

# Verizon 4G LTE Network Extender for Enterprise User Guide

Network Systems Samsung Telecommunications America

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VSR 1.2.8

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This manual describes how to install the 4G LTE Network Extender for Enterprise and cable connection specifications.

### Relevance

This manual applies to the following products/software.

Model	Release
SLS-BU102	VSR 1.2.6

### **Conventions in this Document**

Samsung Networks product documentation uses the following conventions.

#### **Symbols**

Symbol	Description
	Indicates a task.
5	Indicates a shortcut or an alternative method.
	Provides additional information.
	Provides information or instructions that you should follow to avoid service failure or damage to equipment.
	Provides information or instructions that you should follow to avoid personal injury or fatality.
$\widehat{\bigstar}$	Provides antistatic precautions that you should observe.

### **Revision History**

The following table lists all versions of this document.

Version	Date	Description
1.0	03/13/2015	First version



### **Organization of This Document**

Section	Title	Description
Chapter 1	Getting Started	Provides an overview of the Network Extender.
Chapter 2	Device Setup	Describes the procedures needed to set up the Network Extender.
Chapter 3	Network Extender Admin Website (Local)	Describes the Network Extender Admin Website (Local).
Chapter 4	Configuring Your Device	Provides detailed information regarding firewall settings.
Chapter 5	Troubleshooting	Provides information to troubleshoot STS LED statuses.
Appendix A	Acronyms	List of terms.

### **Related Documentation**

- Verizon 4G LTE Network Extender for Enterprise Quick Start Guide
- Verizon 4G LTE Network Extender for Enterprise Product, Safety and Warranty
- Verizon 4G LTE Network Extender for Enterprise Installation Manual



### **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. Samsung 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 has 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.



**Circuit Breaker** 

1

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.)

#### FCC Radiation Exposure Statement

To ensure the safety of users, the FCC has established criteria for the amount of radio frequency energy various products may produce depending on their intended usage. This product has been tested and found to comply with the FCC's exposure criteria.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Please reference the Verizon 4G LTE Network Extender for Enterprise Product, Safety and Warranty guide.

The installation of the base unit should allow at least 20 centimeters between the base and persons to be in compliance with FCC RF exposure guidelines.



# Chapter 1 Getting Started

### Introduction

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

Figure 1. Verizon Wireless 4G LTE Network Extender for Enterprise



The following sections are included in this manual:

- Important Safety Information
- Using Your Device
- LED Guide
- Device Setup
- Network Extender Admin Website (Local) Troubleshooting
- Glossary
- Warranty Information

**Important!** Before installing the Network Extender, it is essential to read the entire manual to ensure proper operation of the system.



### Features

The Network Extender provides the following features:

- The Network Extender is a Plug and Play device that can be installed to automatically provide enhanced in-building wireless service in an enterprise or small office without having to change your existing mobile phone.
- The Network Extender enables users to easily install and configure the system by connecting to an existing broadband network.
- The Network Extender supports an embedded web server, which enables customization of IP settings. For more information, see the Network Extender Admin Website (Local) chapter.

For a description of acronyms, see the Acronyms appendix.

The Network Extender box contains:

- Network Extender
- Ethernet cable
- Two RF antennas
- GPS antenna
- GPS cable (7m, 22.9 ft.)
- Power cord
- Power supply
- Mounting brackets (two brackets)
- Quick Start Guide
- Product Safety and Warranty manual



Figure 2. Box Contents







(2) RF Antennas





Mounting Hardware



Power Cord and Ethernet Cable



Power Supply



Quick Start Guide and Product Safety and Warranty Manual

GPS Antenna and Cable

The following optional items are available via third party suppliers. Please contact your Verizon sales representative for details:

- Extra length GPS cables and outdoor GPS antenna
- Power over Ethernet (POE) Power Injectors and Switches:
- .)

### **System Requirements**

- An always-on broadband Internet connection with a recommended minimum bandwidth.
  - For 30 users or less, a bandwidth of 20 Mbps downlink and 10 Mbps uplink per unit is required to support an optimal data connection.
  - For 31 or higher users, a bandwidth of 50 Mbps downlink and 20 Mbps uplink is recommended.
- Firewall modifications are required to support the solution. Be sure to contact your IT administrator for the required changes. Please review the Configuring Your Device chapter, which discusses firewall rules and requirements.

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Firewall modifications are required for the solution to operate. Most calls to Customer Care arise from firewall challenges. Please verify that firewall rule changes have been made before calling into Customer Care.





### Components

The two wireless antennas provide omnidirectional transmission and reception of signals between the Network Extender and communicating with Verizon Wireless mobile phones. Each wireless antenna rotates 360 degrees to accommodate various installations.

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 for the Network Extender. In the event a GPS connection is not possible, refer to the Troubleshooting chapter.

Figure 3. Components - Front View



The Network Extender has a single multicolored LED used to indicate the device connectivity status. Please review the Network Extender Setup chapter for the LED guide when attempting to troubleshoot any issues.



#### Figure 4. Connection Overview



The rear of the Network Extender provides access to the WAN port, power port, and external GPS antenna.

- **1 GPS Antenna Port** provides access to the external GPS antenna for removal and relocation. The connections labelled 1PPS (Pulse per Second) and 10M (10 MHz) are not used in the product.
- **2** Heat Vents provide passive ventilation for the Network Extender and allow for dissipation of internally generated heat.

The Network Extender needs to remain unobstructed to allow proper air flow to the internal components. Place the unit at least 3 meters (9.8 feet) away from products that generate electromagnetic radiation.

**3 DC Power Port** provides power to the Network Extender when connected to the AC power supply and cord (included).

Only use the provided power cord and supply. Using any other power source may result in damage to the Network Extender.

- **4 Backhaul (or WAN) Port(B/H)** allows you to connect the Ethernet cable provided to establish secure communication with the Verizon Wireless 4G LTE network via the Internet. The Backhaul port provides Ethernet connectivity at 100 Base-TX/1000 Base-T.
- **5 RESET Button** allows you to reset the device to factory defaults. Use a pen to push and hold the recessed button for 10 seconds. The STS LED will then become solid red, indicating that the device is resetting. Any manually configured parameters will require reconfiguration.
- 6 STS LED (state status) indicator provides the current operational status of the Network Extender. When blinking green, the Network Extender is in operation. Other system states are indicated below.
- 7 LMT Port allows you to connect to the Network Extender Admin Website (Local) to manage the device settings and view the device status and alarm status.



#### Figure 5. STS LED Overview

Network Extender Status	Progress	Failure	LED state
HW/boot Initialization Hardware Initialization and Software Execution stage			Solid
Ethernet Cable, Acquiring local IP address Detection of the Ethernet cable and local IPv4 Address acquisition stage	$\bigcirc$		Alternating
Acquired local IP, DNS, VPN setup DNS lookup and VPN establishment stage		0	1 Blink
Authentication failure (cause code 4) Explicit FDR Authentication Failure condition		2	2 Blinks
GPS Acquisition in Progress GPS acquisition stage	3	3	3 Blinks
Configuration Download Software download and parameter configuration stage	4	4	4 Blinks
In Service System is in operational condition	F		FastBlinking
*Post operational issues/alarms At least one system alarm is active			*Alternating

# Chapter 2 Network Extender Setup

### **Network Extender Setup**

This section outlines the procedures needed to set up the Network Extender.



- 1 Confirm your package contains all components.
- 2 Review the Product Safety and Warranty document included in the package contents before installing the Network Extender.
- **3** Place the unit near a window to acquire a GPS signal. If this is not possible, refer to the Troubleshooting chapter. A GPS signal is required to maintain continuous timing for proper operation and E911 service.
- 4 Connect the RF antennas.

Figure 6. Connect the RF Antennas





Connect one end of the included Ethernet cable to an open LAN port on your service provider router and connect the other end to the Backhaul Port (B/H) located at the rear of the Network Extender. Connecting to the LMT port is optional and is only needed when you wish to directly connect a computer to the Network Extender to access the Local Admin Website

#### Figure 7. Connect the Ethernet Cable



**5** Connect the supplied GPS antenna as shown in figure 8 below. Other GPS antenna options are explained in the Network Extender Installation Manual.

Figure 8. Connect the GPS Antenna





#### Figure 9. Connect the GPS Arrestor and Line Amplifier



Plug the power supply connector into the DC 12V power port located at the rear of the Network Extender. Insert one end of the power cord into the power supply and then plug the other end into an available power outlet.



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6 Confirm the STS LED is illuminated as indicated below.

Allow 30 - 60 minutes for the Network Extender to complete the first time startup sequence and detect both its connections and available communications. If the GPS has not provided position information in one hour, relocate the GPS antenna to receive a stronger signal. See the Troubleshooting chapter. During the initial device bootup/HW initialization period when the unit displays a solid red LED, the Local Admin Website will not be available. Start sequence may be different if Firmware updates are installed at startup.

The System Status (STS) indicator will go from solid orange while the device is booting to blinking orange to indicate successful local network connectivity.

The LED will then blink green, indicating normal operation.

A triple blinking orange LED indicates the GPS has not successfully acquired a position fix or that an alternate timing source is not functioning properly.



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For troubleshooting details based on the status of the STS LED, please refer to the Troubleshooting chapter.

# System Status Indicator Startup Sequence (LED)

The following steps show the detailed Network Extender System Status indicator states during the startup sequence.

**1** Powered-on and hardware initializing

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

LED State: Solid red

The Network Extender is under an autonomous hardware test cycle. It is not possible to load or run any software including the user Network Extender Admin Website (Local).





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2 Hardware test complete and software loaded

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

LED State: Solid orange

The software is loaded.

The device has completed its autonomous hardware tests and loaded all software. It will start the process of connecting to Verizon's 4G LTE network and coming into service. See the Network Extender Admin Website (Local) chapter for information on how to log into the Network Extender.

Figure 12. Software Loaded			
	O STS RESET B/H LMT PWR	ANT 1	
veri <u>zon</u> wireless	$\odot$	Sign Out 🔒	
<ul> <li>☐ Home</li> <li>Connected Devices</li> <li>☆ settings</li> <li>▲ About</li> </ul>	Status & Alerts       GPS       Performance       Support         This page will refresh every 15 seconds       Image: Second	3	



**3** Acquired IPv4 address

Network Extender State: The device is running its software and has started to connect to the Verizon 4G LTE network. The first step is to acquire a local IPv4 address.

LED State: Single blinking orange (0.5 sec. on/0.5 sec off, 3.5 sec. rest)

The device has loaded software and has started to acquire a local IPv4 address from the local DHCP server.

Figure 13. Acquired IPv4 Address			
ANT 0 GPS 1 PPS	O RESET B/H LMT PWR	ANT 1	
veri <u>zon</u> wireless	$\diamond$	🥍 Sign Out 🛔	
Home Connected Devices Settings About	About <u>status &amp; Alers</u> <u>or</u> <u>erformance</u> <u>support</u> Tis page will refresh every 15 seconds <u>status vient v</u>	3	



Z

4 Conducting DNS lookups

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

LED State: Single blinking orange (0.5 sec. on/0.5 sec off, 3.5 sec. rest)

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

Figure 14. DNS Lookup	
	O STS RESET B/H LMT PWR
verizon wireless	🚫 🏄 Sign Out 🛔
<ul> <li>image: Home</li> <li>image: Connected Devices</li> <li>image: Settings</li> <li>image: About</li> </ul>	About stus & Alers     GPS     Performance     support       This page will refresh every 15 seconds     To     To       output     To     To     To



**5** Attempting to reach the Security Gateway (SeGW)

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.

LED State: Slow blinking orange (0.5 sec. on/0.5 sec off, 3.5 sec. rest)



Figure 15. Attempting to Reach SeGW	v	
ANT 0 GPS 1 PPS	O STS RESET B/H LMT PWR	ANT 1
veri <u>zon</u> wireless	$\otimes$	🖄 Sign Out 🏜
Home Connected Devices Settings  About	About Status & Alerts OP Performance Support This page will refresh every 15 seconds This page will refresh every 15	3



6 Successfully reached the SeGW

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

LED State: Slow blinking orange (0.5 sec. on/0.5 sec off, 3.5 sec. rest)

Status details that the device can communicate with the SeGW and IPSec tunnel are not established at this point.

Figure 16. Successfully Reached Sec	ЭW	
ANT 0 GPS 1 PPS	O STS RESET B/H LMT PWR	ANT 1
veri <u>zon</u> wireless	$\otimes$	🖄 Sign Out 🏦
Home Connected Devices Settings  About	About Status & Alerts GPS Performance Support This page will refresh every 15 seconds Not provide the second se	3



7 VPN setup completed

Network Extender State: The device has set up a VPN tunnel with the initial SeGW.

LED State: Slow blinking orange (0.5 sec. on/0.5 sec off, 3.5 sec. rest)

This confirms that the device has set up a VPN connection with Verizon's 4G LTE network.

Figure 17. VPN Setup Completed		
ANT 0	OM STS RESET B/H LMT PWR	ANT 1
verizon wireless	$\otimes$	🖄 Sign Out 🛔
Home Connected Devices Connect	About <u>status &amp; Alerts</u> <u>OPS</u> <u>Performance</u> <u>Support</u> Tis page will refresh every 15 seconds <del>status &amp; Alerts</del> <u>Seconds</u> <del>status &amp; Alerts</del> <u>Seconds</u> <del>status &amp; Alerts</del> <u>Seconds</u> <del>seconds</del> <u>Seconds</u> <u>seconds</u> <u>Seconds</u> <u>Seconds</u> <u>seconds</u> <u>Seconds</u> <u>Seconds</u> <u>seconds</u> <u>Seconds</u> <u>Seconds</u> <u>Seconds</u> <u>Seconds</u> <u>seconds</u> <u>Seconds</u>	<ul> <li>the initial network</li> </ul>



8 Possible SeGW authentication failure

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

LED State: Double blinking red (0.5 sec. on/0.5 sec. off, 3 sec. rest)

This details that the device been notified it failed authentication with the FDR. Please note the LED will flash at 50% of the previous state rate.

Figure 18. SeGW Authentication Fail	ure	
ANT 0	O STS RESET B/H LMT PWR	ANT 1
verizon wireless	$\diamond$	🞽 Sign Out 🛔
Home Connected Devices Settings  About	Status & Alerts       GPS       Performance       Support         This page will refresh every 15 seconds         Status & GPS       Performance       Support         This page will refresh every 15 seconds         Status & GPS       Performance       Support         Status & GPS       Performance       Support         Dis page will refresh every 15 seconds       Support       Support         Support       Support       Support       Support         Suppor	Wireless Customer Care for further assistance



**9** GPS acquisition in progress

Network Extender State: The device has set up a VPN tunnel with the initial SeGW and is awaiting a GPS fix before progressing.

LED State: Triple blinking orange (0.5 sec. on/0.5 sec. off, 3 sec. rest)

Until a GPS fix is obtained, the device will search for GPS signal and not proceed to the next step of "Configuration Download".

Figure 19. GPS Acquisition Progress		
	O STS RESET B/H LMT PWR	ANT 1
verizon wireless	$\diamond$	🖄 Sign Out 🏦
Home Connected Devices Settings About	About Status & Alerts GPS Performance Support This page will refresh every 15 seconds This page will refresh every 1	3



10 Connection with the management system

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

LED State: Quadruple blinking orange (0.5 sec. on/0.5 sec. off, 3 sec. rest)

The device will be allocated a serving FeMS 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 FeMS and request configuration information.

Figure 20. Connection with Managem	nent System
ANTO GPS 1 PPS	O STS RESET B/H LMT PWR
veri <u>zon</u> wireless	🚫 🖄 Sign Out 🛓
Home Connected Devices Settings  About	About Item 8 A letts     GP B     Performance     Support       This page will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 seconds       Image will refresh every 15 seconds     Image will refresh every 15 seconds     Image will refresh every 15 sec



**11** Software update download in progress

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

LED State: Quadruple blinking orange (0.5 sec. on/0.5 sec. off, 3 sec. rest)

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.

Figure 21. Software Update		
ANT D GPS 1 PPS	OM STS RESET B/H LMT PWR	ANT 1
verizon wireless	$\otimes$	Sign Out 🔒
Home Connected Devices Settings  About	About Status & Alerts OPS Performance Support This page will refresh every 15 seconds Status & Alerts Status Bislow This page will refresh every 15 seconds Status & Alerts Status Bislow Description of the Status Assistance Server Not Reschable Na Reachable Status Bislow	3



Z

#### **12** Configuration in progress

Network Extender State: The device is assigned a FeMS and may have received new software. It will need to provide OTAR results before receiving configuration parameters.

LED State: Quadruple blinking orange (0.5 sec. on/0.5 sec. off, 3 sec. rest)

Figure 22. Configuration in Progress		
ANT 0	OM STS RESET B/H LMT PWR	ANT 1
verizon wireless	$\otimes$	🎽 Sign Out 🛓
<ul> <li>Home</li> <li>Connected Devices</li> <li>Settings</li> <li>About</li> </ul>	About Status & Alerts OPS Performance Support This page will refresh every 15 seconds Model of the second secon	3

If the OTAR process returns no results, the FeMS will then provide configuration solely based on the GPS location.



Z

13 Operational status

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

LED State: Fast blinking green (0.5 sec. on/0.5 sec. off)

The device can also be in-service with an alternating red and green LED color, indicating an alarm condition. Refer to the Troubleshooting chapter for more information on alarm codes.

Figure 23. Operational Status		
ANT 0	O STS RESET B/H LMT PWR	ANT 1
verizon wireless	0	🖄 Sign Out 🛔
Home Connected Devices Settings  About	About Status & Alerts OPS Performance Support This page will refresh every 15 seconds Meriod Status Status Meriod Status Status Meriod Status Status Meriod Status Status System Status In service + System Status History	3

# Chapter 3 Network Extender Admin Website (Local)

The Network Extender is designed to connect and auto configure without user intervention. This section contains detailed information regarding the Network Extender Admin Website (Local) to view the device status and make changes.

There are two ways to access the Network Extender Local Admin Website. Connect a computer directly to the Network Extender via the LMT port or connect a computer via a router on the same subnet as the Network Extender. In order to connect your computer via the Network Extender's LMT Port, you will need to change the computer's LAN IPv4 TCIP settings to be in the same subnet as the Network Extender unit's LMT Port fixed IP address (192.168.32.27).

- 1 In Windows, click **Control Panel** on the **Start** menu.
- 2 Click Network and Sharing Center.

Control Panel + All	Control Panel Items 🕨			<ul> <li>✓</li> <li>✓</li></ul>
Adjust your computer's setting	gs			View by: Small icons 👻
🏲 Action Center	C Administrative Tools	🛃 AutoPlay	🐌 Backup and Restore	Re BitLocker Drive Encryption
Color Management	Credential Manager	😬 Date and Time	🕢 Default Programs	📑 Desktop Gadgets
🚔 Device Manager	Devices and Printers	Display	Sease of Access Center	📕 Flash Player (32-bit)
Folder Options	K Fonts	🔠 Getting Started	RomeGroup	🚑 Indexing Options
Thtel® PROSet/Wireless Tools	🔁 Internet Options	<u>ع) اعبرہ (22 bit)</u>	Expoard (	🖾 Location and Other Sensors
Mail (32-bit)	Mouse	Network and Sharing Center	Rotification Area Icons	Performance Information and Tools
Personalization	Phone and Modem	Power Options	Program Updates (32-bit)	Programs and Features
🗃 Realtek HD Audio Manager	P Recovery	🔗 Region and Language	🐻 RemoteApp and Desktop Connections	SAP GUI Configuration
Nound	Speech Recognition	Sync Center	🕎 System	Taskbar and Start Menu
Troubleshooting	C TruePrint	& User Accounts	📑 Windows CardSpace	Windows Defender
P Windows Firewall	Windows Mobility Center	Windows Update		



**3** Click the local area connection icon that represents your Ethernet connection.

Conn	rking S lect using Intel(R)	naring :: 82579LM (	Gigabit Netv	vork Conne	ection #2
This	connectio	on uses the	following it	ems:	Configure
$\mathbf{X}$	Client Dete QoS File a Inten Inten Link- Link-	ministic Ne Packet Sc nd Printer het Protoco Layer Topo Layer Topo	etwork Enha heduler Sharing for I of Version 6 of Version 4 of Ogy Discov	s ncer Microsoft N (TCP/IPv6) (TCP/IPv4) reny Mappe reny Respon	etworks r I/O Driver nder
	Install		Uninsta		Properties
De	scription ansmissio de area n	n Control F etwork pro	Protocol/Inte tocol that pr	ernet Protoc ovides con	col. The default
Tr wi ac	ross dive	rse intercoi	Inected net	in childe.	

4 Configure the TCP/IPv4 settings to the following.

Internet Protocol Version 4 (TCP/IPv4)	Properties ? X
General	
You can get IP settings assigned autor this capability. Otherwise, you need to for the appropriate IP settings.	matically if your network supports o ask your network administrator
Obtain an IP address automatica	lly
• Use the following IP address:	
IP address:	192 . 168 . 32 . 28
Subnet mask:	255.255.255.0
Default gateway:	192 . 168 . 32 . 27
<ul> <li>Obtain DNS server address autor</li> </ul>	natically
Ouse the following DNS server add	dresses:
Preferred DNS server:	192 . 168 . 32 . 27
Alternate DNS server:	
Validate settings upon exit	Advanced
	OK Cancel

- **5** Open Internet Explorer and enter http://192.168.32.27 into the address bar.
- **6** Click **Continue** and accept the Self Signed Certificate to launch the Network Extender Admin Webpage.



### **Home Page**

The Welcome page can be reached by the Network Extender unit's IP address (assigned from the DHCP server via the Backhaul (B/H) port or the LMT port that has an initial fixed IP address (http://192.168.32.27) subnet mask (255.255.255.0). Sign in via either method using the respective IP Address.

Sign in using the default admin password: **enterpriseFemtØ** 

Figure 24.	Network Extender	Login Pop-Up	Window

veri <u>zon</u> wireless				🚫 🏄 Sign In 🛔	
	We	elcome to your 4G LTE Net	work Extender for Enterp	Sign In To Your Network Extender Admin Password	
Home Connected Devices Connected Devices Connected Devices Connected Devices Connected Devices Connected Devices Connected Devices				Sign In Need help?	
	Wii IP /	reless Number: Address:	0 192.168.1.166	0	
Ma	nage My Network Extender ange Network Extender Admin Password	My Account & Tools My Verizon Wireless	Help & Sup Attend a wirr Community I Device Supp	sort eless workshop Forums ort Page and User Guide	

?

Each page has a question mark icon that will display a help screen for the related page.



The Welcome page displays basic device information for operation such as the GPS fix location, device name, serial number and IP address.

Figure 25. Network Extender Welcome Page

veri <u>zon</u> wireloss	🚫 🍰 Sign Out 🛓			
Home Connected Devices Settings About	Welcome to your 4G LTE	Network Exter	nder for Enterprise	
	Wireless Number:	0		3
	Serial Number:	S61D937616		
	Network Extender Name:	VzWA079		
	Software Version:	1.2.0.01		
	IP Address:	0.0.0.0		
	Location:	Latitude: N I Longitude: W	032:59:10.000 096:42:05.000	
— — — Manage My Network Extender	My Account & Tools		Help & Support	
Change Network Extender Admin Passwor	d My Verizon Wireless		Attend a wireless wo Community Forums Device Support Pag	urkshop e and User Guide



There are four (4) status indication combinations possible in the header as shown in the following figure.

#### Figure 26. Header Status States



Figure 27. Mouse-over GPS Fix

	Mouse-over	
ľ	GPE: Acquisition in Progress	
	HGE 🖄 Syn Oxta	

The 4G icon indicates network service while the location icon indicates a GPS fix. Moving the cursor over the GPS icon will provide the status of whether the device is in GPS acquisition mode or a GPS fix is acquired.



### **Connected Devices**

The connected devices page shows the current connected users as well as the history of the Network Extender capacity utilization over a period of 24 hours. The value reported is the peak per hour.

Figure 28. Network Extender Connected Devices Page

Verizonwialess	0	Sign Out 🛔
Kerizenviewes	Dele-Hour         O         Conneoled Users:       0         Peak Conneoled Users:       0         Vertifield Refrech:       0 (es of 17:35:39 Central Deylight Time)         (within last 24 hours):       0%         Last Data Refrech:       12:36:35 Central Deylight Time)         Capacity Users:       0%         Last Data Refrech:       12:36:35 Central Deylight Time)         Official Refrech:       12:36:35 Central Deylight Time)         Official Refrech:       12:36:35 Central Deylight Time)         Official Refrech:       12:36:36 Central Deylight Time)         Official Refrech:       12:36:36 Central Deylight Time)         Openative exceeds the 70% threshold consistently, an additional Network Extender. If the capacity exceeds the 70% threshold consistently, an additional Network Extender. If the capacity exceeds the 70% threshold consistently, an additional Network Extender. If the capacity exceeds the 70% threshold consistently, an additional Network Extender. If the capacity exceeds the 70% threshold consistently, an additional Network extender. If the capacity exceeds the 70% threshold consistently.         Openative exceeds the 70% threshold consistently.       Descender         Openative exceeds the 70% threshold consistently.       Descender         Openative exceeds the 70% threshold consistently.       Descender         Openative exceeds the 70% threshold consistently.       Desc	



### Settings

The Network Extender Network Settings tab allows the setting of the DNS information, default gateway, IP address and subnet mask. The backhaul limit and MTU size can also be set here. Information regarding device setting is in the Configuring Your Device chapter.

Figure 29. Network Extender Network Settings Tab

veri <u>zon</u> wireless			🚫 🏄 Sign Out 🛔
ی ه چ و	Home Connected Devices Settings	Network         Advanced         Change Admin Pass           DHCP         Image: Constraint of the second and	<b>word</b> 44 0
		Backhaul Limit (1 ~ 1000 Mbps) MTU Size (1280 ~ 2000 bytes)	)
		Primary Time Server IP Address Secondary Time Server IP Address 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0	ldress 0



The Network Extender Advanced Settings tab allows setting the device output power. This tab provides information on how the device is positioned with other Network Extenders in the network as well as Verizon cell sites.



veri <u>zon</u> wireless				$\otimes$	🎽 Sign Out 🛔
		Settings			
। व ्य	Home Connected Devices Settings About	Network A A A A A A A A A A A A A A A A A A A	Advanced Change Adr Physical Cell ID (PCI 502	nin Password	0
		Transmit Power (0 ~ 100 %)	100  fresh Save Cancel		
		Neighboring Cells Detected	ell Tower ID + Type +	RSRP (dBm) ≎	
		Last Data Refresh: 12:33:02 Centre	ral Daylight Time		



The Network Extender Change Password tab allows the user to change the Local Admin Website password for the device. In the event of a lost password, pressing the RESET button for 10 seconds will reset the device to factory default settings.

Figure 31. Network Extender Change Password Tab

veri <u>zon</u> wireless					🚫 嬼 Sign Out 🛔
	A Home	Settings			
	Connected Devices	Network	Advanced	Change Admin Password	
	Settings	Current Admin Password			?
	(i) About	New Admin Password			
		Confirm New Password			
		Security Question	Select a question	×	
		Security Answer			
			Save Changes		



### About

The Status and Alerts tab on the About page shows the operational status and alerts that can be used for diagnostics and troubleshooting.

Figure 32. Network Extender Status and Alerts Tab

verizon wireless		🚫 🖄 Sign Out 🛓
	Home Connected Devices Settings About	About Status & Alerts GPS Performance Support This page will refresh every 15 seconds ATTO OF THE Seconds THE Second S
		Not Reachable N/A N/A Not Reachable Date Time Error Description Troubleshooting
		M2/13         Backhaul Port Down         There is no cable         Please check the cable connecting the effemts by your internet connection.           GMT         Common the backhaul port         Ensure the port LLDs are flashing showing the backhaul Port         Ensure the port is functional.
		N2/13     MME     The effents     This error can accur because of connectivity between the effents and the connectivity between the effents and the reternet. Reside check that you are ennected to your internet gateway and



The GPS tab on the About page displays the GPS satellite IDs and receive single strength. If GPS location information is lost, the unit can operate in the holdover state using the Network Extender's internal clock rather than GPS timing. The device can operate in the holdover state for approximately 24 hours.

Figure	33.	GPS	Tab
i igui c		0, 0	1 un

verizon wireless				🚫 🖄 Sign Out 🛔
유 Horr 로 Con	ne Status & Al nected Devices incs This page will refresh	erts GPS every 15 seconds	Performance	Support
(i) Abo	ut GPS Status:	Locat	ion Acquired	
	GPS Satellite ID 2 5 12 10 25 6 17 24	GPS Signal Quality (dB) 28 24 21 21 21 21 20 20 0 0	Description Fair Fair Fair Fair Fair Fair Weak Weak	92 32 Fair 10 Weak
	9 Last Data Refresh: 12	0 :27:26 Central Daylight Time	Weak	



The Performance tab on the About page displays bandwidth utilization charts. There are two graphs for bandwidth utilization:

- The first graph is a 15 minute trend, updated every 30 seconds. This graph starts populating when the user navigates to this screen and stays on the screen. It will start over if the user navigates to another screen and comes back to this page. Every data point on the graph represents the peak value for the 30 second interval.
- The second graph is an eight hour trend, updated every hour. This graph will maintain the history and the user does not need to stay on this screen. Every data point represents the peak value for that hour.

🚫 🍰 🏻 Sign Out 🛔 Home Status & Alerts OP8 Performance 8upport Connected Devices This page will refresh every 30 seconds Settings The f ing charts provide real-time Backhaul Utilization data About Bandwidth Utilization - 15 minute trend 70 60 60 10 10 10 30 20 10 0 12.43.00 ur: Minute: Sec Down Uplink Bandwidth Utilization - 8 hour trend 70 80 60 å ₽ 40 20 20 10 0 20141030-1 Date-Hour C Downlink Uplink

#### Figure 34. Performance Tab



The Support tab on the About page contains the contact information for customer support.

Eiguro	25	Sun	nort	Tab
rigure	55.	Sup	ροιι	Iau

verizon wireless				🚫 🖄 Sign Out 🛔
		About		
	Home	Status & Alerts GPS	Performance	Support
	Settings	Customer Support Phone: Customer Support Email:	800-922-0204 support@verizonwireless.com	
		Community Forums Device Support Page and User Guide Attend a wireless workshop		

# Chapter 4 Configuring Your Device

The Network Extender is designed to connect and automatically configure with minimal user intervention, though in some cases depending on the firewall settings, some settings may need to be adjusted on the local LAN. This section contains detailed information regarding the firewall settings that are applicable for network administrators.

#### Table 1. Destination Ports

Source	Destination	Protocol	Destination Port	Notes
Network Extender	GPS Assistance Server	UDP	52428	
Network Extender	DNS Server	UDP/TCP	53	
Network Extender	VzW SeGW	UDP	500/4500	More than one port may be used for multiple device installation
Network Extender	VzW SeGW	ESP/50	NA	When NAT/PAT is not present
VzW SeGW	Network Extender	ESP/50	NA	When NAT/PAT is not present

#### Table 2. 1588 Ports(only needed with 1588 server)

Protocol	Port	Description
UDP	319	1588 Server communication: Event message
UDP	320	1588 Server communication: General Message

The following table lists the IP addresses of each of the network elements required to include in the firewall.

#### Table 3. Firewall Settings

Network Element	IP Address	Fully Qualified Domain Name (FQDN)
GPS Server	209.210.15.73 216.221.129.99	gps.vzwfemto.com
Security Gateway	Branchburg, NJ: 69.78.145.119, 69.78.145.122 Duff, OH: 69.78.34.151, 69.78.34.154 Southlake, TX:	sg-4g.vzwfemto.com



	69.78.82.87, 69.78.82.90 Colorado Springs, CO: 69.78.226.55, 69.78.226.58	
Security Gateway	Branchburg, NJ: 69.78.145.119, 69.78.145.122 Duff, OH: 69.78.34.151, 69.78.34.154 Southlake, TX: 69.78.82.87, 69.78.82.90 Colorado Springs, CO: 69.78.226.55, 69.78.226.58	sg-4gbb.vzwfemto.com sg-4gdu.vzwfemto.com sg-4gsl.vzwfemto.com sg-4gcs.vzwfemto.com

# Chapter 5 Troubleshooting

This chapter contains potential reasons for different STS LED statuses.

### Solid Red LED

Reasons for a solid red LED:

- A hardware reset has occurred and the system is rebooting.
- If LED remains solid red for more than a few minutes, then there may be a hardware failure, such as the power supply is unstable or other hardware issues.

### **Alternating Orange and Red LED**

Reasons for an alternating orange and red LED:

• The unit has completed the startup sequence (bootup), but no Ethernet connection is detected in the backhaul port. See the alarm condition ALARM {PORT\_DOWN}.

### **Blinking Red LED**

A blinking red LED indicates a startup failure state. Reasons for a blinking red LED:

- 1 blink The device failed to set up a VPN tunnel with the initial SeGW."
- 2 blinks The device failed to set up a VPN tunnel with the initial SeGW with an explicit "Authentication Failure."
- 3 blinks GPS acquisition failure
- 4 blinks Configuration failure

### **Blinking Orange LED**

A blinking orange LED indicates an "in progress" state. Reasons for a blinking orange LED:



- 1 blink DNS resolutions and VPN setup are in progress
- 3 blinks GPS acquisition in progress
- 4 blinks Configuration download and OTAR in progress

### **Blinking Alternating Red and Green LED**

A blinking alternating red and green LED indicates a post-operational critical issue. Reason for a blinking alternating red and green LED:

See Table 4. Critical Alarms and Table 5. Minor Alarms for next steps.

### Alarms

The following table lists critical alarms that will halt the functioning of the Network Extender.

Error	Description	Next Steps
CLOCK_FAIL	The clock is abnormal.	There is a failure preventing your device from functioning correctly. If you are using GPS, please ensure that the GPS antenna is installed in a location near the window. If you are not able to receive GPS information after repositioning the antenna, you may need to purchase and install an external outdoor antenna. Please check the Network Extender GPS tab on the About page displaying the
		GPS satellite IDs and receive signal strength.
		If you are using IEEE1588, please ensure that the IEEE1588v2 server is powered on and accessible, and check your firewall settings as defined in this user guide.
POWER_FAIL	The power used within the board is unstable or abnormal.	Your power supply is unstable. Please check that your power supply is stable.

#### Table 4. Critical Alarms



Error	Description	Next Steps
FUNCTION_FAIL	GPSR module failure due to a self-test failure, power failure, Electronic Frequency Control (EPC) exceeding normal operation range, or OCXO/TCXO failure.	The device is attempting to receive GPS information. If the issue persists for more than 12 hours, please ensure that the GPS antenna is installed in a location near the window. If you are not able to receive GPS information after repositioning the antenna, you may need to purchase and
		install an outdoor GPS antenna. Please see the GPS outdoor antenna section of the installation guide.
LOCKING_FAIL	No GPS signal can be received.	The device is not receiving GPS information. Please ensure that the GPS antenna is installed in a location near the window.
		If you are not able to receive GPS information after repositioning the antenna, you may need to purchase and install an external outdoor antenna. Please see the GPS outdoor antenna section of the installation guide.
TOD_MSG_MISSED	The TOD message is not received from the GPSR.	There is a failure preventing your device from functioning correctly. Please verify if the GPS antenna is installed properly. Please contact Verizon Wireless Customer Care if the issue is not resolved.
NO_CURRENT_PTP_MASTER	The 1588 clock slave module fails to get Grand Master Information.	The device cannot contact the IEEE1588v2 server. Please ensure that the IEEE1588v2 server is powered on and accessible. Check your firewall settings as defined in this user guide.
NO_PTP_SIGNAL	The SPLL state of 1588 clock module is abnormal.	There is a failure preventing your device from functioning correctly. This is a hardware failure. Please contact Verizon Wireless Customer Care.
CLOCK_DEV_NOT_INIT	Failure to initialize the 1588 clock module, such as clock chip configuration and 1588 PTP parameter setup.	There is a failure with your IEEE1588v2 configuration. Please check your settings and ensure they are correct.
OVER_POWER	RU output power has exceeded the normal range.	There is a failure preventing your device from functioning correctly. Please contact Verizon Wireless Customer Care.
SERVICE_OFF	Service cannot be provided due to abnormal service condition.	There is a failure preventing your device from functioning correctly or your device has been locked. If the problem persists, please contact Verizon Wireless Customer Care.
MME_COMMUNICATION_FAIL	The Network Extender cannot communicate with backend servers.	There is a communication failure preventing your device from functioning correctly. If the problem persists, please contact Verizon Wireless Customer Care.



Error	Description	Next Steps
TEMPERATURE_HIGH	The temperature has exceeded a threshold.	Your device is overheating. Please locate the unit in an area with an ambient temperature between 0-50 degrees Celsius in-line with the installation guide.



The following table lists minor alarms. The Network Extender will continue to function, but it may function with reduced performance.

#### Table 5. Minor Alarms

Error	Description	Next Step
OVERLOAD	The average CPU load has exceeded a threshold.	There is a temporary CPU load alert, but your device is still functioning correctly. This alert should clear itself. If the alert persists for a long time, please check the number of users on the Connected Devices page and see the capacity section of the installation guide.
DISK_FULL	Disk usage has exceeded a threshold.	There is a temporary disk usage alert, but your device is still functioning correctly. This alert should clear itself. If the alert persists, please check the number of users on the Connected Devices page and see the capacity section of the installation guide.
MEMORY_FULL	Memory usage has exceeded a threshold.	There is a temporary memory usage alert, but your device is still functioning correctly. This alert should clear itself. If the alert persists, please check the number of users on the Connected Devices page and see the capacity section of the installation guide.
PROCESS_DOWN	An application block is deactivated/terminated.	There is a temporary process alert, but your device is still functioning correctly. No action is needed and the alert should clear itself.
ANTENNA_FAIL	The feeding current to the antenna side is open/short or the antenna cable is dismounted.	Your RF antennas may have problems. Please ensure that your antennas, and any extension cables, are correctly installed as described in the installation guide.
TOD_MSG_MISSED	The TOD message is not received from the PTPM.	There is a failure preventing your device from functioning correctly.
DIGITAL_INPUT_HIGH	Digital input power level is higher than a threshold.	There is an RF alert, but your device is still functioning correctly. No action is needed.
DIGITAL_INPUT_LOW	Digital input power level is lower than a threshold.	There is an RF alert, but your device is still functioning correctly. No action is needed.
VSWR_FAIL	Antenna has a fault or antenna cable is not correctly connected.	Your antenna system is not functioning correctly. Please ensure that your antennas, and any extension cables, are correctly installed as described in the user guide. If your issue persists, please contact Verizon Wireless Customer Care.
RX_PATH_FAIL	RSSI level is below a threshold.	There is a RF alert, but your device is still functioning correctly. No action is needed.



Error	Description	Next Step
NTP_UPDATE_ERROR	The NTP server configuration is not correct or time renewal fails because of NTP server disconnection.	There is a TOD failure alert, but your device is still functioning correctly. No action is needed.
COVER_OPEN	Cover is open.	Tamper detection has been activated. Sensors in the device have detected unauthorized physical access. This may be due to physical damage or removal of the device housing. Verizon is aware of your issue. Please contact Verizon Wireless Customer Care.

# **Appendix Acronyms**

A-GPS	Assisted GPS
B/H	Backhaul
ANSI	American National Standards Institute
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
ESP	Enhanced Security Payload Protocol
FDR	Femtocell Device Register
FeMS	Femto Management System
FQDNs	Fully Qualified Domain Names
GPS	Global Positioning System
HTTP	HyperText Transport Protocol
HTTPS	HTTP Secure (HTTP protected by SSL/TLS)
ID	Identifier
IP	Internet Protocol
IPSEC	Internet Protocol Security - System of Protocols
LAN	Local Area Network
MTU	Maximum Transmission Unit
NAT	Network Address Translator
NE	Network Extender
OTAR	Over The Air Registration
POE	Power Over Ethernet
SeGW	Security Gateway
SSL	Secure Socket Layer
TCP	Transmission Control Protocol
TLS	Transport Layer Security - System of Protocols
UDP	User Datagram Protocol



Verizon 4G LTE Network Extender for Enterprise User Guide

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