casa systems

# Verizon 4G LTE Network Extender 3 for Enterprise

# User Guide

## v8.1

DOC-3698-01
Document Revision 8.1b
March 2023

# Contents

## Appendix A. FAQs

# Preface

## About this guide

The *Network Extender 3 User Guide* is intended for system administrators, support engineers, and operators who are responsible for basic installation and configuration of Network Extender units. Users who perform these tasks should be familiar with the Apex hardware and software capabilities, as well as have experience with both 3G and 4G technologies.

The following chapters are provided in this guide:

| For information about | See |
|---|---|
| Getting Started | Chapter 1. |
| Installation | Chapter 2. |
| Web GUI | Chapter 3. |
| Configuration | Chapter 4. |
| Troubleshooting | Chapter 5. |
| Specifications | Chapter 6. |
| FAQs | Appendix A |

## Document revision history

This document supports the following Network Extender 3 software. See the *Casa Systems – Apex eFemto Small Cell Release Notes* for additional information on new functionality not yet covered in this guide.

- Revision 1.0 — April 2021; initial version, R4.9.24.1
- Revision 2.0 — May 2021; revised version, R4.9.29
- Revision 3.0 — September 2021; initial version, R4.10.8
- Revision 3.1 — October 2021; revised version, R4.10.8.1
- Revision 3.2 — October 2021; revised version, R4.10.9
- Revision 3.3 — November 2021; revised version, R4.10.9
- Revision 4.0 — February 2022; revised Web GUI
- Revision 5.0 — March 2022; revised version
- Revision 6.0 — May 2022; revised Web GUI features
- Revision 7.0 — August 2022; revised version
- Revision 8.0 — December 2022; revised Casa contact information
- Revision 8.1 — January 2023; revised version
- Revision 8.1a — February 2023; revised per Accessibility Report results
- Revision 8.1b — March 2023; revised per Accessibility Report results

## Corporate facility

Casa Systems, Inc.
100 Old River Road
Andover, MA 01810

# Personal and Product Safety

This product safety information includes U.S. directives that you must follow. All applicable OSHA regulations and standards shall be followed.

The installation, maintenance, or removal of telecommunications equipment requires qualified, experienced personnel. Installation instructions are written for such installation personnel.

## Site Safety

Site construction shall be design-approved and certified by engineers who have valid and up-to-date P.E. license approval with the National Society of Professional Engineers.

Workers shall evaluate site safety as per all applicable safety ordinances and requirements including, but not limited to OSHA, NFPA 70, and applicable building code requirements prior to, during, and after completion. Workers shall not conduct product work until and unless the site is in full safety compliance with associated regulatory requirements.

## Materials

Workers shall use only approved materials that comply with applicable safety and environmental requirements. All materials shall be deployed in accordance with all applicable safety requirements, and according to manufacturer instruction. Workers shall not install any materials that are intrinsically unsafe, or have shipping, handling, or installation instructions that are intrinsically unsafe.

## Electrical

This product contains hazardous energy levels as defined by UL 60950. Care must be taken as injury to personnel or damage to the equipment could result from mistakes. Maintenance should only be carried out by approved workers who have adequate training and understanding and are familiar with the required procedures and instructions.

In addition to all applicable safety requirements, workers shall abide by the latest edition of NFPA 70 national electrical code. Certified and licensed Electricians and Power Limited Technicians shall perform electrical work as required by applicable regulatory requirements.

All structural materials shall be grounded, and all input and outputs shall have built-in isolation from the network as per NFPA 70 standards and client-approved standards. All connectivity and input and output hardware ports that connect to external power sources shall be designed and installed to meet national safety and regulatory requirements.

## Shipping, Transport, and Manual Handling

Worker shall assure they understand and abide by all associated regulatory and standards instruction applicable to shipping, transport and handling of product, including but not limited to OSHA and all associated documentation for product shipping, transport, and manual handling requirements.

Worker shall assure adequate and approved shipping, transport, and handling procedures are utilized to maintain safety.

## Installation

Installation shall be carried out by trained and competent workers always observing all applicable safety rules and regulations.

Workers shall read, and understand the latest published installation documentation, and make sure all required workers, tools, and materials are approved and present prior to beginning any defined work task.

Workers shall also abide by the latest published installation documentation for general work procedures and guidance materials.

All relevant safety measures must be taken to ensure that equipment is not connected to live power and transmission sources during installation. Equipment must be correctly installed to meet the relevant safety standards and approval conditions.

## Maintenance

Maintenance shall be carried out by trained and competent workers while always observing all applicable safety rules and regulations. Equipment covers shall not be removed while live power and/or transmission is connected unless specifically directed by a Casa published work instruction and as determined safe by all associated safety rules and regulations.

## Environment

The product must be operated in an environment within the specified relative humidity and ambient temperature ranges.

Keep all liquids away from the equipment, as accidental spillage can cause severe damage.

## Grounding

To comply with ANSI/NFPA70 and UL 60950, equipment must be connected to a safety grounding point via a permanent connection. Grounding points are located on the product for this purpose. Always connect the ground cable as per the latest published instructions before fitting other cables. The product must remain grounded continuously unless all system and power connections are removed.

If equipment is grounded through a cabinet or rack, make sure it is done so properly according to the latest published installation instructions.

## Technical documentation

Casa Systems provides the following documentation set in PDF format, viewable using current versions of Adobe Reader©. The latest documentation and revisions are uploaded on a continued basis for Verizon customers.

Contact Verizon Support for assistance with downloading selected Casa documentation PDFs.

- *Casa Systems – Apex eFemto Small Cell User Guide* (this document)
- *Casa Systems – Apex eFemto Small Cell Quick Start Guide*

## Support information

For detailed instructions and device information, visit:

***www.verizon.com/support/4g-lte-network-extender-enterprise-basics/***

**Customer Support:** 800-922-0204

## Safety Warnings

**AC System**: Disconnect AC power, before servicing.

**RF Cable Installation**: Installation shall be in accordance with the applicable parts of Chapter 8 of ANSI/NFPA 70.

**Circuit Breaker**: Branch circuit protection.

The power system must be equipped with external branch circuit protection that complies with NEC requirement and have a rating maximum of 20A. (Use UL-listed circuit breaker.)

# Chapter 1. Getting Started

## About this chapter

This chapter provides Getting Started information for the Network Extender 3.

The following topics are covered in this chapter:

# Introduction

This user guide introduces the Verizon Wireless 4G LTE Network Extender 3 for Enterprise, designed to quickly enhance and extend the Verizon Wireless network experience for voice and data.

**Figure 1-1. Network Extender 3**

This Network Extender provides the following features:

- This Network Extender is a simple-to-install device that provides enhanced in-building wireless service without having to change your existing 4G LTE mobile phone.
- This Network Extender allows users to easily install and configure the system by connecting to an existing broadband network.
- This Network Extender supports an embedded web server, which allows you to customize your device settings providing troubleshooting and operational data.

## System Requirements

- This device only supports Verizon Wireless 4G LTE mobile handsets with Advanced Calling turned on, as shown in Chapter 2, Making a call.
- Internet Access: This Network Extender requires an Internet connection to operate and must be connected to an available port on a router or modem with always-on Internet connection with a recommended bandwidth greater than 50mbps.

  **Note:** A lower bandwidth configuration may impact the system performance and user experience.
- GPS signal: This Network Extender requires continuous GPS location to operate. Ensure the supplied GPS antenna is properly installed near or on a window with clear and open view of the sky. Sync LED should be green.
- Firewall modifications may be required to support the solution. Be sure to contact your IT administrator for the required changes. Please review the Firewall rules for business in Chapter 4. In the event that firewall changes are needed, please attempt to make these changes before calling into Customer Care.

  **Note:** For more clarity on firewall settings, please see Firewall settings in Chapter 4.
- The Network Extender supports IEEE 802.3ab Gigabit Ethernet Auto-Negotiation. Auto-Negotiation is a requirement of 802.3ab and may cause a speed and/or duplex mismatch if not fully enabled on the Network Extender switch/router port.

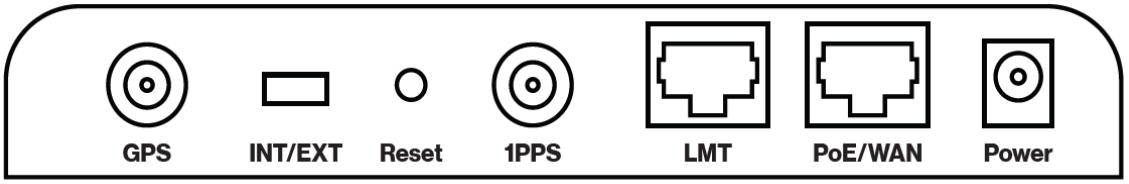
  Casa recommends that Full auto-negotiation be enabled. If the Network Extender does not come into service as either 100/Full or 1000/Full, the recommendation is to configure statically as either 1000/Full (if capable) or 100/Full.

  **Note:** If 100/Full is used, the Network Extender can go into service, but throughput will be limited.

## Network Extender Basics

This section will guide you through the basic features and functions of your Network Extender. Figure 1-2 details the ports on the back of the Network Extender.

**Figure 1-2. Network Extender Ports**




The RF Antenna of Network Extender is embedded in the Front cover and 6 different external antenna ports are located on the top of the Network Extender.

The included GPS antenna is required for the automated setup process and is necessary in the event the mobile phone is used to call for emergency services while in the coverage area of the Network Extender. Table 1-1 provides port information for the Network Extender.

The Network Extender has multiple, single color LEDs used to indicate the device connectivity status. Please refer to Chapter 5, Troubleshooting when attempting to troubleshoot the solution.

**Table 1-1. Network Extender port descriptions**

| Port Name | Function |
|---|---|
| GPS | To connect GPS antenna and receive GPS signal. |
| INT/EXT | To select antenna INT (Internal)/EXT (External).<br><br>**WARNING**: Incorrect use of this switch may cause PA damage. Refer to INT/EXT antenna (page 2-22) for important information on the proper use of the INT/EXT switch. |
| Reset | Factory Reset. |
| 1PPS | Reserved for future use. |
| LMT | Local Monitoring Terminal Port to manage setting and display device status. |

**Table 1-1. Network Extender port descriptions (continued)**

| Port Name | Function |
|---|---|
| PoE/WAN | To connect to a Power over Ethernet (PoE) and/or Wide Area Network (WAN) Port. |
| Power | To connect Power Supply (12V DC). |

# Chapter 2. Installation

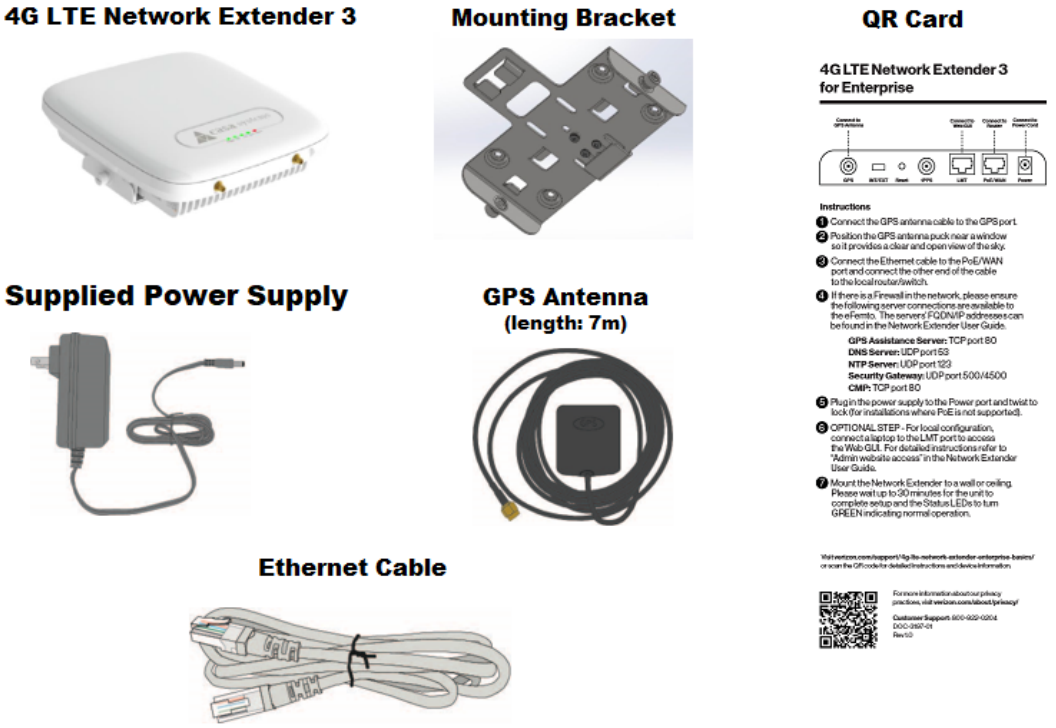
## About this chapter

This chapter includes installation information for the Network Extender 3. The following items are described in this chapter:

# Unpacking the box

The following items are provided in the Network Extender box:

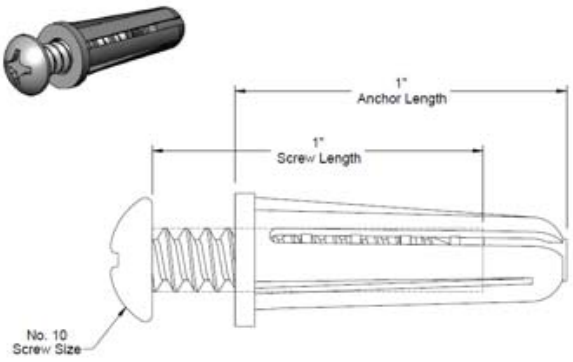
**Figure 2-1. What's included in the box**



## Required fasteners (not provided)

The fasteners shown in Figure 2-2 (Qty: 4) are required to mount the Network Extender to the wall.

**Figure 2-2. Fasteners (not provided)**



# Coverage area

The coverage area of the Network Extender varies based on many factors including; the layout and building materials of the location in which it is deployed. An open floor plan will allow for greater coverage as compared to an office space with many metal and/or concrete walls, which impede the cellular signal.

Use Table 2-1 to estimate coverage area and recommended distance between network extenders when deploying more than one in a location.

**Table 2-1. Coverage area**

| Building Layout | Approximate Range of Network Extender (radius) | Recommended distance between network extenders |
|---|---|---|
| Open | 200 feet | 320 feet |
| Medium | 100 feet | 170 feet |
| Dense | 70 feet | 120 feet |

**Note:** Coverage area can vary depending on number and size of obstructions and building material types.

## Building Layout

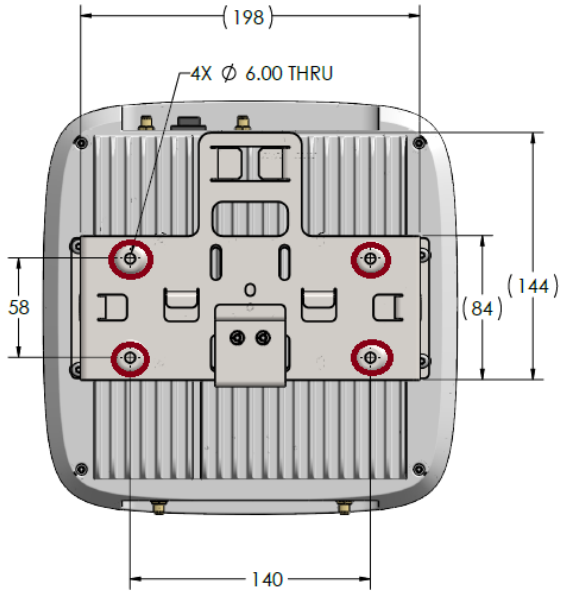
- Open: Open layout with no or few internal walls.
- Medium: mixed layout with open and scattered walled offices.
- Dense: walled office layout with narrow hallways

# Installing the wall bracket

## Marking the mounting position

Before placing the Network Extender, mark the position where it will be installed and also the positions where anchor bolts will be fixed using a pen or pencil. Mark the 4 holes using the bracket as a guide (see Figure 2-3).

**Figure 2-3. Anchor locations**

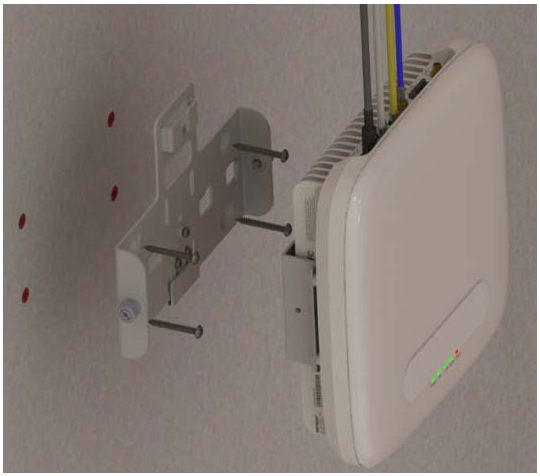



When anchoring on a wall, ensure the positions are marked as horizontal or vertical, as only a limited range of tuning is allowed for leveling after the system is mounted.

# Securing the mounting bracket to the wall

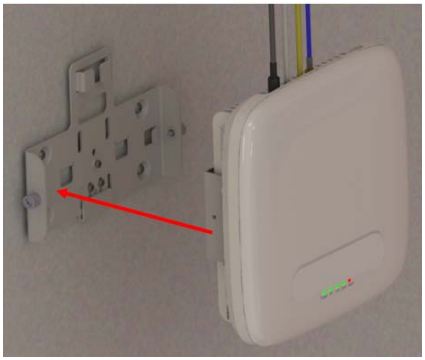
1. Attach the upper bracket to the wall/ceiling (see Figure 2-4).

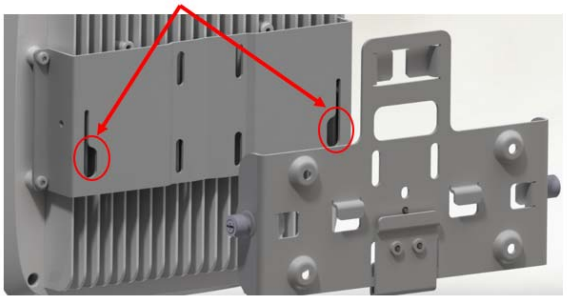
**Figure 2-4. Attach bracket**



2. Align the tabs on the upper bracket with the opening on the lower bracket and push inward (see Figure 2-5).

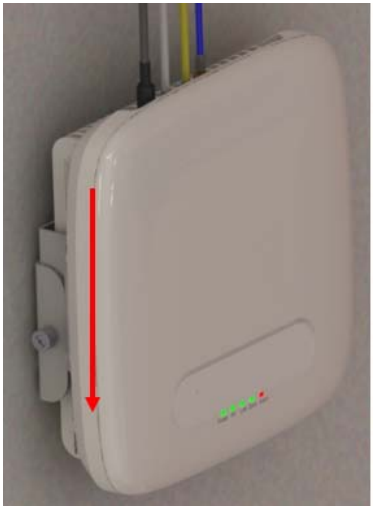
**Figure 2-5. Align tabs**





3. Push downward to seat the unit (see Figure 2-6).

**Figure 2-6. Seat the unit**



4. Tighten the screw fasteners, one on each side (see Figure 2-7).

**Figure 2-7. Tighten the fasteners**

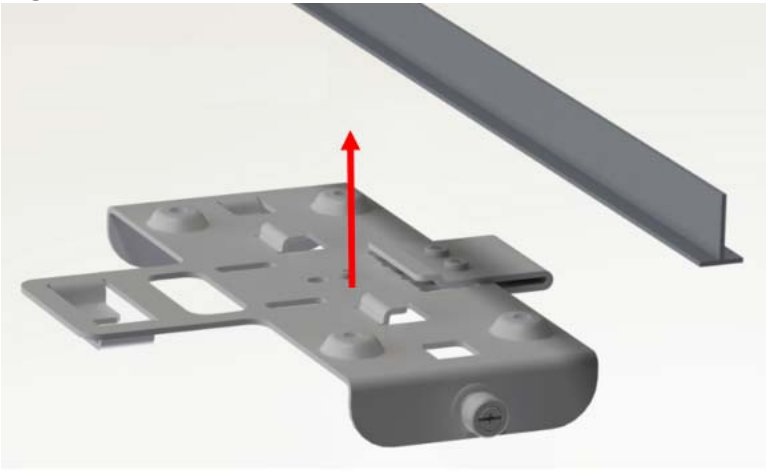
# Securing the mounting bracket to a dropped ceiling

The following procedure details how to attach the Network Extender in a suspended ceiling application.

**WARNING**: Before installing the Network Extender to a dropped ceiling, the installer should ensure that the structure is secure and capable of supporting the weight of the Network Extender. Additional ceiling support hangers may be required to ensure a safe installation and all hangers used for installing the Network Extender should adhere to local building codes.

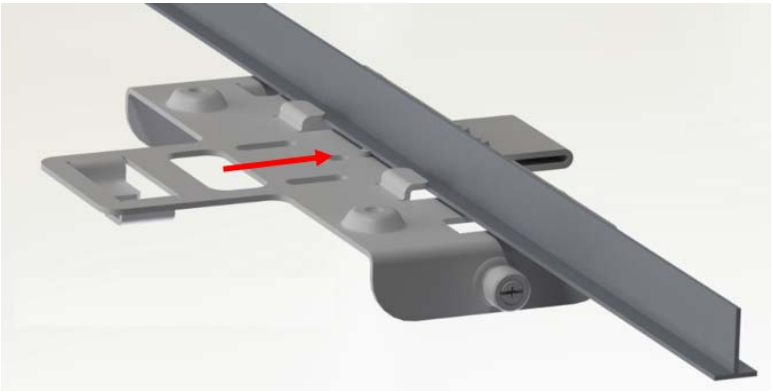
1. Push the upper bracket up against the bottom of the T-Rail (see Figure 2-8).

**Figure 2-8. Push upper bracket**



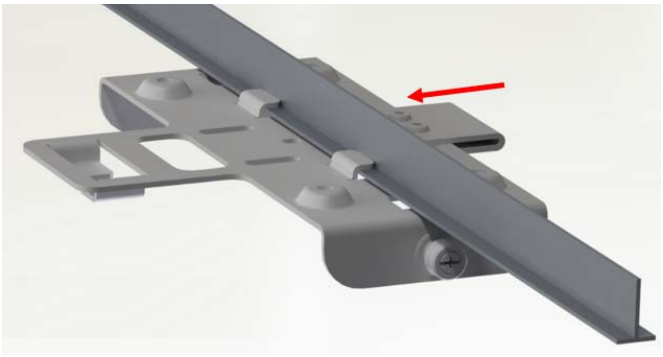
2. Push the upper bracket back against the T-Rail to engage the tabs (see Figure 2-9).

**Figure 2-9. Engage tabs**



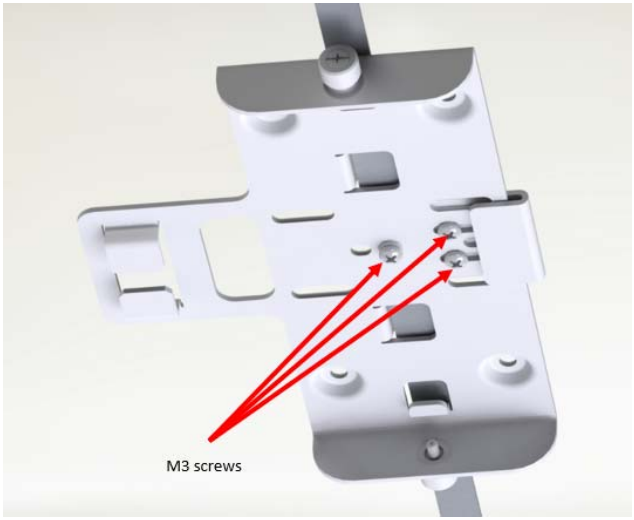
3. Push the clamp back against the T-Rail to engage tabs on both sides of the rail (see Figure 2-10).

**Figure 2-10. Push clamp**



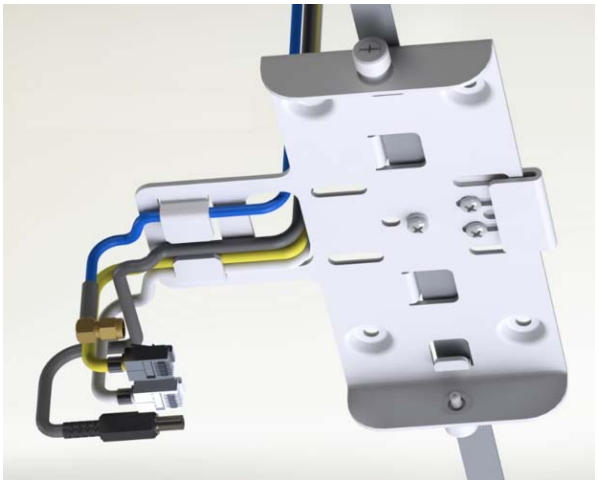
4. Tighten the three M3 screws to lock the clamp and the upper bracket onto the T-Rail (see Figure 2-11).

**Figure 2-11. Tighten screws**



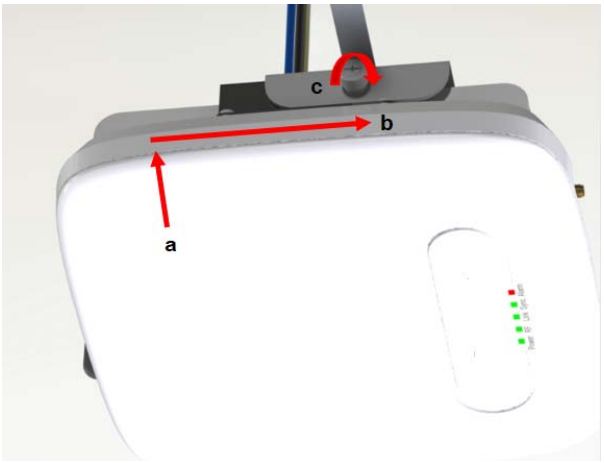
5. Route the cables in the cable management tabs (see Figure 2-12).

**Figure 2-12. Route cables**



6. Push the Network Extender up (a) and back (b) locking it into the upper bracket, then tighten the screw fasteners (c) on both sides (see Figure 2-13).

**Figure 2-13. Push the unit**



# Connecting the cables

The Network Extender unit can be connected to the network via an Ethernet connection. The Ethernet connection is plug-and-play.

1. Connect the GPS antenna cable to the GPS port on the unit (see Figure 2-14).

**Figure 2-14. GPS port**


2. Position the GPS antenna puck near a window so it provides a clear and open view of the sky.

**WARNING**: The unit will not connect to the LTE network if the GPS antenna fails to lock on its location.

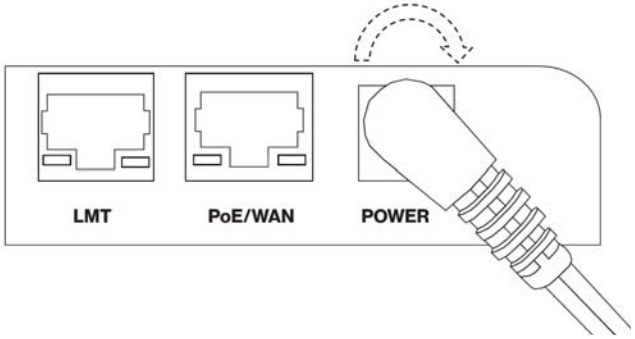
3. Connect the Ethernet cable to the PoE/WAN port on the unit (see Figure 2-15).

**Figure 2-15. PoE/WAN port**


4. Connect the other end of the Ethernet cable to a port on the home router/switch or connect it to the Ethernet outlet that has service.

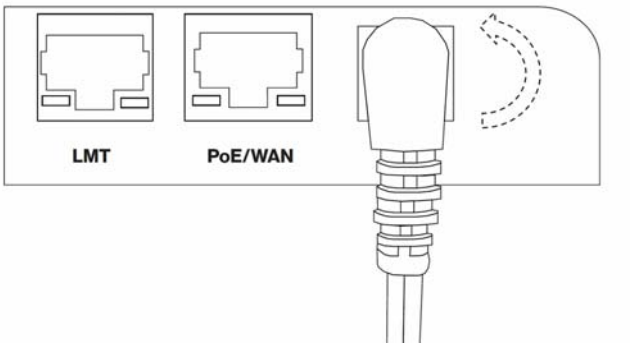
5. To install the power cable, it should be plugged in at 45 Degrees and twist clockwise to secure the power cord in the lock position (see Figure 2-16).

**Figure 2-16. Lock the power cable**




6. To unlock the power cable, twist it counterclockwise from the lock position (45 Degrees) as shown in Figure 2-17.

**Figure 2-17. Unlock the power cable**



## Optional mounting configurations

The Network Extender can be mounted on a plenum above the ceiling (see Figure 2-18) or on a pole (see Figure 2-19).

**Note:** The mounting bracket cross bar (shown in Figure 2-18) is an accessory that is not included with the Network Extender and is shown for reference only.

**Figure 2-18. Plenum above ceiling**

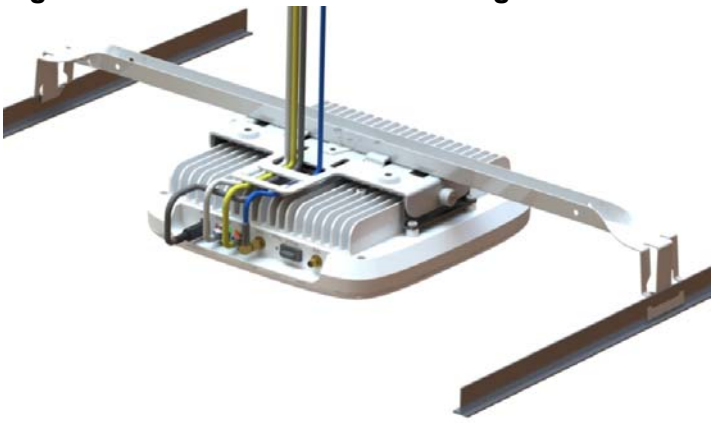


**Figure 2-19. Pole mount installation**

# Startup sequence

The following steps provide detail Network Extender states during the startup sequence. Table 2-1 provides functional details for each status LED during the startup sequence.

**Table 2-1. Status LED functions**

| LED | Color | Function |
|---|---|---|
| Power |  | OFF: Power not detected. |
| | | ON: All the power rails are present. |
| | | Flashing: Unit booting or firmware upgrading. |
| RF |  | OFF: Radio activity disabled, not transmitting and receiving. |
| | | ON: Radio activity enabled, unit transmitting and receiving. |
| Link |  | OFF: Ethernet link down. |
| | | ON: Ethernet link up. |
| Sync |  | OFF: Synchronization not established with the GPS. |
| | | ON: GPS synchronization complete. |
| | | Flashing: Lost GPS synchronization. |
| Alarm |  | OFF: No alarms detected. |
| | | Flashing: System critical alarm. |

1. Powered-on and hardware initializing.

The Network Extender State: The device has been powered on and the system is performing hardware tests.

**Note:** The Network Extender is under an autonomous hardware test cycle. It is not possible to load or run any software, including the user Admin Website Page.

2. Hardware test completed and software loaded ("Boot Complete").

The Network Extender State: The device has completed hardware initialization and loaded all software.

Admin Website State: The software is loaded. The Admin Website is accessible only from the LMT port.

**Note:** The device has completed its autonomous hardware tests and loaded all software. It will start the process of connecting to Verizon's network and coming into service. See Accessing the Network Extender GUI for information on how to log into the Network Extender Admin Web page.

3. Acquired IPv4 address ("Acquired an IP address").

The Network Extender State: The device is running its software and has started to connect to the Verizon network.

The unit is configured by default to acquire a local IPv4 address from the local DHCP server.

Admin Website State: The Admin Website is accessible from the LMT and WAN ports.

4. Conducting DNS lookups ("Identifying the Initial Network").

The Network Extender State: The device has acquired a local IPv4/IPv6 address from local DHCP. The next step is to conduct DNS lookups for the public FQDNs provisioned at the factory.

Admin Website State: The Admin Website is accessible.

**Note:** The Network Extender needs to resolve the FQDNs for A-GPS, and initial SeGW from the public DNS server.

5. GPS acquisition in progress ("Waiting for GPS position fix").

The Network Extender State: The device is awaiting a GPS fix before progressing.

Admin Website State: The Admin Website is accessible.

**Note:** Until a GPS fix is provided, the device will not be able to continue and receive configuration information.

6. Attempting to reach the Initial SeGW ("Attempting to reach Initial network").

The Network Extender State: The device has conducted DNS lookups for the public FQDNs provisioned at the factory and is trying to contact the initial SeGW.

Admin Website State: The Admin Website is accessible.

**Note:** This status details that the Network Extender has attempted to communicate with the SeGW.

7. Successfully reached the Initial SeGW ("Successfully reached the Initial network").

The Network Extender State: The device has contacted the initial SeGW successfully.

Admin Website State: The Admin Website is accessible.

**Note:** Status details that the device can communicate with the SeGW, but the IPSec tunnel is still not established at this point.

8. VPN setup to Initial SeGW completed ("Authentication to Initial Network completed successfully").

The Network Extender State: The device has brought up the IPSec tunnel with the initial SeGW.

Admin Website State: The Admin Website is accessible.

**Note:** This confirms that the device has set up a VPN connection with Verizon's network.

9. Authentication failure during IPSec tunnel setup to Initial SeGW ("Authentication failure to Initial Network. Unit is not provisioned. Please contact Verizon Wireless Customer Care for further assistance").

The Network Extender State: The device has failed to set up a VPN tunnel with the initial SeGW with an explicit "Authentication Failure."

Admin Website State: The Admin Website is accessible.

**Note:** This details that the device been notified it failed authentication with the Verizon Authentication server.

**10.** Connection with the management system ("Connecting to Initial Management Server").

The Network Extender State: The device acquired location information and is connecting with the AeMS.

Admin Website State: The Admin Website is accessible.

**Note:** The device will be allocated a serving AeMS and possibly an alternate serving SeGW based on its location. It may re-establish IPSec to the new SeGW at this point if required. If not, it will contact the AeMS and request configuration information.

**11.** Software download in progress.

The Network Extender State: The device is assigned a AeMS and has been instructed to download new software.

Admin Website State: The Admin Website is accessible.

**Note:** The device will download the newest software and reboot. The process will start from the first steps again, but the GPS acquisition will occur much faster.

**12.** Configuration download in progress.

The Network Extender State: The device is communicating with the Verizon management system (AeMS) and may have received new software. It will need to complete the "Radio Environment Scan" before receiving additional configuration parameters.

Admin Website State: The Admin Website is accessible.

**Note:** During the REM scan process, if no adjacent neighbor Network Extenders or Macro cells are detected, the Verizon Management system (AeMS) will then provide the configuration solely based on the GPS location.

**13.** Operational status.

The Network Extender State: The device is in normal in-service operation and has completed all steps.

Admin Website State: The Admin Website is accessible.

**Note:** If the Alarm LED state is Red, this means an alarm condition has occurred. In this case, please refer to Alarm troubleshooting in Chapter 5, for more information on alarm codes.

# Indoor GPS antenna

The Network Extender receives timing information from the GPS. The Network Extender is required to be placed such that the GPS receiver has an unobstructed line of sight with at least 4 strong satellites in order for it to get a position fix during the booting process. Thereafter, the Network Extender is required to maintain sync with at least one satellite to be able to continue to monitor the position fix.

Without adequate GPS signal, the Network Extender cannot function properly. When positioning the Indoor GPS antenna, ensure that it is:

- Installed in a horizontal position.
- Adjacent to a window and in an open area. This ensures clear reception of the GPS signal.
- 7m GPS antenna (included)

**Note:** Extended length GPS antenna cables and PTP servers are available, see Verizon Network Extender support page

This section outlines the installation and relocation of the Indoor GPS Line (see Figure 2-20).

**Figure 2-20. GPS port**

1. Turn off the Network Extender.
2. Connect the provided Indoor GPS antenna cable to the GPS port on the Network Extender.
3. Place the antenna near a window where the GPS signal is stronger. To help evaluate GPS signal quality in each location, a free smart phone application called “GPS Test” can be used.
4. Turn on the Network Extender to allow the detection of an available GPS signal.

**Notes:**
If GPS signal cannot be detected, reposition the GPS antenna and place it in a new location to receive a stronger signal. This new location should be located close to a window. In some cases, if the GPS signal indoors is very weak, an external outdoor GPS (not included) may need to be installed.

A GPS signal is required for proper operation and E911 service. If a GPS signal is not acquired after 30 to 60 minutes, please see Configuration steps in Chapter 4.

To see the status of the GPS acquisition, use the Admin website (Local) as shown in System Information Dashboard in Chapter 3.

# INT/EXT antenna

The Network Extender provides a switch (INT/EXT) (see Figure 2-21) used to select an Internal or External Antenna for the Network Extender.

**Figure 2-21. INT/EXT switch**


Setting the Network Extender to EXT without an external antenna connected will end with PA damage. Changing the switch during unit operation produces the same effect.

- INT means internal antennas are used.
- EXT is to use the connectors available in the back to connect external antennas/ DAS.

**Warning:** The mechanical switch should be changed only when the unit is powered off or when the radio is disabled.

# PoE device

The Network Extender provides the ability to be powered with an ultra-high Power over Ethernet (Class 5 PoE++) source (see Figure 2-22).

**Figure 2-22. PoE/WAN port**


Table 2-1 provides the recommended PoE specifications for the Network Extender.

**Table 2-1. Recommended PoE specifications**

| Characteristic | Recommendation |
|---|---|
| Maximum Output Power | 60W |
| Output Current | 960mA ~ 1.1A |
| Minimum Voltage | 50V |
| Ethernet Output Interface Specification | CAT5e or better<br>4-pair powering:<br>(Pin 3,4,5,6(+) Pins 1,2,7,8(-)) |

The Network Extender's PoE details are as follows:

### Power class negotiation

- Fully supported standard power negotiation protocol including PoE++ hardware negotiation and LLDP negotiation.
- Have a fixed class 5 setting in the Network Extender. When it is powered by 802.3bt, it will ask for 40W and when it is powered by 802.3at, it will get maximum 25.5W.
- The Web GUI indicates that only the licensed band will be used when 802.3at is available.

### Available power awareness

- A UART interface has been provided between the CPU and the POE controller to read the assigned power class, disabling the RF when a lower power class is provided by the Power Device.

The LED indicator on the Network Extender indicates errors associated with the PoE port. See Status LEDs in Chapter 5 for more details.

# Making a call

Once the Network Extender is in service, your phone must be within 50 feet of the Network Extender to connect to the Network Extender and make calls.

To verify your Verizon phones are connected to the Network Extender:

- Make sure your Verizon Wireless 4G LTE mobile phone has the Advanced Calling feature turned on.
- Dial #48 from your mobile phone and listen for the following confirmation: “You are under 4G LTE Network Extender coverage …”
- Some phones may show a home icon when connected to the Network Extender.

**Note:** The Network Extender's coverage depends on environmental factors, such as physical structures and the strength of external cell towers.

To turn on Advanced Calling on your 4G LTE Verizon Wireless phone, follow the steps below for your device's operating system:

- Android™: Go to Settings > Advanced Calling and turn ON service.

**Note:** On some devices, it may be found in Wireless Calling, HD Voice or VoLTE call.

- Apple® iOS: Go to Settings > Cellular > Cellular Data Options > Enable LTE > Voice & Data. Additionally, on the “My Verizon” Mobile App, enable Advance Calling feature for your phones.
- Windows®: Go to Settings > Cellular+SIM > SIM settings and turn ON Advanced Calling.

# Chapter 3. Web GUI

## About this chapter

This chapter contains detailed information regarding the Casa Systems Network Extender 3 Admin Website (Local) where you can monitor the device status and make changes to settings. The following topics are covered in this chapter:

# PC requirements

To access the Admin Website, a PC should satisfy the following conditions:

- Internet Explorer: 11 (Edge is recommended)
- Chrome: 35.0.1916.153 or higher version
- Firefox: 30.0 or higher version
- Safari: 7.0.2 or higher version
- Internet connection

# Accessing the Network Extender GUI

There are two ways to access the Network Extender website GUI.

1. Directly connect to Network Extender by using the Network Extender IP address, in case your computer is connected to the Network Extender GUI overview as the Network Extender.
2. Use the Connect to the GUI via the LMT port on the back side of the Network Extender.

## Connect to the GUI via the same network

To connect to the Network Extender GUI, you need to know the Network Extender IP address and your computer needs to be connected to the same network of the Network Extender.

1. Use a computer connected to the same network as the Network Extender.
2. Open a browser.
3. Enter the IP address of the Network Extender into the address bar:

   ```
   https://< IP address of Network Extender>
   ```

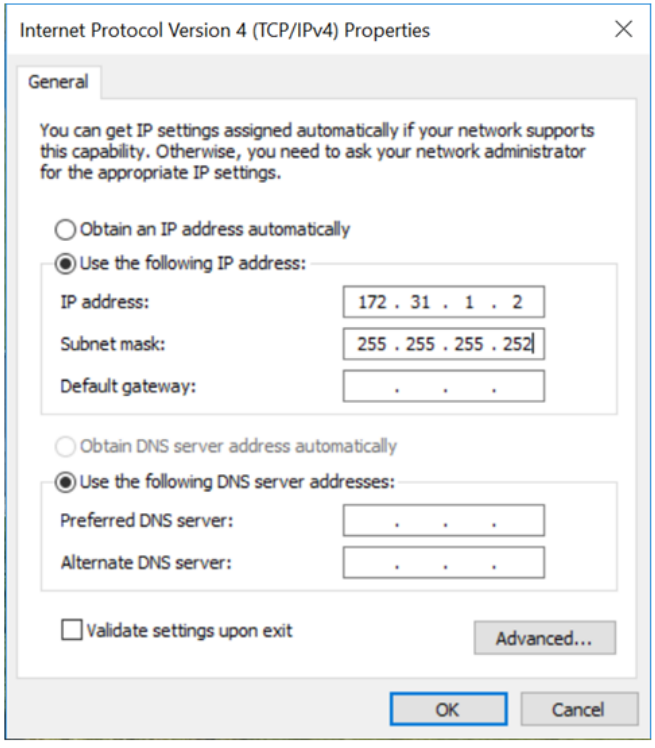
## Connect to the GUI via the LMT port

To connect to the Network Extender GUI, you will need to change your TCP/IPv4 settings to connect directly to the LMT port from your laptop, using an Ethernet cable.

To access settings and manage the Network Extender, login to the web interface by following these steps:

1. In Windows, click **Control Panel** on the Start menu.
2. Click **Network and Sharing Center**.
3. Click the **Local Area connection** icon that represents your Ethernet connection.
4. Change the Internet Protocol Version 4 (TCP/IPv4) Properties for the local computer Ethernet connection as shown in Figure 3-1, then click **OK**.

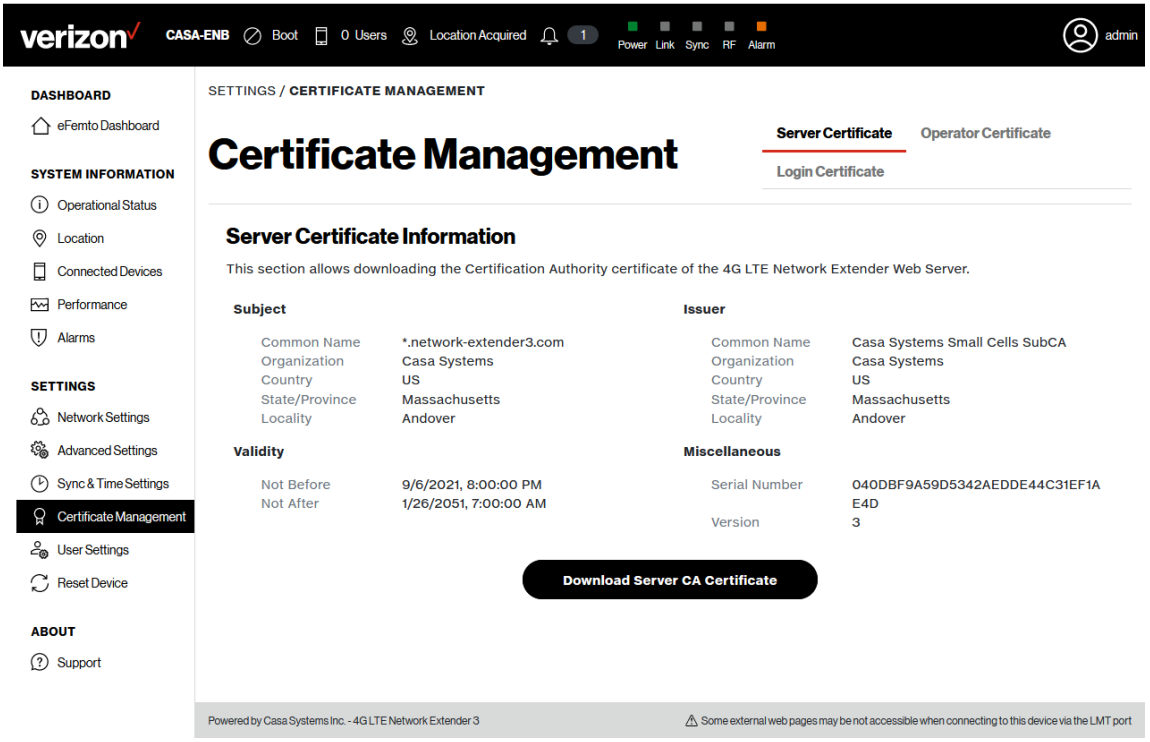
**Figure 3-1. IPv4 (TCP/IPv4) Properties**



5. Open Internet Explorer and enter https://172.31.1.1/ into the address bar.
6. Click **Continue** and accept the self-signed Internet site certificate warning to launch the 4G LTE Network Extender 3 for Enterprise Admin Website.

**Note:** The device CA certificate can be downloaded from the Certificate Management page and added to trusted certificates in the Web browser to avoid future warnings (see Figure 3-2).

**Figure 3-2. Certificate Management**



# Network Extender GUI overview

The Network Extender website GUI gives you detailed information on your Network Extender unit's status. You can also use the website to change settings. The Welcome page shows basic device information such as the Network Extender unit's MAC address, GPS fix location, device name, and IP address.

## Log in to the Network Extender GUI

1. Once you are at the Welcome Page, enter the User and Password (see Figure 3-3).

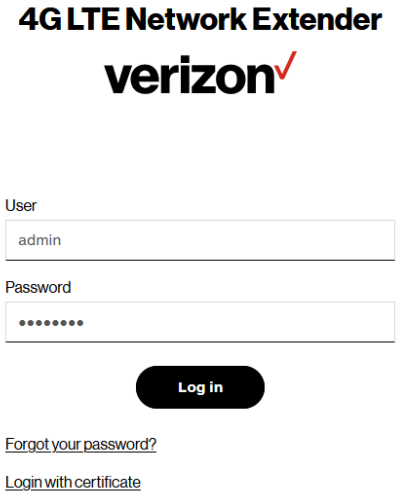
The default administrator password is **VzWNetExtender3@ + last six digits of the MAC**. The MAC ID can be found on the label on the side of the Network Extender.

**Example:** VzWNetExtender3@213DA5

**Note:** The password is case-sensitive. Letters in the last six digits of the MAC ID should be UPPER case. The default password and all Network Extender settings can be set back to default by pressing the reset button located on the back of the Network extender for more than 10 seconds.

2. Click **Log in**.

**Figure 3-3. The login page**



## Change admin password upon first login

If the user is logging in using the default password, a warning pop-up window will be displayed, asking the user to set a new password. Clicking the OK button on the pop-up will navigate the user to the Settings > Change Admin Password page.

The Network Extender Change Password tab allows you to change the local Admin Password for the Network Extender. In the event of a lost password, insert a mini precision screwdriver or insulated tool into the RESET hole on the back of the Network Extender and hold for 10 seconds to reset the Network Extender to factory default settings.

## Setting a password

Set a password following the rules described below:

- The password should be between 8 and 64 characters long.
- The password shall include uppercase characters, lowercase characters, numbers and special characters (!, “, #, $,%, &, *,?, @).
- The password should include one special character.
- The password should not include more than three identical characters in a row (“111”, “aaa”, “CCC”).
- The password should include at least one lowercase letter, one uppercase letter and one number.
- The new password should not be identical to the current password.

## Security questions

Select a Security Question among the five given questions listed below:

- What is your date of birth (mmddyy)?
- What is your birthplace?
- What was your first car?
- What is your mother's maiden name?
- What is your pet's name?

## Setting a security answer

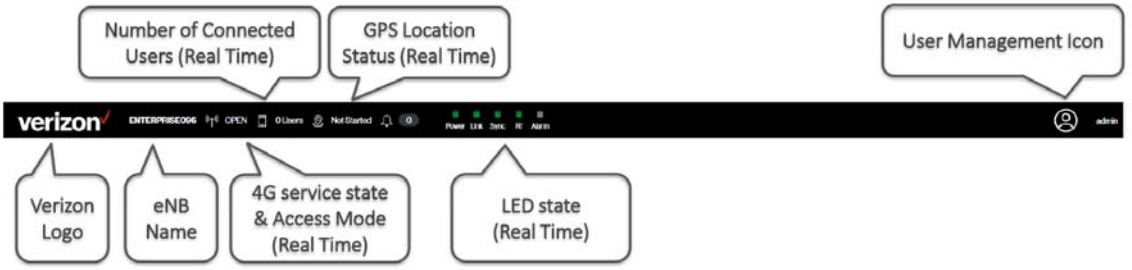
Set a Security Answer that should be between 1 and 64 characters long.

# Web GUI header bar

The top of the Web GUI includes a Header Bar (see Figure 3-4) that provides contextual information which is dynamically updated by the Web GUI application in real time without the user's intervention.

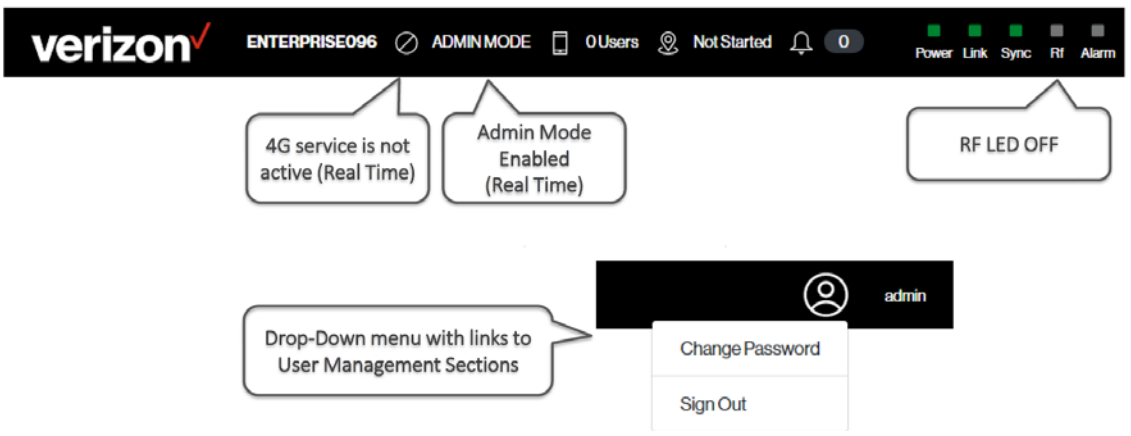
Header Bar information is common to all pages. The LEDs in the Header Bar show the same status as the physical LEDs on the Network Extender.

**Figure 3-4. Header Bar**




The Header Bar includes a shortcut to a drop-down menu providing access to the User Management sections and the ability to change the password and Sign Out (see Figure 3-5).

**Figure 3-5. Header Bar drop-down menu**



## 4G service state management

The Network Extender state management and operation mode is provided on the Header Bar and is maintained dynamically (see Figure 3-6). Table 3-1 provides a short description for each Network Extender state.

**Figure 3-6. Operational mode indicator**


**Table 3-1. Service states**

| Network Extender State | Descriptions |
|---|---|
| NO SERVICE | LTE Service not active or stopped - No communication with the device or Critical Failure. |
| BOOT | LTE Service not active or stopped because the Network Extender device is booting. |
| ADMIN MODE | LTE Service not active or stopped because of ADMIN MODE activation. |
| OPEN | LTE Service active and OPEN Access Mode. |
| HYBRID | LTE Service active and HYBRID Access Mode. |
| CLOSED | LTE Service active and CLOSED Access Mode. |

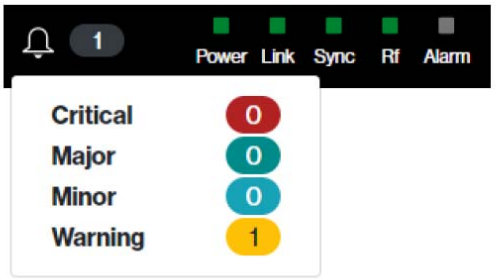
## Network Extender alarms

The alarms drop-down menu shows the active alarms in the system in all pages (see Figure 3-7).

**Figure 3-7. Active alarms**

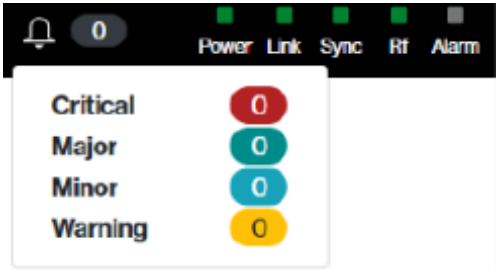

The alarms drop-down menu showing a Warning alarm (see Figure 3-8).

**Figure 3-8. Alarm drop-down menu**




The alarms drop-down menu showing no alarms (see Figure 3-9).

**Figure 3-9. No alarms**

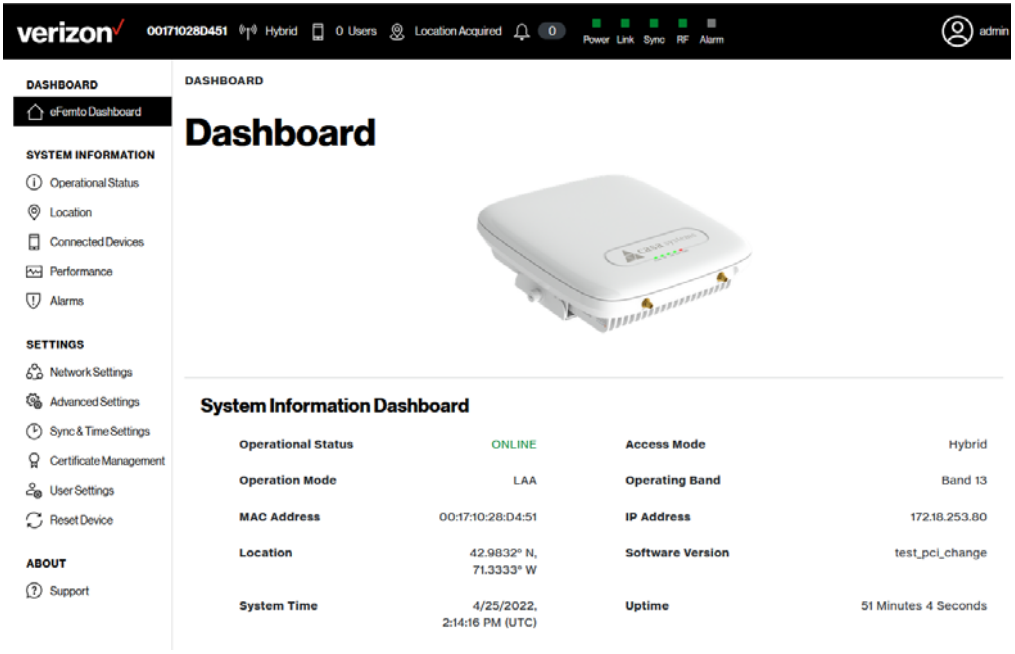


# Dashboard

The Network Extender Dashboard (see Figure 3-10) provides both system information and Network Extender settings.

Refer to the following FAQ (in Appendix A) for detailed instructions:
*How to verify the device operation mode*

**Figure 3-10. Network Extender dashboard**




## System Information Dashboard

**Operational Status**: Operational status of the Network Extender.
**Operation Mode**: Operational mode status of the Network Extender.
**MAC Address**: MAC Address of the Network Extender.
**Location**: GPS location of the Network Extender.
**System Time**: Date and time of the System which the Network Extender is connected.
**Access Mode:** Access mode of the Network Extender.
**Operating Band**: Operational band supported by the Network Extender.

**IP Address**: IP Address of the Network Extender.
**Software Version**: Latest version software loaded onto the Network Extender.
**Uptime**: Total time the Network Extender has been online.

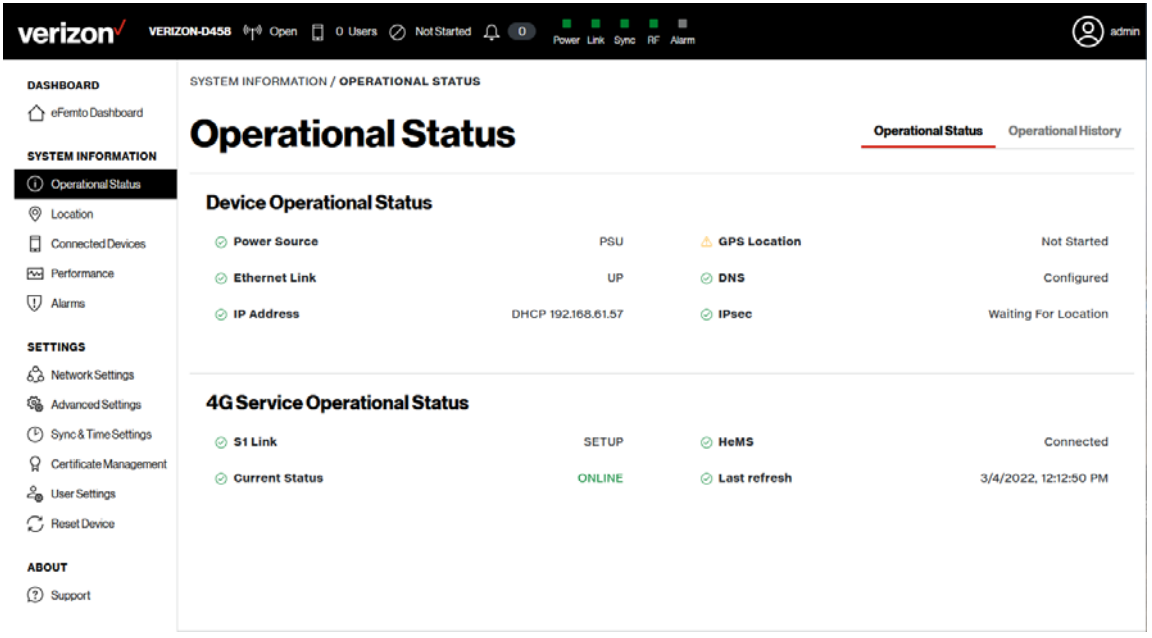
# System Information

## Operational Status

The Operational Status page (see Figure 3-11) is a read only page and provides operational status for both the device and the 4G service.

Refer to the following FAQ (in Appendix A) for detailed instructions:
*How to verify if the GPS location was acquired*

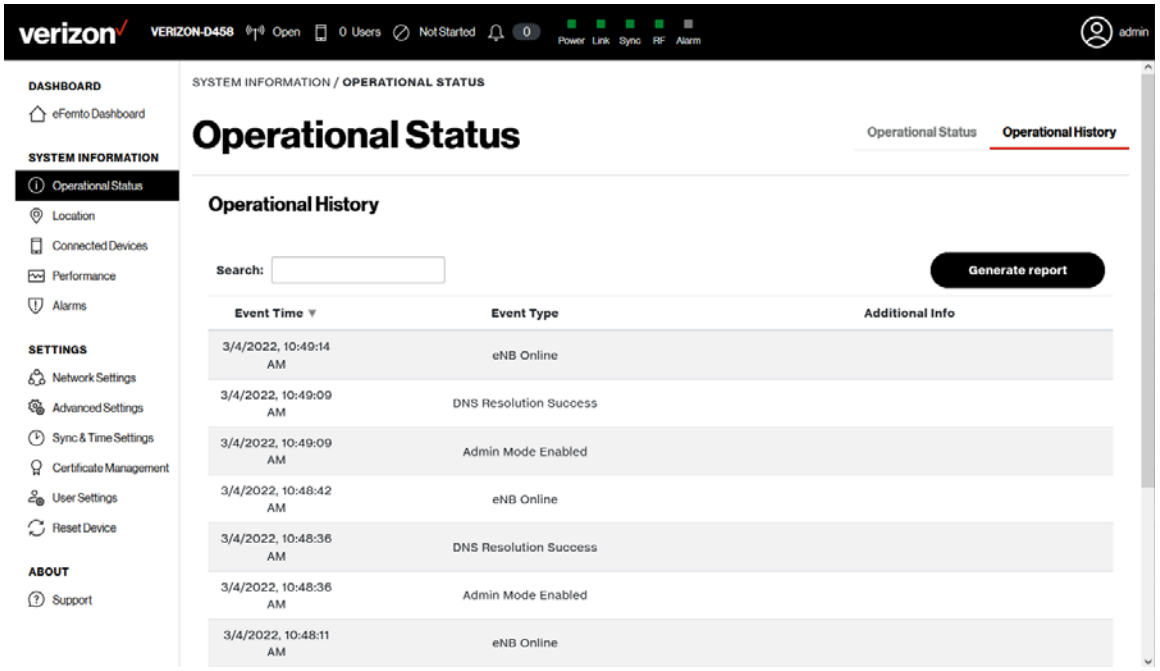
**Figure 3-11. Operational Status page**



## Operational History

The Operational Status page is a read only page and provides operational history (see Figure 3-12).

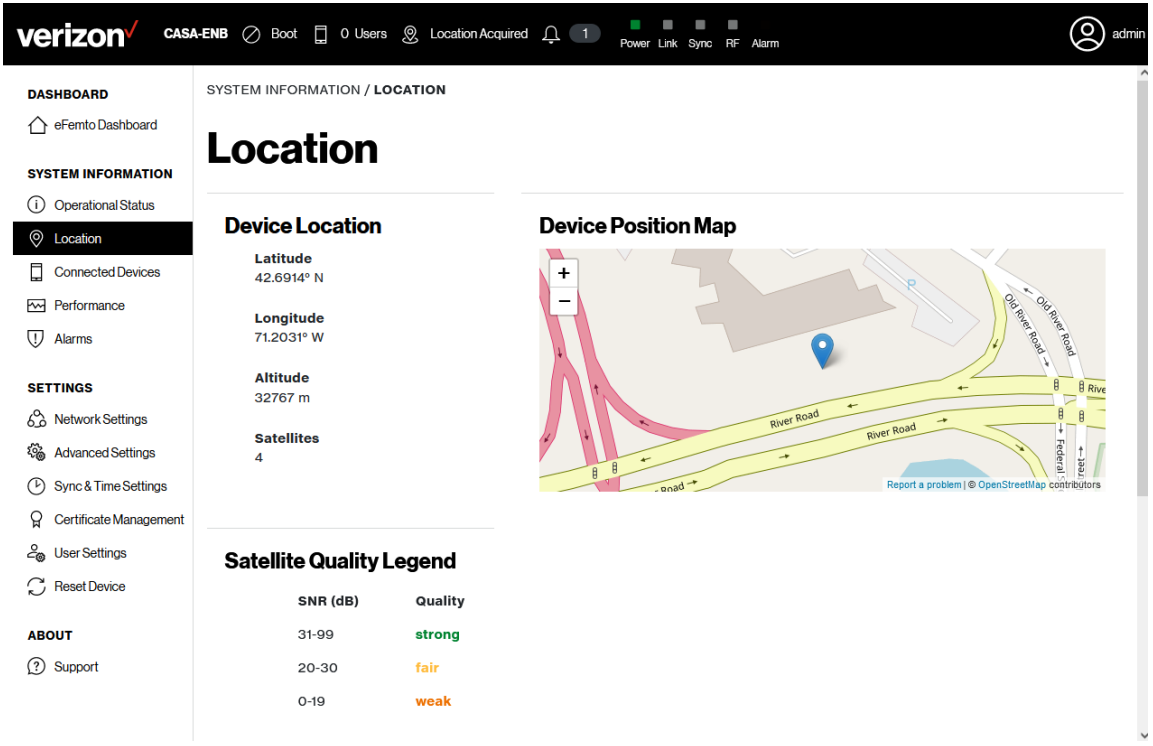
**Figure 3-12. Operational History page**



## Location

The Location page is a read only page and provides specific location information for the device along with a position map (see Figure 3-13).

**Figure 3-13. Location page**

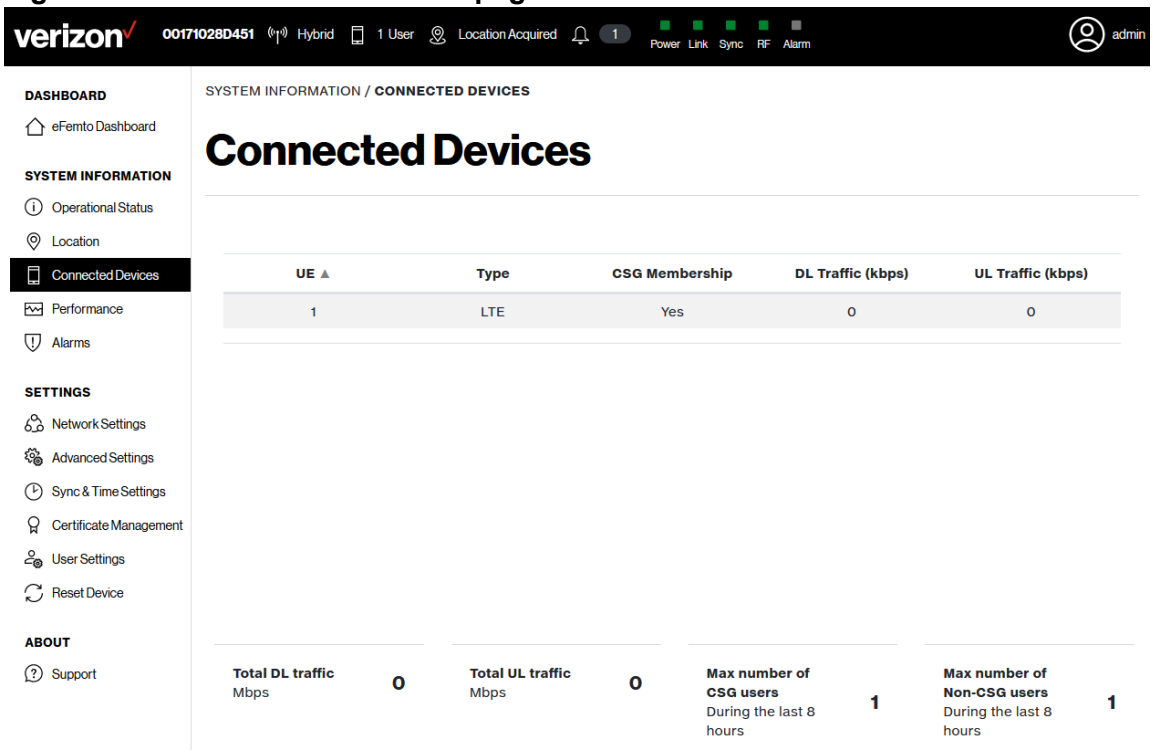


## Connected Devices

The Connected Devices page is a read only page and provides specific information for all active UEs in the system (see Figure 3-14).

Refer to the following FAQ (in Appendix A) for detailed instructions:
*How to check the number of connected users*

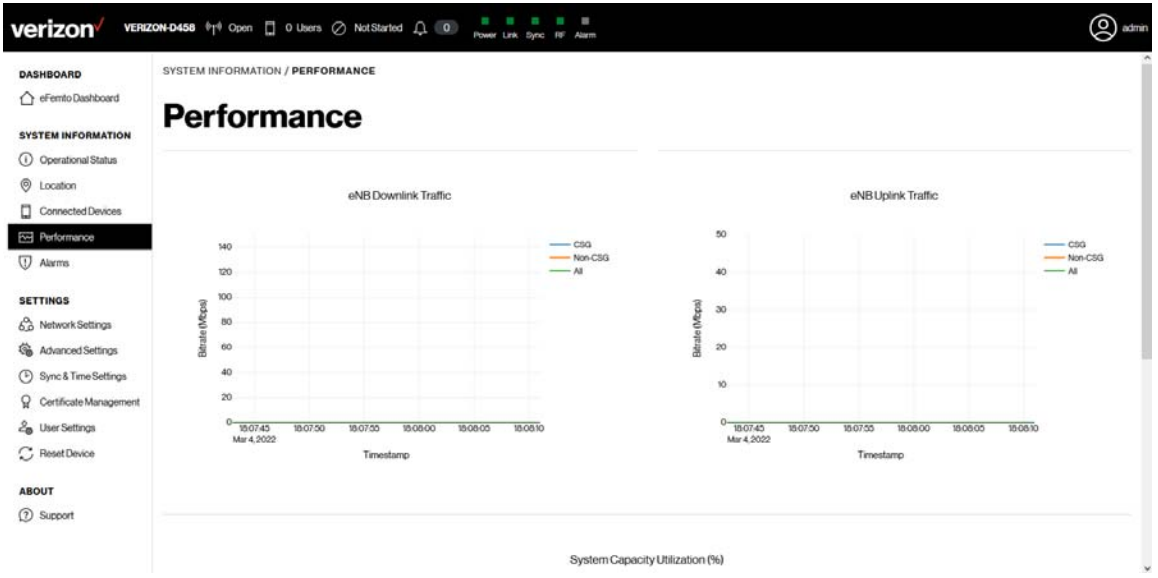
**Figure 3-14. Connected Devices page**



## Performance

The Performance page is a read only page and displays traffic data for eNB Downlink and Uplink Traffic (see Figure 3-15).

**Figure 3-15. Performance graphs**



## Alarms

The Alarms page is a read only page and displays Active Alarms data (see Figure 3-16) and Alarm History (see Figure 3-17).

Refer to the following FAQ (in Appendix A) for detailed instructions:
*How to check the active alarms and generate an alarm report*

**Figure 3-16. Active Alarms page**

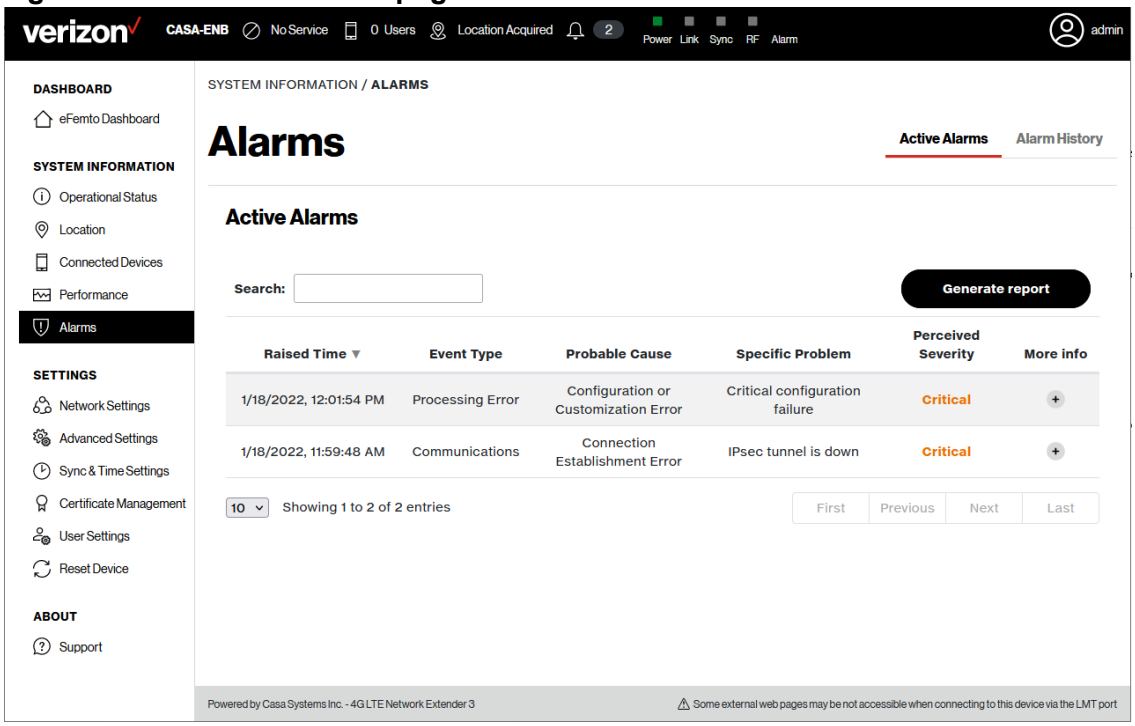
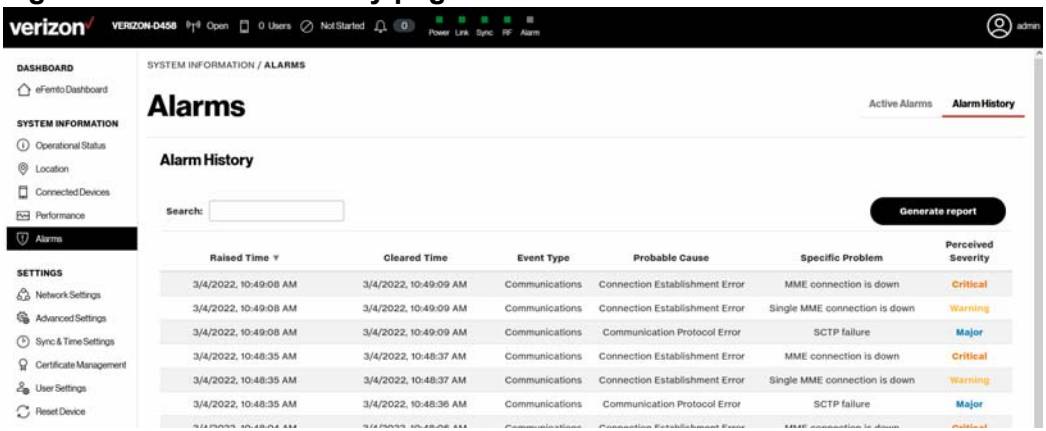


**Figure 3-17. Alarm History page**



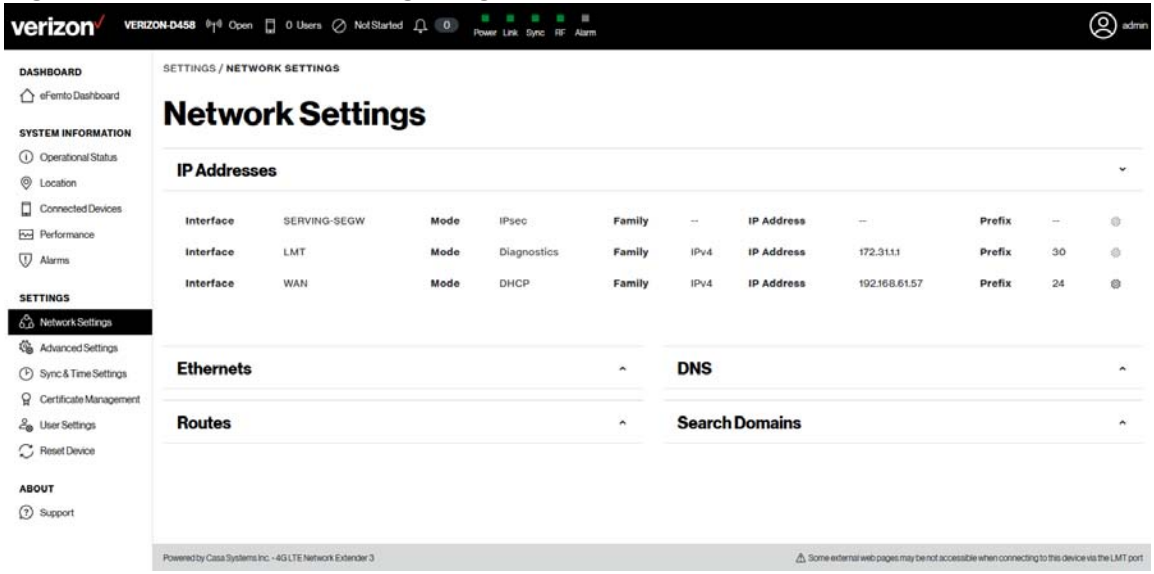
# Settings

## Network Settings

The Network Settings page (see Figure 3-18) displays the following:

- IP Addresses,
- Ethernets information,
- DNS data,
- Routes,
- Search Domains settings,
- VLAN information.

**Figure 3-18. Network Settings page**

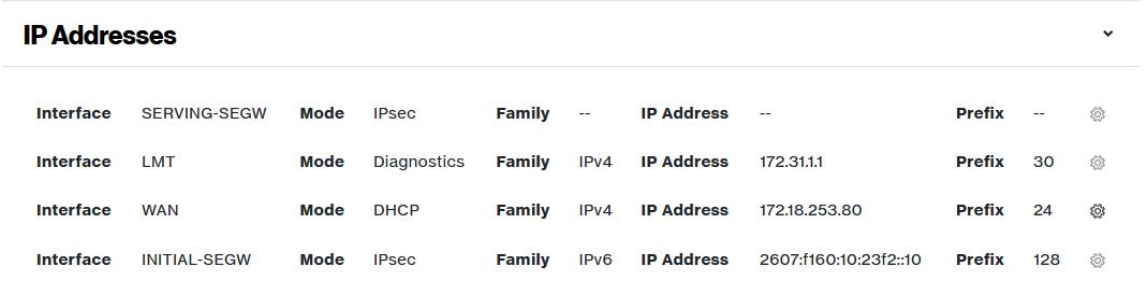


### IP Addresses

The IP Addresses section of the Network Settings page includes information on each Interface, Mode, Family, IP Address, and Prefix (see Figure 3-19).

Refer to the following FAQs (in Appendix A) for detailed instructions:
*How to configure a static IP address*

**Figure 3-19. IP Addresses**

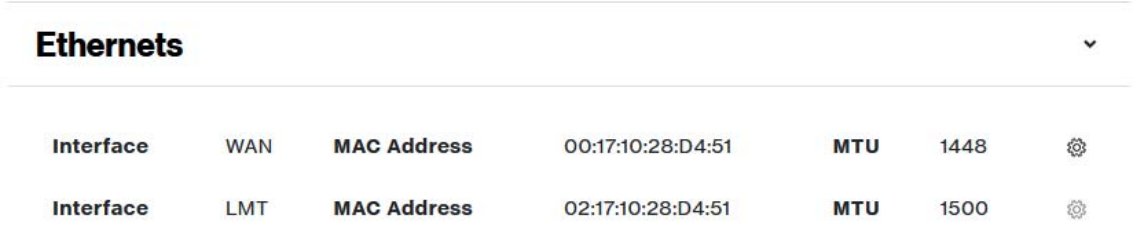


### Ethernets

The Ethernets section of the Network Settings page displays Ethernet information including Interface, MAC Address, and MTU settings (see Figure 3-20).

Refer to the following FAQs (in Appendix A) for detailed instructions: *How to adjust MTU (maximum transfer unit) size*

**Figure 3-20. Ethernets**

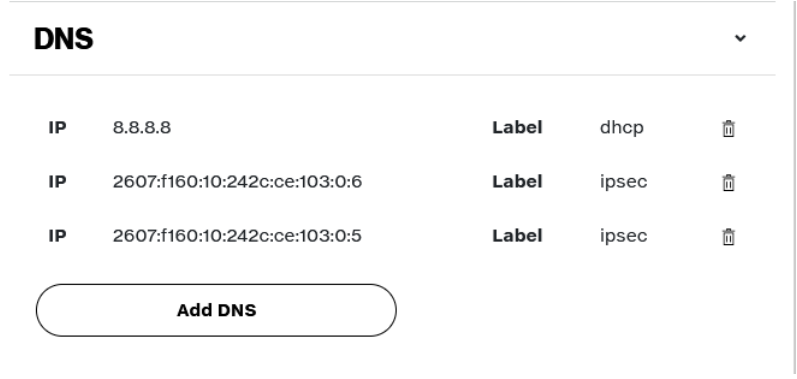



### DNS

The DNS section of the Network Settings page displays DNS information including IP and Label for each active DNS (see Figure 3-21).

Refer to the following FAQs (in Appendix A) for detailed instructions: *How to add a DNS*

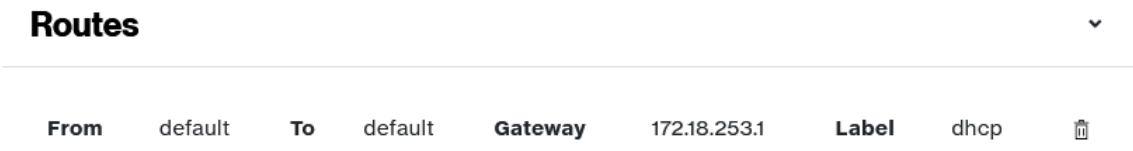
**Figure 3-21. DNS**



### Routes

The Routes section of the Network Settings page displays active route information (see Figure 3-22).

**Figure 3-22. Routes**

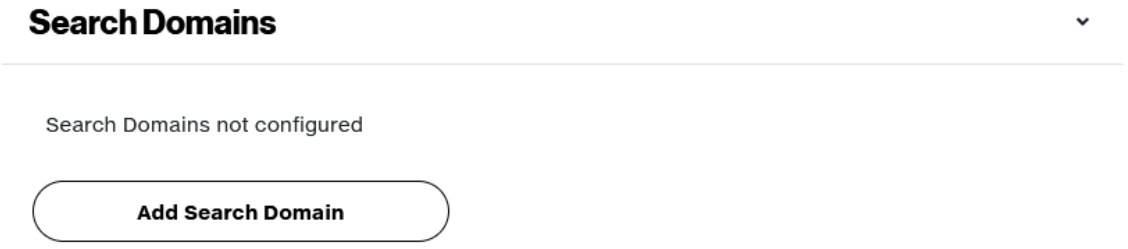



### Search Domains

The Search Domains section of the Network Settings page displays active domains (see Figure 3-23).

Refer to the following FAQs (in Appendix A) for detailed instructions:
*How to add a search domain*

**Figure 3-23. Search Domains**

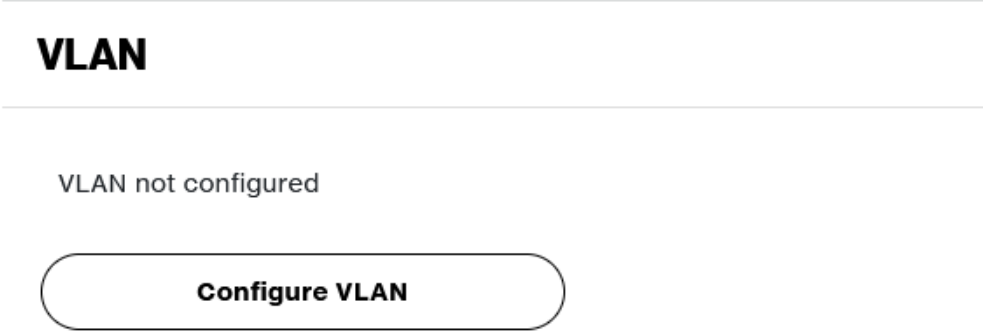


### VLAN

The VLAN section of the Network Settings page allows you to configure a VLAN (see Figure 3-24).

Refer to the following FAQs (in Appendix A) for detailed instructions:
*How to add a VLAN*

**Figure 3-24. VLANs**



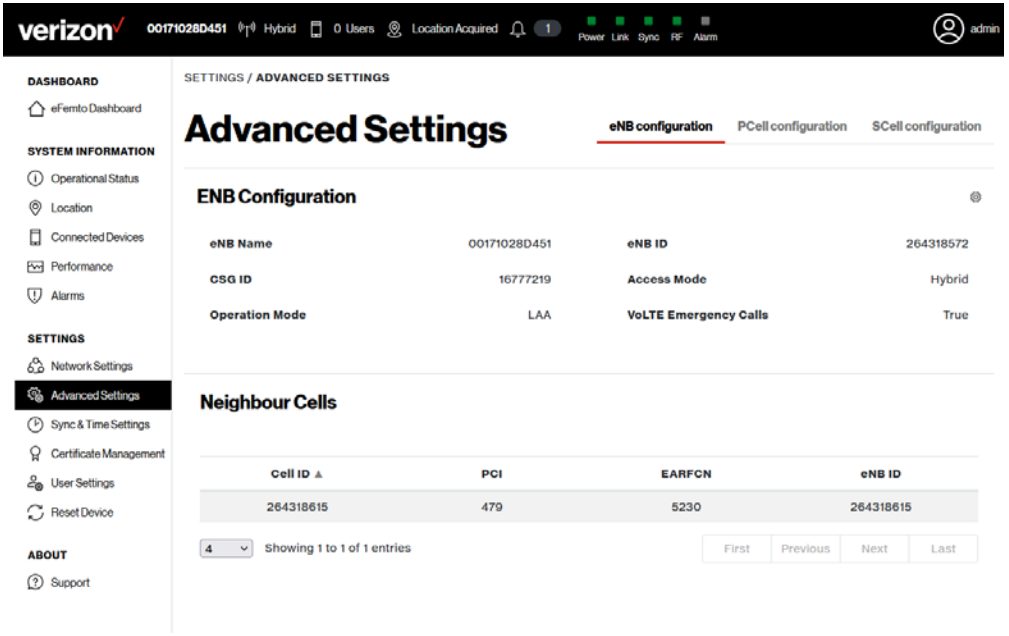
# Advanced Settings

The Advanced Settings page provides access to the eNB configuration page (see Figure 3-25), PCell configuration page (see Figure 3-26), and the SCell configuration page (see Figure 3-27).

Refer to the following FAQs (in Appendix A) for detailed instructions:
*How to add a DNS*
*How to change the device operating channel*
*How to configure Network Extender Operation Mode*

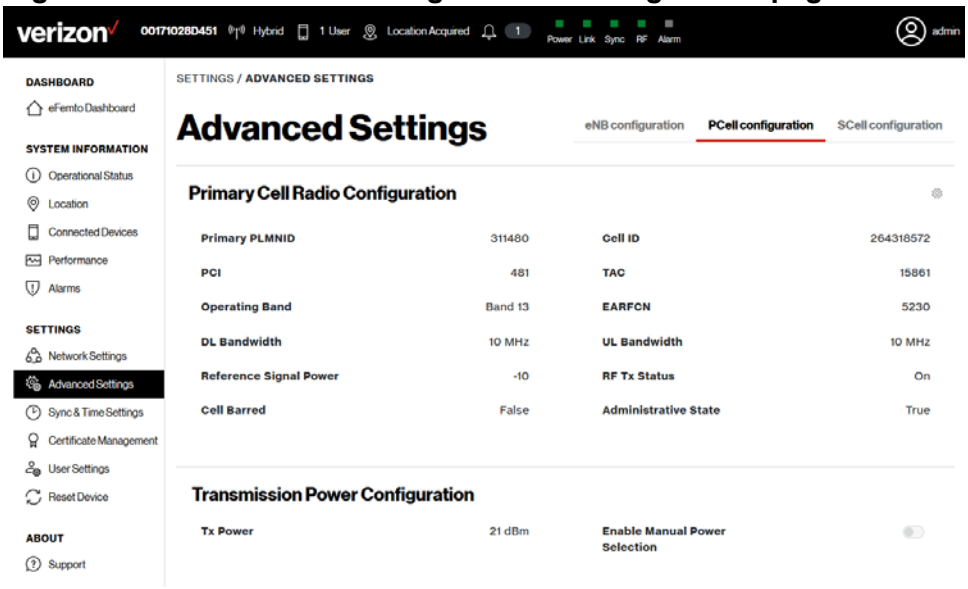
## eNB Configuration page

**Figure 3-25. Advanced Settings > eNB configuration page**



## PCell configuration page

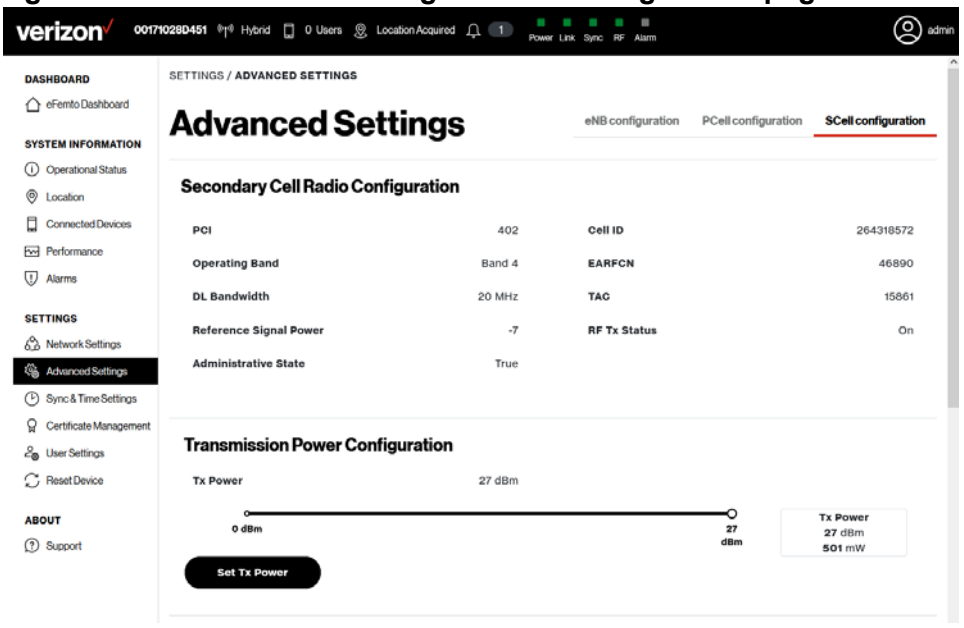
**Figure 3-26. Advanced Settings > PCell configuration page**



### SCell configuration page

***Note:*** *When the Network Extender Operation Mode is set to LAA, the SCell configuration page displays as shown in Figure 3-27.*

**Figure 3-27. Advanced Settings > SCell configuration page**

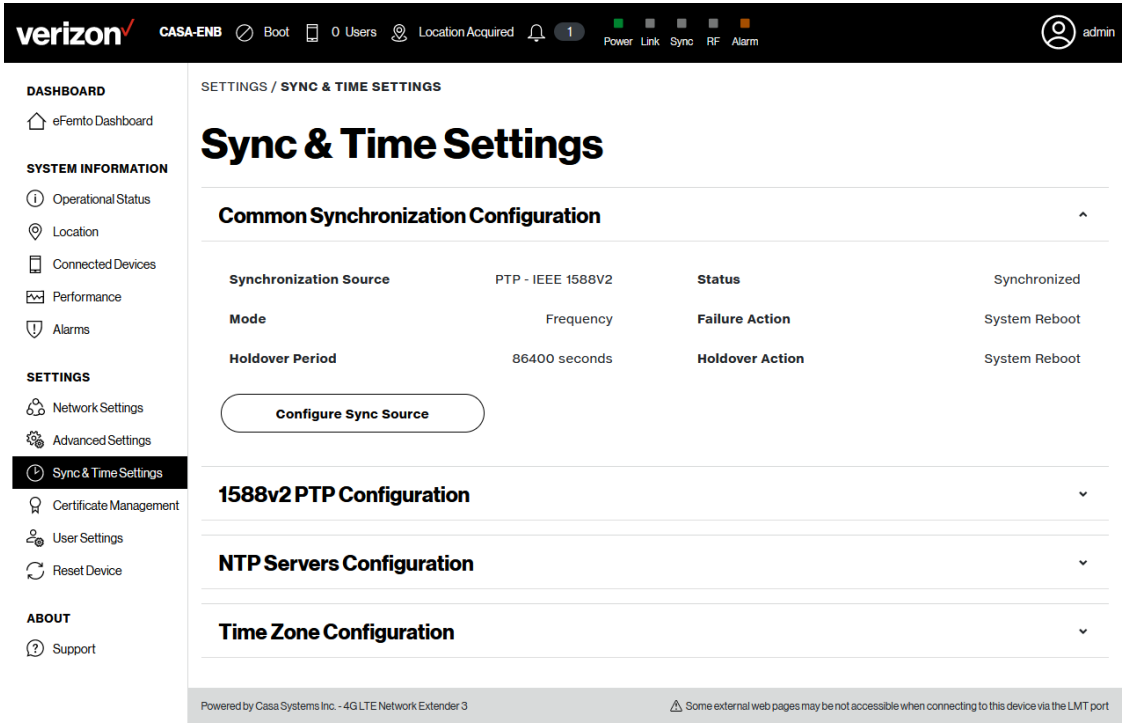


## Sync & Time Settings

The Sync & Time Settings page displays Common Synchronization Configuration settings (see Figure 3-28).

Refer to the following FAQ (in Appendix A) for detailed instructions:
*How to configure Synchronization Source*

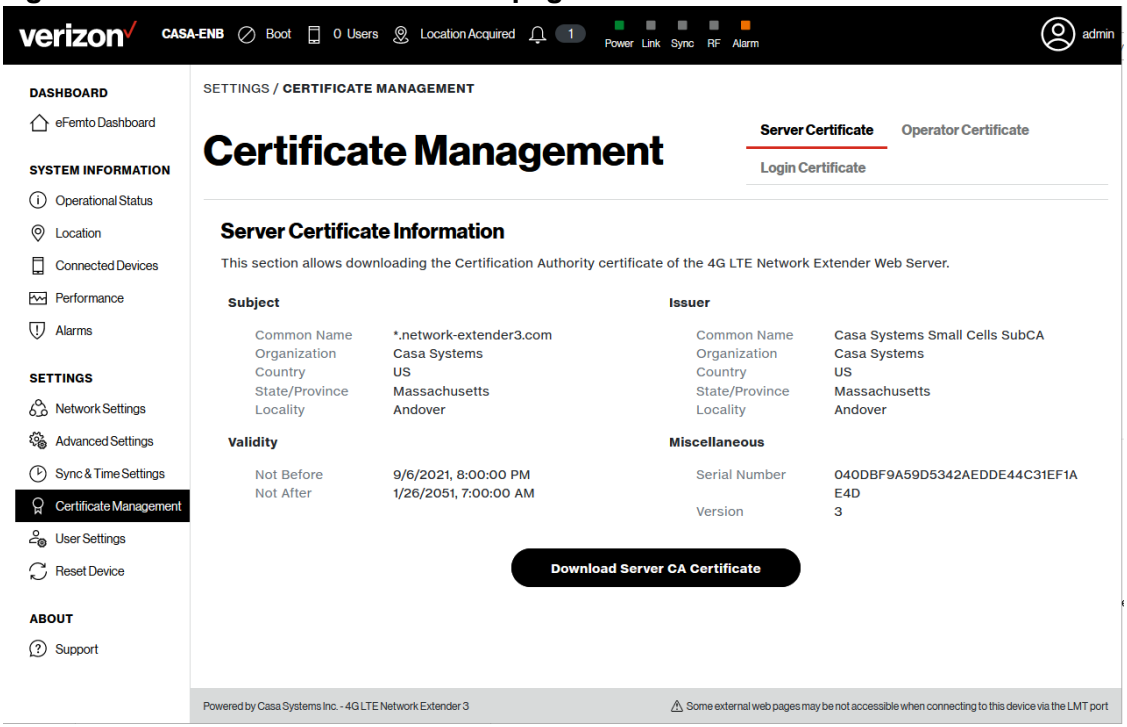
**Figure 3-28. Sync & Time Settings page**



## Certificate Management

The Certificate Management page displays Server Certificate Information for the select device (see Figure 3-29).

**Figure 3-29. Certificate Information page**

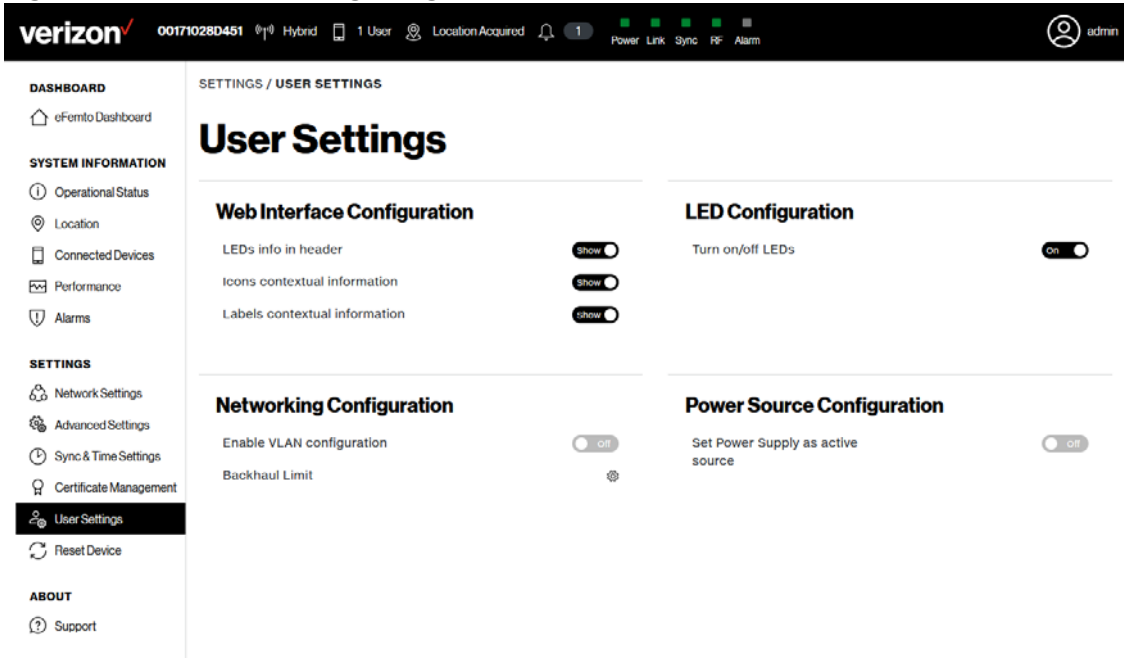


## User Settings

The User Settings page displays Web Interface Configuration, LED Configuration, and Network Configuration (see Figure 3-30).

Refer to the following FAQs (in Appendix A) for detailed instructions:
*How to add a VLAN*
*How to configure Network Extender Backhaul Limit*

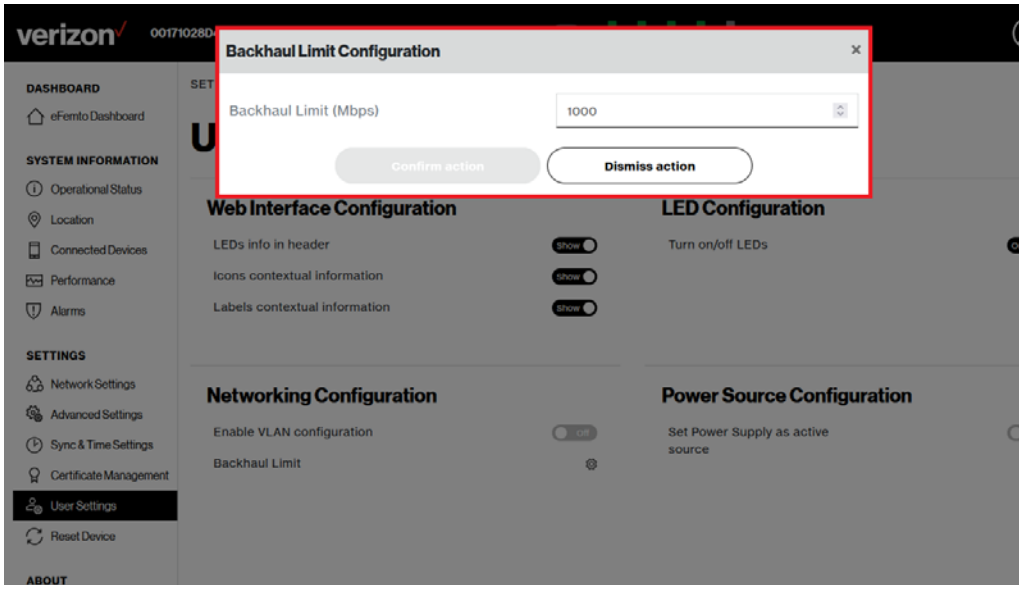
**Figure 3-30. User Settings page**



### Setting the Backhaul Limit

The User Settings page provides configuration options for the Network Extender Backhaul Limit (see Figure 3-31).

**Figure 3-31. Backhaul Limit Configuration dialog**

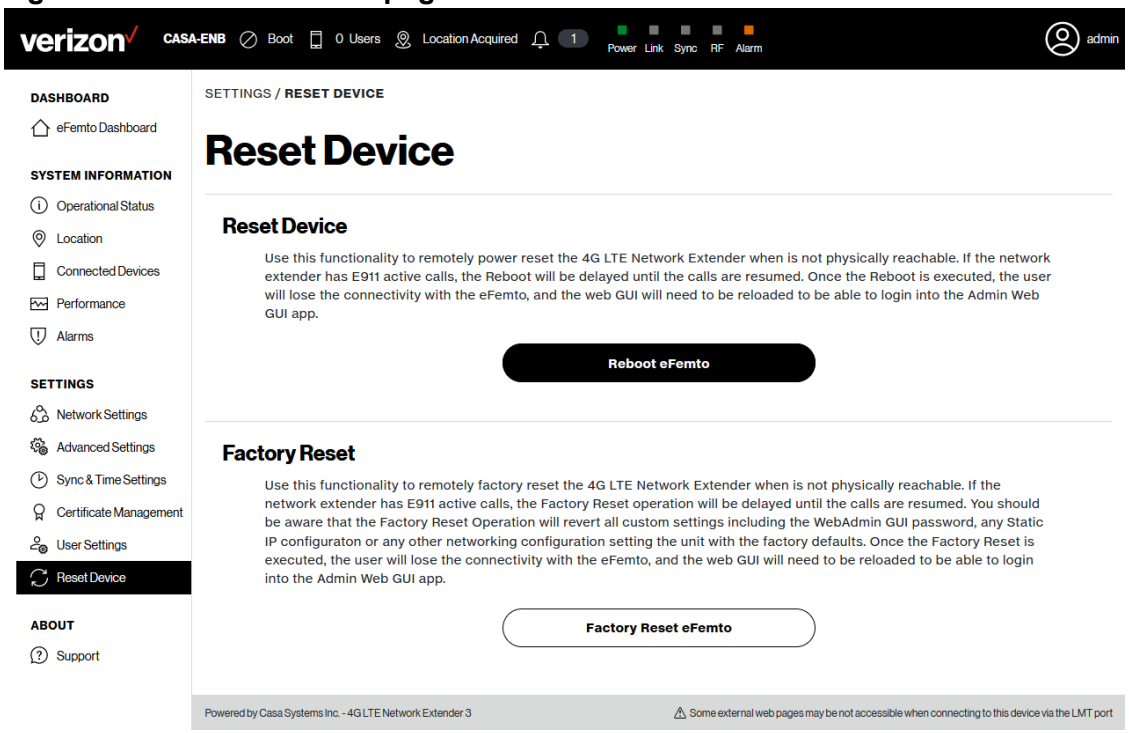


## Reset Device

The Reset Device page provides the ability to reset the Network Extender device and perform a Factory Reset (see Figure 3-32).

Refer to the following FAQ (in Appendix A) for detailed instructions:
*How to reboot or factory reset a device*

**Figure 3-32. Reset Device page**

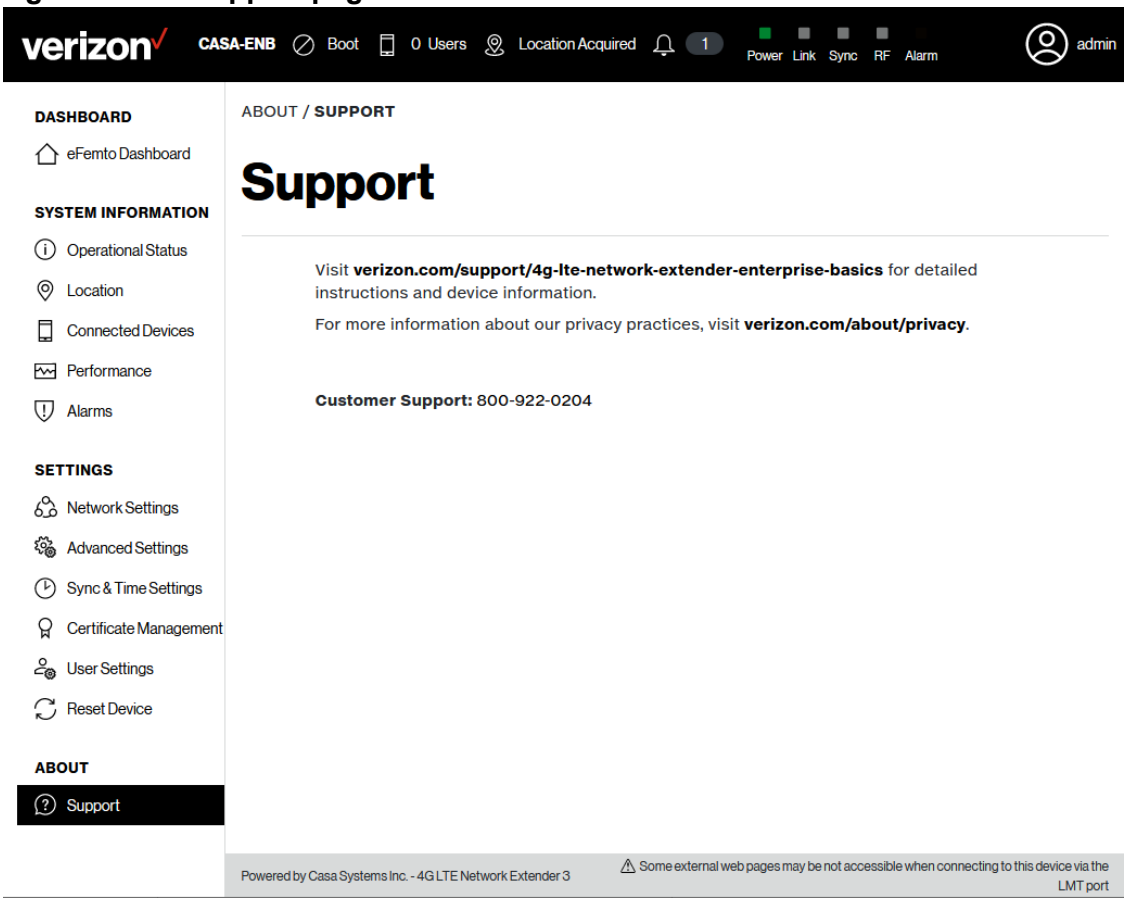


# About

## Support

The Support page provides contact information to obtain customer support (see Figure 3-33).

**Figure 3-33. Support page**



# Chapter 4. Configuration

## About this chapter

This chapter describes firewall settings for configuring the Network Extender 3. The following topics are covered in this chapter:

# Firewall settings

The Network Extender is designed to connect and automatically configure with minimal user involvement, though in some cases, depending on the firewall settings, some settings may need to be adjusted on the local LMT (see Figure 4-1).

**Figure 4-1. LMT port**

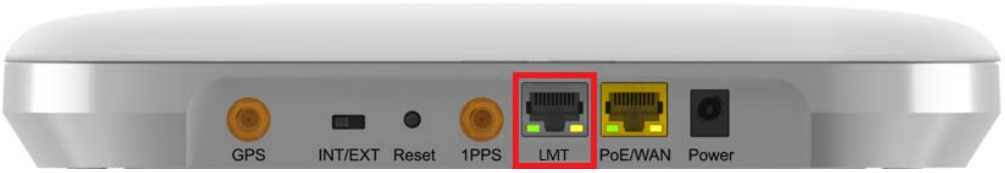



Table 4-1 provides details on the destination ports regarding the firewall settings that are applicable for network administrators.

**Table 4-1. Destination ports**

| Source | Destination | Protocol | Destination Port | Notes |
|---|---|---|---|---|
| Network Extender | GPS Assistance Server | TCP | 80 | |
| Network Extender | DNS Server | UDP | 53 | |
| Network Extender | NTP Server | UDP | 123 | |
| Network Extender | Verizon Security Gateway | UDP | 500/4500 | More than one port may be used for multiple device installation. |
| Network Extender | CMP | TCP | 80 | |
| Network Extender | Verizon Security Gateway | ESP/50 | N/A | When NAT/PAT is not present. |
| Verizon SeGW | Network Extender | ESP/50 | N/A | When NAT/PAT is not present. |

Table 4-2 lists the IP addresses of each of the network elements that need to be included.

**Table 4-2. Firewall settings**

| Network Element | Comment | Fully Qualified Domain Name (FQDN) |
|---|---|---|
| GPS Server | - | http://xtrapath1.izatcloud.net<br>http://xtrapath2.izatcloud.net<br>http://xtrapath3.izatcloud.net |
| Security Gateway (SeGW) | The serving server will be automatically assigned. | sgw.vzwfemto.com<br><br>The FQDN of the initial-SeGW is resolved by the public DNS server<br><br>sgw-rcmdva83.vzwfemto.com<br>sgw-chntvaav.vzwfemto.com<br>sgw-wsbomagj.vzwfemto.com<br>sgw-ynkrnyzl.vzwfemto.com<br>sgw-wmtppaaa.vzwfemto.com<br>sgw-esyrnyen.vzwfemto.com<br>sgw-aurscoty.vzwfemto.com<br>sgw-temqazkw.vzwfemto.com<br>sgw-snvacanx.vzwfemto.com<br>sgw-rdmewa22.vzwfemto.com<br>sgw-azusca21.vzwfemto.com<br>sgw-elsstx13.vzwfemto.com<br>sgw-hsnotx08.vzwfemto.com<br>sgw-tulyok13.vzwfemto.com<br>sgw-chrxnclh.vzwfemto.com<br>sgw-orlhfl01.vzwfemto.com<br>sgw-alprgagq.vzwfemto.com<br>sgw-omalnexu.vzwfemto.com<br>sgw-hchlilmt.vzwfemto.com<br>sgw-lenykscj.vzwfemto.com<br>sgw-jhtwpadp.vzwfemto.com<br>sgw-sfldmilr.vzwfemto.com |

**Table 4-2. Firewall settings (continued)**

| Network Element | Comment | Fully Qualified Domain Name (FQDN) |
|---|---|---|
| CMP | - | cmp.securitycredentialing.com |
| NTP Server | The default NTP server is based on a pool.ntp.org.<br><br>Different locations will get different IP addresses.<br><br>The user needs to make sure the FQDN is allowed. | 0.north-america.pool.ntp.org<br>1.north-america.pool.ntp.org |

# Firewall rules for business

Business networks protect their data and clients using a firewall. Depending on the firewall configuration, certain ports may need to be opened on the firewall to allow the Network Extender to come into service.

The Network Extender communicates to the Verizon Wireless Gateway over an Internet Protocol Security Protocol (IPSEC) encrypted tunnel. The use of Network Address Translation (NAT)/Port Address Translation (PAT) within the network will determine which firewall rules need to be opened.

The Network Extender will also access a DNS Server to obtain the IP Address of Verizon's Security Gateways and may access a DHCP Server for its IP addresses. Since this communication is generally done within the same subnet/network, these settings are not included in the firewall table. If they are required, they use the standard DNS and DHCP ports. DNS-UDP uses port 53. DHCP-BOOTP uses port 67.

The Network Extender enables the IT administrator to deploy the solution in almost any scenario. The embedded web server allows for flexible configurations.

# CSG User Configuration

The following information is used to configure Closed Subscriber Group (CSG) mode for the Network Extender.

***Note:*** *CSG mode must be configured using the Verizon tools and configuration steps described below. CSG mode cannot be configured through the Network Extender Web GUI.*

## CSG modes

### Open Mode

- Default, out of the box.
- Any VzW UE within vicinity can attach to the Open Network Extender.

### Hybrid Mode

- CSG subscribed members have priority over non-members.
- Non CSG subscribed members are allowed service only if resources are not used up by CSG members. Non members can be pre-empted in favor of CSG members.

### Closed Mode

- Network Extender resources are exclusively reserved for CSG subscribed MDNs.

## Dependencies

- CSG capable mobile phone (2018 or newer Verizon certified phones).
- Verizon post-pay subscriber account.
- Profile-07 or newer SIM card.

## Configuration steps

1. To enable and/or manage CSG, the user must login to his/her Verizon account via MyVerizon or MyBiz portal.
2. Create a CSG Group ID.
3. Assign phone numbers to the CSG Group ID. Each phone can be assigned up to 10 CSG Group IDs.
4. Assign the CSG Group ID to the Network Extender. One CSG Group ID can be assigned to one or more Network Extenders.
5. Change CSG mode (Hybrid/Closed) for each Network Extender.

# Chapter 5. Troubleshooting

## About this chapter

This chapter provides troubleshooting information for the Network Extender 3 including status LEDs and list of alarms.

The following topics are covered in this chapter:

# Status LEDs

Figure 5-1 shows the location of the status LEDs for the Network Extender.

**Figure 5-1. Network Extender status LEDs**

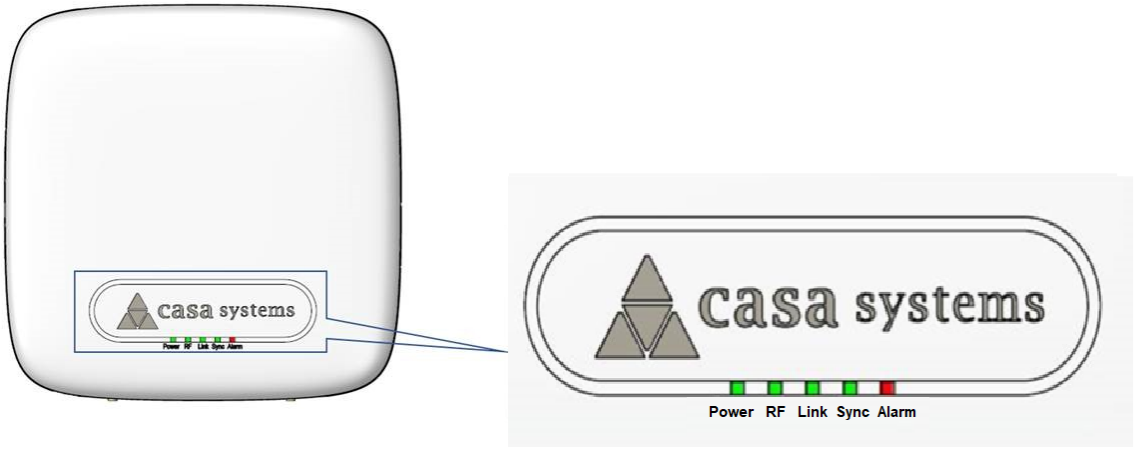



Table 5-1 provides functional details for each status LED applicable for network administrators.

**Table 5-1. Status LED functions**

| LED | Color | Function |
|---|---|---|
| Power | | OFF: Power not detected. |
| | | ON: All the power rails are present. |
| | | Flashing: Unit booting or firmware upgrading. |
| RF | | OFF: Radio activity disabled, not transmitting and receiving. |
| | | ON: Radio activity enabled, unit transmitting and receiving. |

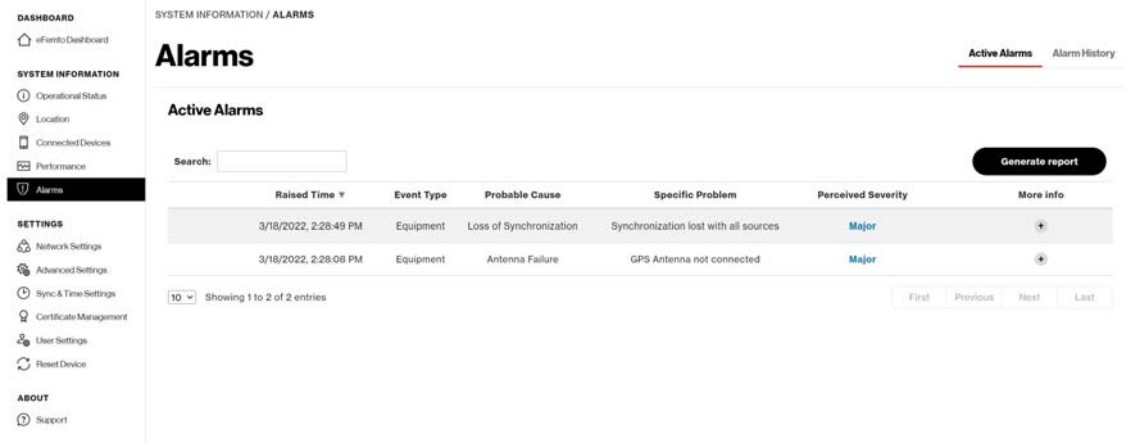
**Table 5-1. Status LED functions (continued)**

| LED | Color | Function |
|---|---|---|
| Link |  | OFF: Ethernet link down. |
| | | ON: Ethernet link up. |
| Sync |  | OFF: Synchronization not established with the GPS. |
| | | ON: GPS synchronization complete. |
| | | Flashing: Lost GPS synchronization. |
| Alarm |  | OFF: No alarms detected. |
| | | Flashing: System critical alarm. |

# Alarm troubleshooting

The Web GUI provides a list of active alarms for the Network Extender. Access the list of active alarms from the Web GUI dashboard by clicking **Alarms** (see Figure 5-2). See List of Network Extender 3 Alarms for detailed information.

**Figure 5-2. Web GUI alarms page**



## List of Network Extender 3 Alarms

Table 5-2 provides recommended troubleshooting steps used to address issues raised by the alarm IDs shown on the active alarms page.

**Table 5-2. Alarm troubleshooting**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| L3 not detected | LTE L3 software protocol stacks encountered an issue and LTE services are not available, the device shall resume normal operation after self-healing. | If the alert persists, please restart your device. | 20001 |
| L2 not detected | LTE L2 software protocol stacks encountered an issue and LTE services are not available, the device shall resume normal operation after self-healing. | If the alert persists, please restart your device. | 20002 |
| Flash memory usage | There is a temporary memory usage alert, but your device is still functioning correctly. | This alert should clear itself. | 20004 |
| MME connection is down | The device cannot communicate with Verizon's Network. Please check the LAN/ Firewall settings, connectivity status and available bandwidth. | If the problem persists, please contact Verizon Wireless Customer Service. | 20005 |
| RRM overload | This alert should clear itself. | If the alert persists for a long time, please check the number of users in the “Connected Devices” tab and see the capacity section of the user guide. | 20006 |
| High CPU load | There is a temporary CPU load alert, but your device is still functioning correctly. | This alert should clear itself. | 20008 |
| High NACK level | This is related to RF quality issue, there is an excessive retransmission caused by an external source of interference. | Please check the radio environment and Network Extender Placement. | 20009 |
| Over-the-air synchronization lost | This is related to RF quality issue. | Please Check for availability of Verizon macro sites signal. | 20010 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| GPS synchronization lost | There is an issue with the GPS. | Ensure open view of the sky. Reboot/power cycle the unit.<br><br>If the issue persists, replace the unit. | 20011 |
| Cell synchronization failure | There is an issue with the GPS. | Ensure open view of the sky. LTE service may degrade if the unit operates for long period of time without synchronization. | 20012 |
| SCTP Failure | The device cannot communicate with Verizon's Network. | The device will reboot automatically and try establishing the connection again.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20013 |
| Ethernet error | There is an issue with the Ethernet connection. | Power cycle the device to clear the issue.<br><br>If symptom persists, the unit will need to be replaced. | 20014 |
| CPU Temperature Unacceptable | The device is over-heating. | Please locate the unit in an area with an ambient temperature between Operational Temperature range -10°C to 65°C (14°F to 149°F). | 20015 |
| PA Temperature Unacceptable | The device is over-heating. | Please locate the unit in an area with an ambient temperature between Operational Temperature range -10°C to 65°C (14°F to 149°F). | 20016 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| HTTP failed access | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20017 |
| OAM errors | Parameters not set properly. | Verify that all parameters are set per guideline. | 20018 |
| RAM memory full | The RAM memory is full. | Power cycle the unit to clear the fault. | 20019 |
| Threshold Crossed: RLF | Radio Link Failure. | Caused by high interference of weak signal. | 20020 |
| Threshold Crossed: Low SINR | Low SINR. | Check the radio environment and Network Extender Placement. | 20021 |
| PA Biasing Failure | PA Biasing Failure. | Power cycle the device to clear the issue.<br><br>If symptom persists, the unit will need to be replaced. | 20022 |
| PCI Collision | A neighboring Cell is operating on the same PCI/Frequency. | The unit will be assigned a different PCI by the Verizon's management system.<br><br>No action needed. | 20023 |
| PCI Confusion | Two or more neighboring Cells are operating on the same PCI/Frequency. | The device is still functioning correctly, the Network Element management system shall resolve this alarm. | 20024 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| L1 start timeout | Physical Layer (Layer 1) encountered an issue and LTE services are not available, the device shall resume normal operation after self-healing. | If the alert persists, please restart your device. | 20026 |
| DSP or PHY Crash | Physical Layer (Layer 1) encountered an issue and LTE services are not available, the device shall resume normal operation after self-healing. | If the alert persists, please restart your device. | 20027 |
| Cell not synchronized | There is an issue with the GPS. Ensure open view of the sky. | LTE service may degrade if the unit operates for long period of time without synchronization. | 20028 |
| Synchronization lost with all sources | There is an issue with the GPS. | Ensure open view of the sky. LTE service may degrade if the unit operates for long period of time without synchronization. | 20029 |
| Invalid PHY or RF configuration | Parameters not set properly. | Verify that all parameters are set per guideline. | 20030 |
| System information configuration failure | Parameters not set properly. | Verify that all parameters are set per guideline. | 20031 |
| Single MME connection is down | The device is still functioning correctly. The device will retry automatically establishing the connection again. | This alert indicates that the device cannot communicate with one of Verizon Network's redundancy systems.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20034 |
| IPsec tunnel down | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20035 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| IPsec tunnel expiry | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth. When the connection is re-established, the device will attempt to create a new tunnel automatically.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20036 |
| IPsec IKE SA expiry | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth. When the connection is re-established, the device will attempt to create a new tunnel automatically.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20037 |
| Operator Certificate Expired | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth. When the connection is re-established, the device will attempt to download certificate automatically from Verizon's Network.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20038 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| Holdover Period Expiration | LTE services are not available. | There is an issue with the GPS. Ensure open view of the sky. Reboot/power cycle the unit.<br><br>If the issue persists, replace the unit. | 20039 |
| Administrative Reboot | This is a notification that the device was rebooted from Verizon's Management System. | No action needed. | 20040 |
| Forced Reboot | This is a notification that the device was rebooted from Verizon's Management System. | No action needed. | 20041 |
| Max MME connection attempts reached for all MME | The device cannot communicate with Verizon's Network. | The device will reboot automatically and try establishing the connection again.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20042 |
| Reboot Loop | The device detected more than 5 continuous reboots in less than 30 minutes. | If the problem persists, please contact Verizon Wireless Customer Service. | 20043 |
| DNS Resolution Failure | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings and Review DNS server configuration, connectivity status and available bandwidth.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20044 |
| TR069 Agent not detected | The device shall resume normal operation after self-healing. | If the alert persists, please restart your device. | 20045 |
| Watchdog not detected | The device shall resume normal operation after self-healing. | If the alert persists, please restart your device. | 20046 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| Critical configuration failure | Parameters not set properly. | Verify that all parameters are set per guideline. | 20047 |
| CMS server connection failure | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth. The device will reboot automatically and try establishing the connection again.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20049 |
| AeMS connection no response | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth. The device will reboot automatically and try establishing the connection again.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20050 |
| Low DC Power | PoE source is delivering up to class 4. | Verify PoE device supports class 5 and has sufficient power to feed the LTE Network extender device. Verify Ethernet cabling.<br><br>If possible, change to a different switch port and wall patch panel socket. | 20051 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| Power Out of Range | PoE source is delivering up to class 3. | Verify PoE device supports class 5 and has sufficient power to feed the LTE Network extender device. Verify Ethernet cabling.<br><br>If possible, change to a different switch port and wall patch panel socket. | 20052 |
| RX RACH Overload | A mobile phone is saturating the (RACH) channel. | Power cycle the device to clear the issue.<br><br>If symptom persists, please contact Verizon Wireless Customer Service. | 20053 |
| RX PUCCH Overload | A mobile phone is saturating the (PUCCH) channel. | Power cycle the device to clear the issue.<br><br>If symptom persists, please contact Verizon Wireless Customer Service. | 20054 |
| RX PUSCH Overload | A mobile phone is saturating the (PUSCH) channel. | Power cycle the device to clear the issue.<br><br>If symptom persists, please contact Verizon Wireless Customer Service. | 20055 |
| GPS Antenna not connected | There is an issue with the GPS connector/ Antenna. | Ensure open view of the sky. Reboot/power cycle the unit.<br><br>If the issue persists, replace the GPS Antenna. | 20056 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| Tampering detection | Unit cover has been removed. | This alarm is triggered when the cover of the unit is removed. Visually inspect the unit and contact Verizon Wireless Customer Service if the cover is not removed or damaged . | 20057 |
| Abnormal RSSI level | The received signal strength indicator (RSSI) level is below a threshold. | This is a warning that a poor radio signal strength is measured, but the device is still functioning correctly.<br><br>No action is needed. | 20058 |
| IQ power out of range | Detected IQ power higher than a threshold in the transmission path. | The detected output power of the device is higher than the configured value.<br><br>Reboot the device and if the problem persists contact Verizon Wireless Customer Service. | 20059 |
| RSI Collision | RSI conflict detected in the LTE network. | This alarm is triggered when an RSI conflict is detected by the device.<br><br>No action is needed because SON automatically reconfigures the device with new, non-overlapping RSI. | 20060 |
| High Neighbor Interference | Radio interference detected from neighboring cells. | Use the manual band selection on the Web GUI to assign a different frequency to the Network Extender device. Navigate to advanced setting to change the Network Extender configuration. | 20061 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| Not Signed Upgrade Package | Software upgrade failed due to wrong non-signed upgrade file. | An upgrade using wrong non-signed file has been attempted.<br><br>No action is needed; the upgrade is rejected by the device. | 20062 |
| Integrity Check Failure | Software upgrade failed due to corrupted file. | An upgrade using corrupted file has been attempted. No action is needed; the upgrade is rejected by the device. Upgrade should be reattempted to discard file corruption during transfer.<br><br>If upgrade fails again, please contact Verizon Wireless Customer Service. | 20063 |
| Unable to get IP from DHCP | The unit failed to acquire a local IP address from the local DHCP server. | Verify the configuration of the LAN router and reboot if necessary to assign a valid IP to the device. | 20064 |
| Unable to get operator certificate from CMS server | The device cannot retrieve the operational Certificates from Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth. The device will reboot automatically and try establishing the connection again.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20065 |
| Clock synchronization problem | There is an issue with the GPS. | Ensure open view of the sky. LTE service may degrade if the unit operates for long period of time without synchronization. | 20066 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| Operator certificate expired | The device cannot communicate with Verizon's Network. | Please contact Verizon Wireless Customer Service. | 20067 |
| Operator certificate within renewal expiration window | The device detected the operator certificate is about to expire (validity under one month) | No action is needed. Unit will download new certificate from Verizon's Network. | 20068 |
| CMS server connection failure on certificate renewal | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth. The device will reboot automatically and try establishing the connection again.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20069 |
| CMS server authentication failure on certificate renewal | The device cannot communicate with Verizon's Network. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth. The device will reboot automatically and try establishing the connection again.<br><br>If the problem persists, please contact Verizon Wireless Customer Service. | 20070 |
| OAM Proxy not detected | The OAM component used to interface the different protocol stack applications has crashed. | The unit is not manageable, its operation will be degraded and shall be rebooted. | 20071 |
| Operator certificate Issuer is not accepted by SeGW | The device cannot communicate with Verizon's Network. | Please contact Verizon Wireless Customer Service. | 20072 |

**Table 5-2. Alarm troubleshooting (continued)**

| Alarm | Description | Recommendation | Unique Alarm ID (Code) |
|---|---|---|---|
| Connection failure for all NTP servers | The device cannot communicate with any of the configured NTP servers. | Please check the LAN/ Firewall settings, connectivity status and available bandwidth. The device will operate correctly if GPS signal is valid. | 20073 |
| GPS Antenna not connected on boot | There is an issue with the GPS connector/ Antenna. | Ensure open view of the sky. Reboot/power cycle the unit.<br><br>If the issue persists, replace the GPS Antenna. | 20074 |

# Chapter 6. Specifications

## Key Specifications

**Table 6-1. Key specifications**

| Item | Details |
|---|---|
| Frequency Bands | Band 4, 13, and 66 Selectable (1 carrier), B46 (LAA) |
| Carriers | 1 LTE Carrier + 1 LAA Carrier |
| BW Channelization - Licensed | 5, 10, 15, 20 MHz |
| LAA Channel | 20 MHZ |
| Maximum Modulation | 64 QAM |
| Max TX Power - Licensed | 24 dBm (2 streams @ 21 dBm) per LTE carrier |
| Max 1X Power - 1 AA | 27 dBm (2 streams @24 dBm) for each LAA port |
| Antenna Configuration | 2 MIMO DL, UL Rx diversity (2 Tx/2 Rx) per LTE carrier |
| RF Ports - Internal | 4 internal RF ports, 1 GPS port |
| RF Ports - External | 2 licensed RF ports exposed to support DAS solutions |
| Backhaul Interface | 10/100/1000 Gigabit Ethernet, RJ-45 |
| LMT Interface | 10/100/1000 Gigabit Ethernet, RJ-45 |
| Logical Interfaces | LTE: S1-U, S1-MME, X2 |
| Synchronization | GPS or IEEE 1588v2 |
| GPS constellation | GPS (USA), SBAS (USA) |
| Maximum connected users | 64 |

**Table 6-1. Key specifications (continued)**

| Item | Details |
|---|---|
| Security protocol | IPSEC: AES, 3DES |
| Key Management | PKI: IKEv2 key management, certificate based authentication with secure boot. |

# Physical and Environmental Information

**Table 6-2. Physical and Environmental Information**

| Item | Details |
|---|---|
| Dimensions | 240 mm x 240 mm x 65 mm |
| Weight | <2200 Grams |
| Nominal Power Consumption | <25W at full capacity with licensed bands, < 29W with LAA |
| Power | 12 VDC power supply @ 220 VAC |
| PoE | • PoE+ 802.3at Class 4 with licensed bands only<br>• PoE++ 802.3bt Class 5 when LAA is enabled |
| Operational Temperature | -10ºC to 65ºC (14ºF to 149ºF) |
| Humidity | 5% to 95% Relative Humidity - non condensing |
| Protection | IP50 |

# Supported Services

**Table 6-3. Supported Services**

| Item | Details |
|---|---|
| Supported Services | Supported services include:<br><br>**SON**: Hybrid SON support with dSON and cSON; dSON agent can work with or without cSON and supports using a real-time interface through X2 or TR-069; SON macro integration supported through X2-GW, X2-Proxy or direct connection. |
| | **TR-069**: TR-069 agent supports TR-196v2 and TR-181 data models. |
| | **CSG**:<br><br>Open Mode (Default, out of the box):<br>Any VzW UE within vicinity can attach to the Open Femto Cell.<br><br>Hybrid Mode:<br>- CSG subscribed members have priority over non-members.<br>- Non CSG subscribed members are allowed service only if resources are not used up by CSG members. Nonmembers can be pre-empted in favor of CSG members.<br><br>Closed Mode:<br>Network Extender resources are exclusively reserved for CSG subscribed MDNs. |

# Appendix A. FAQs

## About this appendix

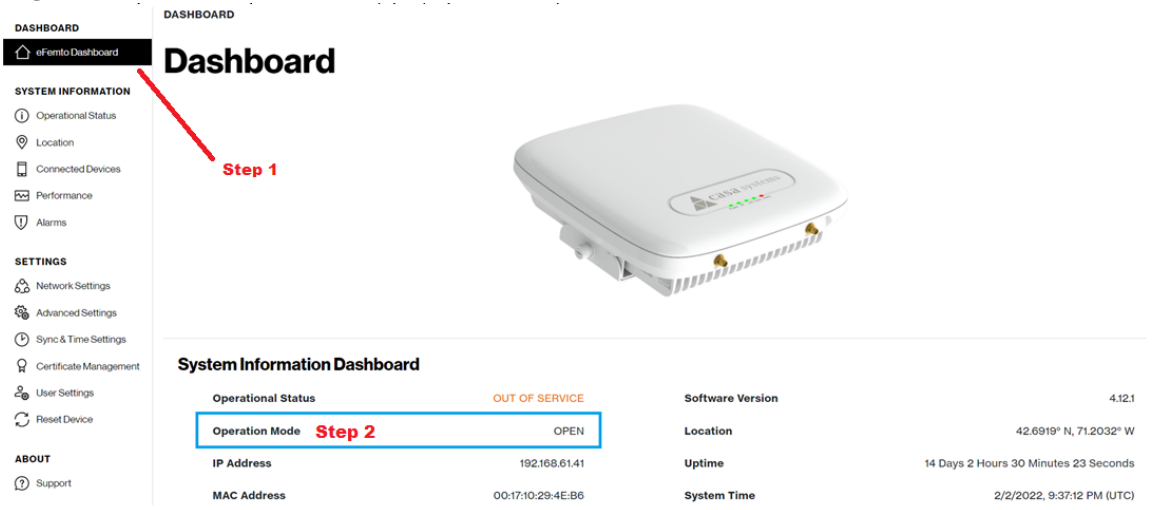
This Appendix provides the following Frequently Asked Questions (FAQs) for the Network Extender.

# Dashboard FAQs

## How to verify the device operation mode

1. From the main Dashboard, click **Dashboard** (see Figure A-1).
2. Under System Information Dashboard, verify the **Operation Mode** of the Network Extender (selections include: Open, Hybrid, or Close).

**Figure A-1. Operation Mode**

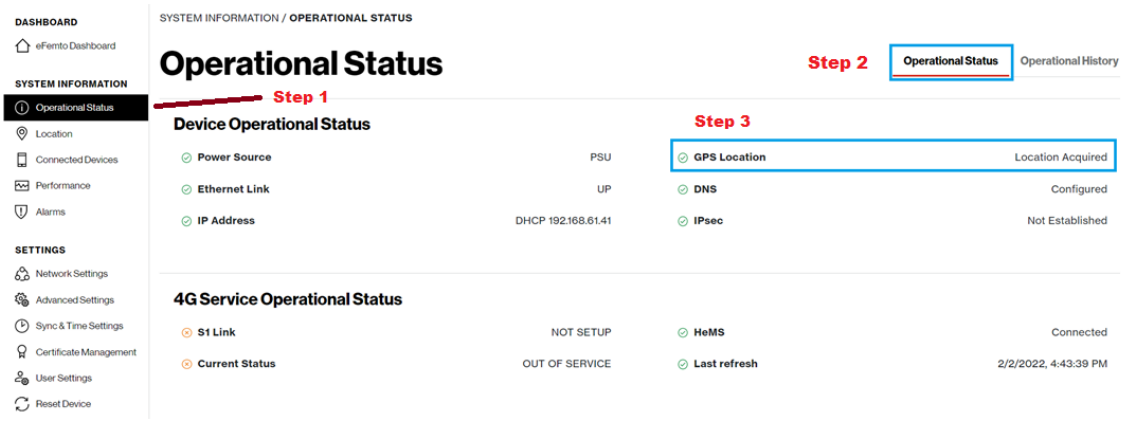


# System Information FAQs

## How to verify if the GPS location was acquired

1. From the main Dashboard, click **System Information** > **Operational Status** (see Figure A-2).
2. On the upper right corner of the page, click **Operational Status**.
3. Under Device Operational Status, check the **GPS Location** (Location Acquired shown).

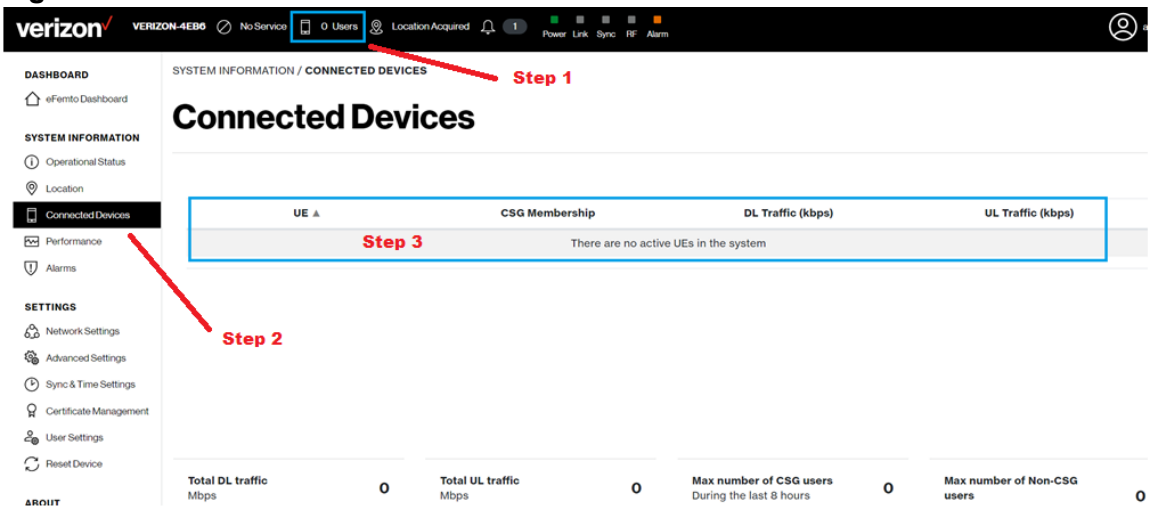
### Figure A-2. GPS Location



## How to check the number of connected users

1. The number of active users is displayed in the Web GUI header.
2. From the main Dashboard, click **System Information** > **Connected Devices** (see Figure A-3).
3. Under Connected Devices, the active UEs are displayed.

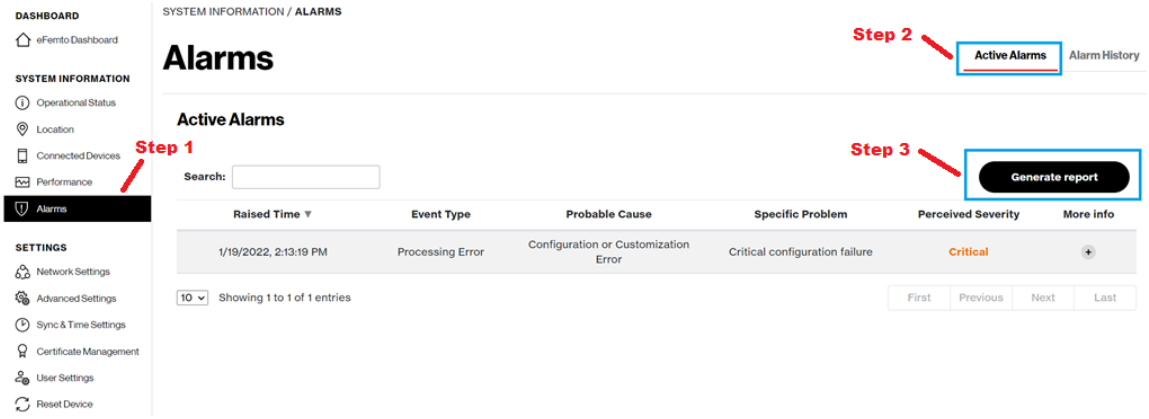
**Figure A-3. Connected Devices**



## How to check the active alarms and generate an alarm report

1. From the main Dashboard, click **System Information** > **Alarms** (see Figure A-4).
2. On the upper right portion of the page, click **Active Alarms** to display a list of active alarms.
3. Click **Generate report** to generate an alarm report.

**Figure A-4. Network Extender Alarms**

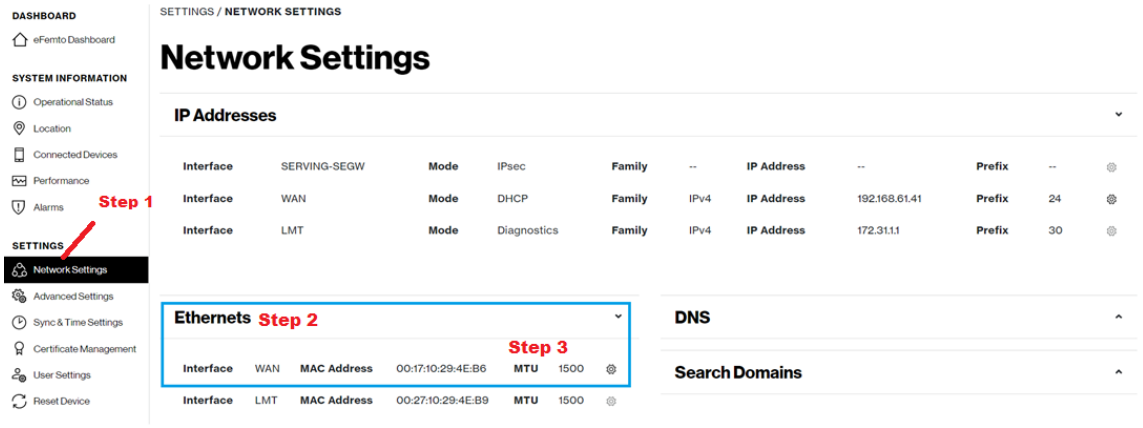


# Settings FAQs

## How to adjust MTU (maximum transfer unit) size

1. From the main Dashboard, click **Settings** > **Network Settings** (see Figure A-5).
2. Under Ethernets, select the interface.
3. Click MTU and change the setting as needed.

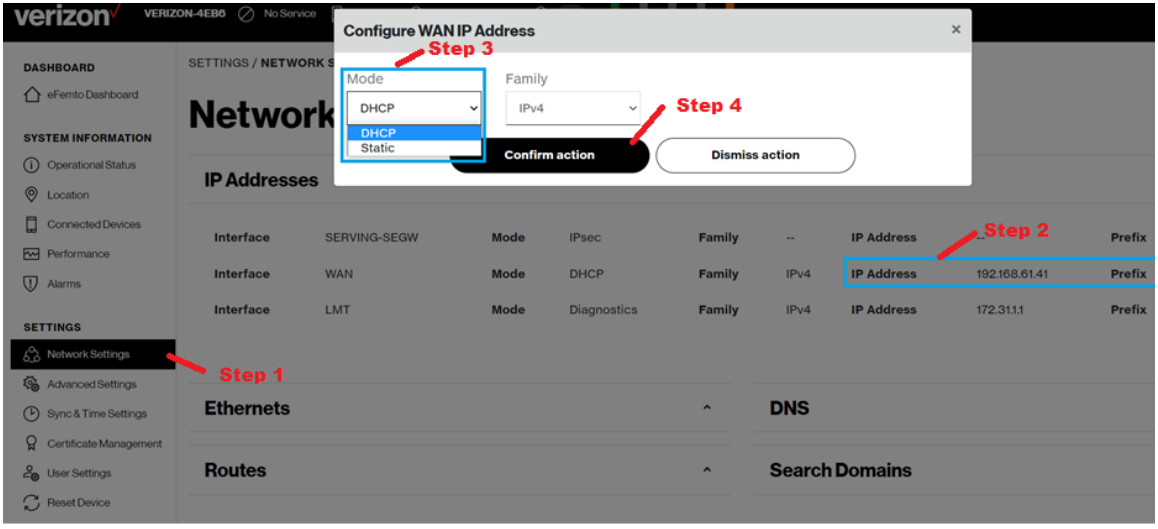
### Figure A-5. Network Settings



## How to configure a static IP address

1. From the main Dashboard, click **Settings** > **Network Settings** (see Figure A-6).
2. Under IP Addresses, select the IP Address that requires the change.
3. On the **Configure WAN IP Address** page, under Mode, select either **DHCP** or **Static**.
4. Click **Confirm action**.

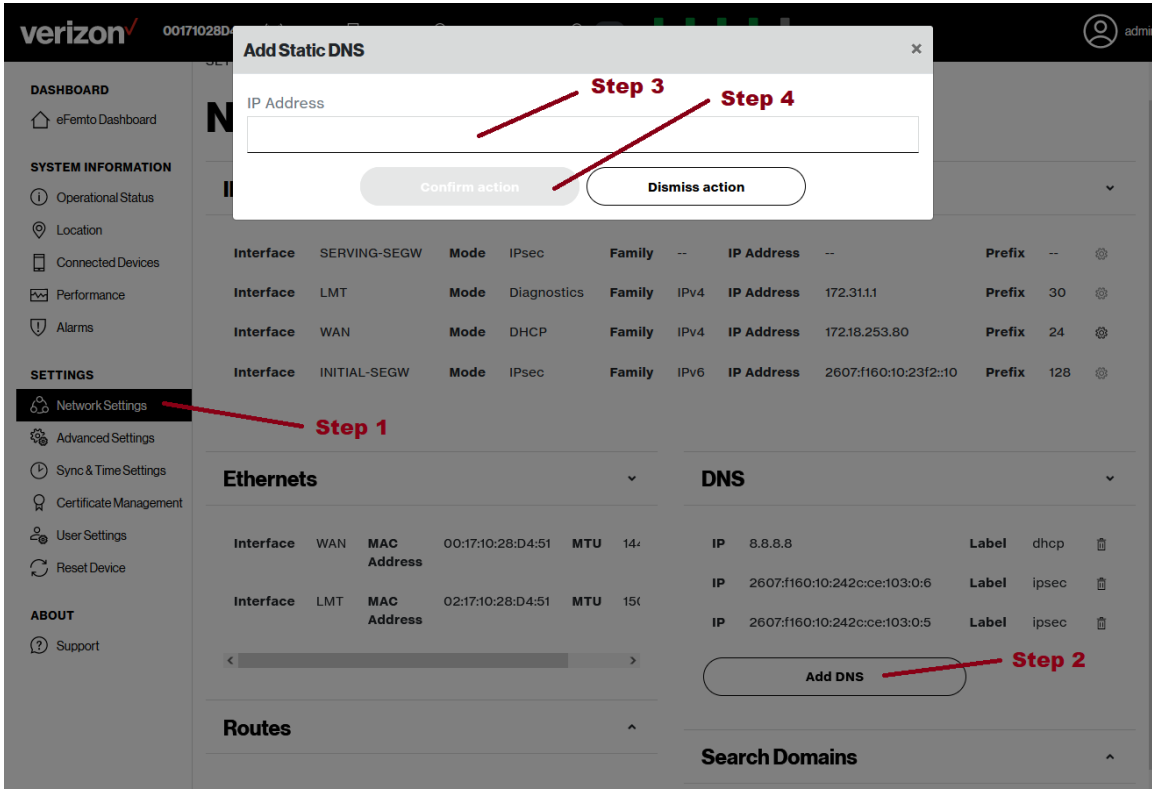
**Figure A-6. Static IP address**



## How to add a DNS

1. From the main Dashboard, click **Settings** > **Network Settings** (see Figure A-7).
2. Under DNS, click **Add DNS**.
3. On the **Add Static DNS** page, enter the DNS IP Address.
4. Click **Confirm action**.

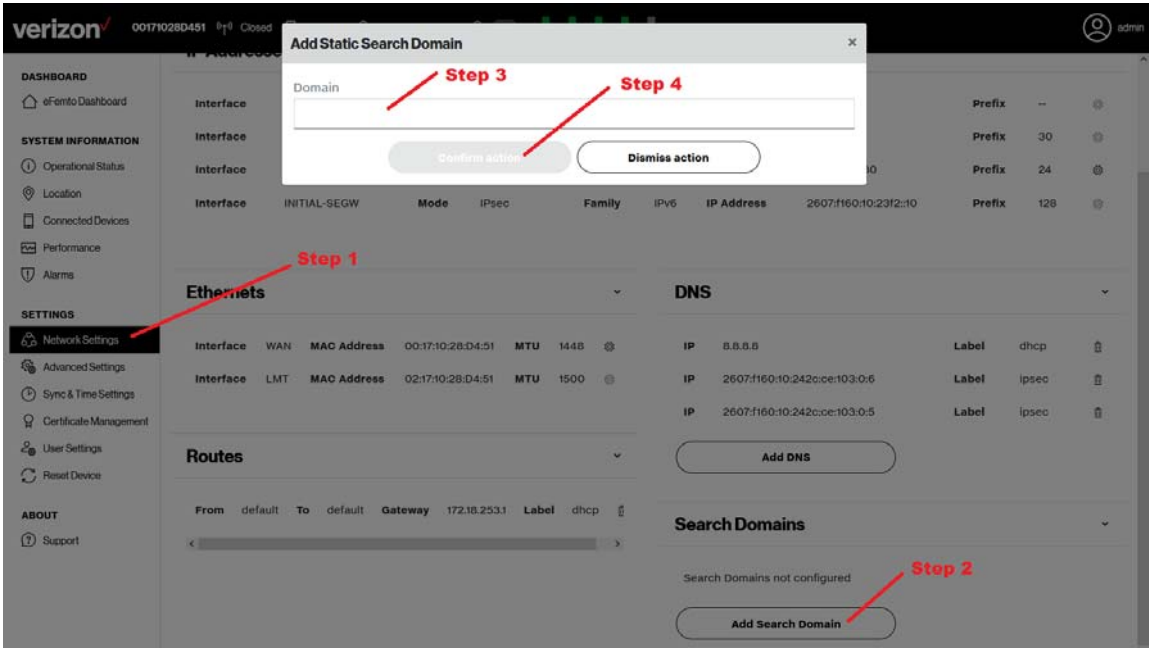
### Figure A-7. DNS settings



## How to add a search domain

1. From the main Dashboard, click **Settings** > **Network Settings** (see Figure A-8).
2. Under Search Domains, click **Add Search Domain**.
3. On the **Add Static Search Domain** page, enter the Domain Address.
4. Click **Confirm action**.

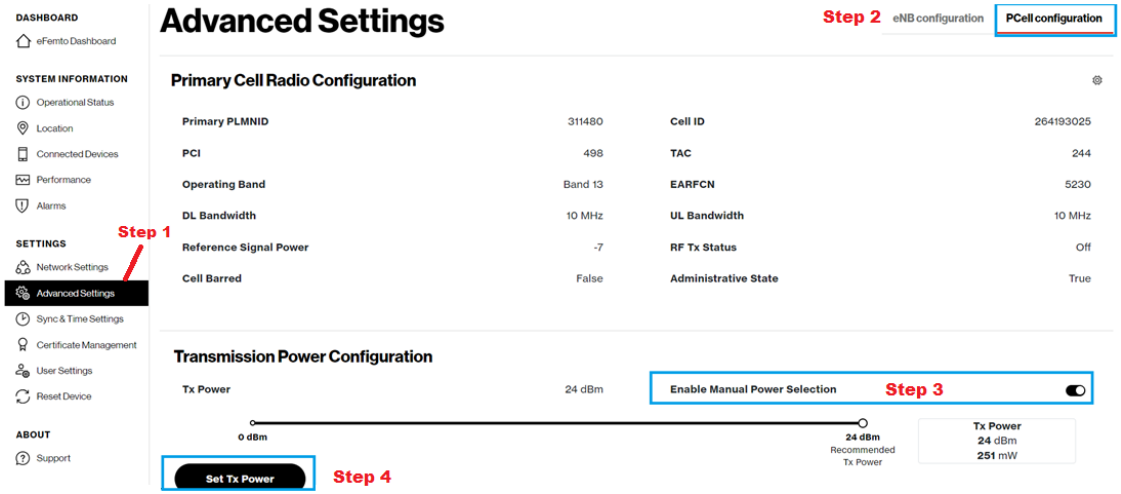
### Figure A-8. Search domains



## How to manually adjust the device transmission power

1. From the main Dashboard, click **Settings** > **Advanced Settings** (see Figure A-9).
2. On the upper right corner of the Advanced Settings page, select **PCell Configuration**.
3. Under Transmission Power Configuration, select **Enable Manual Power Selection**.
4. Click **Tx Power**.

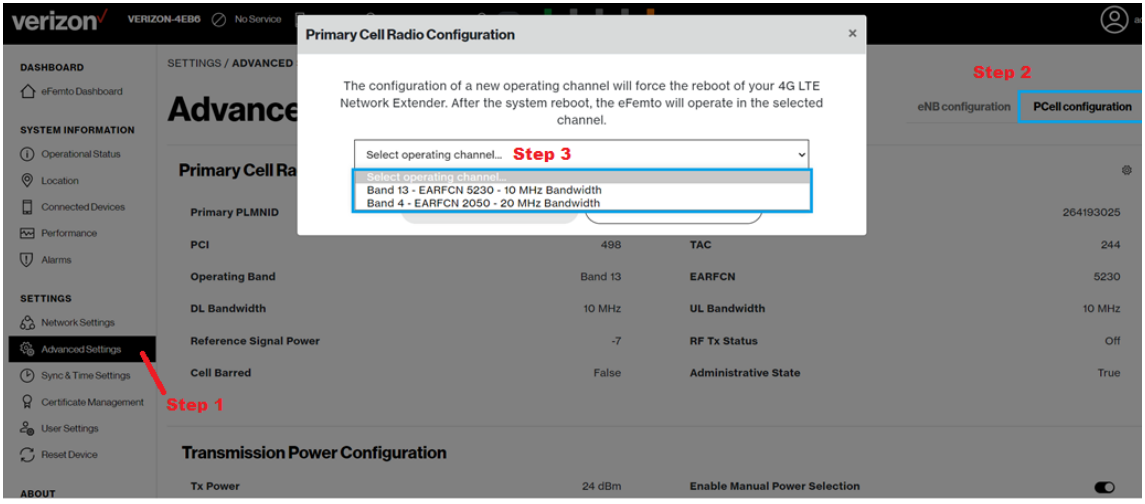
### Figure A-9. Advanced Settings



## How to change the device operating channel

1. From the main Dashboard, click **Settings** > **Advanced Settings** (see Figure A-10).
2. On the upper right side of the page, click **eNB configuration**, and select **PCell configuration**.
3. On the Primary Cell Radio Configuration page, select the **operating channel** from the drop down menu.

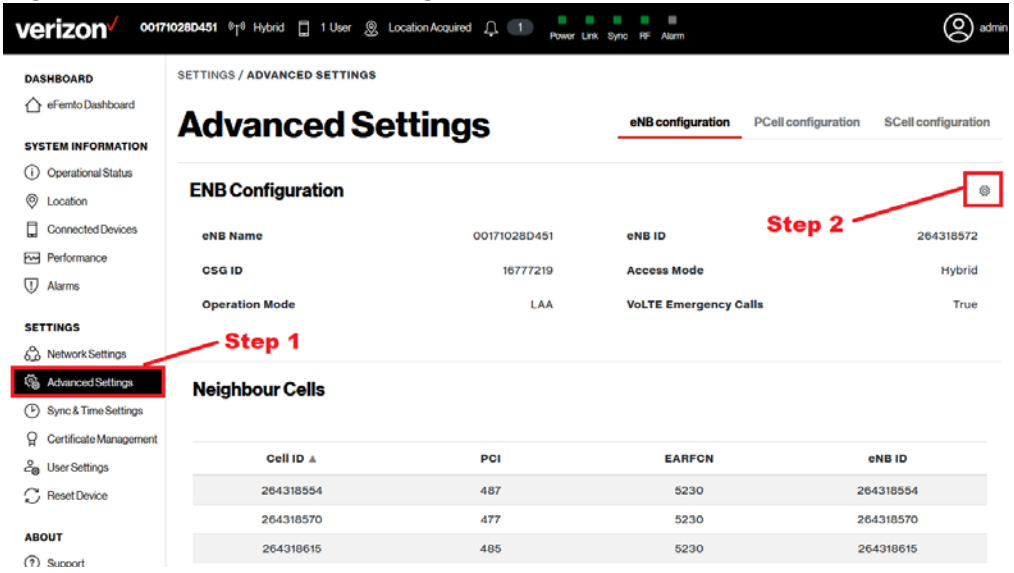
### Figure A-10. PCell configuration



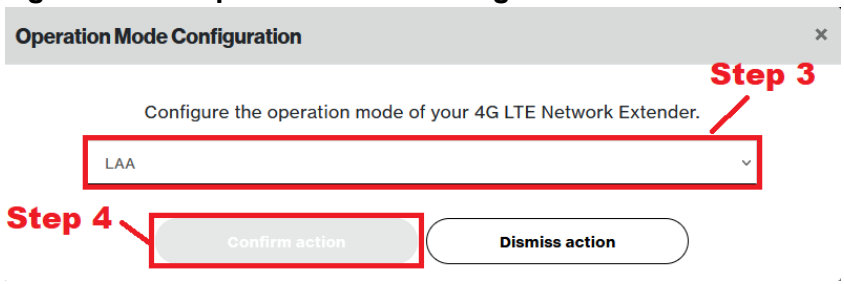
## How to configure Network Extender Operation Mode

1. From the main Dashboard, click **Settings** > **Advanced Settings** (see Figure A-11).
2. On the Advanced Settings page, under ENB Configuration, click the settings icon (see Figure A-11).
3. On the Operation Mode Configuration dialog, select an operation mode (Single Carrier, CAT-M1, or LAA) (see Figure A-12).
4. Click **Confirm action** (see Figure A-12).

### Figure A-11. Advanced settings



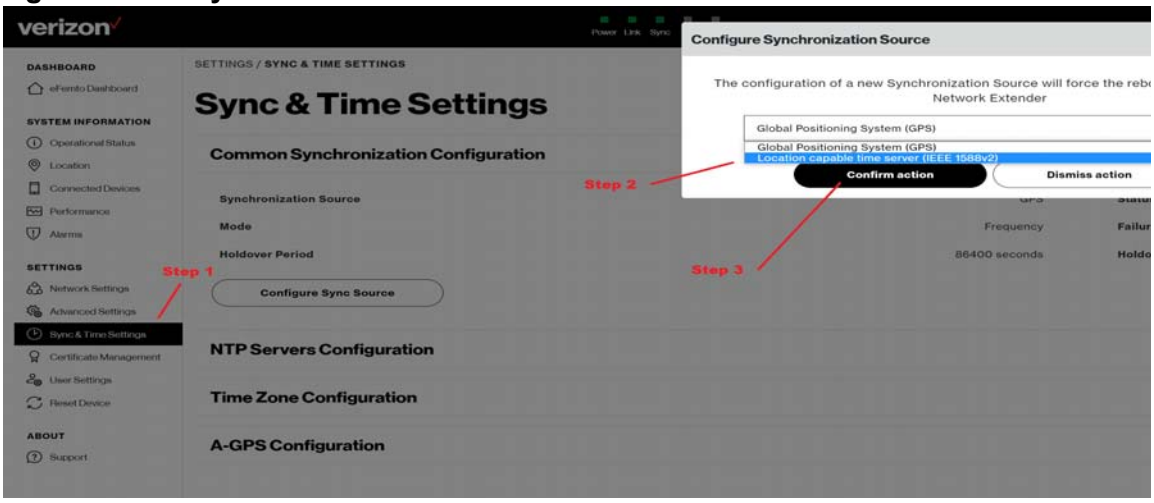

### Figure A-12. Operation Mode dialog



## How to configure Synchronization Source

1. From the main Dashboard, click **Settings** > **Sync & Time Settings** (see Figure A-13).
2. On the Configure Synchronization Source dialog, select the synchronization source.
3. Click **Confirm action**.

**Figure A-13. Synchronization Source**

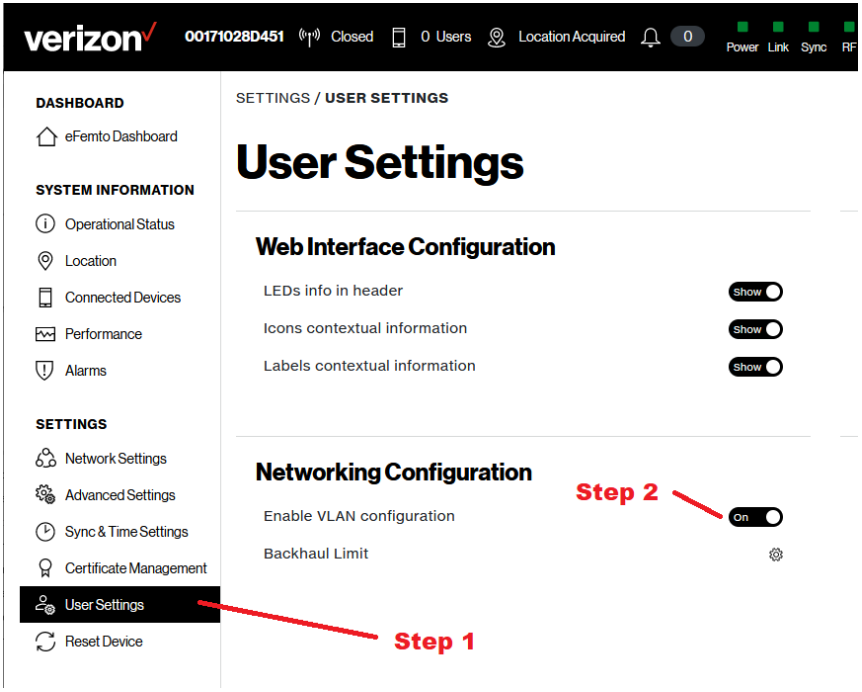


## How to add a VLAN

The Web GUI provides the ability to configure a VLAN for the Network Extender.

1. From the main Dashboard, click **Settings** > **User Settings** (see Figure A-14).
2. Click **Enable VLAN configuration** (see Figure A-14).

**Figure A-14. Enable VLAN Configuration**

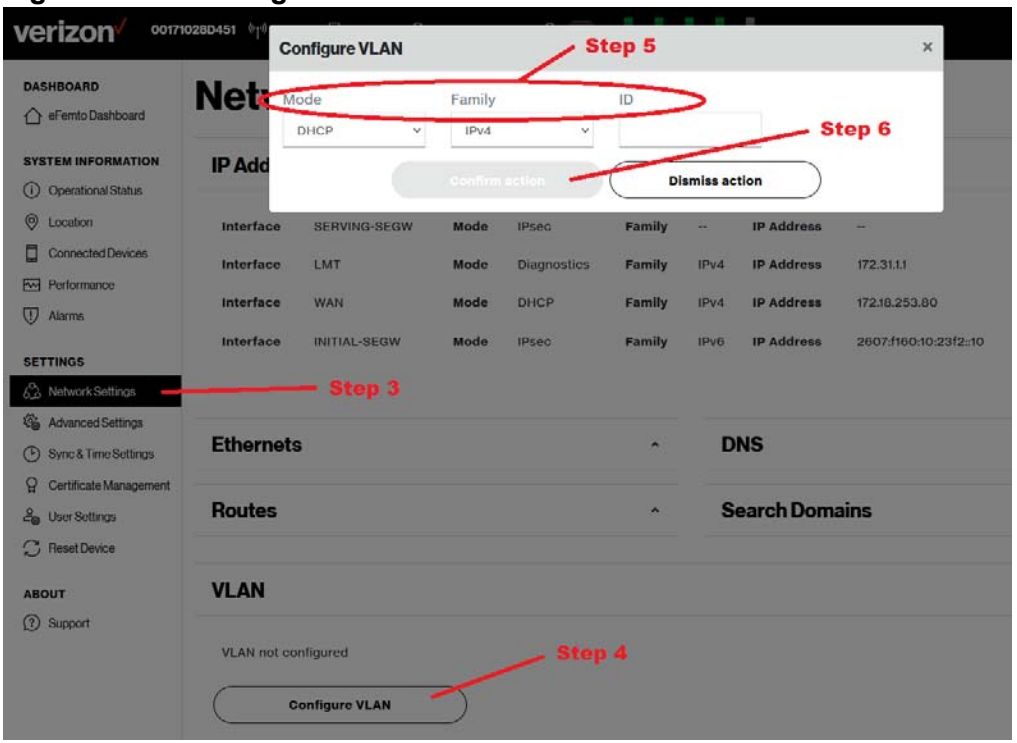



3. Click **Network Settings** (see Figure A-15).
4. Click **VLAN** > **Configure VLAN** (see Figure A-15).
5. On the Configure VLAN dialog, set **Mode** (DHCP or Static), **Family**, and **ID**. This action will reboot the unit (see Figure A-15).

- If using DHCP, check that the unit can get IP address after reboot.
- If not using DHCP, try to ping the unit static WAN IP from another device in the same VLAN.

6. Click **Confirm action** (see Figure A-15).

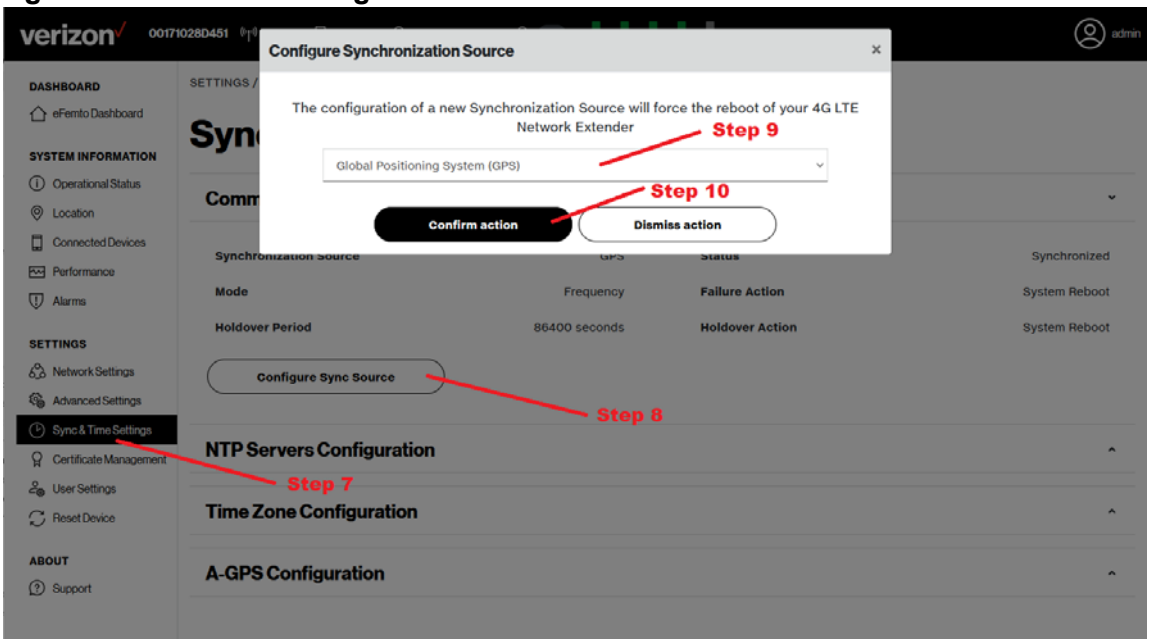
**Figure A-15. Configure VLAN**




7. Under Settings, click **Sync & Time Settings** (see Figure A-16).
8. Click **Configure Sync Source** (see Figure A-16).
9. On the Configure Synchronization Source dialog, set the ePTP server IP address (see Figure A-16). This action will reboot the unit again.

10. Click **Confirm action** (see Figure A-16).

**Figure A-16. VLAN Configuration**



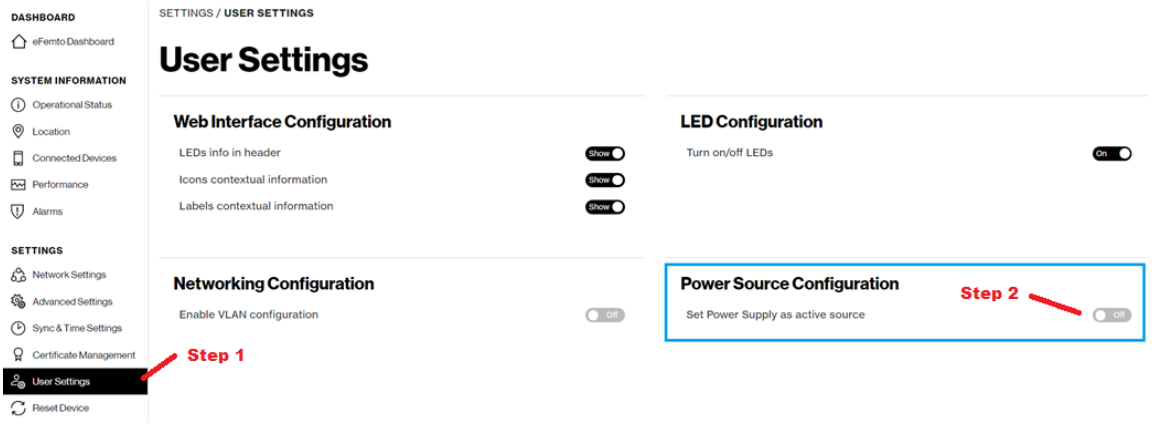

If the Network Extender cannot get a location, it is probably because the ePTP server is unreachable. Ping the Network Extender from a device in the same subnetwork used by the ePTP server.

## How to set the power source

The Network Extender provides the ability to select the Network Extender power source to either PoE (Power Over Ethernet) or the AC power adapter.

1. From the main Dashboard, click **Settings** > **User Settings** (see Figure A-17).
2. Under Power Source Configuration, select **Off** to select PoE (power is provided via the Ethernet port), or **On** to select the AC power source.

**Figure A-17. Power Source Configuration**



## How to configure Network Extender Backhaul Limit

1. From the main Dashboard, click **Settings** > **User Settings** (see Figure A-18).
2. On the User Settings page, click the settings icon for **Backhaul Limit** (see Figure A-18).
3. On the Backhaul Limit dialog, enter the desired limit (in Mbps) (see Figure A-19).
4. Click **Confirm action** (see Figure A-19).

**Figure A-18. Setting the Backhaul Limit**

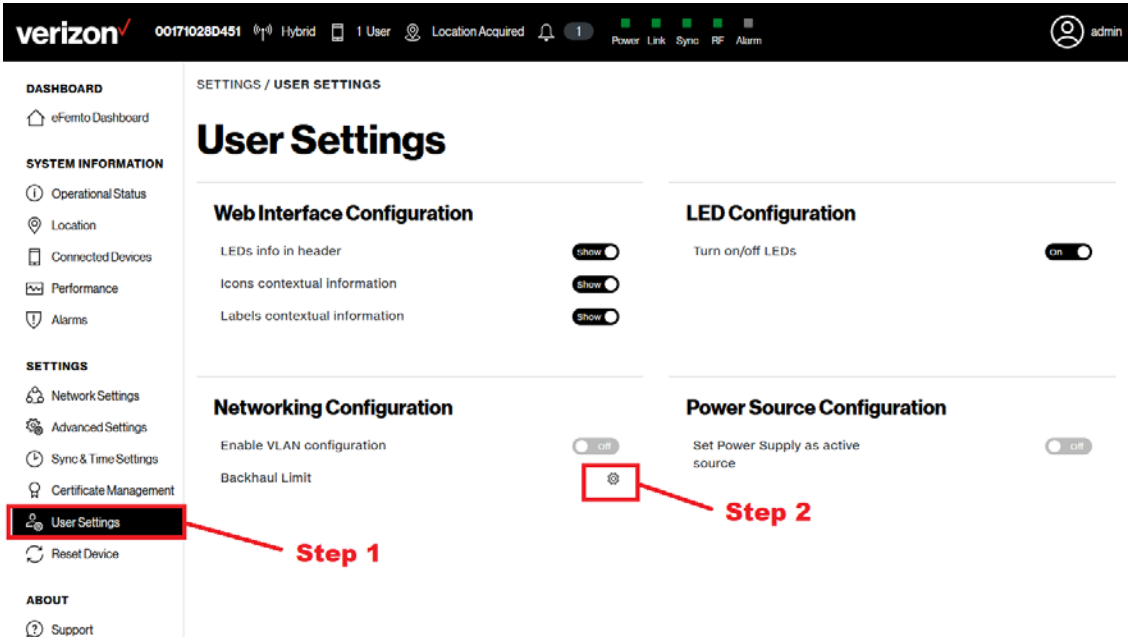
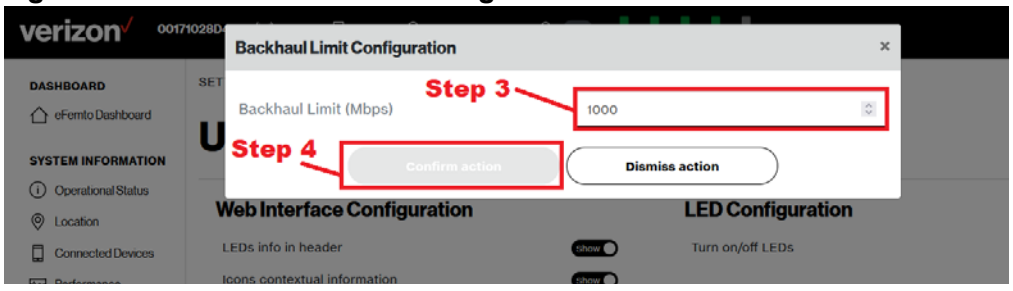


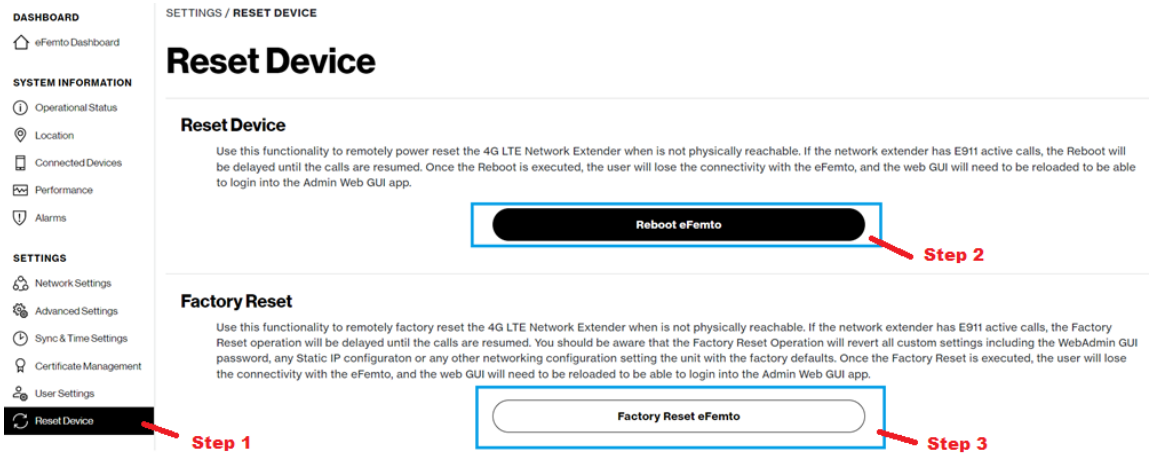

**Figure A-19. Backhaul Limit dialog**



## How to reboot or factory reset a device

1. From the main Dashboard, click **Settings** > **Reset Device** (see Figure A-20).
2. To reset the Network Extender, on the Reset Device page, click **Reboot eFemto**.
3. To reset the Network Extender to Factory Settings, on the Reset Device page, click **Factory Reset eFemto**.

### Figure A-20. Reset device



# CSG mode FAQs

## Where can the user manage the CSG function?

User will be able to manage the CSG function of the Network Extender via MyVerizon or MyBiz portal.

## Will the user be able to determine which CSG IDs are associated with the phone?

User will have to login to the MyVerizon or MyBiz portal to view/manage the phone numbers associate with CSG IDs. There is no way to determine the assigned CSG IDs from the phone.

## Can the user specify a particular CSG ID number?

No. The system assigns a CSG ID. However, the user can specify the name of the CSG group.

## How many CSG ID can be assigned to a Network Extender?

Only one CSG ID per Network Extender. However, the Network Extender can be re-assigned a different CSG ID if necessary.

## Will the CSG ID be changed if a Network Extender changed its CSG mode from Hybrid to Closed or vise versa?

No. The Network Extender keeps the same CSG group and ID but only change the mode.

## Will different CSG mode impacts E911 calls?

No. Emergency E911 calls are supported regardless of CSG membership. Emergency active calls on the Network Extender CANNOT be pre-empted nor redirected.

casa systems

100 Old River Road
Andover, MA 01810
USA

# Verizon 4G LTE Network Extender 3 for Enterprise User Guide



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