Cambium Networks™

USER GUIDE

Home Mesh Router

Release 1.1.0

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Contents

About This User Guide

This section describes the following topics:

This User Guide describes the features supported by Home Mesh Routers, and provides detailed instructions for setting up and configuring Home Mesh Router.

Intended audience

This guide is intended for use by the system designer, system installer, and system administrator.

Purpose

Cambium Network's Home Mesh Router documents are intended to instruct and assist personnel in the operation, installation, and maintenance of Cambium's equipment and ancillary devices. It is recommended that all personnel engaged in such activities be properly trained.

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Cross references

References to external publications are shown in italics. Other cross references, emphasized in blue text in electronic versions, are active links to the references.

Feedback

We appreciate feedback from the users of our documents. This includes feedback on the structure, content, accuracy, or completeness of our documents. To provide feedback, visit our support website: https://support.cambiumnetworks.com.

Related documents

The table below provides details of related documents for Home Mesh Router.

Document Name	Location
Home Mesh Router Product Details	https://www.cambiumnetworks.com/products/wifi/#residential
Home Mesh Router User Guide (This document)	https://support.cambiumnetworks.com/files
Home Mesh Router Release Notes	https://support.cambiumnetworks.com/files
cnMaestro Cloud User Guide	https://docs.cloud.cambiumnetworks.com/help/5.0.0/index.htm
Software Resources	https://support.cambiumnetworks.com/files
Community	http://community.cambiumnetworks.com/
Support	https://www.cambiumnetworks.com/support/contact-support/
Warranty	https://www.cambiumnetworks.com/support/warranty/
Feedback	support@cambiumnetworks.com

Hardware platforms

lists the existing hardware platforms in Home Mesh Routers:

Hardware Platform	Description
RV22	Dual-Band Wi-Fi 6 5 GHz (3x3:2); 2.4 GHz (2x2:2) Home Mesh Router

Important regulatory information

Note

Operation in the band 5150-5250 MHz is only permitted for indoor use, to reduce the potential for harmful interference to co-channel mobile satellite systems.

L'utilisation dans la bande 5 150-5 250 MHz n'est autorisée que pour une utilisation en intérieur, afin de réduire le risque de brouillage préjudiciable causé aux systèmes mobiles par satellite à plusieurs canaux.

Operation in the USA

Caution

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation of the device.

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Attention

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

For products available in the USA market, only channels 1 through 11 can be operated. Selection of other channels is not possible.

This device and its antennas(s) must not be co-located or operated in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm (7.8 inches) between the radiator and your body.

Operation in Canada

Caution

This device complies with Innovation, Science and Economic Development Canada (ISEDC) licenseexempt RSSs. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation of the device.

Renseignements specifiques au Canada

Caution

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- l'appareil ne doit pas produire de brouillage, et
- l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

For products available in the Canada market, only channels 1 to 11 can be operated. Selection of other channels is not possible.

Pour les produits disponibles aux Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d’autres canaux n’est pas possible.

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Cet équipement est conforme aux limites d’exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Operation in the EU

Cambium Networks RV22 Home Mesh Router is compliant with applicable European Directives required for CE marking:

- 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC; Radio Equipment Directive (RED).
- 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive).

- Cambium Networks complies with the European Regulation 2023/988 of 10 May 2023 on General Product Safety. EU Authorized Representative: Cambium Networks Europe B.V., Muiderstraat 1, 1011PZ Amsterdam, Netherlands. Contact Information: GPSR@cambiumnetworks.com.

Introduction

Cambium Home Mesh Router is designed to deliver high performance Wi-Fi and mesh. The router uses the high efficiency 802.11ax technology for maximum compatibility with consumer devices, low latency, and high throughput. The Home Mesh Routers are developed for an optimal complete home coverage with simultaneous dual-band 2.4 GHz and 5 GHz operation. It also provides longer range, higher efficiency, and lesser interference when compared to earlier Wi-Fi technologies. The routers are designed to communicate together and create a mesh network to cover the entire area, thereby avoiding Wi-Fi black spots.

The Home Mesh Routers can be configured using cnMaestro Cloud and the cnMaestro Subscriber application. However, it always requires cnMaestro Cloud.

The cnMaestro Subscriber application is a user-friendly way for the end customers to configure important entities, such as the Wi-Fi name, password, and a guest Wi-Fi. In addition, they can perform other actions, such as grouping client devices in the home into Profiles (for example, My Kids), set web content filter rules, and schedule on/off time. They can trigger an instant Family Time to get everyone together for mealtime. And they can also run speed tests anytime to test the network.

Features supported by Home Mesh Routers

The following are the key features supported by Home Mesh Routers:

- **Speed test**—Measure the speed of the routers with the speed test option available in cnMaestro Cloud and the cnMaestro Subscriber application. To correlate speed test results, a router speed test is automatically triggered when the consumer runs the speed test from the cnMaestro Subscriber application or cnMaestro Cloud.
- **Access Control List (ACL)**—Create simple rules to block or allow certain traffic between the WAN, LAN, and router.
- **Firewall (DoS attacks)**—Protect your customers from Denial of Service (DoS) attacks by enabling the router against IP spoof, smurf attack, and ICMP fragmentation attack.
- **Event logging**—Log every event that occurs in the router for better troubleshooting of issues.
- **SNMP v2c and v3 support**—Supports SNMP v2c and v3 versions for raising alarms against thresholds.
- **Content Filtering**—Easily control the category of web content allowed or blocked for the clients assigned to the profile.
- **Family Time**—Create a group huddle time within the family by switching off Wi-Fi at scheduled times. You can also pause internet connectivity during meal time.
- **Bedtime Schedule**—Configure a weekly schedule for internet access to devices within a profile.
- **Schedule LED**—Schedule to switch off the LEDs during bedtime.

- **Optimize Wi-Fi**—The router scans all the channels, measures utilization, and decides if a channel change is required. A good Wi-Fi signal strength and low noise create a high SNR for each subscriber client device. This supports multiple HD video streams, web browsing, and security cameras on the same system.

- **Profiles**—Create a group of clients with similar functions or requirements. For example, group all IOT clients in the same profile and configure to never disable them. Create a kids profile and schedule internet access time, content filtering to only those devices. This profile enables parental control and scheduled internet access features for the clients assigned to the profile.

- **Wired Mesh**—In addition to the wireless mesh deployment mode, you can also deploy the Home Mesh Routers in a wired mesh mode. Create a wired mesh by connecting the node routers to the LAN ports of the mesh base router. The supported mesh deployment modes include 1-1, 1-1-1, and 1-2. You can also deploy the routers in a 1-2 mixed mode, where you can connect one node router wirelessly and another by a wired connection.

    - No configuration changes are required for RV22 routers to work in both wired and wireless mesh modes.

    - Use any LAN port on the mesh base and any LAN port on the mesh node routers to establish a wired mesh connection. When a mesh node router detects an RV22 neighbor on its LAN port, it automatically establishes a wired mesh link using the LAN ports.

    For more information, see Setting up the Home Mesh Router—Wired Mesh Mode.

    Note

    - You must not use the WAN port on the mesh node router to establish a wired mesh.
    - When all LAN ports on the mesh base are connected and if it does not detect any RV22 neighbor on any of these LAN ports, then the wireless mesh mode is initiated.
    - When both deployment modes are available, the wired mesh mode of deployment takes a higher precedence.

- **Client Priority**—Prioritize traffic for profiles that include important devices, such as your work computer, gaming console, or devices used for streaming services. Add these clients to a single profile and enable the **Priority** toggle switch in the mobile application to prioritize traffic to these devices over other devices. Once configured, the priority feature is enabled or disabled on all clients managed in that profile. Any client in this profile cannot be added to another profile.

Table 1 lists the features supported by cnMaestro Cloud and the cnMaestro Subscriber application.

Table 1: Feature support matrix

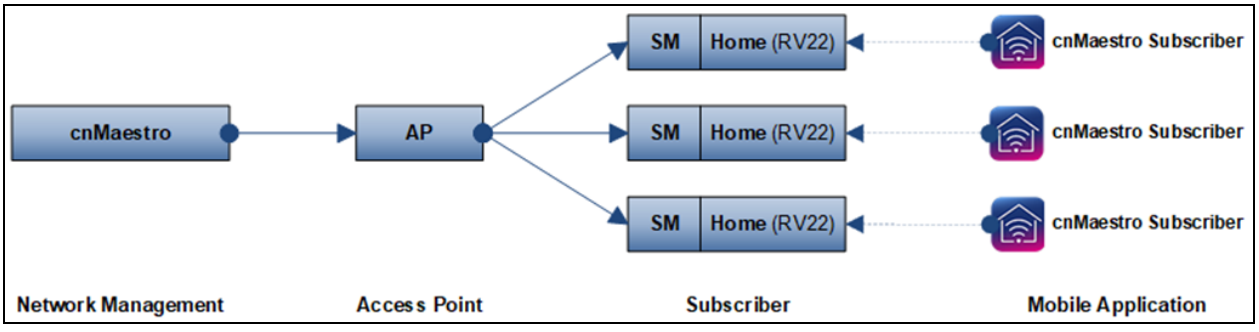
Feature	Supported on cnMaestro Cloud	Supported on cnMaestro Subscriber application
Speed test	✓	✓

Feature	Supported on cnMaestro Cloud	Supported on cnMaestro Subscriber application
Access Control List (ACL)	✓	
Firewall (DoS attacks)	✓	
Event logging	✓	
SNMP v2c and v3 support	✓	
Web content filter		✓
Family Time		✓
Bedtime Schedule		✓
Schedule LED (LED Control)		✓
Optimize Wi-Fi		✓
Profiles		✓
Client Priority		✓

Basic architecture of the router

The basic architecture of the Home Mesh Router is as shown below.

Figure 1: *Basic architecture of the router*

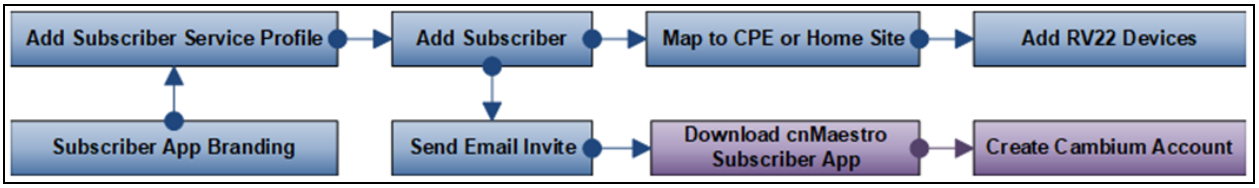


The cnMaestro Subscriber application allows home customers to manage RV22 devices using their mobile phones. In Figure 1, the Subscriber is demarcated by the SM CPE. Alternatively, it could be mapped to a PON ONU, or to no explicit backhaul. In the latter case, the Subscriber would be attached to a new cnMaestro Home Site.

Workflow for creating and managing Subscribers

The workflow for creating and onboarding Subscribers, so that customers can use the mobile application, has a cnMaestro (blue) and a customer (purple) component, as shown below.

Figure 2: *Subscriber workflow*



A Subscriber is configured in cnMaestro Cloud, and an invite is sent to the customer's email address, which will enable home Wi-Fi management using the mobile application. The customer must download the cnMaestro Subscriber application from the Apple App store or Google Play Store. The site in the application, which maps to the Subscriber, can be customized and branded.

Table 2: Features for managing the routers

Feature	Details
Onboarding	Supported using Cambium ID or Serial Number (MSN).
Dashboard	Dashboards tailored for Home Site and RV22 Home Mesh Router.
Configuration	Available through RV22 Home Mesh AP Groups.
Details	Overview and network information display.
Notifications	Alarms, AP Events, and Wi-Fi Events aggregated at System, Managed Account, Network, Site, and Device levels.
Performance	WAN Throughput, Wireless Throughput (downlink/uplink), Clients by Band, Noise Floor, Interference, and Airtime (2.4/5 GHz) performance graphs.
Statistics	System, Managed Service, and Network statistics available.
Software Update	Software update provided at System, Managed Account, Network, Site, and Device levels.
Maps	Location of Home Sites and Devices.
Clients	Both Wired and Wireless Clients supported at Site and Device levels.
Tools	Status, Debug, Network Connectivity, Wi-Fi Analyzer, Speed Test, and Packet Capture tools available.
Reports	Data Reports downloaded from the System, Managed Service, Network, and Site levels.

Hardware Overview

This chapter contains the following topics:

Warning

The WAN port of the Home Mesh Router may be damaged if a 48 VDC passive power (passive POE) is connected to the WAN port.

Package contents

The Home Mesh Router package contains the following contents:

- One RV22 Wi-Fi 6 Home Mesh Router
- One power adapter
- One RJ45 cable of approximate 1.5m length

Figure 3: *RV22 front and top views*

Figure 4: *RV22 back view*

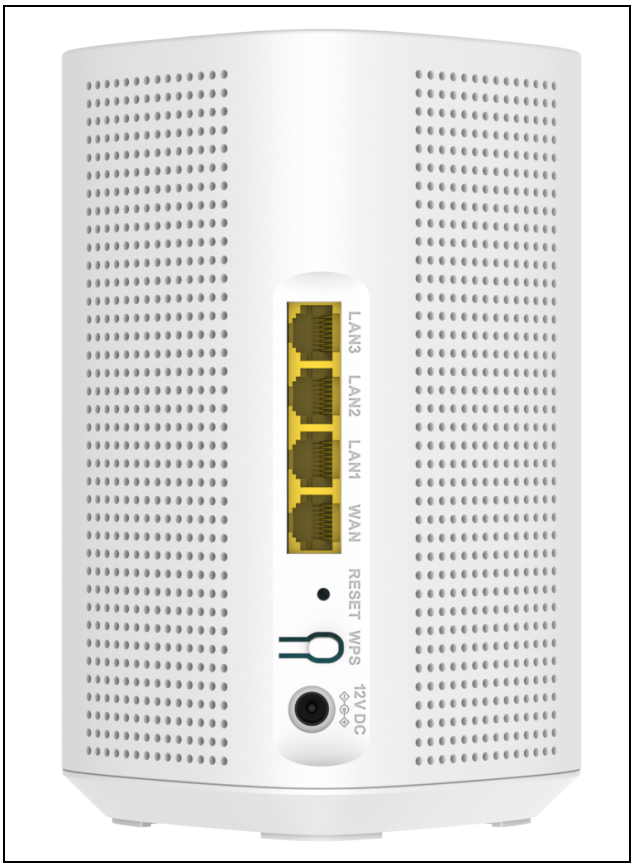


Table 3 lists the LED status indicators of the RV22 Home Mesh Router.

Table 3: LED status indicators

Router Mode	LED Color	Description
Standalone	Solid Red	On boot
	Solid Purple	Device is up and operational
	Solid Blue	Device is up and connected to cnMaestro

Router Mode	LED Color	Description
Mesh	Purple and Red toggling alternatively	When Mesh client is looking for Mesh base
	Purple—On for 3 seconds and off for 3 seconds	When connected to Mesh base, Link signal is less than -75dBm, and not connected to cnMaestro
	Blue—On for 3 seconds and off for 3 seconds	When connected to Mesh base, Link signal is less than -75dBm, and connected to cnMaestro
	Solid Blue	When connected to Mesh base, Link signal is meeting RSSI requirements, and connected to cnMaestro
	Solid Purple	When connected to Mesh base, Link signal is meeting RSSI requirements, and not connected to cnMaestro

Adding a logo to the RV22 Home Mesh Router

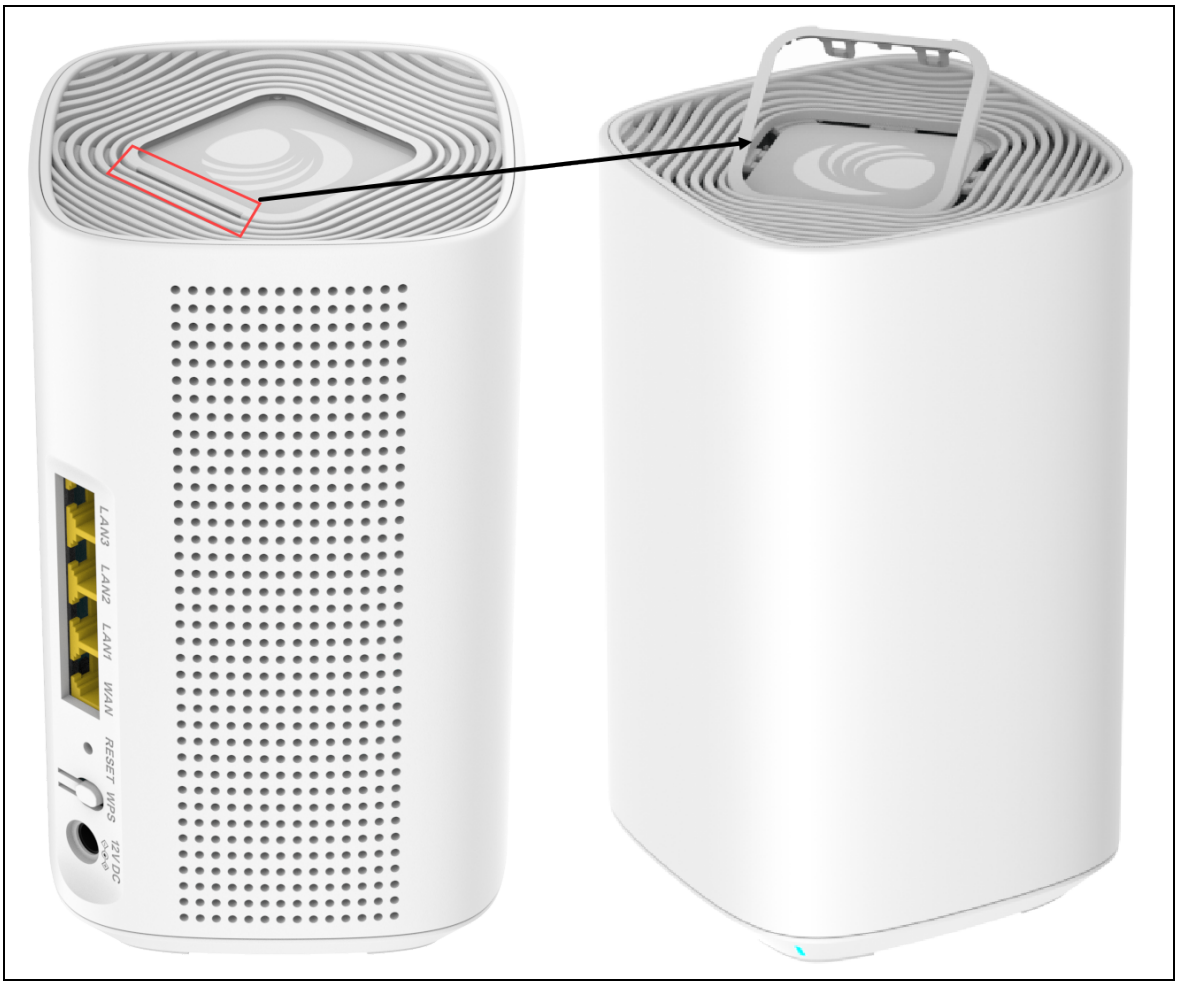
You can customize the RV22 Home Mesh Router by adding the required logo to the router.

To add a custom logo to the router:

1. Find the latch slot at the top of the router.

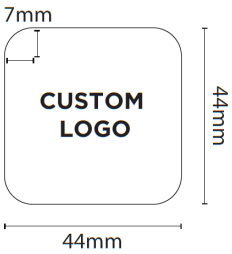
   Use a flat-head screwdriver to remove the clear plastic window.

Figure 5: *Opening the top latch*



2. Insert the logo in the space provided and close the window.

   Recommended size for the logo: 44 mm x 44 mm



Installing the AX-E1000 (LRS01-E1000) Surge Suppressor with the RV22 Home Mesh Router

The AX-E1000 (LRS01-E1000) is a dedicated Ethernet data surge suppressor designed to protect the RV22 Home Mesh Router's WAN port from potential damage during and after installation.

The surge suppressor is required only when connecting the RV22 to a PoE injector, such as one used with a subscriber module (SM) or similar devices. The PoE injector may generate a differential current pulse that could damage the WAN port of the Home Mesh Router.

Attention

- Failure to install the surge suppressor voids the warranty for the RV22 Home Mesh Router.
- Ensure the connections are secure and that the IN and OUT ports are aligned as specified. Incorrect orientation may impair functionality.

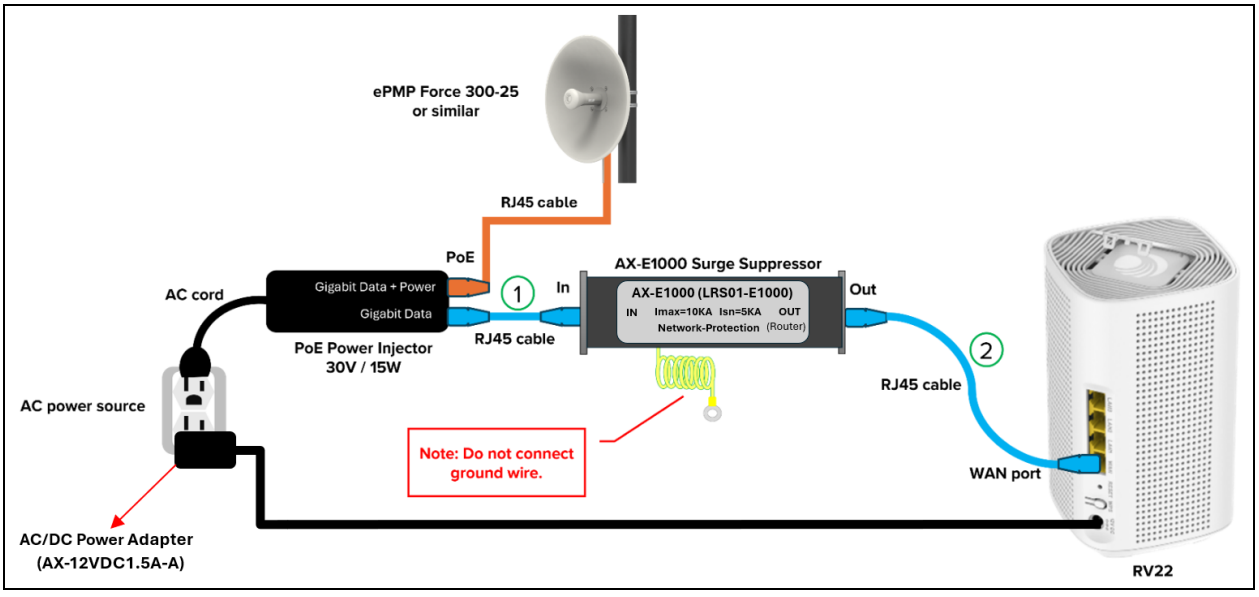
Note

The surge suppressor is not required when connecting the RV22 Home Mesh Router to a modem or an Optical Network Terminal (ONT).

Installation instructions

1. Connect the **IN** port of the AX-E1000 (LRS01-E1000) to the **1 GbE LAN** port on the Cambium PoE injector.
2. Connect the **OUT** port of the AX-E1000 (LRS01-E1000) to the **WAN** port on the RV22 Home Mesh Router.

Figure 6: *AX-E1000 (LRS01-E1000) Surge Suppressor installation diagram*



Configuring Home Mesh Router

Before shipping the Home Mesh Routers to the subscribers, they must be configured with AP groups, Wi-Fi profiles, and associated with the corresponding subscriber.

Configuring the routers involves the following steps:

1. Configuring WLAN profiles (SSIDs)
2. Configuring AP groups
3. Onboarding the Home Mesh Router to cnMaestro
    a. Subscriber application branding
    b. Adding a subscriber service profile
    c. Adding a subscriber
    d. Claiming the Home Mesh Router

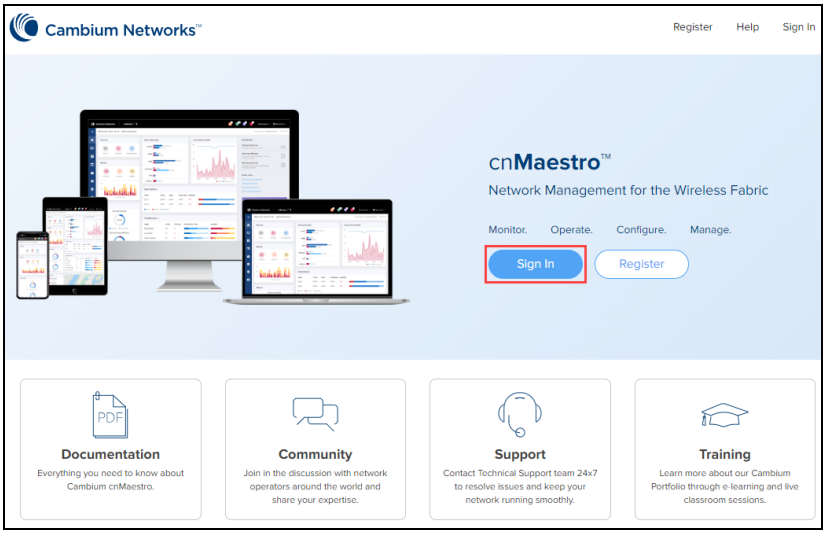
Configuring the WLAN Profiles (SSIDs)

WLANs allow you to configure home and guest access SSIDs for the Home Mesh Router. This WLAN profile (Wi-Fi profile) is associated with an AP group that contains configuration, which is applied on the Home Mesh Routers. When applied on the routers, these SSIDs act as default SSIDs on all routers associated with the AP group.

To configure a Wi-Fi profile, complete the following steps:

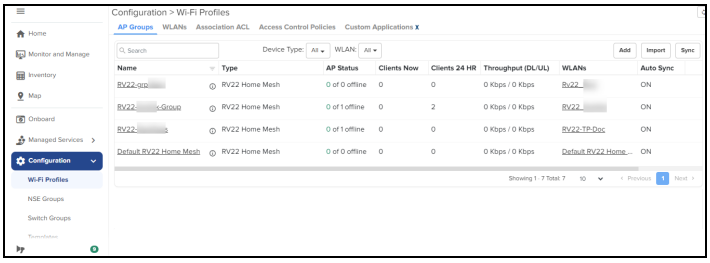
1. Sign in to cnMaestro.

   The home page appears.



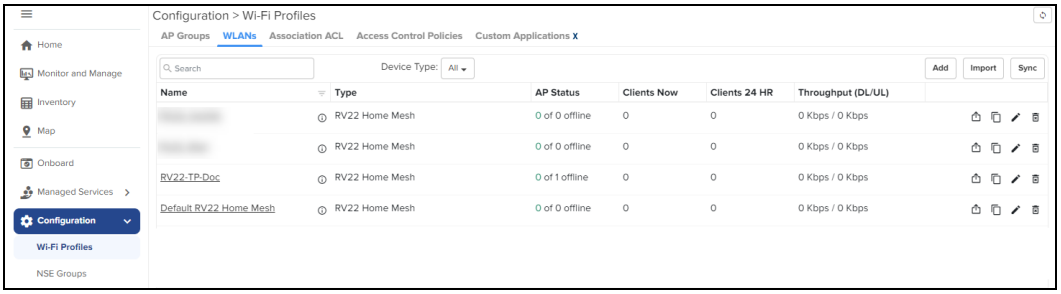
2. Click **Configuration** > **Wi-Fi Profiles**.

   The AP Groups page under Wi-Fi Profiles appears, by default.



3. Click the **WLANs** tab.

   The WLANs page appears.



4. Click **Add**.

   The WLANs > Add New window appears.

   In the **WLANs > Add New** window, configure the WLAN parameters as described in Table 4.

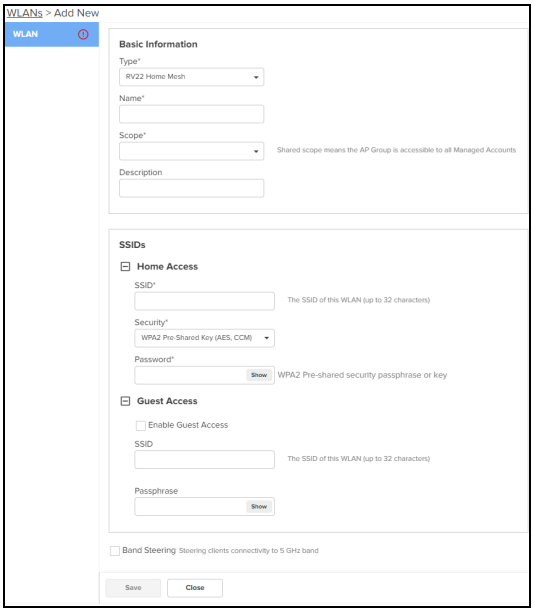


Table 4: WLAN parameters

Parameter	Description
Basic Information	
Type	Type of device for which the WLAN profile is configured. Select **RV22 Home Mesh** from the dropdown list.
Name	Name of the WLAN profile.
Scope	Specifies the availability of the WLAN profile across managed accounts. The following values are supported:

Parameter	Description
	• Base Infrastructure—The WLAN profile is available only for the global account. It is not shared with other managed accounts. • Shared—The WLAN profile is shared across all managed accounts. It can be mapped to devices in the managed account, but it cannot be modified. To modify the configuration, it must be copied into the managed account and then updated. • Managed Account—The WLAN profile is available only for that specific managed account.  **Note** When the scope is configured for a WLAN profile, it cannot be modified.
Description	Brief description for the WLAN profile.
SSIDs—Home Access Configure the default SSID that is used to connect devices wirelessly. Only one home SSID can be configured.	
SSID	Unique name of the SSID for this WLAN. Supports a maximum of 32 characters. You must either configure the default SSID or enter a customized SSID. The default SSID: `RV22_<last 6 digits of device MAC>`. For example, `RV22_123456`.
Security	Security method used for encryption. The following security methods are supported: • **Open** • **WPA Pre-Shared Key (AES, CCM)** • **WPA2 Pre-Shared Keys (AES, CCM)** • **WPA/WPA2 Pre-shared Keys (TKIP, AES)** • **WPA Pre-Shared Key (TKIP, AES)** Default: **WPA2 Pre-Shared Keys (AES, CCM)**  **Note**

Parameter	Description
	If you select **Open**, you must disable 802.11r roaming under **AP Groups** > **Radio** configuration.
Password	Security passphrase or key used to connect to this SSID. You must either configure the default password or enter a customized password. Default password: `password`
SSIDs—Guest Access Configure the guest SSID to allow any guest devices to access the wireless network.	
Enable Guest Access	Determines whether the guest access is enabled. Select the check box to enable guesst access.
SSID	Unique name of the guest SSID for this WLAN. Supports a maximum of 32 characters.
Password	Security passphrase or key used to connect to this guest SSID.
Band Steering	Determines whether the band steering is enabled for the wireless clients. When enabled, APs steer wireless clients to connect to the 5 GHz band.

5. Click **Save**.

Configuring AP Groups

AP groups apply the same configuration to multiple Home Mesh Routers. AP groups contain configuration, such as administrator password, event logging, radio settings, WAN mappings, and DNS mode.

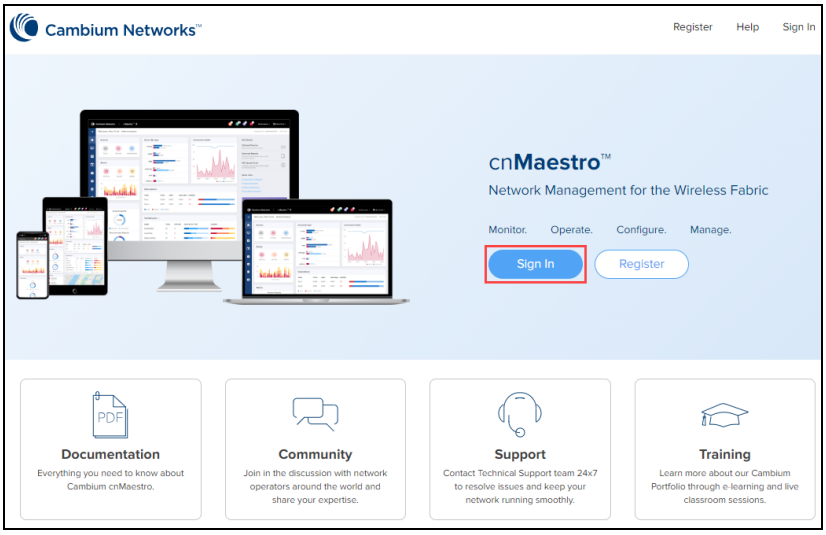
The following are part of the AP group:

- **Basic**
- **Management**
    - Administrator Access
    - Time Settings
    - Event Logging
    - SNMP
- **Radio**
- **Network**
    - WAN Configuration
    - LAN Configuration
- **Security**
    - DoS Protection
    - Access Control List (ACL)

To configure an AP group, complete the following steps:

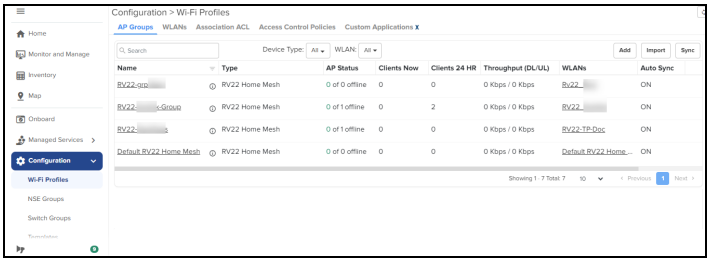
1. Sign in to cnMaestro.

   The home page appears.



2. Click **Configuration** > **Wi-Fi Profiles**.

   The **AP Groups** page under **Wi-Fi Profiles** appears, by default.



3. Click **Add**.

   The **Add New** window appears with multiple tabs. By default, the **Basic** tab is selected.

4. In the **Add New** window > **Basic** tab, select **RV22 Home Mesh** in the **Type** dropdown list and configure the parameters described in Table 5.

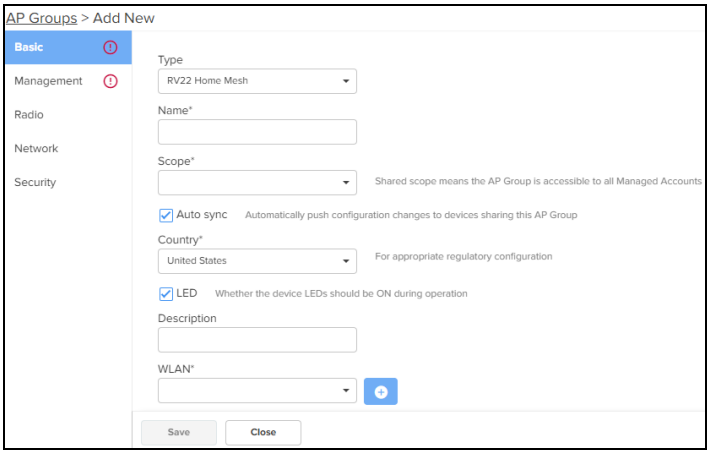


Table 5: Basic parameters

Parameter	Description
Type	Type of device for which the AP group is configured. Select **RV22 Home Mesh** from the dropdown list.
Name	Hostname of the device. Supports a maximum of 64 characters
Scope	Specifies the availability of the AP group across managed accounts. The following values are supported: • Base Infrastructure—AP group is available only for the global account. It is not shared with other managed accounts. • Shared—AP group is shared across all managed accounts. It can be mapped to devices in the managed account, but it cannot be modified. To modify the configuration, it must be copied into the managed account and then updated. • Managed Account—AP group is available only for that specific managed account. **Note** Once the scope has been configured on a AP group, it cannot be modified.
Auto sync	Specifies whether configuration is applied to the router automatically after saving. Select the check box to enable auto sync.
Country	Country of operation of the device. To be set by the administrator only. The allowed operating channels and the respective transmit power levels depend on the country of operation. The list of countries supported depends on the SKU of the device (FCC and ROW). **Note** Radios remain disabled unless this parameter is configured.
LED	When enabled, turns on the device LEDs during operation.
Description	Brief description for the AP group.
WLAN	WLAN profile to be associated with this AP group.

Parameter	Description
	WLAN profile contains SSID details of the wireless network. Select the WLAN from the dropdown list. If no WLAN is configured, create one by clicking the add ( ) icon. For more information, See Configuring WLAN profiles (SSIDs).

5. Click the **Management** tab on the left pane and configure the following parameters:

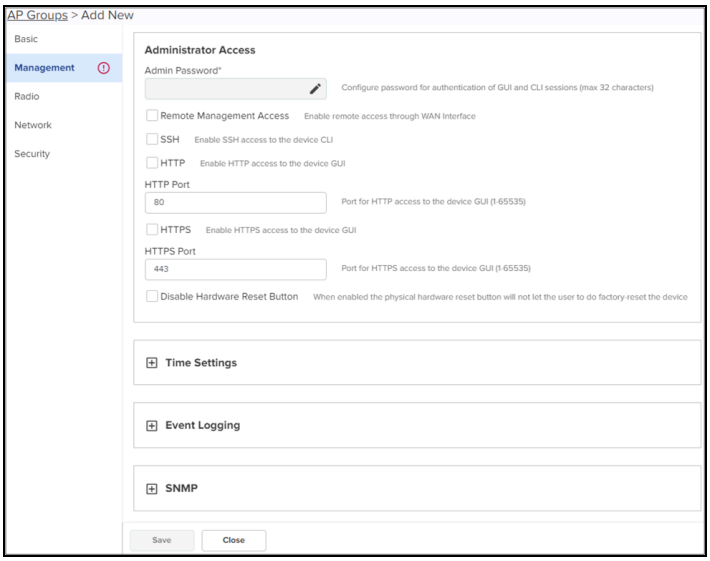


Table 6: Management parameters

Parameter	Description
Administrator Access-related parameters	
Admin Password	Password for authentication of the router.
Disable Hardware Reset Button	Determines whether the reset button on the router is required to prevent a factory reset operation of the router. Select the check box to prevent the user from performing the factory reset operation.
Time Settings-related parameters	
Time Zone	Time zone of the location where the router is installed. Select an appropriate time zone from the dropdown list.
NTP Server 1	Hostname or IPv4 address of the Network Time Protocol (NTP) server.

Parameter	Description
NTP Server 2	Hostname or IPv4 address of a second NTP server.
Event Logging-related parameters	
Syslog Server	Hostname, IPv4 address of the Syslog server and the respective port number. Default port number: 514
Syslog Severity	The severity level of event that must be forwarded to the server. The supported severity levels (0-7) are based on RFC standards.
SNMP-related parameters	
Enable	Determines whether SNMPv2c or SNMPv3 support on the router is enabled. Select the check box to enable SNMP support.
Trap Receiver IP	IPv4 address of the SNMP server to receive the SNMP traps. This parameter is appicable to both SNMP v2c and v3 versions.
Version	Specifies the SNMP version configured for the router. The following options are available: • v2c • v3
SNMPv2c-related parameters	
SNMPv2c RO community	The SNMP v2c read-only community string used as a password when obtaining information from the router.
SNMPv2c RW community	The SNMP v2c read-write community string as a password when writing information to the router.
SNMPv3-related parameters	
SNMPv3 Username	Username for the SNMPv3 server. Supports a maximum of 32 characters.
Enable Authentication	Indicates whether authentication is enabled for SNMP communication. Select the check box to enable authentication.
Authentication Protocol	Specifies the authentication protocol. The following options are available: • MD5 • SHA

Parameter	Description
	Cambium uses SHA-1 authentication protocol. By default, the **SHA** option is selected.
Authentication Password	Password used for authentication. Supports 8 to 32 characters.
Enable Encryption	Indicates whether encryption is enabled for SNMP communication. Select the check box to enable encryption.
Encryption Type	Specifies the encryption type. The following options are available: • AES • DES By default, the **AES** option is selected.
Encryption Password	Password used for encryption. Supports 8 to 32 characters.

6. Click the **Radio** tab on the left pane and configure the preferred radios (2.4 GHz or 5 GHz or both).

   By default, both the radios are enabled. You can disable only the 2.4 GHz radio.

   Configure the following parameters (described in Table 7), which are similar across 2.4 and 5 GHz radio tabs:

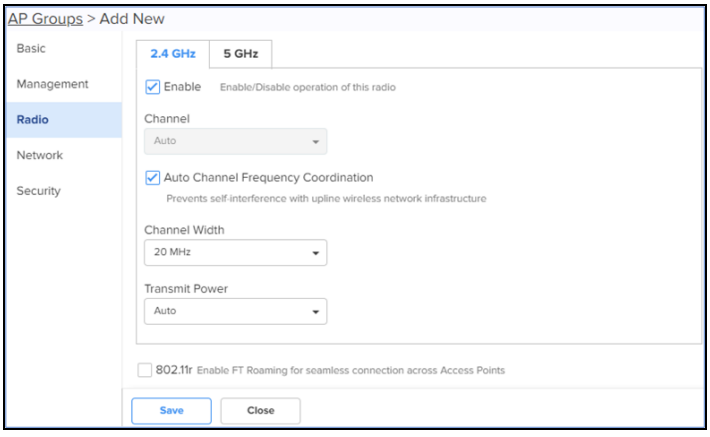
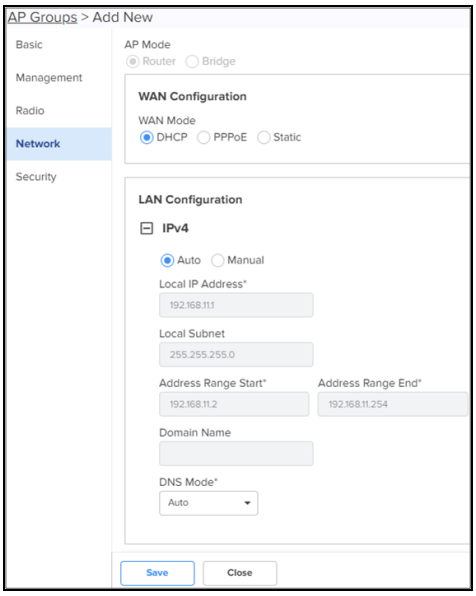


Table 7: Radio parameters

Parameter	Description
Enable	Enables the operation of radio.
Channel	This parameter cannot be modified. Specifies the 2.4 GHz channel that is used. Default: **Auto**
Auto Channel Frequency Coordination	Enable to prevent router from self-interference with upline wireless network infrastructure.
Channel Width	Operating channel width of the selected radio. Following channel widths are supported: • For 2.4 GHz—20 MHz and 40 MHz. Default: **20 MHz** • For 5 GHz—20 MHz, 40 MHz, 80 MHz, and 160 MHz. Default: **80 MHz**
Transmit Power	Transmit power of the router in percentage (%). The following options are available: • Auto • 20 • 40 • 60 • 80 • 100
802.11r	Enables the 802.11r Fast Transition (FT) mechanism for faster roaming between Home Mesh routers in a network.  **Note** Disable 802.11r roaming when the WLAN security is configured as **Open** under **WLANs** > **Home Access** > **SSID**.
Candidate Channels	This parameter is applicable only to 5 GHz radio. Configures whether all channels in the 5 GHz band are used or not. Following are the supported values: • **All**—Includes all channels supported in the 5 GHz band. • **Prefer Non-DFS**—Excludes the DFS channels (radar channels) and includes only the non-DFS channels.

7. Click the **Network** tab on the left pane and configure the WAN mode and IP address assignment parameters.



   i. The **AP Mode** is pre-configured as **Router** and cannot be modified.

   ii. In the **WAN Configuration** section, select the **WAN Mode** and configure the corresponding parameters.

   This mode selects the mode of IP address assignment for the WAN interface. The following WAN modes are supported:

   - **DHCP**—This mode is selected by default.
   - **PPPoE**—Configure the PPPoE parameters as described in Table 8.

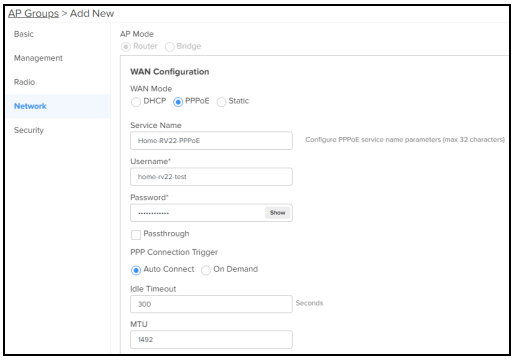


Table 8: WAN Mode: PPPoE parameters

Parameter	Description
PPPoE-related parameters	
Service Name	Name of the PPPoE service name. Supports a maximum of 32 characters.
Username	Username of the PPPoE service required for authentication.
Password	Password of the PPPoE service required for authentication.
Passthrough	Indicates whether the clients must directly establish connection with the service provider. Select the check box to enable passthrough.
PPP Connection Trigger	Indicates the connection method for the router for keeping the connection intact. The following options are supported: • Auto Connect • On Demand
Idle Timeout	This parameter is mandatory when you select **On Demand** type of **PPP Connection Trigger**. Specifies the duration (in seconds) after which PPPoE keep-alive packets must be sent to keep the connection intact. Default: 300
MTU	Maximum size (in bytes) of each packet sent in a single transmission between connected devices. Default: 1492

- **Static**—Configure the Static parameters as described in Table 9.

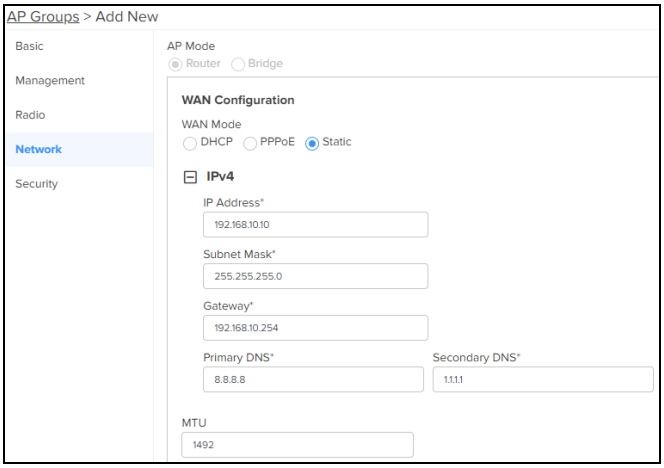


Table 9: WAN Mode: Static parameters

Parameter	Description
Static-related parameters	
IP Address	IPv4 address assigned to the router.
Subnet Mask	Subnet mask assigned to the router's IPv4 address.
Gateway	IPv4 address of the gateway used for communication.
Primary DNS	IPv4 address of the primary DNS server.
Secondary DNS	IPv4 address of the secondary DNS server.
MTU	Maximum size (in bytes) of each packet sent in a single transmission between connected devices. Default: 1492

Note

If you select **PPPoE** or **Static** mode, you must preconfigure the settings in the router before shipping the routers to customers. Complete the following steps before shipping the Home Mesh Router to the customers:

i. Onboard the Home Mesh Router using the standard WAN mode as **DHCP**.

ii. After the Home Mesh Router is onboarded, set the WAN mode to **PPPoE** or **Static**.

iii. Configure the username and password credentials.

The configuration and the credentials are applied on the Home Mesh Router.

iv. Disconnect the Home Mesh Router and ship it to the customer.

When the customer connects the router to the PPPoE authenticated network, the Home Mesh Router uses the PPPoE credentials to authenticate.

iii. In the **LAN Configuration** section, configure the mode of IP address assignment for connecting devices to **Auto** or **Manual**.

If you select **Manual** mode of assignment, configure the following parameters:

Table 10: LAN Configuration parameters for Manual mode

Parameter	Description
IPv4-related parameters	
Local IP Address	Local IPv4 address assigned to the router.
Local Subnet	Subnet mask assigned to the router's IPv4 address.
Address Range Start	Starting IPv4 address in the address pool.
Address Range End	Ending IPv4 address in the address pool.
Domain Name	The domain name.
DNS Mode	DNS mode used for IP address resolution. Following are the supported options: • Auto • Manual • Proxy

8. Click the **Security** tab on the left pane and configure protection against different types of attacks, such as Smurf attack and ICMP fragment.

Select the check box corresponding to the DoS protection options.

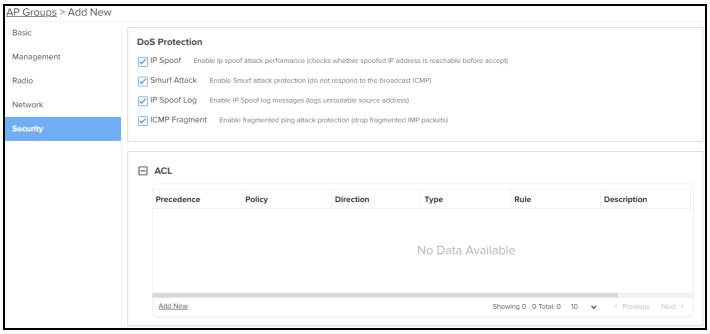


Table 11: Security parameters: DoS Protection

Parameter	Description
IP Spoof	Enable protection against IP spoof attacks. When enabled, the router checks whether the spoofed IP address is reachable before accepting.
Smurf Attack	Enable protection against Smurf attacks. When enabled, the router does not respond to the broadcast ICMP.
IP Spoof Log	Enable logging of IP spoof addresses. When enabled, the router logs the unroutable source IP address.
ICMP Fragment	Enable protection against ICMP fragmented ping attack. When enabled, the router drops the fragmented ICMP packets.

9. Click **Add New** in the **ACL** section and configure the parameters as described in Table 12.

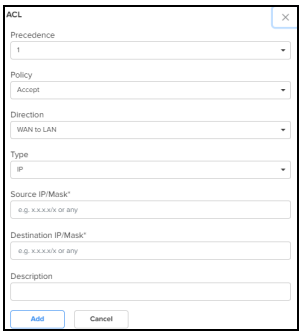


Table 12: Security parameters: Access Control List (ACL)

Parameter	Description
Precedence	Specifies the priority of the rule configured. Select the precedence from the dropdown list.
Policy	Indicates the action to be taken for the policy. The following are the supported actions: • Accept • Drop • Reject
Direction	Direction to which the policy must be applied. The following are the supported options:

Table 12: Security parameters: Access Control List (ACL)

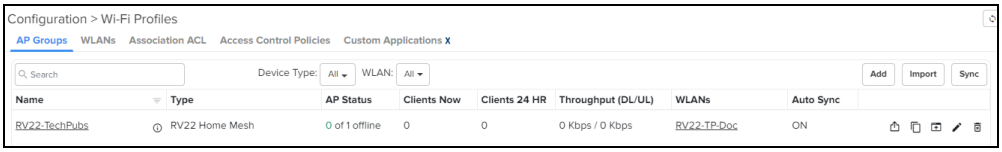
Parameter	Description
	• WAN to LAN • LAN to WAN • WAN to Router • Router to WAN
Type	Type of traffic to which the policy must be applied. The following are the supported options: • IP • IPv6 • MAC • Protocol • Protocolv6 Additional parameters are enabled when you selct the type.
Source IP/Mask Destination IP/Mask	This field is applicable when you select the **Type** as **IP**, **IPv6**, **Protocol**, or **Protocolv6**. Specifies the source IPv4 or IPv6 address and the destination IPv4 or IPv6 address for the policy. You can configure **Any** if there is no specific IP address to apply the policy to any source IP address.
Source MAC/Mask Destination MAC/Mask	This field is applicable when you select the **Type** as **MAC**. Specifies the source MAC address and the destination MAC address for the policy. You can configure **Any** if there is no specific MAC address to apply the policy to any source IP address.
Protocol	Type of protocol for which the policy must be applied. The following are the supported options: • TCP • UDP • ICMP

Table 12: Security parameters: Access Control List (ACL)

Parameter	Description
	• Any Additional parameters are enabled when you selct the protocol.
Source Port	This field is applicable when you select the **Protocol** as **TCP**, **UDP**, or **Any**. Specifies the source port number for the policy.
Destination Port	This field is applicable when you select the **Protocol** as **TCP**, **UDP**, or **Any**. Specifies the source port number for the policy.
Description	Description for the rule.

10. Click **Save**.

The AP group is successfully created with the configured parameters.



Onboarding the Home Mesh Router to cnMaestro

After creating a WLAN profile and an AP group, you must now create a subscriber profile and associate it with the subscriber. Finally, you must onboard the router(s) to the corresponding subscriber.

Adding a subscriber and onboarding the router involves the following steps:

1. cnMaestro Subscriber application branding
2. Adding a home site
3. Adding a subscriber service profile
4. Adding a subscriber
5. Claiming the Home Mesh Router

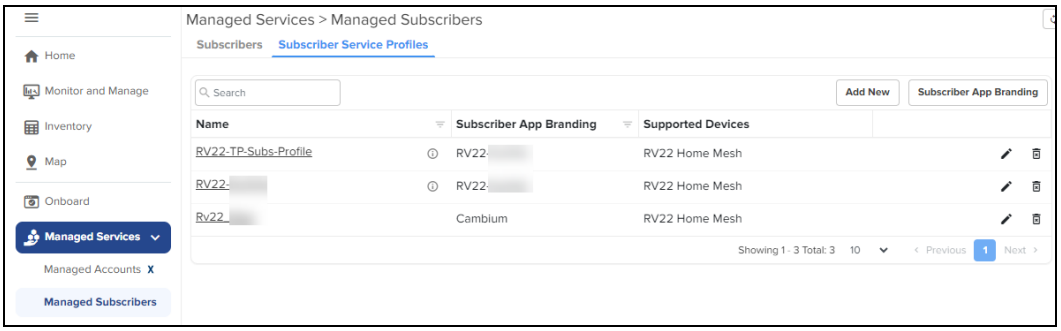
cnMaestro Subscriber application branding

Customize the cnMaestro Subscriber mobile application with your company name, brand logo, and other details, such as support contact information and hours. This branding can be associated with individual subscriber service profiles.

To add brand details to the cnMaestro Subscriber application, complete the following steps:

1. Navigate to the **Managed Services** > **Managed Subscribers** > **Subscriber Service Profiles** tab.

   The **Subscriber Service Profiles** page appears.



2. Click **Subscriber App Branding**.
3. Click the add (+) icon.

   The **Subscriber App Branding** window appears. Configure the parameters as described in Table 13

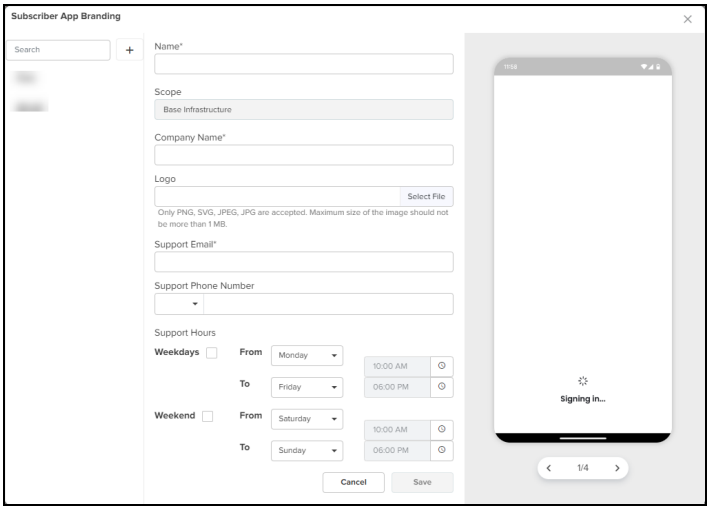


Table 13: cnMaestro Subscriber application branding parameters

Parameter	Description
Name	Name of the application branding.
Logo	Brand logo that is displayed in the cnMaestro Subscriber application. Maximum size of the image supported is 1 MB. Only JPEG, JPG, PNG, and SVG file formats are supported.
Support Email	Email address of your customer support team that is displayed in the application.
Support Phone Number	Phone number of your customer support team that is displayed in the application.
Support Hours	Timings for contacting the customer support team. • Select the **Weekdays** check box and configure the week days on when the customer support team is available. You can also configure the time using the time picker tool. • Select the **Weekends** check box and configure the weekend days on when the customer support team is available. You can also configure the time using the time picker tool.

You can preview your branding updates by scrolling through the images in the preview window on the right.

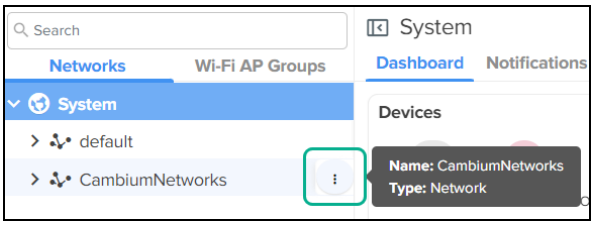
4. Click **Save**.

Adding a home site

A home site is required to associate the subscriber's device with the device configuration.

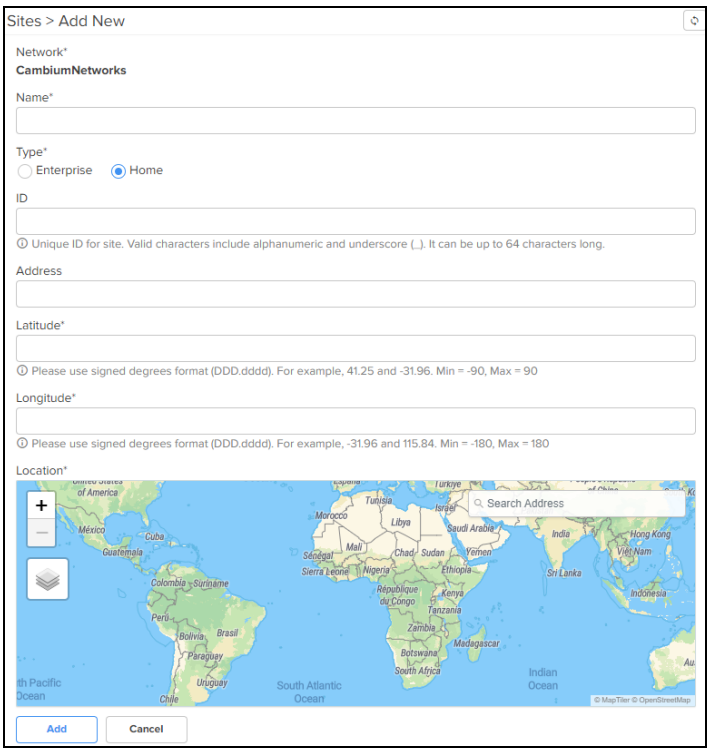
To create a home site, complete the following steps:

1. Click **Monitor and Manage** ( ).
2. In the **Networks** tab, search for the network and hover over the network name.



3. Click the actions ( ) icon and select **Add Site**.

   The **Sites > Add New** page appears.



4. Select the **Home** option in the **Type** field.
5. Enter the location details in the **Longitude** and **Latitude** fields.

   You can also search for the location in the map to fill in the details.

6. Click **Add**.

Managing subscribers (end-customer)

To enable a subscriber to manage the router using the Android or iOS application, you must add a subscriber profile in cnMaestro and send an invitation to the subscriber.

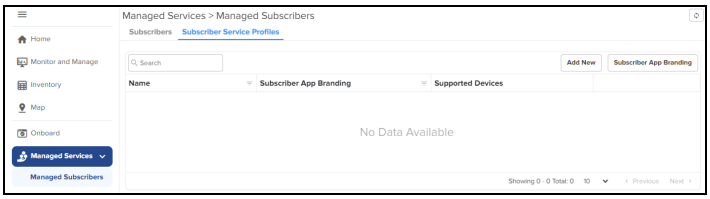
This pocess involves the following actions:

1. Adding a subscriber service profile
2. Adding a subscriber
    a. Modifying the owner details for the Subscriber App
3. Claiming the Home Mesh Router

Adding a subscriber service profile

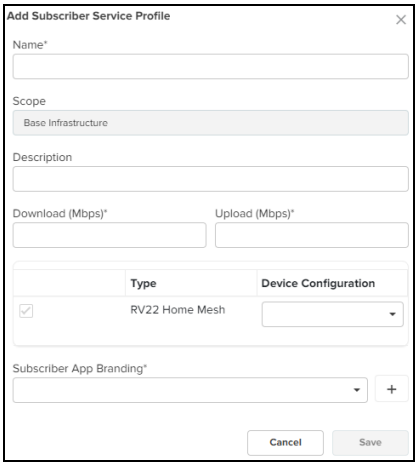
1. Navigate to the **Managed Services** > **Managed Subscribers** > **Subscriber Service Profiles** tab.

   The **Subscriber Service Profiles** page appears.



2. Click **Add New**.

   The **Add Subscriber Service Profile** window appears.



3. Select the Home Mesh Router configuration to which you want to associate with the subscriber

service profile and configure the parameters as described in Table 14.

Table 14: Subscriber Service Profile parameters

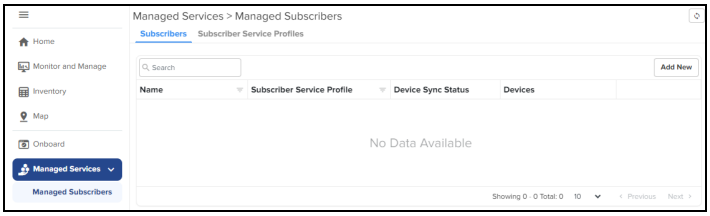
Parameter	Description
Name	Name of the subscriber service profile.
Description	Brief description for the subscriber service profile.
Download (Mbps)	Download speed (in Mbps) configured for the profile.
Upload (Mbps)	Upload speed (in Mbps) configured for the profile.
Type	Displays the device type as **RV22 Home Mesh**. This field cannot be modified.
Device Configuration	Specifies the Wi-Fi AP group (created for Home Mesh Router) that must be associated with the service profile. Select the group from the dropdown list.
Subscriber App Branding	Specifies the cnMaestro Subscriber application branding that must be used in this profile. All routers sent to subscribers in this service profile contain the selected branding logo and information. Select the required branding from the dropdown list. If no branding is present, create one by clicking the add (+) icon. See cnMaestro Subscriber application branding for more information.

4. Click **Save**.

Adding a subscriber

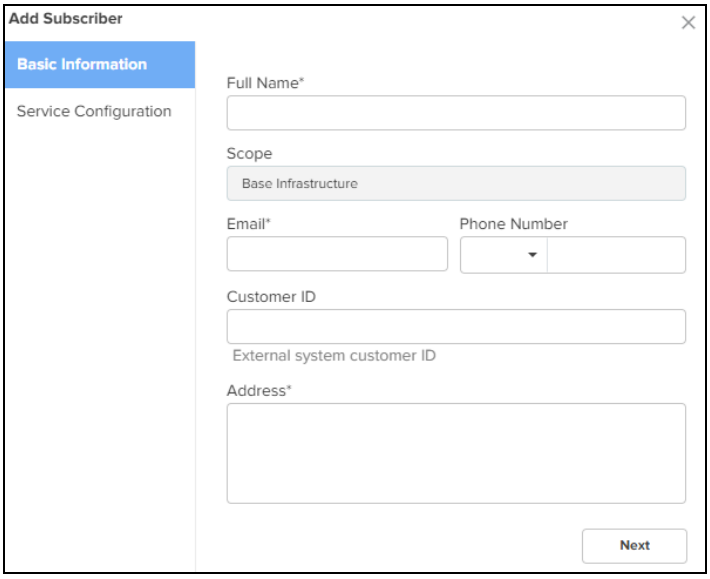
5. Click the **Subscribers** tab on the **Managed Subscribers** page.

   The **Subscribers** page appears.



6. Click **Add New**.

   The **Add Subscriber** window appears.



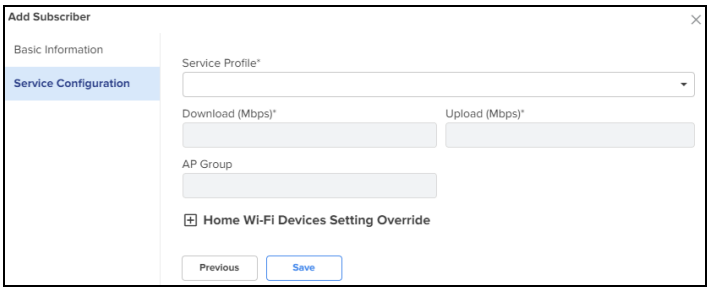
7. In the **Add Subscriber** window, configure the details of the subscriber in the **Basic Information** section, as described in Table 15.

Table 15: Subscriber > Basic tab parameters

Parameter	Description
Full Name	Name of the subscriber.
Email ID	Email address of the subscriber.
Phone Number	Phone number of the subscriber.
Customer ID	Unique ID for the subscriber.
Address	Address of the subscriber where the routers will be installed.

8. Click **Next**.

   The **Service Configuration** tab is displayed.



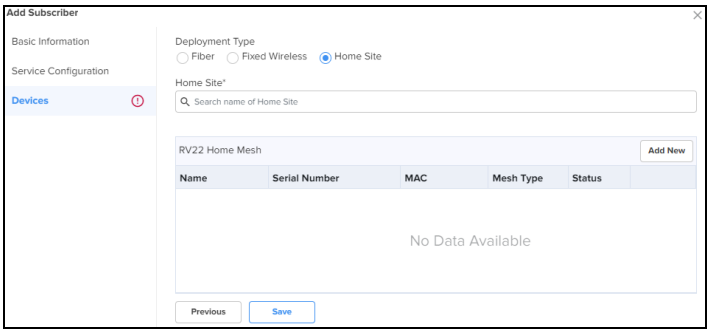
9. Select the subscriber service profile to be associated with this subscriber from the **Subscriber Service Profile** dropdown list.

10. Click **Save**.

A new tab, **Devices** appears, where you can link (or claim) the Home Mesh Router to the subscriber. See Claiming the Home Mesh Router.

The Subscriber application invitation email is sent to the subscriber with the link to join the account.

11. Click **Devices**.



12. Select one of the following options in the **Deployment Type** field:

    - **Fiber**—Select the Optical Network Unit (ONU) device that you want to associate with the subscriber's router by searching in the **ONU** search box.
    - **Fixed Wireless**—Select the Subscriber Module (SM) device that you want to associate with the subscriber's router by searching in the **SM** search box.
    - **Home Site**—Select the home site that you want to associate with the subscriber's router by searching in the **Home Site** search box. For more information on creating a site, see Adding a home site.

13. Before linking the Home Mesh Router to the subscriber, click **Save**.

Modifying the owner details for the Subscriber App

You can modify the owner details for the Subscriber App by modifying the email ID.

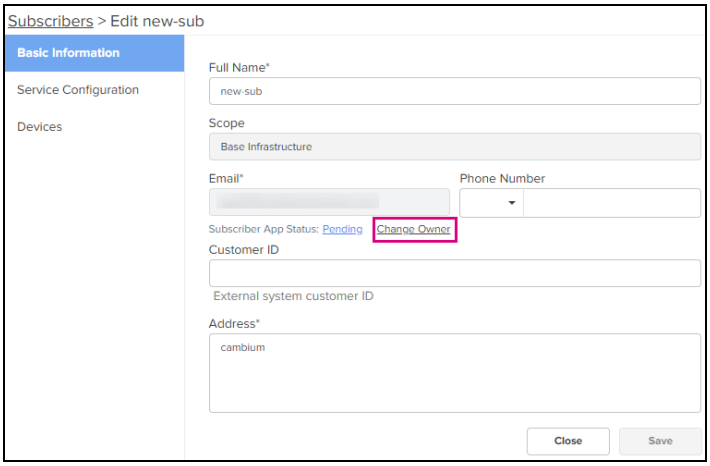
Warning

Modifying the email address will remove all existing users, both primary and secondary.

To modify the email address, complete the following steps:

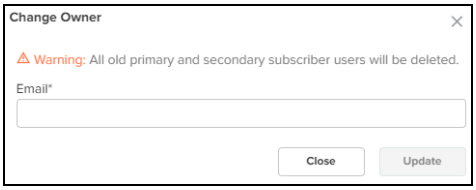
1. Navigate to the **Manage Services** > **Managed Subscribers** > **Subscribers** tab.
2. In the list of subscribers, click the subscriber name for which you want to modify the email ID.

   The corresponding subscriber details are displayed.



3. Under the **Email** parameter, click **Change Owner**.

   The Change Owner window is displayed.



4. Enter the new email ID for the subscriber.
5. Click **Update**.

Claiming the Home Mesh Router

After adding a subscriber profile and a subscriber, you must now associate the Home Mesh Router to the subscriber by claiming the router in cnMaestro.

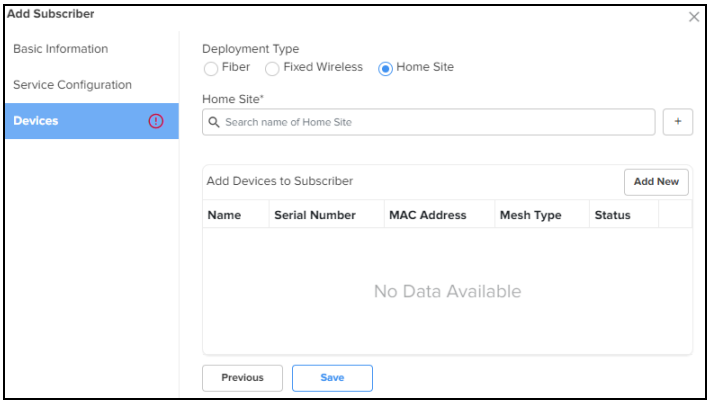
To claim the router, complete the following steps:

1. Navigate to the **Managed Services** > **Managed Subscribers** > **Subscribers** tab.

   The **Subscribers** page appears.

2. In the list of subscribers, click the subscriber name for which you want to associate the Home Mesh Router.
3. Click the **Devices** tab.
4. In the **Add Devices to Subscriber** section, click **Add New**.

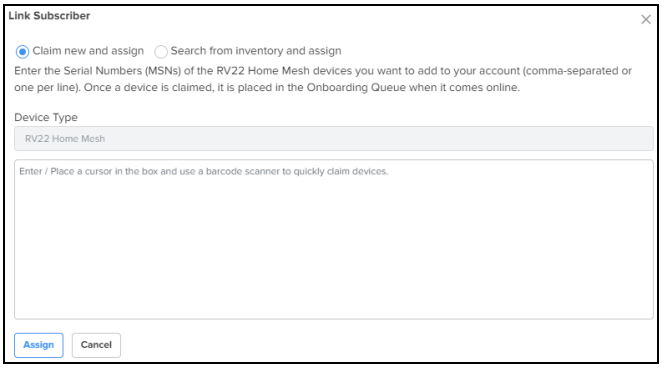
   The **Add Subscriber** window appears.



5. In the **Link Subscriber** window, link the Home Mesh Router to the subscriber by any of the following methods:

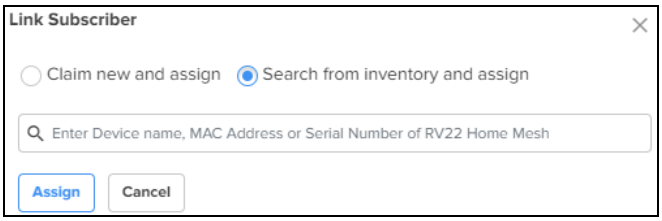
    - To claim a new router that is not onboarded to cnMaestro, select the **Claim new and assign** option and enter the serial number of the device to be claimed.

      You can claim multiple routers by adding multiple serial numbers separated by commas.



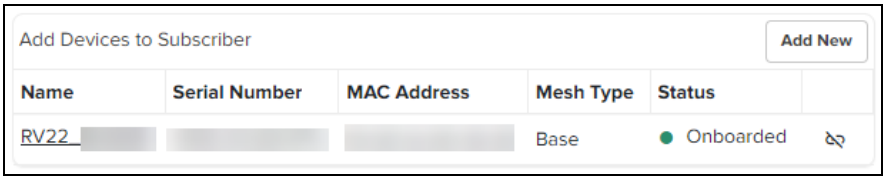
    - To claim a router that is already onboarded to cnMaestro, select the **Search for inventory and assign** option.

      Enter the details of the router you want to claim.



6. Click **Assign**.

   The assigned router appears in the **Add Devices to Subscriber** section.



Note

- The **Onboarded** status must appear in the **Status** column to successfully onboard the RV22 Home Mesh Router.
- To add multiple routers to create a wired or wireless mesh, onboard all the devices to the same subscriber in the **Add Devices to Subscriber** section.

  For information about the supported mesh topologies, see Setting up the Home Mesh Router.
- To unlink the router from the subscriber, click the unlink ( ) icon.

Downloading the cnMaestro Subscriber application

Home Mesh Routers can also be managed using the cnMaestro Subscriber application, available for Apple iOS and Android mobile operating systems.

You can download and install the cnMaestro Subscriber application from the following locations:

- **For Apple iOS**
- **For Android**

Setting up the Home Mesh Router

Home Mesh Routers can be deployed in one of the following modes:

- Setting up the Home Mesh Router—Standalone Mode
- Setting up the Home Mesh Router—Wireless Mesh Mode
- Setting up the Home Mesh Router—Wired Mesh Mode

Note

You can distinguish between wired and wireless mesh deployments by viewing the **Status** page under **Monitor and Manage** > *<Home-Mesh-Router-name>* > **Tools**. The deployments are distinguished by the type of line displayed between the routers.

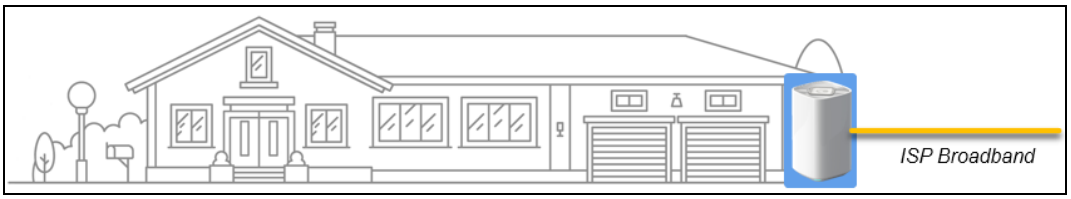
- Wired mesh—A solid line is displyed between the routers.

  In this deployment type, **RSSI**, **SNR**, **Radio**, and **Channel** fields do not display any value.

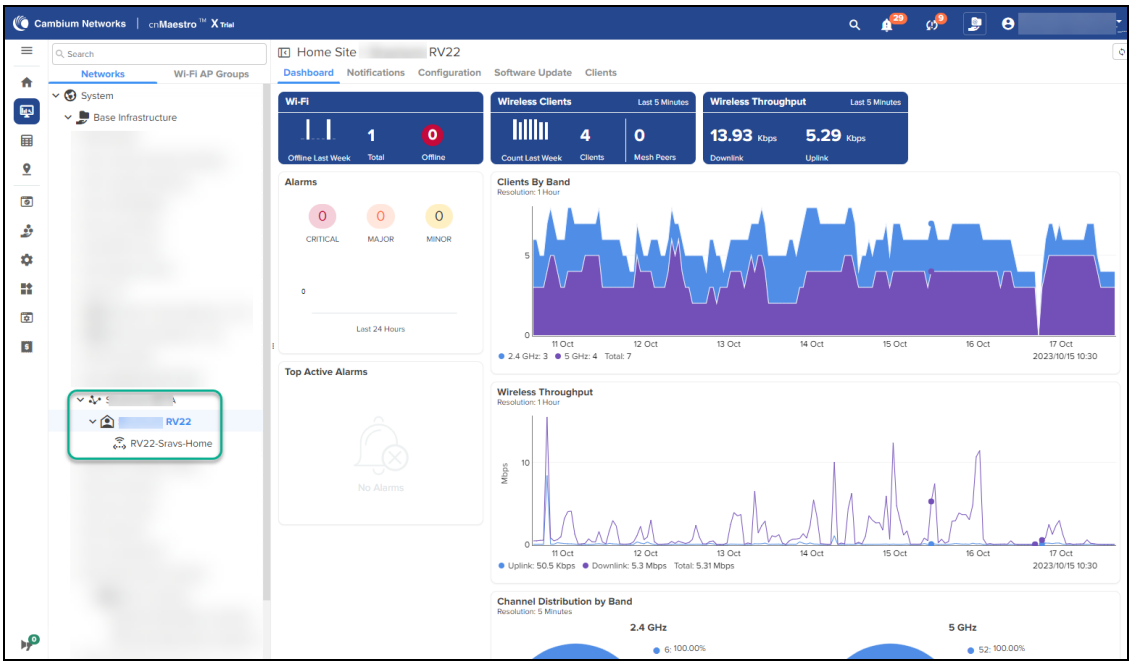
- Wireless mesh—A dotted line is displyed between the routers.

Setting up the Home Mesh Router—Standalone Mode

In standalone mode of deployment, there is only one Home Mesh Router deployed. A sample scenario is shown in the following figure:



A sample cnMaestro dashboard for the standalone mode of deployment is shown in the following figure:



Setting up the Home Mesh Router—Wireless Mesh Mode

To configure a wireless mesh, onboard the routers to a site—Claim all the routers, which you want to be part of the mesh, on cnMaestro in the subscriber workflow. See Claiming the Home Mesh Router. Connect the mesh base router to the internet and wirelessly connect the node routers. The AP group mapped to the subscriber is applied to all the routers to sync the configuration.

Following are some of the wireless mesh configuration scenarios and the corresponding dashboards and hierarchy in cnMaestro:

- Wireless mesh: 1-1 deployment
- Wireless mesh: 1-1-1 deployment
- Wireless mesh: 1-2 deployment
- Wireless and wired mixed mesh 1-2 deployment

Wireless mesh: 1-1 deployment

In this deployment, the base router is connected to one node router, thereby creating a wireless 1-1 mesh deployment.

Figure 7: *Wireless mesh: 1-1 deployment*

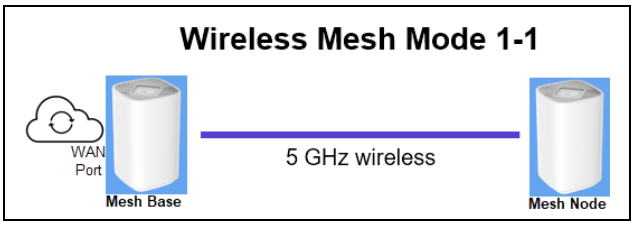


Figure 8 displays a sample cnMaestro dashboard for the wireless mesh 1-1 deployment.

Figure 8: *Sample dashboard for wireless mesh: 1-1 deployment*

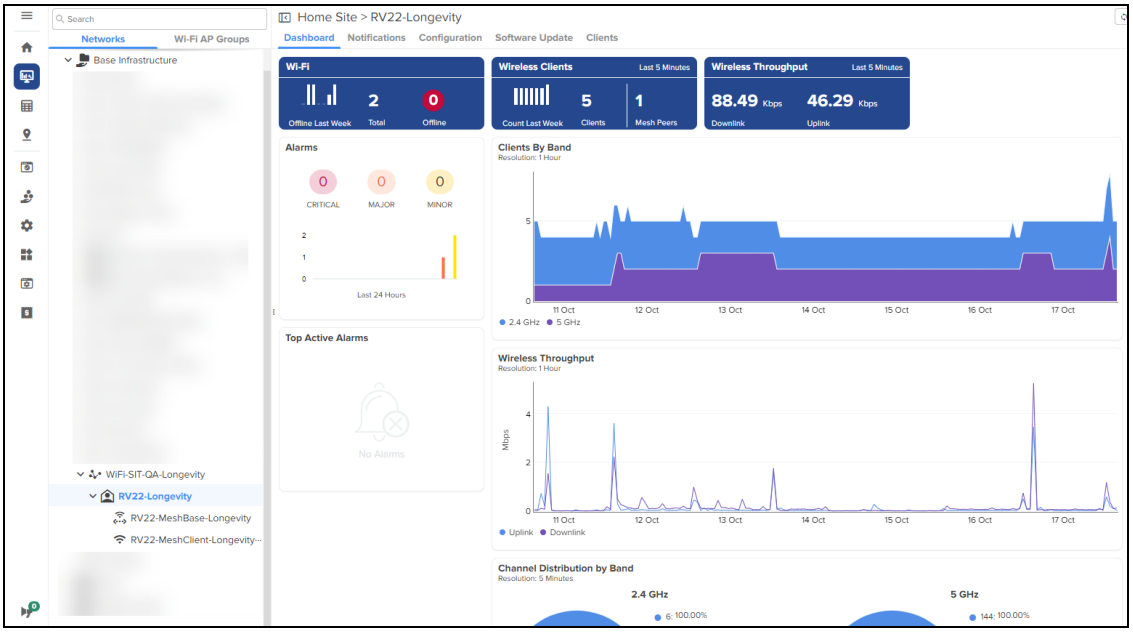
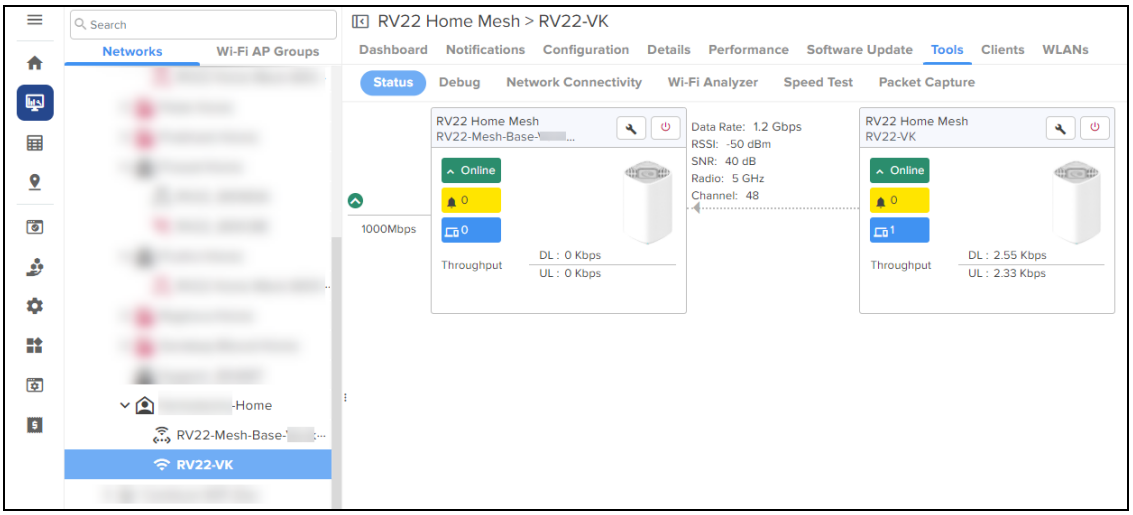


Figure 9 displays a sample cnMaestro status page for the wireless mesh 1-1 deployment.

Figure 9: *Sample status page for wireless mesh: 1-1 deployment*



Wireless mesh: 1-1-1 deployment

In this deployment, the base router is connected wirelessly to only one of the node routers, which is inturn connected to another node router, thereby creating a wireless 1-1-1 mesh deployment.

Figure 10: *Wireless mesh: 1-1-1 deployment*

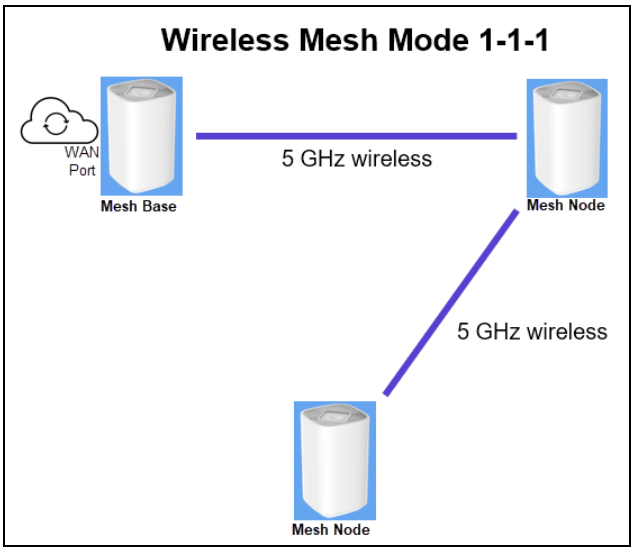


Figure 11 displays a sample cnMaestro dashboard for the wireless mesh 1-1-1 deployment.

Figure 11: *Sample dashboard for wireless mesh: 1-1-1 deployment*

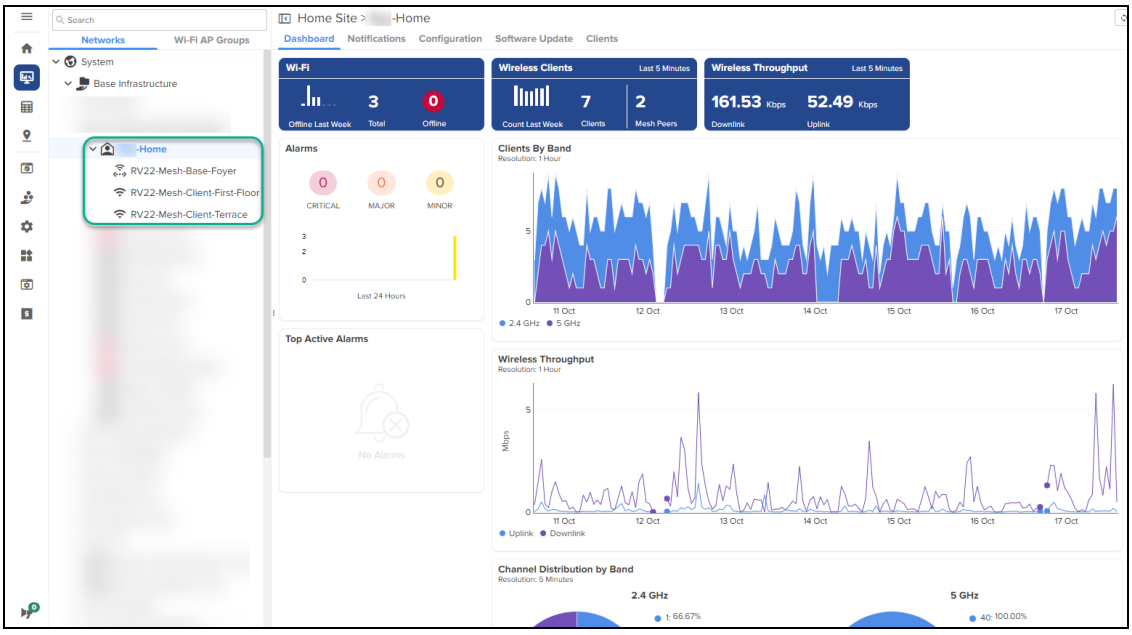
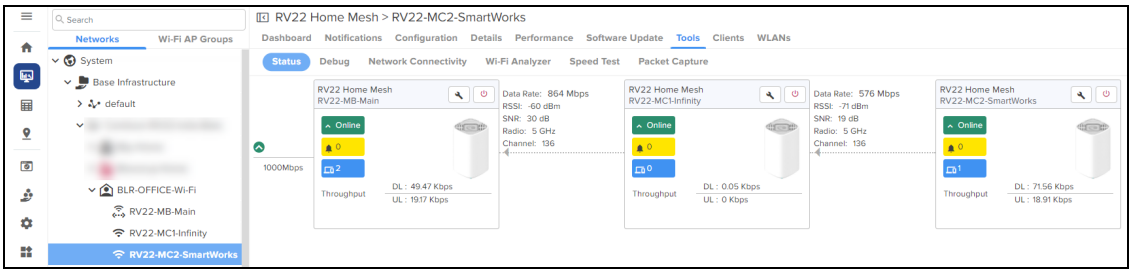


Figure 12 displays a sample cnMaestro status page for the wireless mesh 1-1-1 deployment.

Figure 12: *Sample status page for wireless mesh: 1-1-1 deployment*



Wireless mesh: 1-2 deployment

In this deployment, the base router is connected to two node routers simultaneously, thereby creating a wireless 1-2 mesh deployment.

Figure 13: *Wireless mesh: 1-2 deployment*

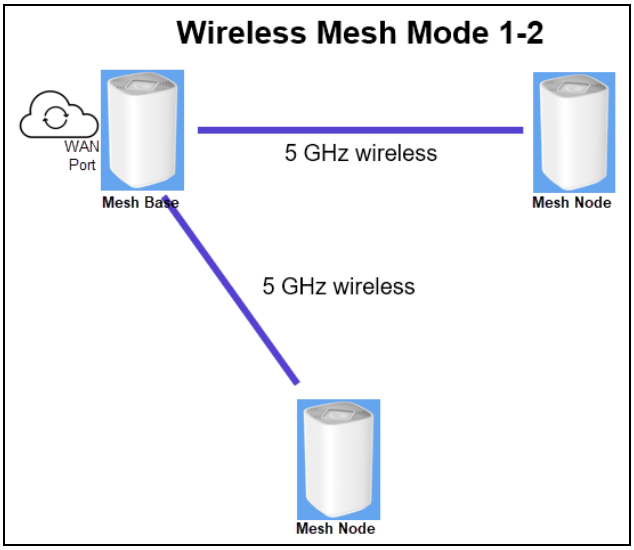


Figure 14 displays a sample cnMaestro dashboard for the wireless mesh 1-2 deployment.

Figure 14: *Sample dashboard for wireless mesh: 1-2 deployment*

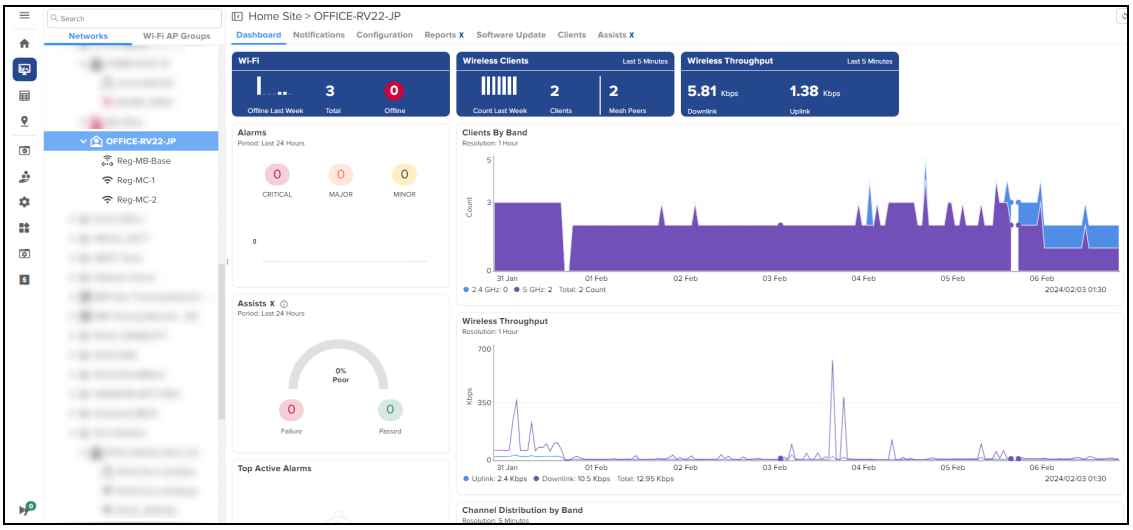
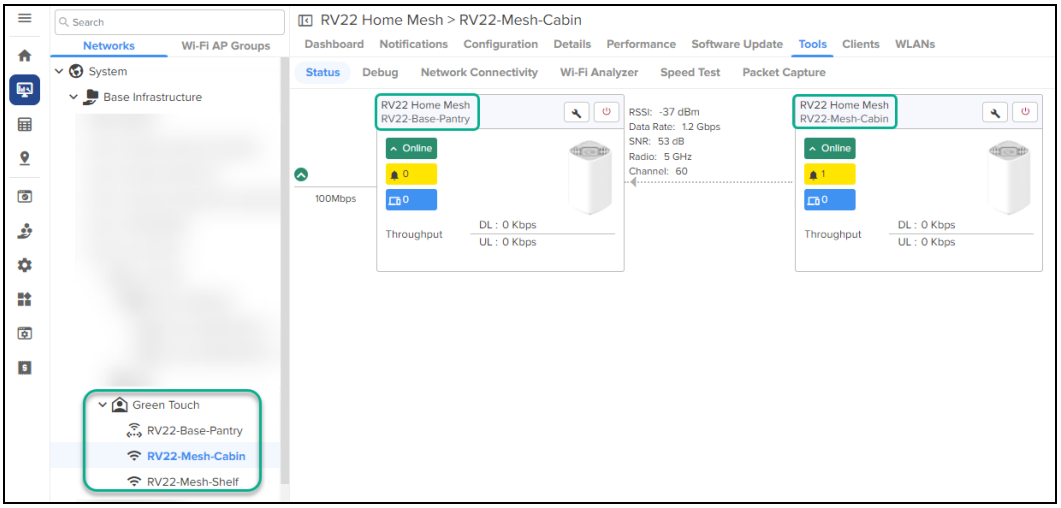


Figure 15 and Figure 16 display sample status pages for the node routers in a wireless mesh 1-2 deployment.

In the following status samples, the **RV22-Base-Pantry** router is connected to both **RV22-Mesh-Shelf** and **RV22-Mesh-Cabin** routers, forming a 1-2 multi-mesh topology.

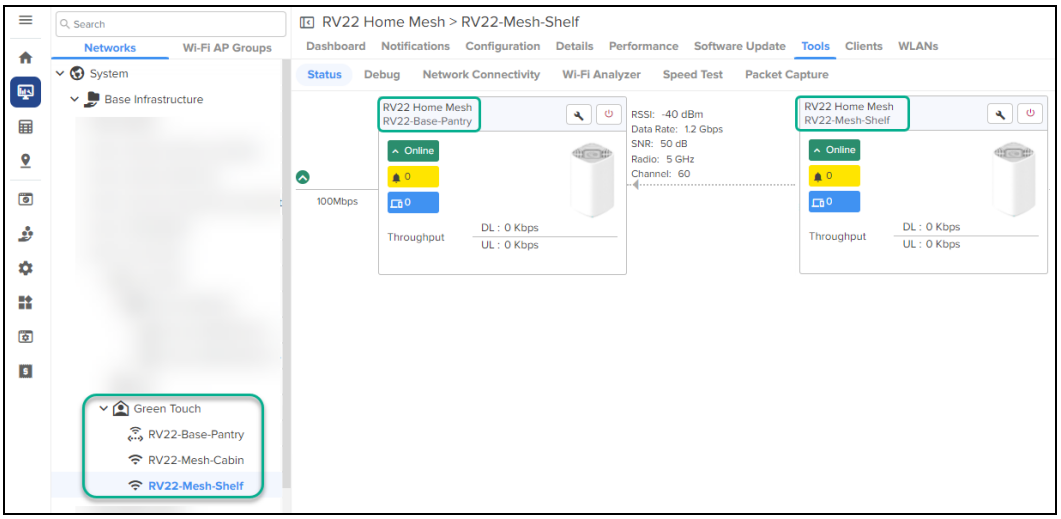
- Network toplogy for the **RV22-Mesh-Cabin** router

  Figure 15: *Sample status page for RV22-Mesh-Cabin node router in a wireless mesh: 1-2 deployment*



- Network toplogy for the **RV22-Mesh-Shelf** router

Figure 16: *Sample status page for RV22-Mesh-Shelf node router in a wireless mesh: 1-2 deployment*



Wireless and wired mixed mesh 1-2 deployment

In this deployment, the base router is connected to one node router wirelessly and simultaneously to another by a wired connection, thereby creating a mixed 1-2 mesh deployment.

Figure 17: *Wireless and wired mixed mesh: 1-2 deployment*

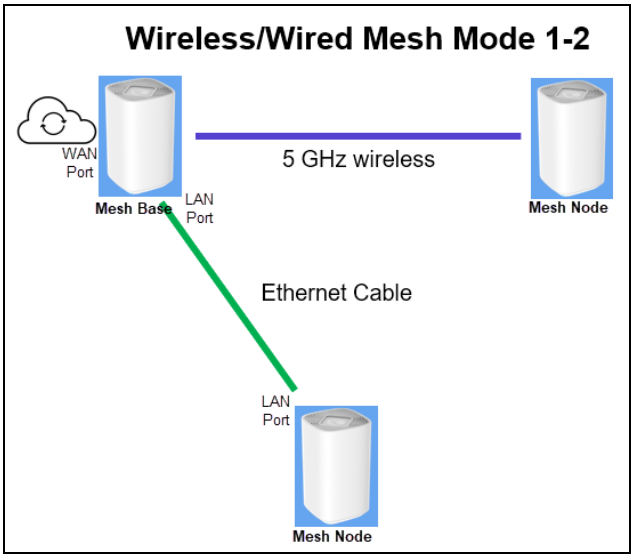
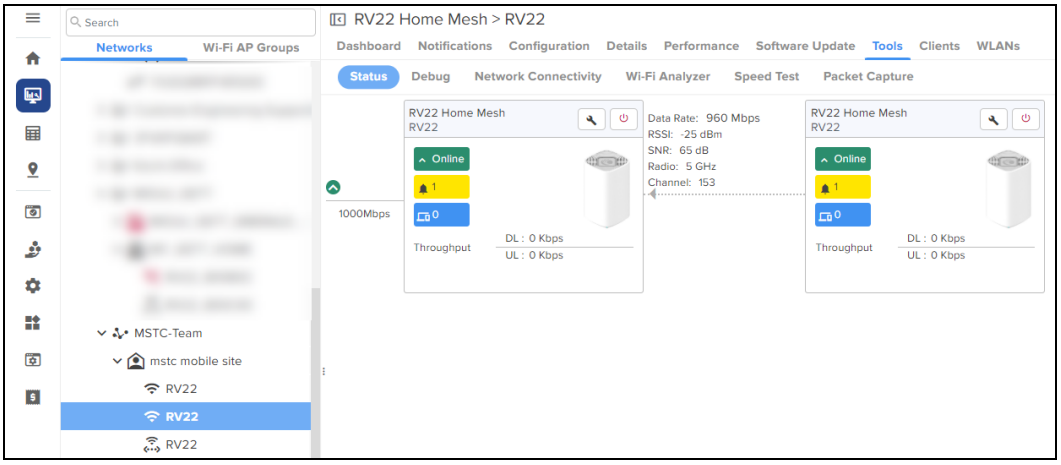


Figure 15 and Figure 16 display sample status pages for the node routers in a mixed mesh 1-2 deployment.

In the following status samples, one RV22 base router is connected to one RV22 node router wirelessly and simultaneously to another RV22 node router by a wired connection.

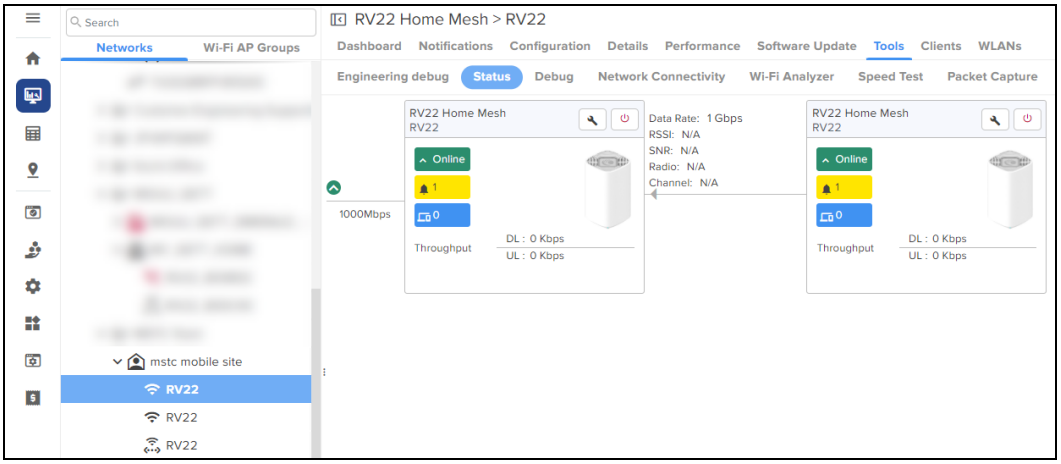
- Network toplogy for the wireless RV22 node router

Figure 18: *Sample status page for the wireless RV22 node router in a mixed mesh: 1-2 deployment*



- Network toplogy for the wired RV22 node router

Figure 19: *Sample status page for the wired RV22 node router in a mixed mesh: 1-2 deployment*



Setting up the Home Mesh Router—Wired Mesh Mode

To configure a wired mesh, onboard the routers to a site—Claim the routers, which you want to be part of the mesh, on cnMaestro in the subscriber workflow. Connect the mesh base router to the internet and connect the node routers to the base router using Ethernet cables. The AP group mapped to the subscriber is applied to all the routers to sync the configuration.

No configuration changes are required for RV22 routers to work in both wired and wireless mesh modes. Use any LAN port on the mesh base and any LAN port on the mesh node routers to establish a wired mesh connection. When a mesh node router detects an RV22 neighbor on its LAN port, it automatically establishes a wired mesh link using the LAN ports.

Note

You must not use the WAN port on the mesh node router to establish a wired mesh.

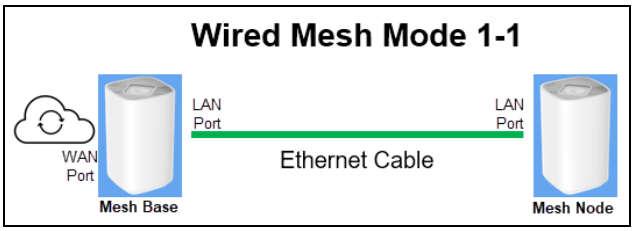
Following are some of the wired mesh configurations supported:

- Wired mesh: 1-1 deployment
- Wired mesh: 1-1-1 deployment
- Wired mesh: 1-2 deployment

Wired mesh: 1-1 deployment

In this deployment, the base router is connected to one node router using an Ethernet cable (between any LAN ports on both routers), thereby creating a wired 1-1 mesh deployment.

Figure 20: *Wired mesh: 1-1 deployment*



Wired mesh: 1-1-1 deployment

In this deployment, the base router is connected to only one of the node routers, which is inturn connected to another node router, by a wired connection (between any LAN ports on the routers), thereby creating a wired 1-1-1 mesh deployment.

Figure 21: *Wired mesh: 1-1-1 deployment*

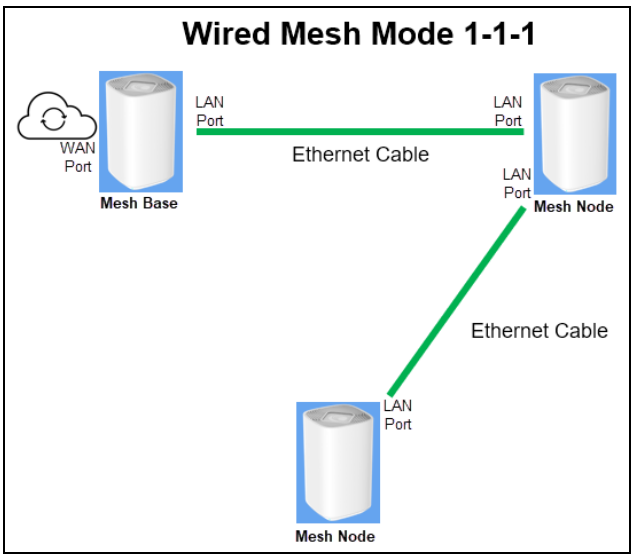
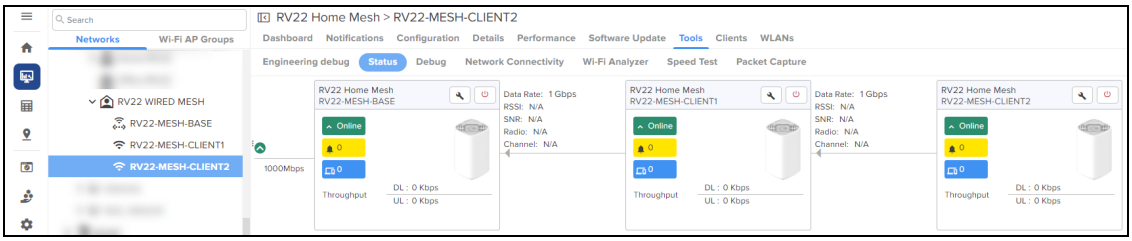


Figure 22 displays a sample cnMaestro status page for the wired mesh 1-1-1 deployment.

Figure 22: *Sample status page for wired mesh: 1-1-1 deployment*



Wired mesh: 1-2 deployment

In this deployment, the base router is connected to two node routers simultaneously by a wired connection, thereby creating a wired 1-2 mesh deployment.

Figure 23: *Wired mesh: 1-2 deployment*

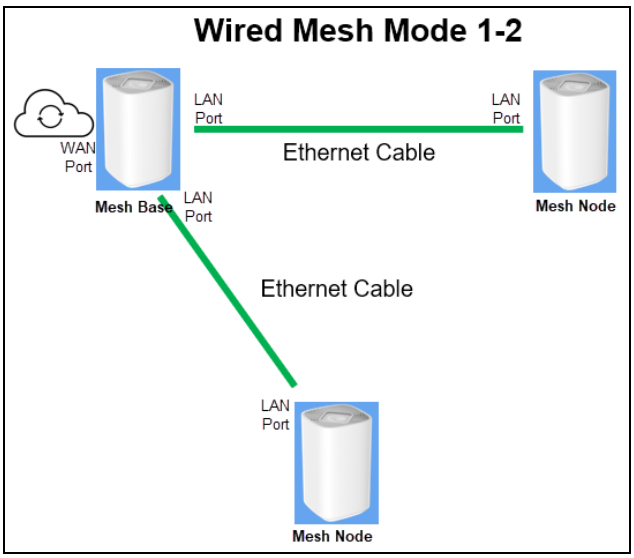
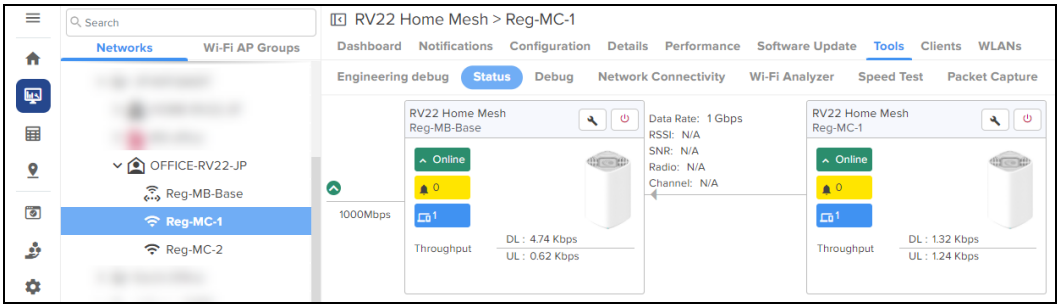


Figure 24 and Figure 25 display sample status pages for the node routers in a wired mesh 1-2 deployment.

In the following status samples, the **Reg-MB-Base** router is connected to both **Reg-MC-1** and **Reg-MC-2** routers using Ethernet cables, forming a wired 1-2 multi-mesh topology.

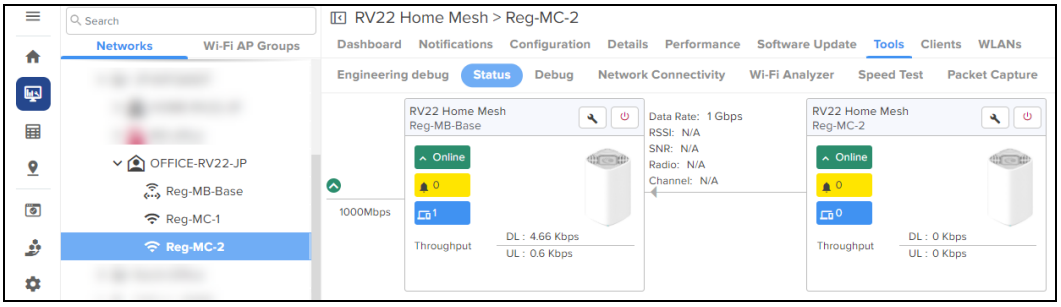
- Network toplogy for the **Reg-MC-1** router

  Figure 24: *Sample status page for Reg-MC-1 node router in a wired mesh: 1-2 deployment*



- Network toplogy for the **Reg-MC-2** router

Figure 25: *Sample status page for Reg-MC-2 node router in a wired mesh: 1-2 deployment*



Viewing router system information and network traffic status

When the customer configures the Home Mesh Router and connects to the internet, you can check the connection of the router in cnMaestro. You can also check the details of the clients that are connected.

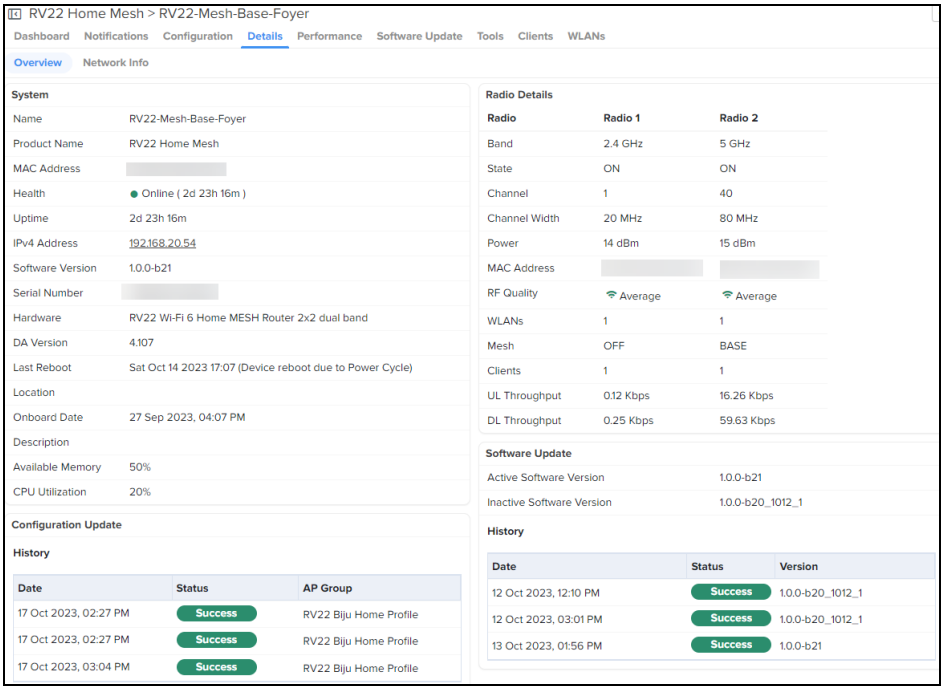
To view router system information and the connection status, navigate to **Monitor and Manage** > *<Home-Mesh-Router-name>* > **Details** tab.

The **Details** page displays information in the following tabs:

- **Overview**

  This page displays information in the following sections:

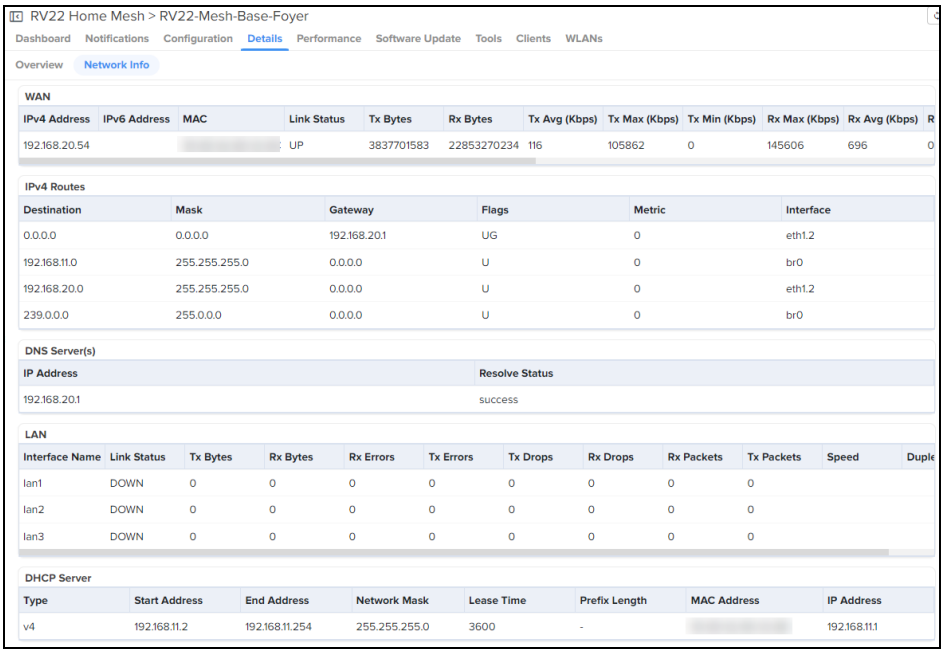
  - **System**—Displays information, such as router name, MAC address, health of the router (online, offline), software version, and location.
  - **Radio**—Displays radio details, such as the running bands, RF quality, count of clients connected to each radio, and the average throughput.
  - **Configuration Update**—Displays the history of configuration updates to the router.
  - **Software Update**—Displays the currently running software version and a history of software updates that were performed and the status.



- **Network Info**

This tab displays information in the following sections:

- **WAN**—Displays collective statistics about total number of transmitted and received data packets, data bytes, packets dropped, maximum and average speeds
- **IPv4 Routes**—Displays the IPv4 routes configured for the router.
- **DNS Server(s)**—Displays the details of the DNS servers.
- **LAN**—Displays details of the LAN interfaces, their status, total number of transmitted and received data packets and size (in bytes), packet errors and drops.
- **DHCP Server**—Displays details of the DHCP servers, start and end IP address in the range used for allocation, and the lease time.



Viewing, editing, and blocking connected clients

cnMaestro allows you to view details of clients (both wired and wireless) connected to the router and edit the name of clients. You can also block certain clients that you do not want to be connected to your wireless networks.

This topic contains the following sections:

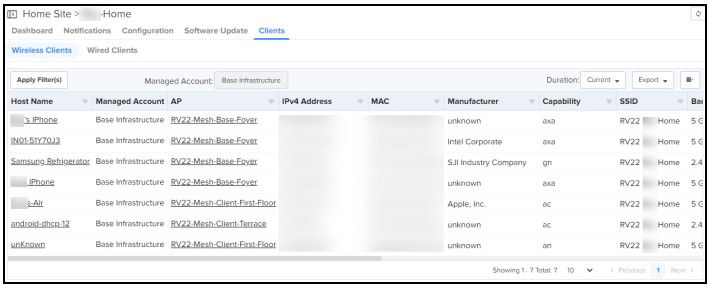
Viewing connected clients

To view the list of connected clients, both wired and wireless, navigate to **Monitor and Manage** > *<Home-Mesh-Router-name>* > **Clients** tab.

The **Details** tab displays information in the following two tabs:

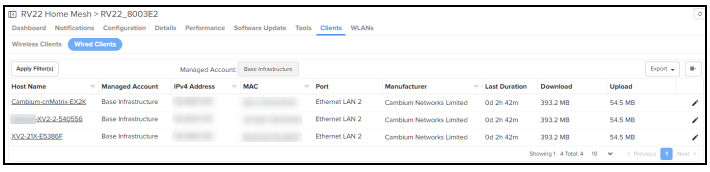
- **Wireless Clients**

  This page displays information about the wireless clients connected to the router, such as the host name, MAC address, IPv4 addess assigned, the router it is connected to, and the status of connection with the router (online, offline).



- **Wired Clients**

  This page displays information about the wired clients connected to the router, such as the host name, MAC address, IPv4 addess assigned, port number to which it is connected, the manufacturer of device connected, last connected duration, and the download and upload data size (in MB).



Editing client host name

To edit the host name of a connected client, click the edit client name ( ) icon corresponding to the client.

Enter the name in the **Host Name** field and click **Save**.

Blocking clients

To block a connected client, click the block (⊘) icon corresponding to the client.

Monitoring and Troubleshooting

You can monitor and perform troubleshooting tasks on the Home Mesh Router using cnMaestro. This topic covers the following sections

- Monitoring the Home Mesh Router
- Troubleshooting the Home Mesh Router
- Upgrading the Home Mesh Router firmware

Monitoring the Home Mesh Router

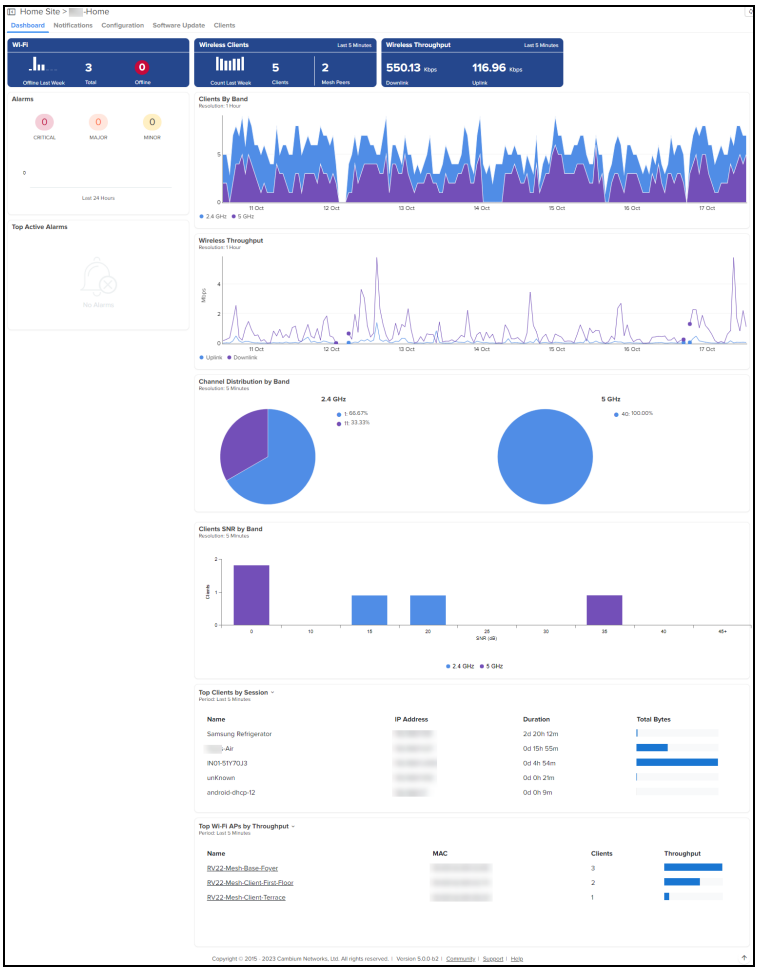
After the device is onboarded to cnMaestro, based on the deploymnet type, the router will be displayed under the site that is configured.

cnMaestro provides the following pages to monitor and view details of the router and the deployment.

- **Home Site Dashboard**
- **Notifications**
- **Software Update**
- **Performance**

Home Site Dashboard

To view the site dashboard, access the **Dashboard** page under **Monitor and Manage >** *<Home-site-name>* **> Dashboard.**



Notifications

The Notifications page displays current alarms, previous alarms, Wi-Fi-related events, and other device-related events.

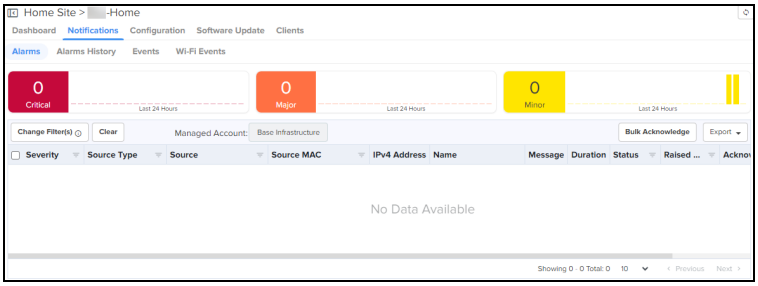
cnMaestro displays the following types of notifications:

- Alarms
- Alarms History
- Events
- Wi-Fi Events

Alarms

The Alarms page displays the number of critical, major, and minor events observed for the Home Mesh Router.You can also view the details of the events, such as severity level, name of the event, time and action taken.

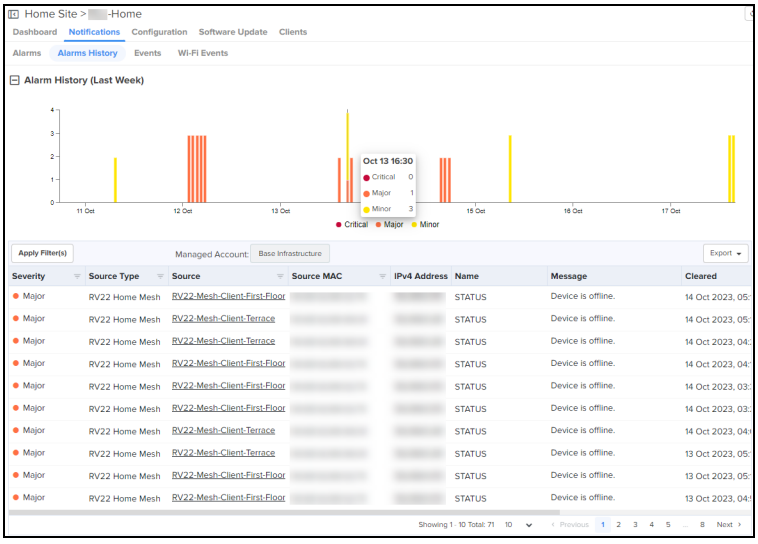
To view the alarms raised, access the **Alarms** page under **Monitor and Manage >** *<Home-site-name>* **> Notifications > Alarms.**



Alarms History

The Alarms History page displays the number of critical, major, and minor events observed in the previous week.

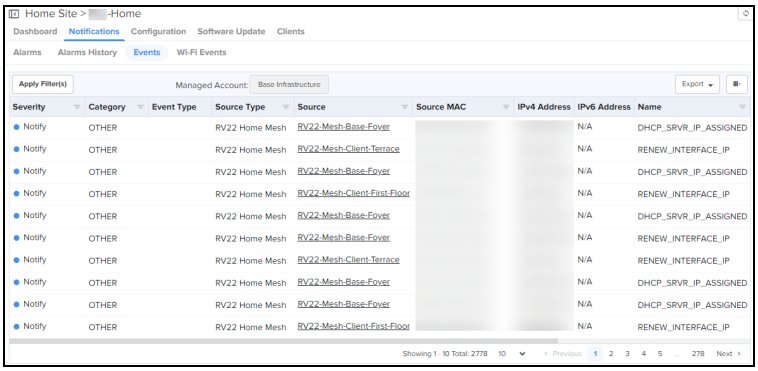
To view the alarms history displayed as a graphical representation, access the **Alarms History** page under **Monitor and Manage >** *<Home-site-name>* **> Notifications > Alarms History**.



Events

The Events page displays Home Mesh Router-related events, such as its status, if there was a bandwidth change, when the DHCP server IP was assigned to the connected clients.

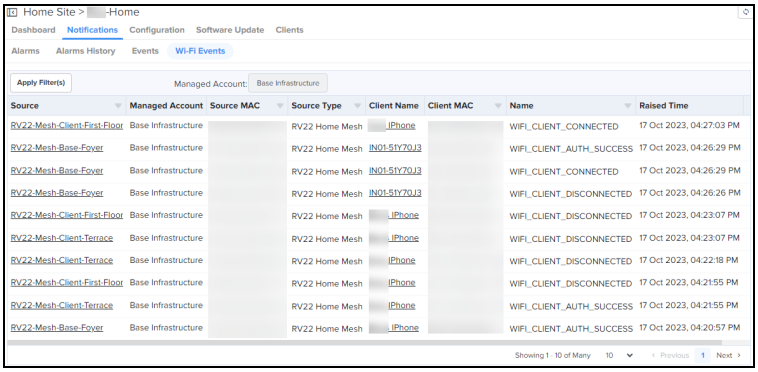
To view the events, access the **Events** page under **Monitor and Manage >** *<Home-site-name>* **> Notifications > Events**.



Wi-Fi Events

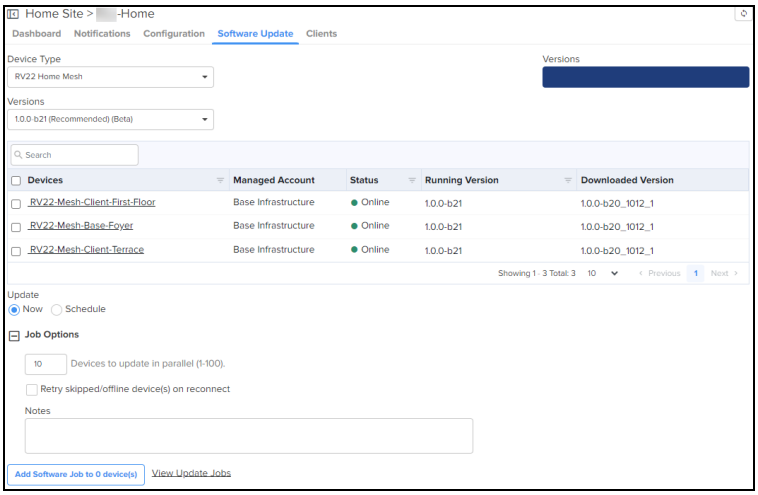
The Wi-Fi Events page displays client-related events, such as when the client connected to the network, when it was disconnected, and authentication events.

To view the Wi-Fi events, access the **Wi-Fi Events** page under **Monitor and Manage >** *<Home-site-name>* **> Notifications > Wi-Fi Events**.



Software Update

To upgrade the router firmware, go to the **Software Update** page. See Upgrading the Home Mesh Router firmware for more information.



Performance

To view the performace of the router, access the **Wi-Fi Events** page under **Monitor and Manage >** *<Home-Mesh-Router-name>* **> Performance**.

The tab displays the following graphical information:

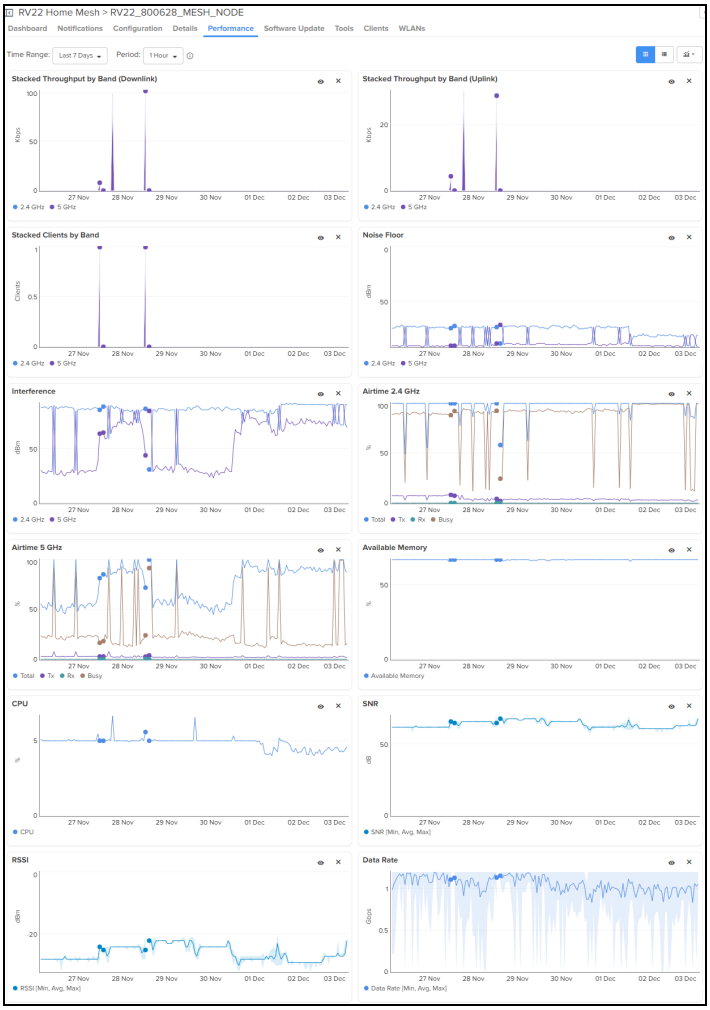
Table 16: Performance tab graphs—Base and Node routers

Parameter	Description	Router (Base / Node / Both)
Stacked WAN Throughput	Hourly throughput for both downlink and uplink in the WAN interface for each band of the mesh base router.	Base only
Stacked Throughput by Band (Downlink)	Downlink speed in each band.	Both
Stacked Throughput by Band (Uplink)	Uplink speed in each band.	Both
Stacked Clients by Band	Count of number of clients connected in each band.	Both
Noise Floor	Amount of background noise (in dBm) or interference created by devices in the same frequency.	Both
Interference	Interefence (in dBm) caused by other wireless signals and devices interrupting the router's Wi-Fi signal.	Both
Airtime 2.4 GHz	Capacity utilization (in %) of the 2.4 GHz band for effective transmission.	Both
Airtime 5 GHz	Capacity utilization (in %) of the 5 GHz band for effective transmission.	Both
Available Memory	Amount of router memory (in %) available for use.	Both
CPU	Router CPU utilization in percentage (%).	Both
SNR	Minimum, average, and maximum SNR values (in dB) for the mesh node router.	Node only
RSSI	Received Signal Strength Indicator (RSSI) value (in dBm) for the mesh node router.	Node only
Data Rate	Minimum, average, and maximum data rates (in Mbps or Gbps) provided by the mesh node router to the client devices.	Node only

Following are sample performance graphs for base and node routers:

- Performance of the *base router* in a mesh deployment

- Performance of the *node router* in a mesh deployment



Troubleshooting the Home Mesh Router

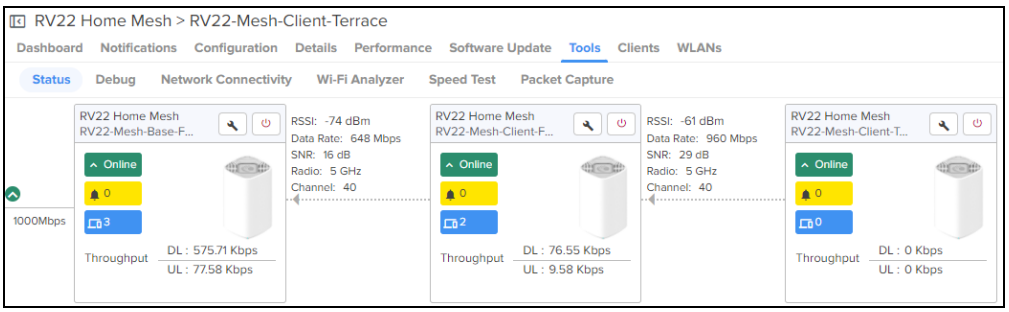
cnMaestro provides the following troubleshooting options for the router:

- Status
    - Downloading tech support file
- Debug
- Network Connectivity
- Wi-Fi Analyzer
- Speed Test
- Packet Capture

Status

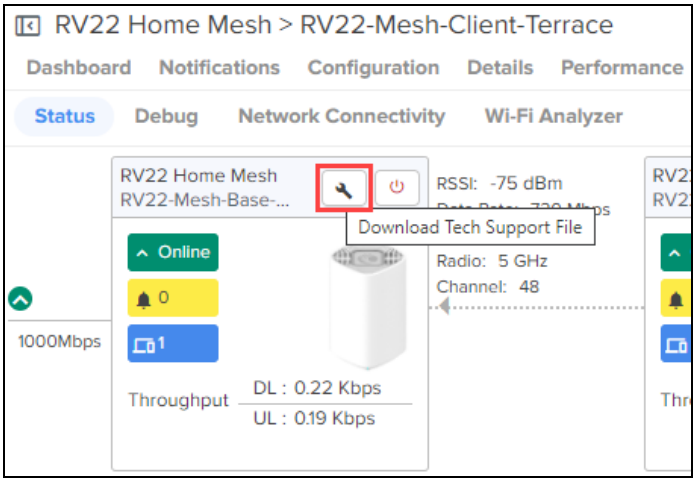
The Status page displays the status of link between the Home Mesh Router base and client devices.

To view the status of the link between the Home Mesh base and client devices, access the **Status** page under **Monitor and Manage >** *<Home-Mesh-Router-name>* **> Tools.**



Downloading tech support file

To download the tech support file, on the **Status** page, click the Download Tech Support File ( ) icon.

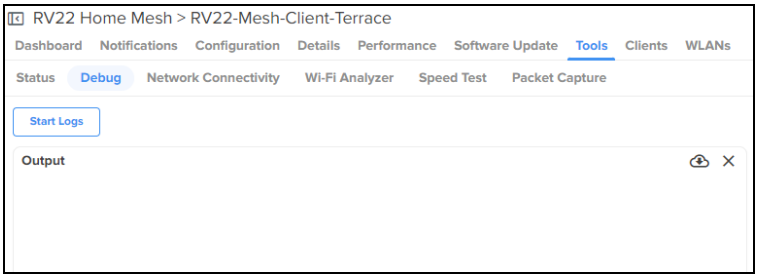


Debug

The Debug page displays log information of the Home Mesh Router. To view the debug information, complete the following steps:

1. Navigate to the **Monitor and Manage >** *<Home-Mesh-Router-name>* **> Tools** > **Debug** tab.
2. Click **Start Logs**.

The log information is displayed in the **Output** window.



Network Connectivity

The Network Connectivity page provides network connectivity information of the Home Mesh Routers.

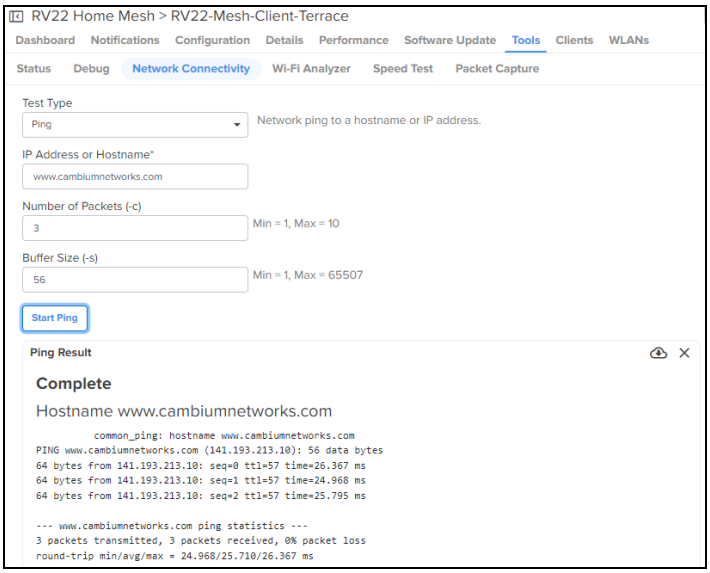
cnMaestro supports the following tests to provide connectivity information for the Home Mesh Routers:

- Ping
- DNS Lookup
- Traceroute

To test network connectivity of the router, complete the following steps:

1. Navigate to the **Monitor and Manage >** *<Home-Mesh-Router-name>* **> Tools** > **Network Connectivity** tab.
2. Select the required test type from the **Test Type** dropdown list and configure the corresponding parameters required for the test.
3. Click **Start Test**.

   cnMaestro initiates the test and displays the result in the **<Test Type> Result** window.



Wi-Fi Analyzer

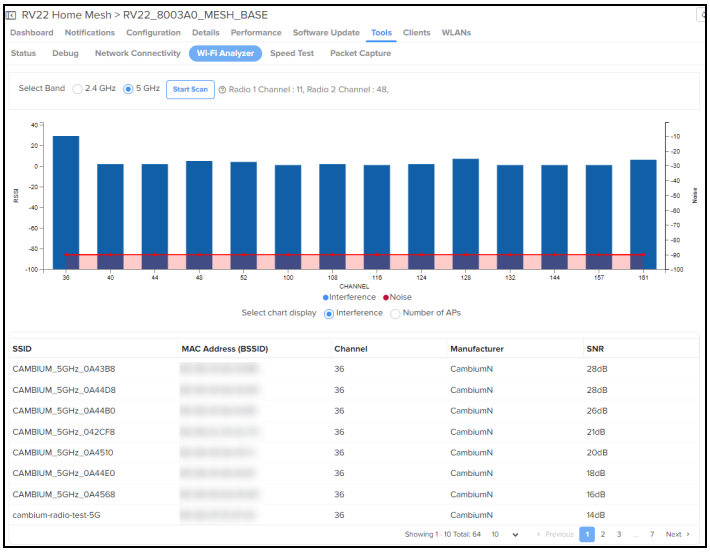
The Wi-Fi Analyzer page displays radio traffic and signal information for the selected band. It displays the interference and noise measured for the selected band.

To view the Wi-Fi Analyzer details, complete the following steps:

1. Navigate to the **Monitor and Manage >** *<Home-Mesh-Router-name>* **> Tools** > **Wi-Fi Analyzer** tab.
2. Select the required band (2.4 or 5 GHz).

3. Click **Start Scan**.

   cnMaestro analyzes the band and displays the result in table.



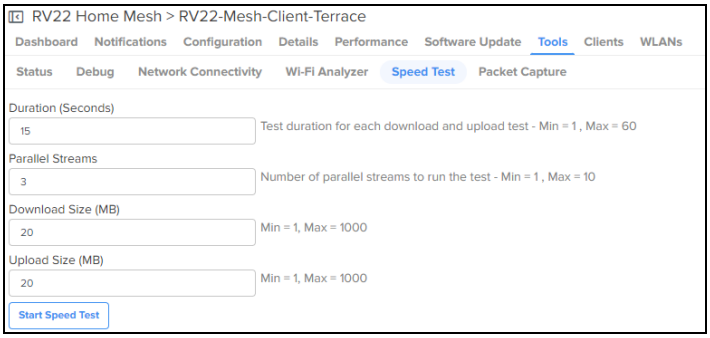
Speed Test

The Speed Test page displays the internet speed provided by the Home Mesh Router.

To know the speed of the router, complete the following steps:

1. Navigate to the **Monitor and Manage >** *<Home-Mesh-Router-name>* **> Tools** > **Speed Test** tab.
2. Configure the required values for testing the speed.
3. Click **Start Speed Test**.

   cnMaestro checks the speed and displays both download and upload speeds in megabits per second (Mbps)

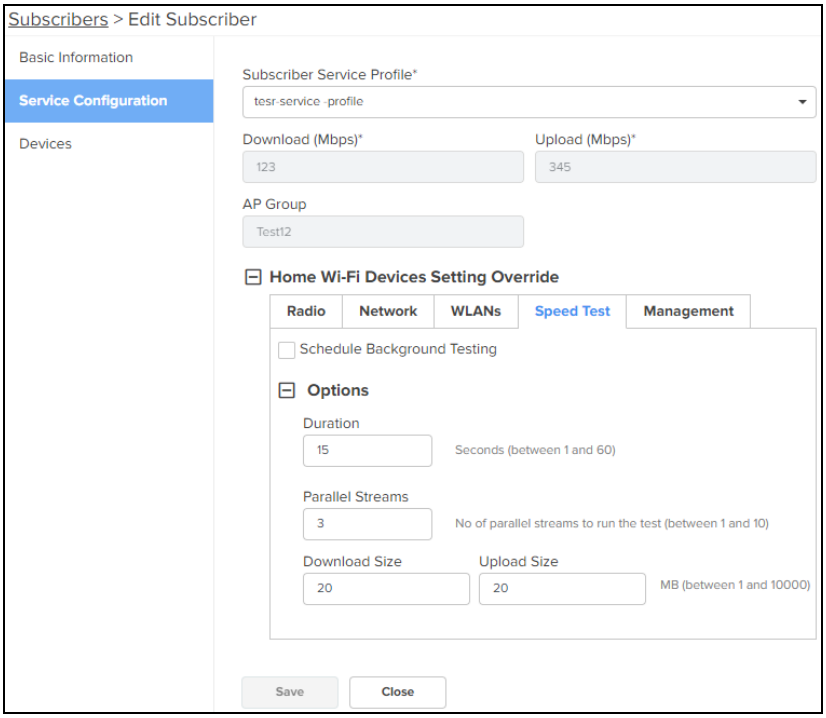


The speed test is also available in the **Subscriber** page in the **Home Wi-Fi Devices Setting Override** section.

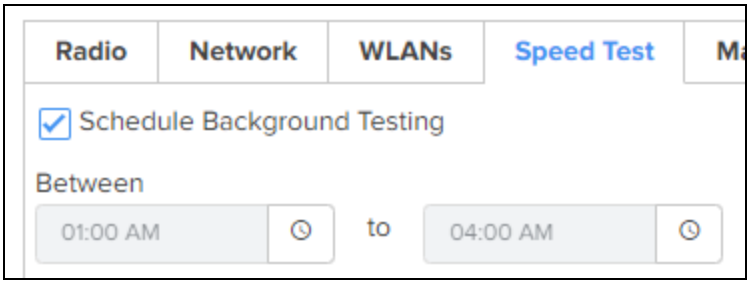
To avail this speed test option, complete the following steps:

1. Navigate to the **Manage Service Providers** > **Managed Subscribers** > **Subscribers** tab.
2. From the list of subscribers, click the subscriber name for which you want to configure the speed test.

   The **Edit <Susbcriber-name>** window is displayed.
3. Click the **Service Configuration** tab.
4. In the **Home Wi-Fi Devices Setting Override** section, click the **Speed Test** tab.



5. To schedule the speed test at a particular duration, select the **Schedule Background Testing** check box.
6. Select the start and end time for performing the speed test on the router.



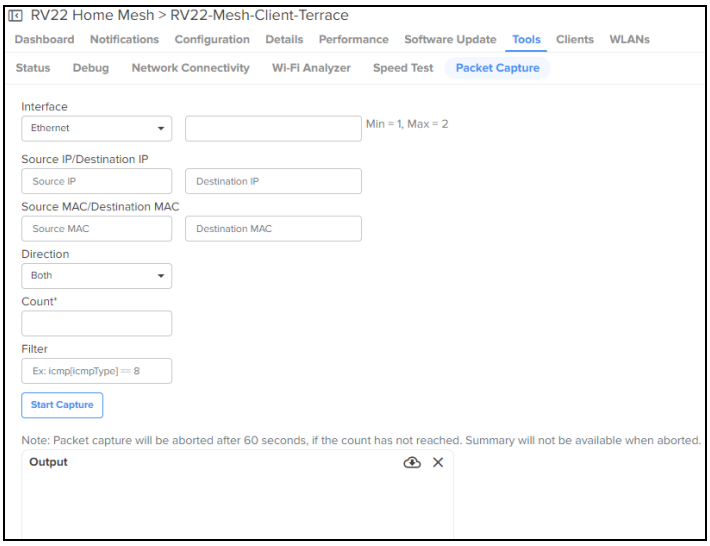
Packet Capture

The Packet Capture page allows the user to capture all packets on a specified interface.

To capture packet data, complete the following steps:

1. Navigate to the **Monitor and Manage >** *<Home-Mesh-Router-name>* **> Tools** > **Packet Capture** tab.
2. Select the required interface and provide the source and destination IP address or MAC address.
3. Provide the number of packets to be captured.
4. Click **Start Capture**.

   cnMaestro displays the information in the **Ouput** window.
5. To download the PCAP file, click the download ( ) icon.



Upgrading the Home Mesh Router firmware

To upgrade the firmware of Home Mesh routers present in a home site, complete the following steps:

1. Navigate to **Monitor and Manage >** *<Home-site-name>* **> Software Update**.

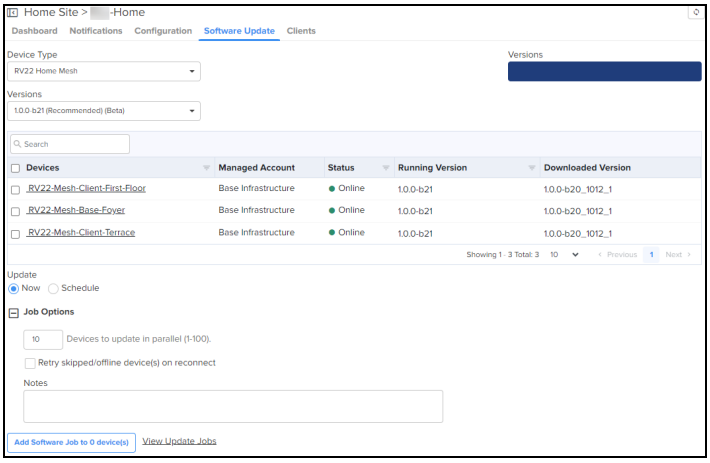
   The Software Update page appears
2. Select **RV22 Home Mesh** from the **Device Type** dropdown list.
3. Select the software version from the **Versions** dropdown list.
4. In the list of devices table, select the check boxes corresponding to the devices for which you want to upgrade the firmware.

   You can also select one router to upgrade the firmware of only that router.
5. Select the **Now** option in the **Update** field to upgrade the firmware immediately.

   To schedule the upgrade job, select the **Schedule** option and configure the required date and time.
6. Click **Add Software Job to** *<number of devices>* **device(s)**.

The upgrade is scheduled to run at the specified date and time.

To view the status of the update jobs, click **View Update Jobs**.



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