the BN if the spectrum provided by the SAS for the RN is different from the BN spectrum (asymmetric grants/spectrum between BN/RN).	Using Spectrum Management, update BNs spectrum to match what is available at the RN.
After 'REACQUIRE SPECTRUM' is triggered, the CBRS SUMMARY card shows stale information.	The card will update once reacquisition is completed (~ 30 seconds).
When an RN disconnects from one BN and connects to another one, if the frequencies of the new BN are different from the earlier one, the RN could take up to 20 minutes to get new grants.	Use the 'REACQUIRE SPECTRUM' button to request new grants immediately.

Network Profile 2

Customer Application

In a Tarana G1 network, the Network Profile parameter defines the maximum distance that an RN can be from its BN as well as the downlink to uplink ratio of the TDD frame and the number of symbols used. Previous to this release, only Network Profile 1, 5, and 6 were supported. Customers can now deploy CBRS RNs up to 30 km away from the BN using Network Profile 2. All BNs in a given area (one's which can hear each other from RF signal perspective) MUST use the same network profile setting when using universal frequency reuse of 1.

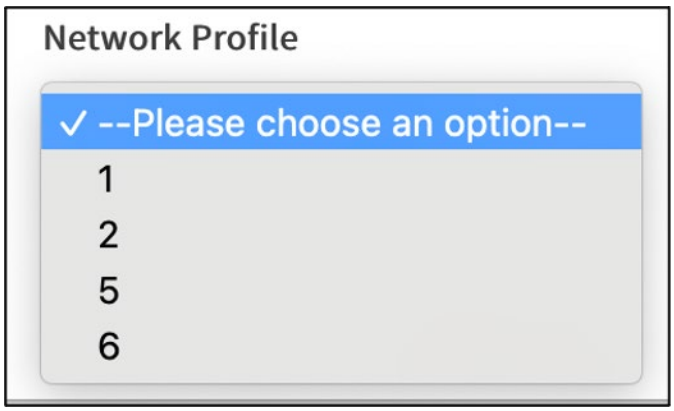
Feature Description

Network Profile 2 has been added to TCS and is now supported. CBRS BNs and RNs running device code version 0.988 or greater can take advantage of this new network profile.

Previous network profile settings (1, 5, and 6) supported a maximum link from BN to RN of 15 km. With Network Profile 2, the maximum link supported is 30 km. The DL to UL ratio is 4:1 and use 32 DL symbols and 8 UL symbols.

Network Profile	Max Cell Range	DL Symbols	UL Symbols	DL:UL Ratio
1	15km	36	8	4.5:1
2	30km	32	8	4:1
5	15 km	32	12	2.67:1
6	15 km	28	16	1.75:1

This parameter is configurable by TCS users with a role of OP Admin. The parameter is set under Admin> Network Configuration at the Market and Cell levels.



Primary BN

Customer Application

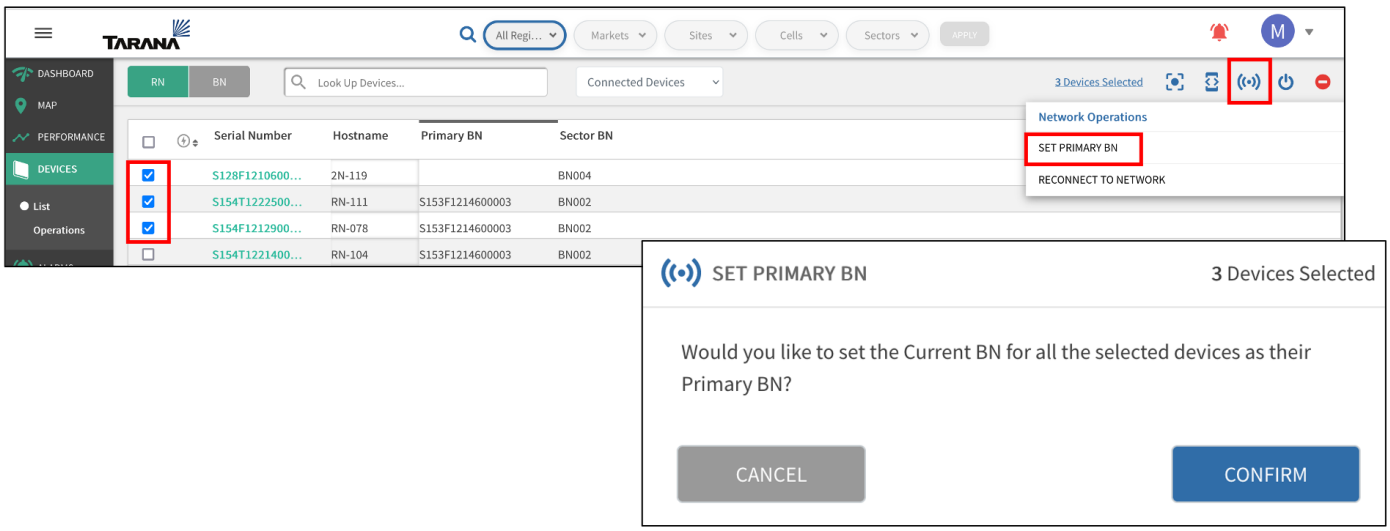
Typically, when an installer installs a RN, the direction/azimuth and tilt of the RN are aligned to connect to a particular BN based on RF planning. If this "primary" BN reboots for whatever reason, the RN may connect to an alternate BN if available. The alternate BN may not be the optimal but could provide connectivity while the primary BN is down. Please note that the installer's primary BN may or may not be the optimal BN for that RN.

Previously, an RN connected to an alternate BN does not switch back to its primary BN when that BN comes back online. This new feature allows a user to specify a primary BN on a per-RN basis. This allows TCS to notify network administrators if an RN is associated to a different BN.

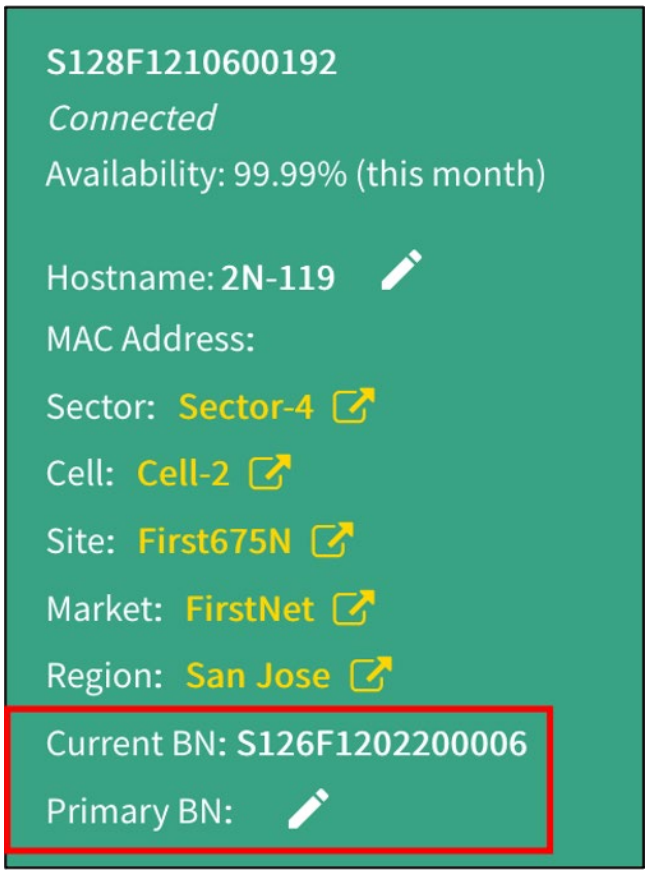
Feature Description

As soon as an RN is installed and connects to a BN, TCS begins to monitor the link's stability. If that link stays connected for 8 hours that BN is marked as the Primary BN by TCS automatically. The Primary BN for an RN can be set either from the Devices table or from an individual RN's device page. The Devices table allows customers to set the Primary BN for multiple devices. The Primary BN parameter is editable by any user with a NOC Operator or higher user role.

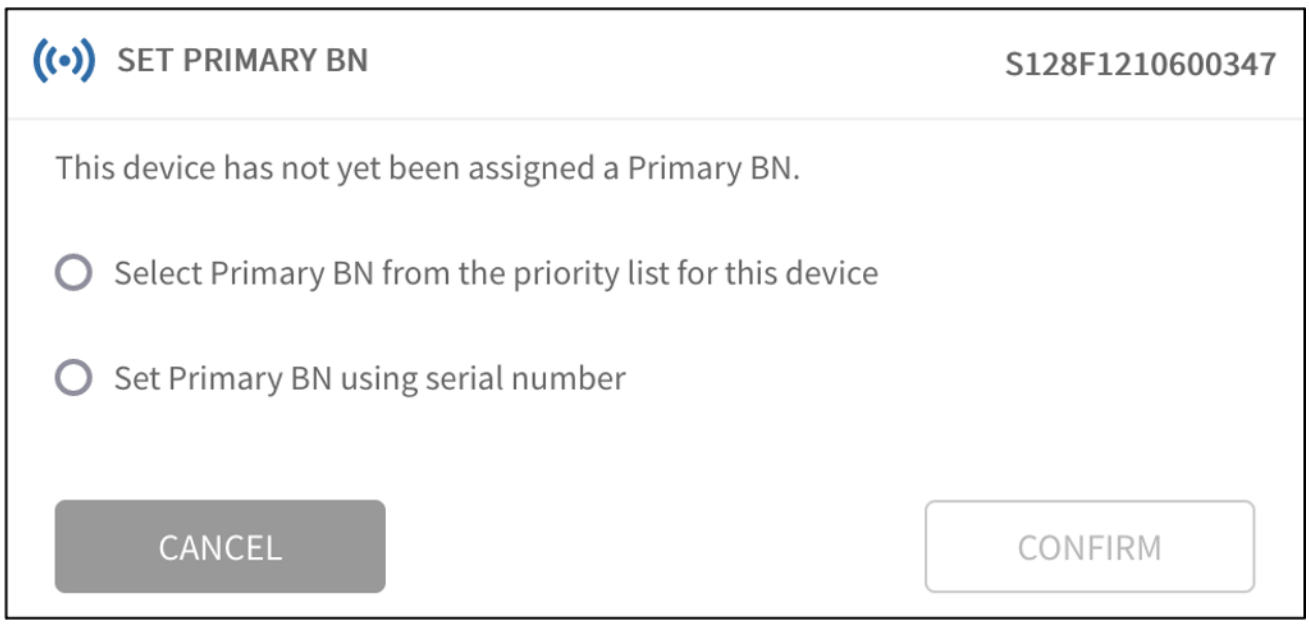
To set the current BN for multiple RNs, select the RNs from the Devices table (blue check). In the upper right corner, click on the Network Operations icon and click Set Primary BN. Click Confirm.



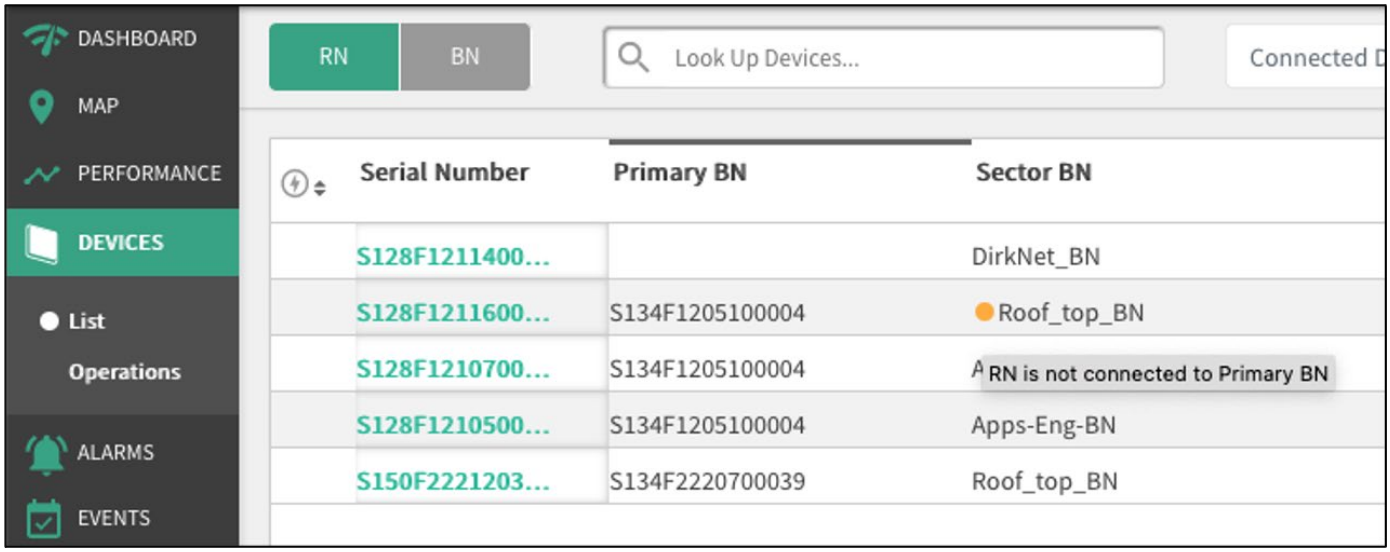
Two new parameters have been added to the RN's individual device page in the device summary box. The current BN identifies the RN' currently associated BN.



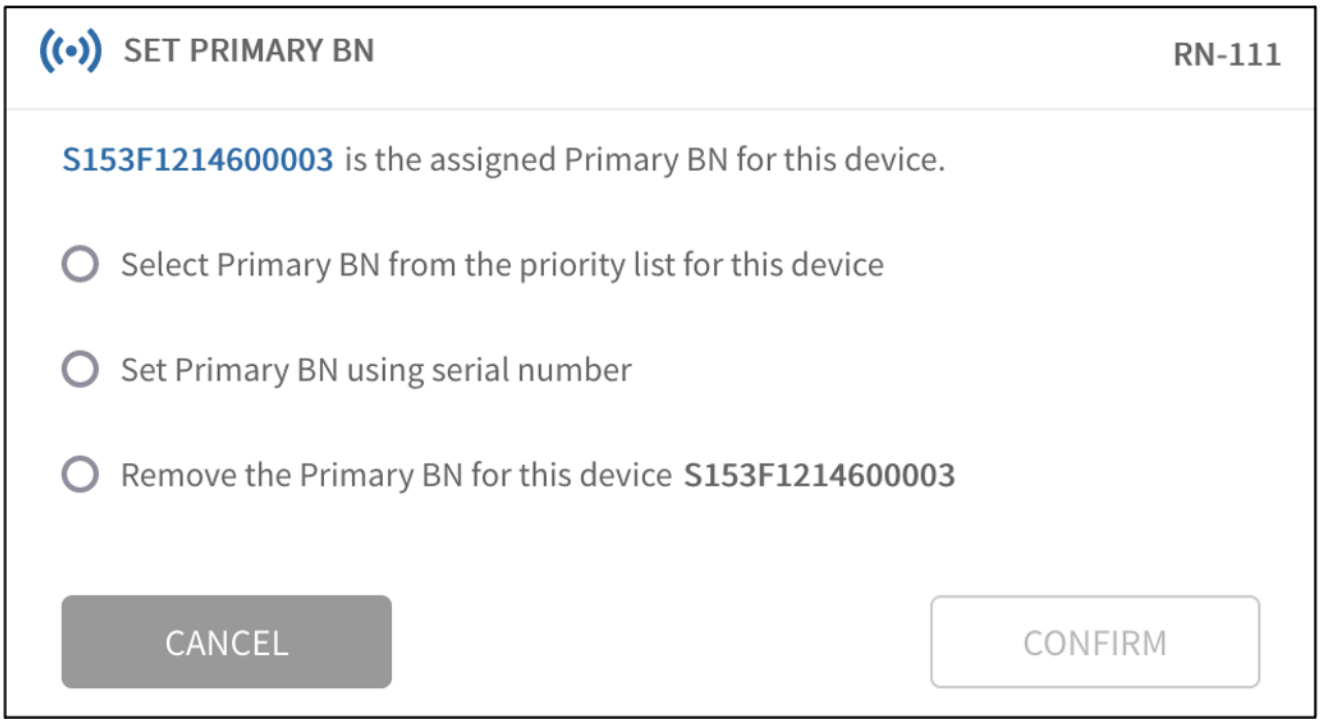
To set the primary BN parameter, click the pencil icon to open the Set Primary BN window. A BN may be specified by serial number or can be selected from the BN list the RN compiled when it last booted or completed a BN search metric.



In the event that an RN loses connectivity with its designated primary BN and resumes connectivity with TCS through an alternate BN, a yellow circle icon next to the RN's Sector BN in the Devices List page will alert the administrator. The administrator can see more information about this alert by simply mousing over the yellow circle icon.



An RN with a previously set Primary BN can use those same parameters to set a new primary BN. Optionally, the primary BN designation can be removed. In the event of a lost BN connection, this will revert the RN's behavior to that seen before the Primary BN feature was added.



Note: Primary BN is an optional opt-in feature. This feature can be enabled (or disabled) globally for all sectors or on a per sector basis. Note that when the feature is enabled, the currently connected BN is set as the primary BN by default if the RN stays connected to this BN for at least 8 hours. The user is allowed to change this to any other BN at any time.

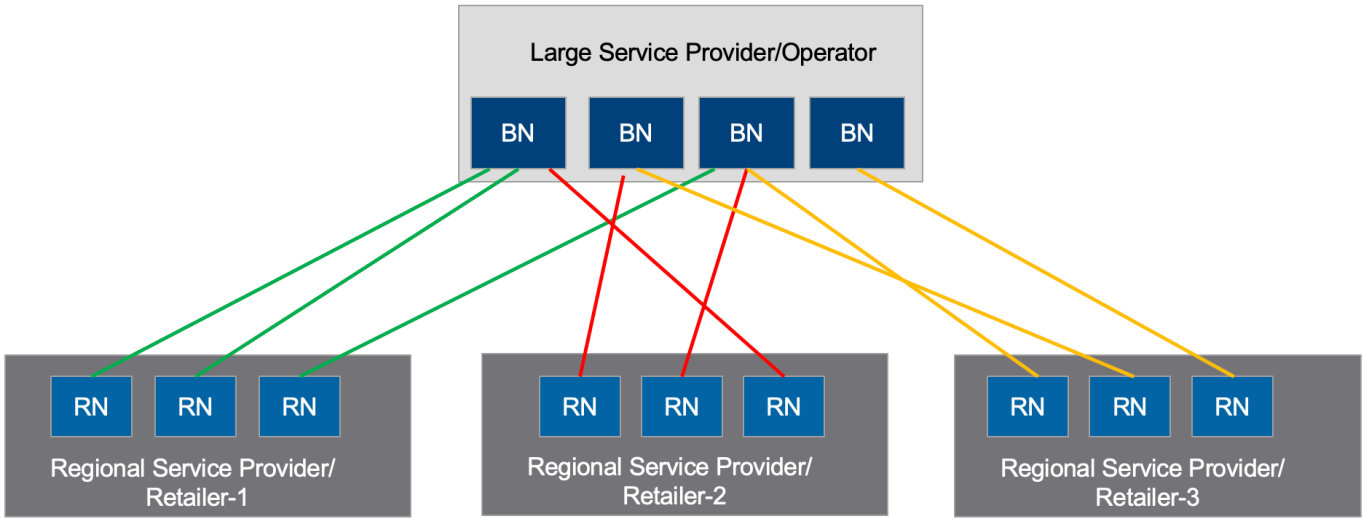
Dependency: RNs must be running version 0.980 device software in order for this feature to work as intended. If RNs are running an older version of software while this feature is enabled in TCS, the Primary BN parameter will be ignored and the configuration will have no effect on the RNs.

Multi-Tenant Support for Retailer*

Customer Application

Large service providers (SP) can deploy and own the network infrastructure down to the BN level and allow different retailers to acquire subscribers and then install and manage their own RNs associated to the SP BN. In this application:

- BNs are owned and operated by a large Service Provider (SP)
    - Each BN may have connected RNs belonging to different Retailers
- Retailers are smaller regional service providers providing internet service to their subscribers
    - RNs are owned and operated by these Regional Service Providers/Retailers
    - RNs from different Retailers may connect to the same BN



***Note:** This feature is applicable only for operators that run wholesale networks. No action is needed by any other operator. To discuss implementing this feature, contact your Tarana representative.

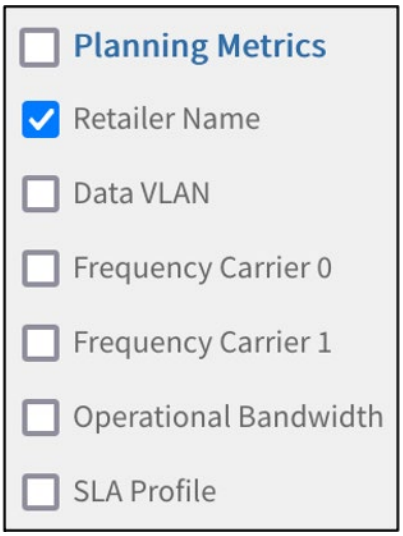
Feature Description

Sectors (BNs) can be shared across multiple retailers, i.e. the RNs connected to a BN may not all belong to the same retailer. The BN is owned by the large SP (using its operator id and default retailer id), whereas RNs will have their respective retailer ids (but operator id of the large SP).

Retailers to be able to manage their respective RNs and also have read-only visibility to the BNs their RNs are associated to in the network.

- Large SP will create and manage the TCS hierarchy and manage their BNs
- Retailer users will provision and manage the RNs in their own network
- BNs that belong to the Large SP are visible to Retailers with limited information
    - Retailer users cannot perform any device operations such as rebooting a BN, making configuration changes, or software upgrades
- A Northbound API will support adding RNs under a specific Retailer

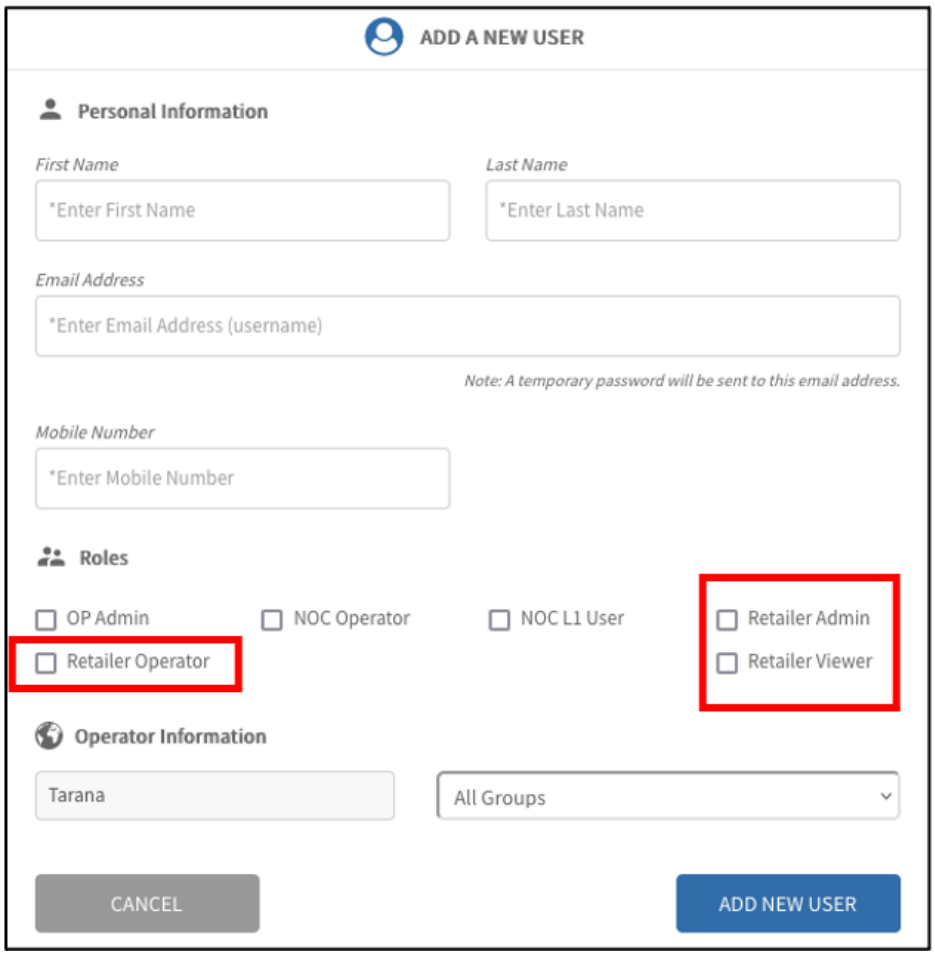
A new parameter, Retailer Name, has been added under the RN's Planning Metrics.



Three new user roles have been added to TCS to support this feature. Under Admin> User Management, a TCS user with OP Admin rights can create and define new user accounts. Three new options to support multi-tenancy for retailers are:

- Retailer Viewer: Read-only access to their devices (RNs)
- Retailer Operator: Both read and write access to their devices. This allows for making configuration changes, rebooting an RN, and upgrading software on their RN.
- Retailer Admin: All the privileges as Retailer Operator plus the ability to create users for their organization (Retailer).

Each of these user roles will have limited read-only access to the BNs associated to their RNs.



For this feature, Tarana will create "Retailers" on behalf of the large service provider operators with wholesale networks. The operator will then be able to assign RNs under those retailers using a BULK PATCH API:

```
curl --location --request PATCH
'https://api.cloud.taranawireless.com/v1/network/radios/<SERIAL-NO>' \
--header 'Content-Type: application/json' \
--header 'x-api-key: <API-KEY>' \
--data-raw '{
{
   "deviceConfigs": [
  {
   "serialNumber": "S154XXXXXXXXXX",
   "config": {
   "retailerName": "TripleARated"
  }},
{
   "serialNumber": "S005XXXXXXXXXX",
   "config": {
   "retailerName": " TripleARated"
  }}
 ]
}
```

To see retailer information:

```
curl --location --request GET
'https://api.cloud.taranawireless.com/v1/network/radios/<SERIAL-NO>' \
--header 'x-api-key: <API-KEY>'
```

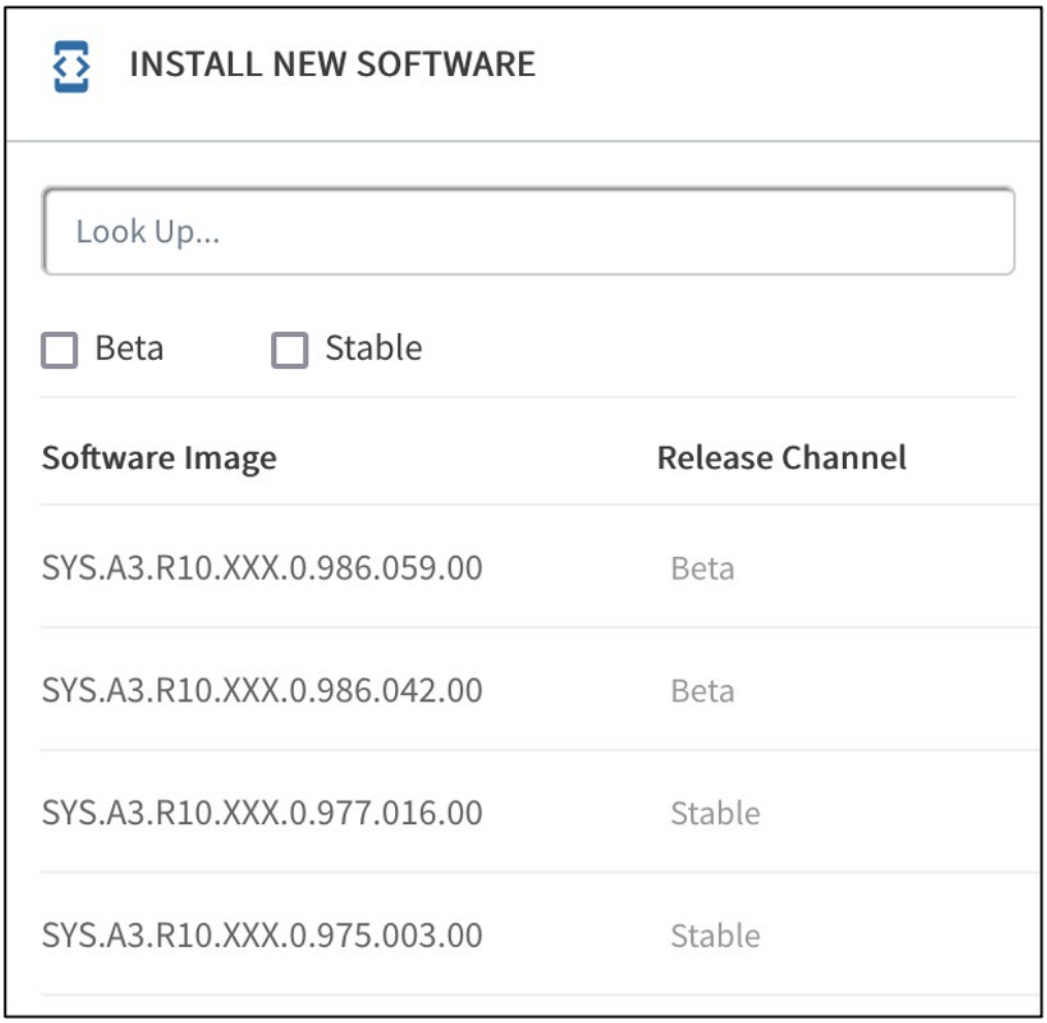
returns

```
{ data:{
         "retailerName": "TripleARated"
         },
  error : null
}
```

Software Inventory Service

Customer Application

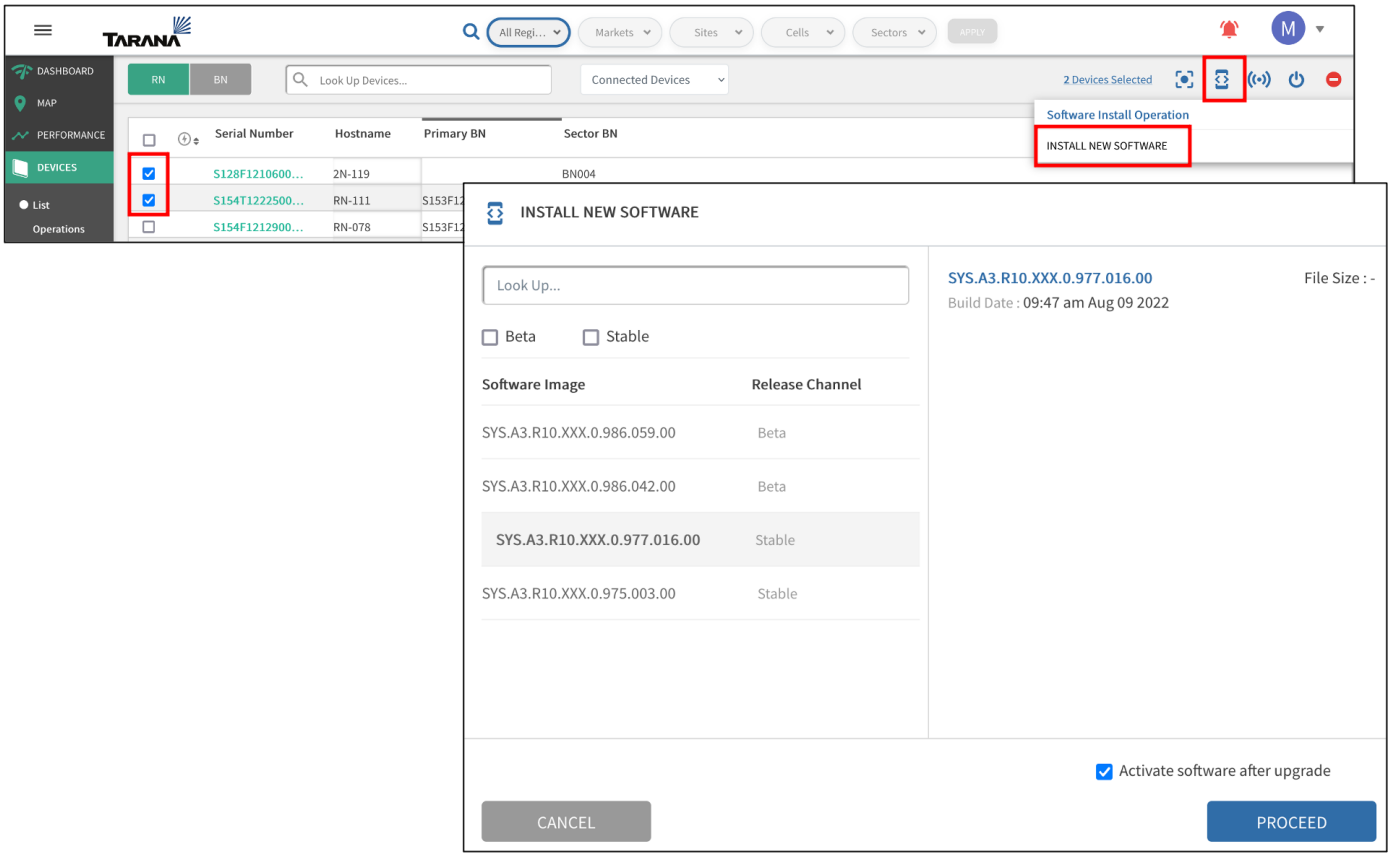
Previously, device software releases included only the release number with no further details. This feature adds a release channel descriptor with values of “Beta” or “Stable”. This enables customers to clearly distinguish between “stable” vs. “beta” device software images when determining which build of device software to select when upgrading BNs and RNs. They can also search and filter the software images as needed.



Feature Description

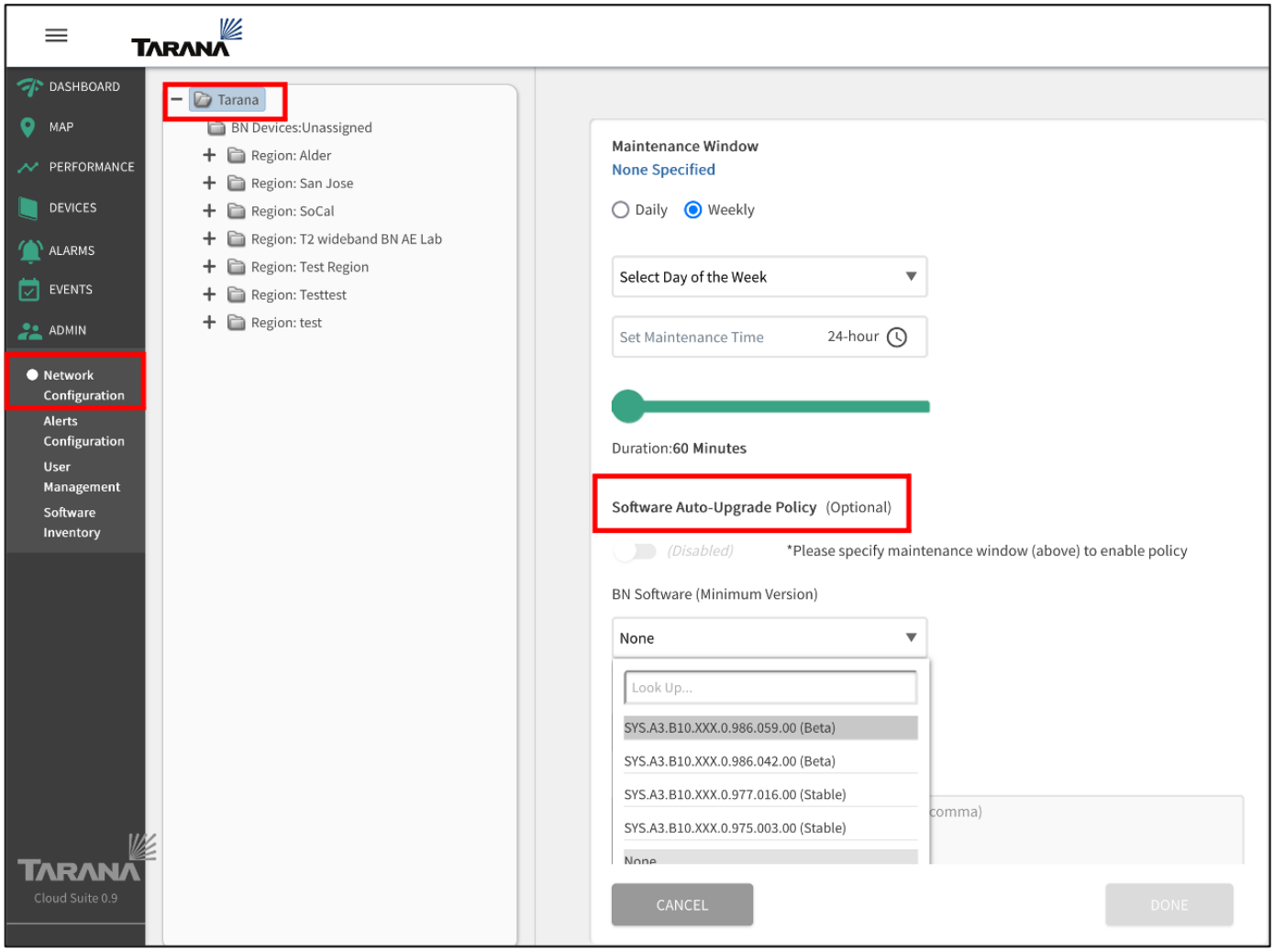
Within TCS, device software can be manually upgraded from either from the Devices table or from an individual device page. The Devices table allows customers to upgrade the software for multiple devices. Users with a NOC Operator or higher user role can upgrade device software.

To upgrade the software for multiple devices, select the devices from the Devices table (blue check). In the upper right corner, click on the Software Install icon and click Install New Software. Select the desired software version and click Proceed.



To automate device software upgrades, under Admin> Network Configuration, edit the Operator page to set the Software Auto-Upgrade Policy. This policy can be overridden on a per-sector basis under Admin> Network Configuration.

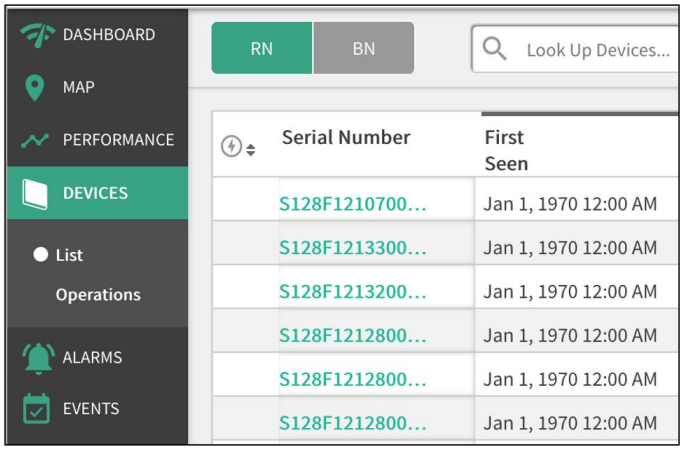
Note: Only users with OP Admin rights can make configuration changes under Admin.

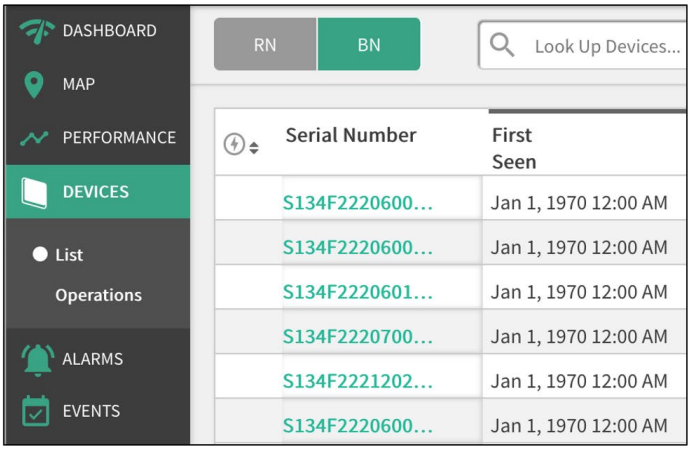


Update to First Seen Parameter

Customer Application

A parameter introduced early in 2022, First Seen, has an update to the values shown. First Seen is available for both BNs and RNs in the Devices List table and is used to establish the device warranty period.





Feature Description

There is no configuration needed either on the device or TCS.

The First Seen date is used to establish the device warranty period. All devices that were connected to TCS prior to the First Seen parameter being introduced already have their warranty period assigned and will have a value of "Jan 1, 1970 12:00 AM" (UTC) as the First Seen date. For these devices the parameter should be ignored.

Note: The Jan. 1, 1970 12:00 AM timestamp for First Seen is based on the user's time zone in TCS being set at UTC. Any other time zone setting will result in a date of Dec. 31, 1969.

About Tarana

Tarana Wireless, Inc. is the performance leader in fixed wireless access network solutions, powered by a number of industry-first and well-proven breakthroughs in perfect, multidimensional optimization of radio signals. Its Gigabit 1 fixed access system overcomes previously insurmountable network economics challenges for service providers in both mainstream broadband and underserved markets, using free unlicensed spectrum. The company is headquartered in Milpitas, California, with additional research and development in Pune, India. For more information, visit taranawireless.com.