ALEOS 4.16.0

Software Configuration User Guide for AirLink LX40

SIERRA WIRELESS®

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1: Introduction

Note: This user guide is intended for the AirLink LX40. If you have a different AirLink router, refer to the ALEOS Software Configuration User Guide for your router.

Overview

ACEmanager™ is the free, web-based utility used to manage and configure AirLink® routers. It is a web application integrated in the ALEOS™ software that runs on the AirLink LX40. AirLink Embedded Operating System (ALEOS) is purpose-built to maintain a wireless connection and to configure the LX40 to the needs of the system. ACEmanager provides comprehensive configuration, monitoring, and control functionality to all AirLink routers.

ACEmanager enables you to:

- Log in and configure parameters
- Adjust network settings
- Change security settings
- Update events reporting and control outputs
- Update ALEOS software and radio module firmware
- Copy configuration settings to other AirLink LX40s

Since ACEmanager can be accessed remotely over-the-air as well as locally, the many features of ALEOS can be managed from any location.

An ALEOS configuration template can be created using ACEmanager, after a single device is configured and installed, to program other AirLink LX40s with the same configuration values. This enables quick, accurate deployment of large pools of devices.

Sierra Wireless AirLink Products

For more information on specific AirLink products, go to www.sierrawireless.com

About Documentation

Each chapter in the ALEOS Configuration User Guide describes a section (a tab in the user interface) of ACEmanager.

Chapters in this user guide explain:

- Parameter descriptions in ACEmanager
- Relevant configuration details
- User scenarios for certain sections in the guide.

Tools and Reference Documents

Document	Description
AirLink LX40 Hardware User Guide	This hardware document describes how to: • Install the AirLink LX40 • Connect the radio antennas • Connect a notebook computer and other input/output (I/O) devices • Interpret the LEDs and indicators on the AirLink LX40.
ALMS User Guide	AirLink Management Service features online help, videos and “How-To” pages that explain how to use ALMS for the remote management of Sierra Wireless AirLink routers.

Cryptographic Algorithms Contained in AirLink Products

- Silex SX-SDMAC WiFi Encryption: RC4 128 bits, AES 128 bits
  - Security 128-bits: WEP, WPA, WPA2, WPA2 Enterprise, EAP-PEAP, EAP-TLS
- NXP MCIMX6X1CVK08AC: SHA-256, 2048-bit RSA key (NXP HW security not used, only OpenSSL or Linux kernel crypo module)

Standards

- TLS 1.2 and 1.3 (TLS 1.0 and TLS 1.1 are deprecated in ALEOS 4.16.0)
- Wi-Fi: Dual Band 2.4/5GHz Wi-Fi 802.11 b/g/n/ac (Wave2 Client Mode), WPA2 Enterprise
- Bluetooth hardware, no ALEOS software support
- 3G WCDMA/HSPA+
- 2G GSM/GPRS
- 4G LTE (Cat-4 (WP7610, WP7607, WP7609), Cat-M1/NB1 (WP7702))

Software Libraries

- OPENSSL-1.0_VERSION=1.0.2p
- OPENSSL-1.1_VERSION=1.1.1d
- DROPBEAR_VERSION=2017.75
- OPENVPN_VERSION=2.4.8
- Linux kernel 4.9.88

ALEOS does not provide any programming interfaces that can be used to gain access to the cryptographic functionality on the device.

2: Gateway Configuration

To access ACEmanager:

1. Insert the SIM card, if applicable. Refer to the Hardware User Guide for your router for details.
2. Power on the AirLink router.
3. Launch your browser and enter the IP address and port number:
   https://192.168.13.31:9443
   - For devices upgraded to ALEOS 4.14.0 or previous: http://192.168.13.31:9191

Note: When you first log in, your browser may display warnings related to the self-signed certificate. Please accept any warnings and continue.

ACEmanager is supported on the latest versions of Firefox and Microsoft® Edge.

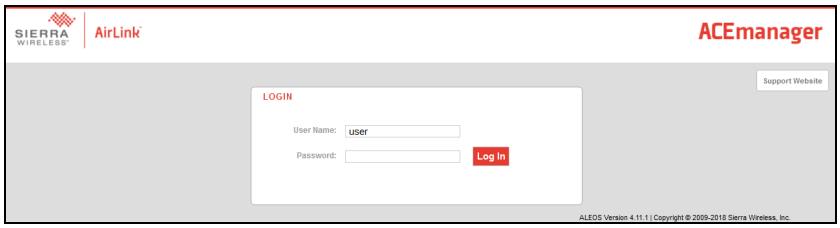


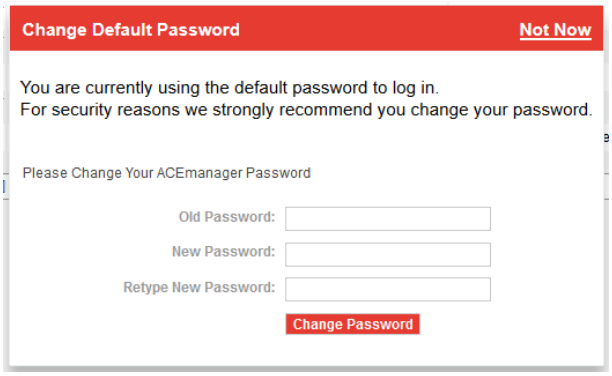
Figure 2-1: ACEmanager: Main Login screen

4. Log in:
   - User Name: “user” (entered by default)
   - Default Password:
     - For devices that support unique passwords, the default password is printed on the device label.
     - For other devices, the default password is 12345.

Note: ACEmanager sessions, by default, time out in 15 minutes. If there is no activity for this idle timeout period, you are redirected to the Login screen. To change the session idle timeout period, see Session Idle Timeout (minutes) on page 241.

Note: For system security, ensure that you change the default ACEmanager password. The new password must be at least 8 characters long. For more information, see Change Password on page 329.

If your device is using a non-unique default password to log in to ACEmanager, a message to change the default password is displayed.



Note: By clicking "Not Now", you may continue without changing the default password; however, you must accept the risk of bypassing this critical and strongly recommended security measure.

After your initial log in to ACEmanager, you have the option of displaying the router status parameters on subsequent Login screens.

1. In ACEmanager, go to Services > Device Status Screen.
2. In the Device Status on Login Screen field, select Enable. (For details, see Device Status Screen on page 292.)

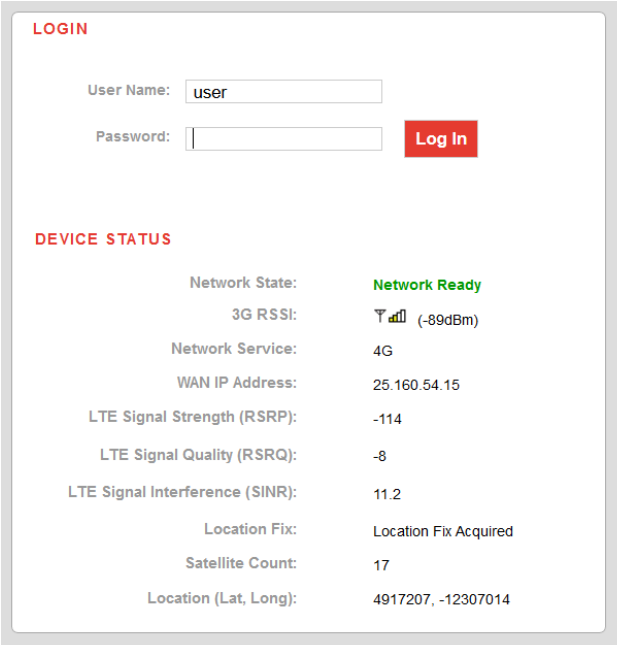


Figure 2-2: ACEmanager: Main Login screen with Location and Device Status enabled.

If you have Location fields selected on the Device Status screen, but Location Service is disabled, the router Login screen will show Location Service Disabled.

Recovery Mode

In the unlikely event that ALEOS becomes corrupted, or if the LX40 is unresponsive to ACEmanager input and AT commands, you can manually put the router into recovery mode.

Recovery mode enables you to update the ALEOS software and return the router to working order.

Note: ALEOS software updates done in Recovery mode do not preserve any custom settings such as cellular settings, AAF applications, etc.

To enter Recovery mode:

1. Use an Ethernet cable to connect the router to your computer. (Recovery mode is not supported on USBnet.)
2. Power on the AirLink router.
3. On the router, press the Reset button for more than 20 seconds. (Release the button when the Power LED flashes amber.)
4. Launch your browser and enter the IP address and port number http://192.168.13.31:9191

   Note: The HTTPS log-in feature described on page 16 does not apply to Recovery Mode.

   The following screen appears:

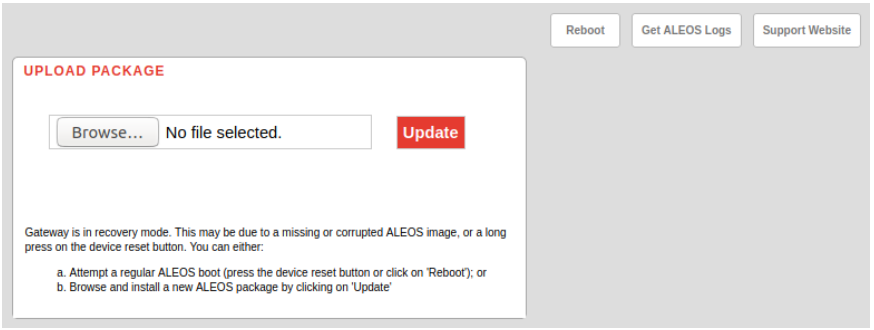
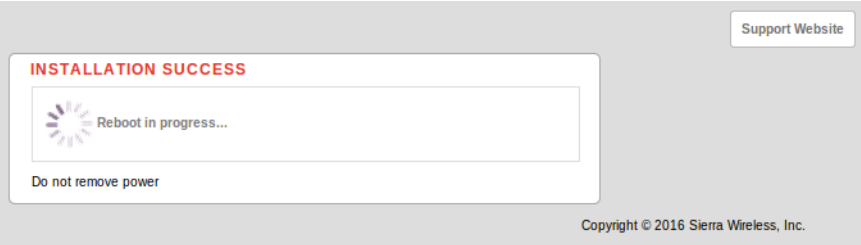


Figure 2-3: Recovery screen

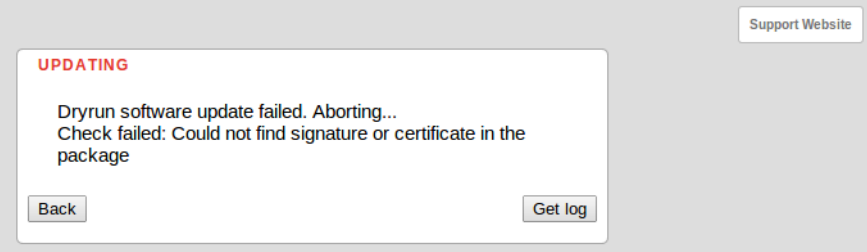
5. (Optional) Click Get ALEOS Logs to download a log file for later evaluation.
6. Click Browse... and navigate to the appropriate ALEOS software version for your router.
7. Click Update.

   The screen lets you know that the update was successful and automatically reboots the router.



When the reboot is complete, the router exits Recovery mode, and the ACEmanager Login screen appears.

If you select an inappropriate version of ALEOS, an error message, such as the following appears.



If this happens, click the Log button and save the log file for review by Sierra Wireless or your authorized reseller.

Click Back to return to the previous screen to select the correct version of ALEOS.

If you have inadvertently entered Recovery mode, you can exit it by doing one of the following:

- Press the reset button on the router to reboot it.
- Click the Reboot button on the Recovery screen.
- Wait 10 minutes. If no action is taken within 10 minutes of the device entering Recovery mode (for example, if the Recovery screen has not been loaded by the web browser), it automatically reboots and exits Recovery mode.

Toolbar

The buttons on the ACEmanager toolbar are:

- Software and Firmware: Updates the ALEOS software and the radio module firmware
- Template:
  - Download and save a configuration as a template
  - Upload a saved template to apply settings
- Reboot: Reboots the router
- Refresh All: Refreshes all ACEmanager pages
- Help
- Logout

Configuring your AirLink Router

There are three options for configuring the AirLink router:

- Use your browser-based ACEmanager (as detailed in this guide)

- Use a terminal emulator application (e.g., Tera Term, PuTTY, etc.) to enter AT commands for many of the configuration options.
- Use the cloud-based AirLink Management Service (see the Sierra Wireless website) application.

Saving a Custom Configuration as a Template

If you have a router configured to match your requirements, you can use ACEmanager to download and save that router's configuration as a template and then apply it to other Sierra Wireless AirLink routers.

Note: Sierra Wireless recommends that templates be created and applied to AirLink routers running the same version of ALEOS. If you apply a template created using an older version of ALEOS to a router running a newer version of ALEOS, settings for newly added features are not updated.

Note: Please note that the illustrations and browser behavior described below will vary depending on your browser and browser settings. You may need to enable pop-ups in your browser to download and save files.

To download and save a custom configuration as a template:

1. Connect a laptop to the router with the configuration you want to save as a template.
2. In ACEmanager, click the Template button on the toolbar.

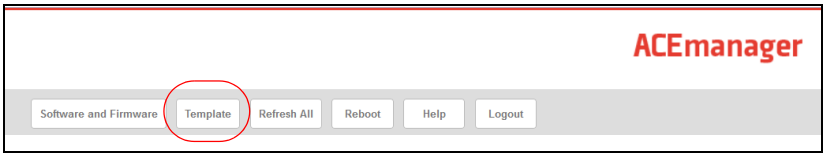


Figure 2-4: ACEmanager: Template button

The following window appears:

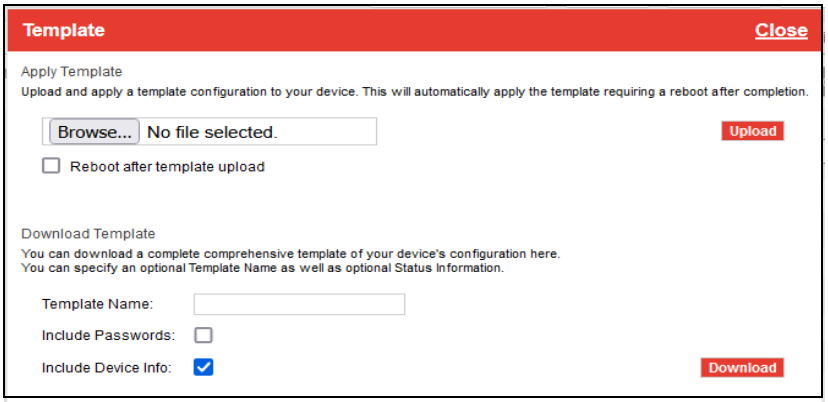


Figure 2-5: ACEmanager: Template window

Use the bottom half of the window to download and save a template.

3. If desired, enter a Template Name. The file is saved using this name and a .xml file extension. Spaces and special characters are not supported, and, if entered, are deleted from the file name.

   If no Template name is entered, the file is saved as SWIApplyTemplate.xml.

4. Choose whether or not to:

   - **Include Passwords**
     When Include Passwords is selected, passwords configured in ACEmanager (such as the email password, the SMS ALEOS Command password, the Serial PPP password, etc.) are shown in plain text in the template file. When the template is uploaded to a router, the passwords are included and replace any existing password configured on the router.
     If Include Passwords is not selected, password fields are not included in the template file, and existing passwords persist when the template is uploaded to a router.

Note: The ACEmanager login password is not included when you select the Include Passwords option.

   - **Include Device Info** (selected by default)
     When selected, the template file includes a “snap-shot” of the current Status tab information with the current settings. This could be useful for troubleshooting.

5. Click Download. The download status appears at the bottom of the window.

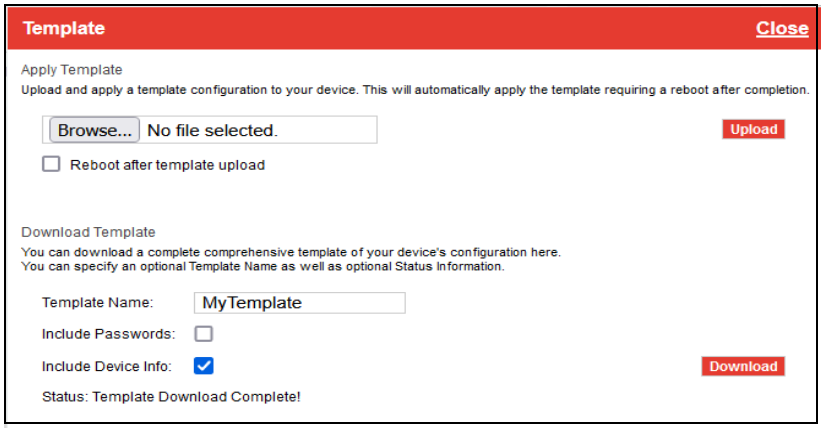


Figure 2-6: Download template complete

Once the download is complete, the following window opens (appearance will vary with the browser you're using):

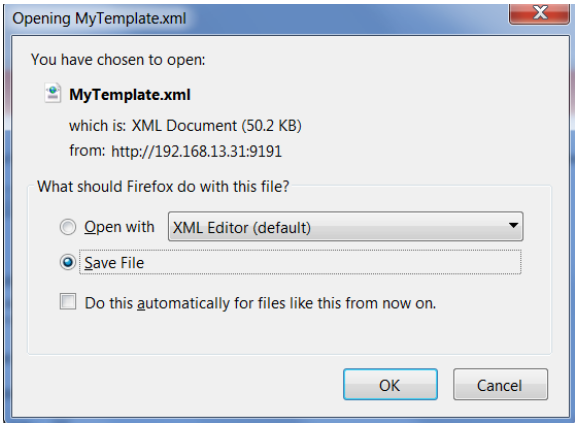


Figure 2-7: Open or Save the template file

6. In most cases, you will want to save the file to your computer for uploading to other AirLink routers, but you also have the option to open the file.
   - Select Save File and click OK—file is saved to your computer (by default to the Downloads folder). If you entered a template name, the file is saved using that name. Otherwise, it is saved under the default name, SWIApplyTemplate.xml.
   - Select Open and click OK—file opens in a text or XML editor as a human readable file. Use this option if you selected Include Device Info when you saved the file and want to view the device information (the text between the <devicestatus> and </devicestatus> tags is the snap-shot of the Device Info), or you want to compare this template with another template.

Warning: *Do not attempt to change settings directly in the template file. Changing settings in the template file could result in unexpected behavior in the AirLink router. Alter the template only if you are specifically directed to do so by your distributor or Sierra Wireless Technical Support.*

Tip: *If you want to compare a new template with the previous one, download and save the old template before applying the new one. You can use any 3rd party text comparison tool to check the differences between two templates.*

Applying a Template

Note: If you are using Internet Explorer 9 (no longer supported) to upload the template, see Templates on page 496 for instructions on configuring the browser's Internet options to allow the upload.

Note: Sierra Wireless recommends resetting the router to the factory default settings before applying the template.

Note: Please note that the illustrations and browser behavior described below will vary depending on your browser and browser settings.

To upload and apply a template to an AirLink router:

1. Connect the computer (where the template is saved) to the AirLink router you want to upload the template to, or connect to the router over the air.
2. Log in to ACEmanager, and go to Admin > Reset.
3. Select the Reset Mode:
   - Preserve Core Settings—Recommended if you are applying a template remotely using a remote ACEmanager connection (or ALMS). For a list of preserved settings, see Reset Configuration on page 340.
   - Reset All— Recommended if you are applying a template locally (i.e your computer is physically connected to the router).
4. Once the router reboots, log in to ACEmanager.
5. In ACEmanager, click the Template button on the toolbar.

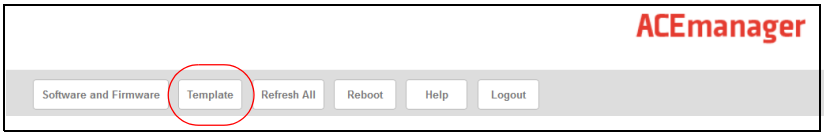


Figure 2-8: ACEmanager: Template button

The following window appears:

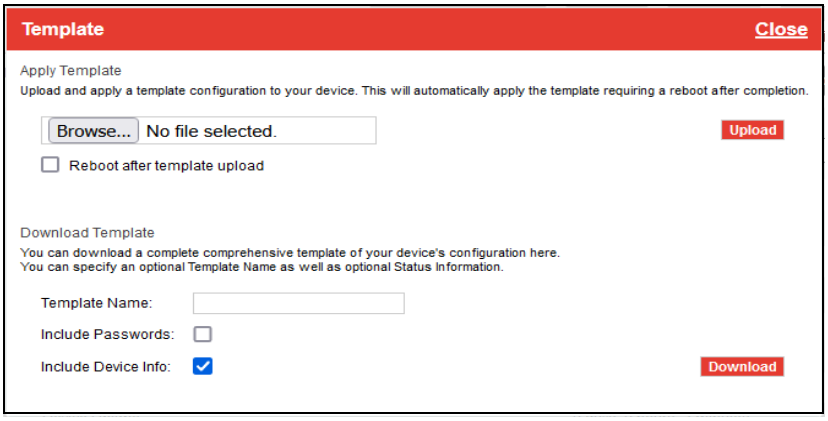


Figure 2-9: ACEmanager: Template window

Use the top half of the window to upload and apply a template to your AirLink router.

6. Click Browse... and navigate to the template you want to upload.
7. Click Open. The template file name appears beside the Browse... button.

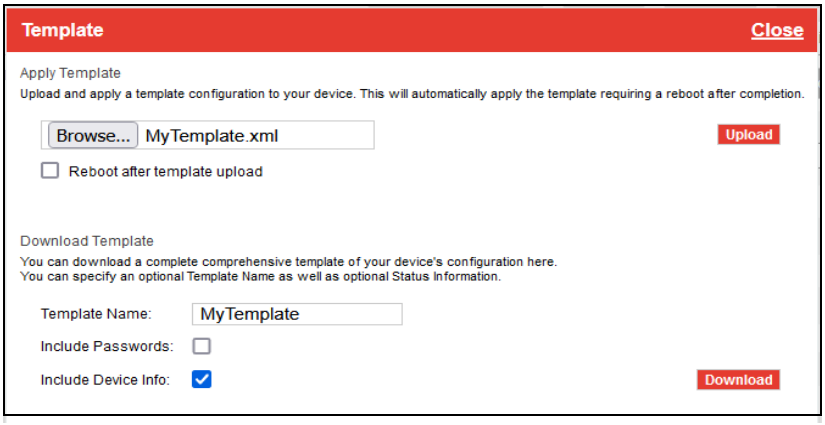


Figure 2-10: Apply Template file opened

8. Select Reboot after template upload to have the router reboot immediately after applying the template. Otherwise, you will need to reboot the router using the Reboot button in ACEmanager.
9. Click Upload.
10. When the upload is complete:
    - the router reboots if you've selected Reboot after template upload
    - click Close and reboot the router using the Reboot button.
11. To confirm that the new template has been applied or to find out which template is currently on a router, go to Status > About and check the ACEmanager Template Name field.

Note: The Template Name field shows the last template applied and does not indicate any configuration changes made since the last template was applied.

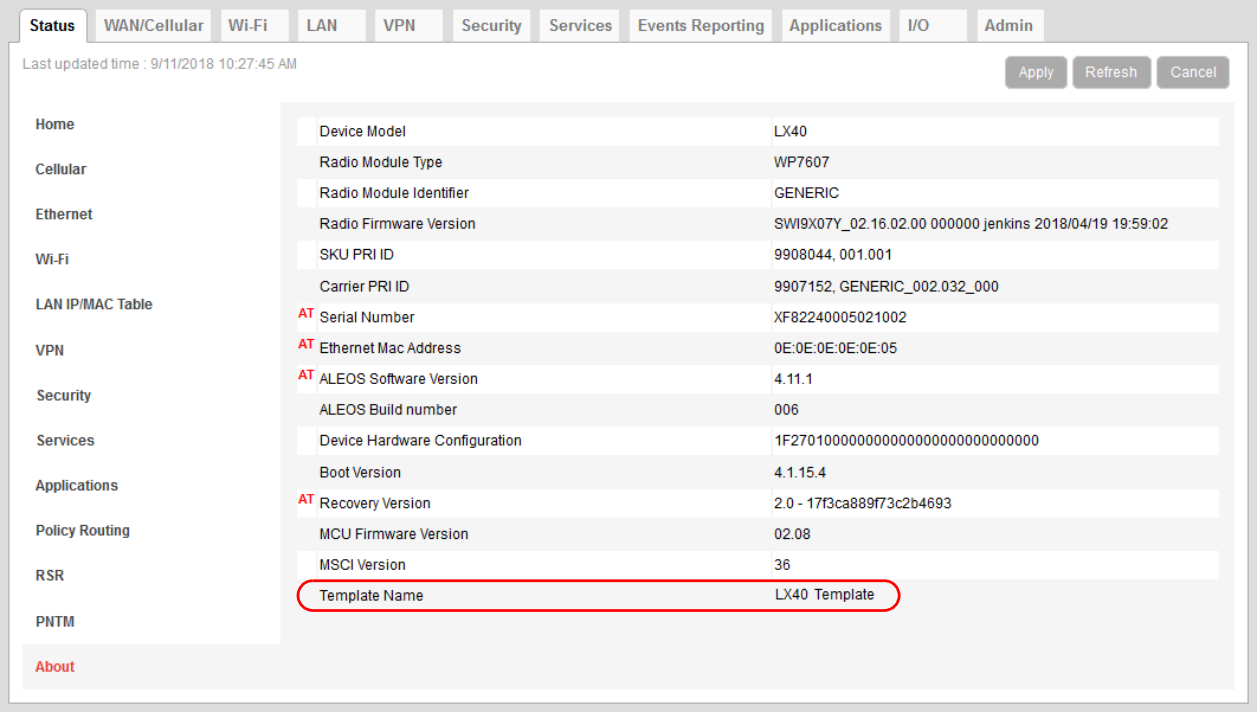


Figure 2-11: ACEmanager: Status > About

Note: If no template has been applied to the router since it was set or reset to the factory default settings, the template field is blank.

Update the ALEOS Software and Radio Module Firmware

To take advantage of new features available in the latest version of ALEOS, update the ALEOS software and radio module firmware on your AirLink routers.

You can use ACEmanager to update one router at a time or you can use AirLink Management Service (ALMS) to update one or multiple routers at the same time.

Important: *Sierra Wireless always recommends updating ALEOS to the latest version to take advantage of new features and security updates. If your application requires you to install an earlier version of ALEOS than your current version, please note that Sierra Wireless:*

- *does not recommend using any version prior to ALEOS 4.9.3.*
- *recommends that ALEOS devices be reset to factory defaults following any downgrade operation.*

Note: ALEOS software releases may not apply to all AirLink devices. Please ensure that the version you select is compatible with your device.

Note: If the update includes a radio module firmware update, the radio module firmware stored on the router is also automatically updated. If there is not enough room in the storage, the radio module firmware update fails, so you may need to remove one of the versions stored on the router to free up space. For more information, see Radio Module Firmware on page 354.

Important: ***When updating to ALEOS 4.16.0 or later, do not skip updating radio module firmware.*** *In ALEOS 4.16.0, the EM7511 automatic exclusion of B29 has been removed, and switching support for Rogers has been added.*

Software Downgrade Information

Note that downgrading ALEOS 4.15.2, ALEOS 4.15.3, and ALEOS 4.15.4 is prevented on newer devices because of hardware component substitutions are not supported on older versions of ALEOS. Refer to the following table for the details.

ALEOS Version	Availability	LX40/60	RV50	RV50X	RV55	MP70	Notes
4.15.0	Dec. 2021	✔	✔	✔	✔	✔	Feature release
4.15.1	Dec. 2021	✔					AT&T 3G sunset check
4.15.2	Jan. 2022		✔	✔	✔		• Radio module bootloader upgrade • Prevents installation lower than this version on newer incompatible hardware
4.15.3	Apr. 2022	✔	✔	✔	✔	✔	• Radio module bootloader upgrade • Prevents installation lower than this version on newer incompatible hardware
4.15.4	July 2022	✔	✔		✔		• Support for additional eSIM suppliers • Prevents installation lower than this version on newer incompatible hardware
4.16.0	Nov. 2022	✔	✔	✔	✔	✔	• Feature release • Critical Maintenance for RV50 ends Dec 31, 2022. This is the final release for the RV50.

Step 1—Planning Your Update

1. Sierra Wireless recommends that you download a template from the router(s) before you begin the update process. For instructions, see Saving a Custom Configuration as a Template on page 20.
2. For each of the routers you want to update, make a note of the:
   - Device Model
   - Radio Module Type
   - Radio Module Identifier

ALEOS Software VersionThis information is available in ALMS and in ACEmanager (Status > About).

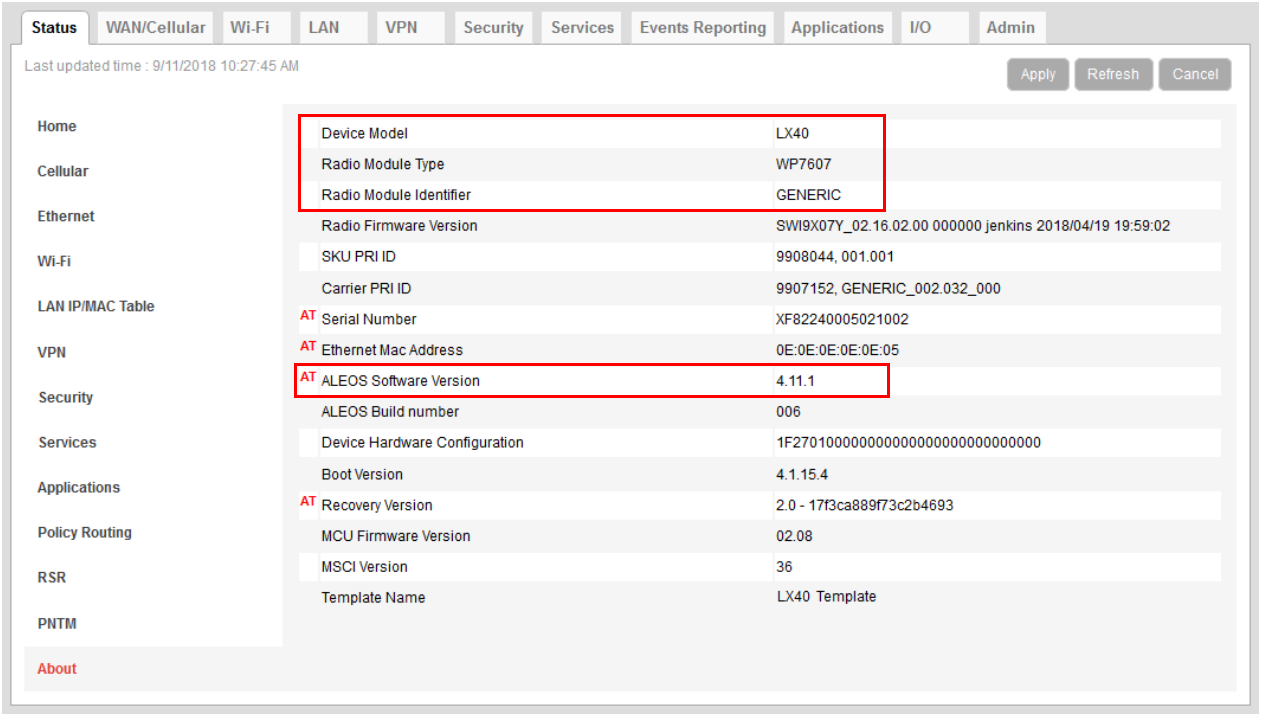


Figure 2-12: ACEmanager: Status > About

3. If you are planning to use ACEmanager to do the update:
   a. Go to source.sierrawireless.com and select your product and mobile network operator to get to the download page for your router.
   b. Download the new ALEOS software version for your system. If new radio module firmware is available, it is included with the ALEOS software in a .zip file.

Important: *Do not install radio module firmware unless you are prompted to do so.*

Note: If low power mode (see page 244) or time of day reboot (page 338) are enabled, Sierra Wireless recommends that you disable these features before beginning the update.

Recommendations

If you have any questions about the update process, contact your authorized Sierra Wireless distributor before updating the radio module firmware.

Scheduling the update

The update can take up to 30 minutes to complete, depending on the speed of your network connection. The AirLink router being updated will be off-line during the update, so take this into account when scheduling the update.

Important: *BE PATIENT! The firmware update can take up to 30 minutes to complete. Waiting for the process to complete is faster than troubleshooting the problems that can be caused by interrupting the process midway. (Interrupting the process may result in having to return the router to the factory for repairs.)*

Note: For LTE-M/NB-IoT AirLink routers: Due to the lower data rates supported by LTE-M/NB-IoT networks, over-the-air software updates can take an extended period of time. When using a Windows PC and ACEmanager to update ALEOS software over-the-air, please ensure that sleep and low power states are disabled on the PC so that the file transfer is not disrupted. Under these conditions, the ALEOS upgrade may take between 3 to 5 hours.

Sierra Wireless recommends using ALMS or AMM for remote software upgrades.

Step 2—Update the ALEOS Software and Radio Module Firmware

Using ACEmanager to Update a Single AirLink Router

To update the ALEOS software and radio module firmware on one AirLink router:

1. Connect the AirLink router you want to update to your laptop, launch your browser and enter the URL for the router as described on page 16. If it is a remote router, enter the domain name or public IP (WAN) address.

Note: If you are connected to the router remotely, any files transferred to the router are transferred over-the-air and you may incur data charges.

2. Log in to ACEmanager.

   Default user name: user

   Default password: Printed on the device label. If the password is not printed on the label, the default password is 12345.
3. Click the Software and Firmware link.

   The Software and Firmware update window opens.

Note: These instructions show typical Software and Firmware update windows. Details such as the ALEOS version, device model, radio firmware version, etc. may vary, depending on the router you are updating.

The update window gives you the option to update both ALEOS and the radio module firmware, or update only the radio module firmware.

Unless advised otherwise by Sierra Wireless, **select ALEOS software** (which updates ALEOS and prompts you to update the radio module firmware if a newer version is available for your router).

4. Click Browse... and navigate to the ALEOS software you downloaded from the Sierra Wireless Web site. This is a .bin file named for the router and the ALEOS software version. For example, LX40_4.12.0.010.bin.

5. Click Update.

   The ALEOS software update runs automatically and green check marks appear beside each step as it is completed.

Important: *Do not disconnect the AirLink router from the computer, and do not power cycle or reset the router during the update. If you see any error messages, refer to the* *Updating the ALEOS Software and Radio Module Firmware on page 497.*

6. Depending on the router and your Mobile Network Operator, you may be prompted to update the radio module firmware.

   If you do not receive a prompt, the radio firmware is up to date. Proceed to step 9. **Only** if prompted to update the firmware, proceed to step 7.

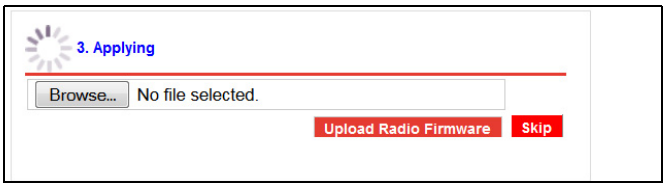


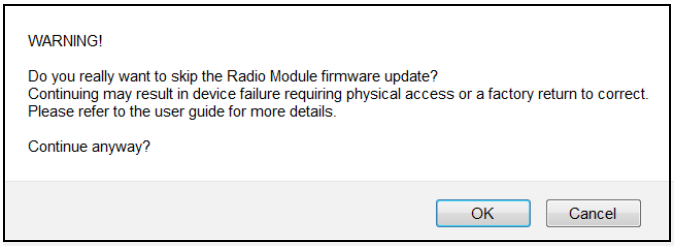
Figure 2-13: Prompt for Radio Module Firmware

7. Under Applying, click Browse... and navigate to the radio module firmware file that was included in the .zip file you downloaded. This is an .iso file named for the router's radio module and the mobile network operator's network (or "GENERIC", if it is intended for more than one operator network). For example, MC7354_GENERIC_2820.iso.

8. Click Upload Radio Firmware.

   A message appears on the window indicating that the firmware has been successfully uploaded.

Note: Sierra Wireless recommends that you do NOT skip the radio module firmware update unless advised to do so by Sierra Wireless or an authorized distributor. If you choose to skip the radio module firmware update, you'll see the following warning.



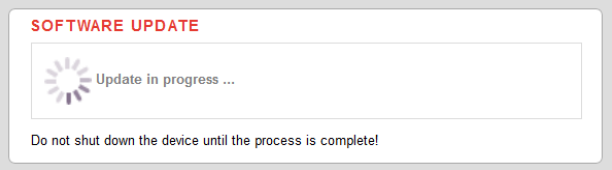
Once the radio module firmware is uploaded, the router begins applying the firmware upgrade. On the AirLink router, the LED chase begins to indicate that the firmware is being applied.

As indicated on the window, the radio module firmware may take 10 to 20 minutes to upload and install.

Important: *Do not disconnect the AirLink router from the computer or reboot the router while the firmware update is in progress. During the radio module firmware update, the router LEDs flash rapidly in sequence (an LED chase or caterpillar). When the radio module firmware update is complete, the router reboots automatically.*

Note: When you update the radio module firmware, the firmware stored on the router is also updated. If there is not enough room in the storage, the radio module firmware update fails. In that case, first remove one of the versions stored on the router to free up space. For more information, see *Radio Module Firmware on page 354.*

9. When the update is complete, the AirLink router reboots. The Software Update progress window appears.



When the reboot is complete, you are returned to the Login screen.

10. After you log in, go to Status > About.
11. Click Refresh.
12. Check the ALEOS Software Version and the Radio Firmware Version fields to confirm that the ALEOS software and the radio module firmware have been updated.

Using AirLink Management Service (ALMS) to Update One or Multiple AirLink routers Over-the-Air

You can use AirLink Management Service to update the ALEOS software and radio module firmware over-the-air on one or multiple AirLink routers.

If you don't have an ALMS account, go to sierrawireless.com/router-solutions/alms for information and to create an account.

Updating ALEOS software with an ALMS account:

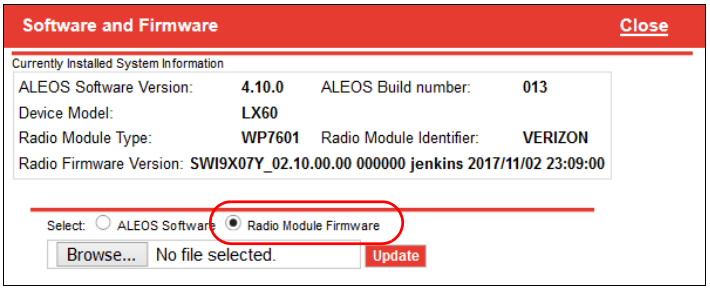
1. Go to airvantage.net and log in.
2. Follow the instructions in the online ALMS documentation to update the ALEOS software and radio module firmware.

Updating Only the Radio Module Firmware

Important: *Use this feature only if directed by Sierra Wireless or an authorized reseller.*

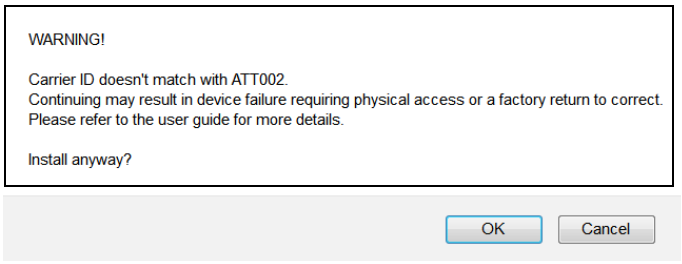
If Sierra Wireless or your authorized reseller directs you to update only the Radio Module Firmware:

1. Select the Radio Module Firmware button.



2. Select the appropriate firmware file for your router and click Update. This is an .iso file named for the router's radio module and the mobile network operator's network (or "GENERIC", if it is intended for more than one operator network). For example, MC7354_GENERIC_2820.iso.

   If you select a file for radio module firmware that is not supported on your router, you will see a warning message similar to the following:

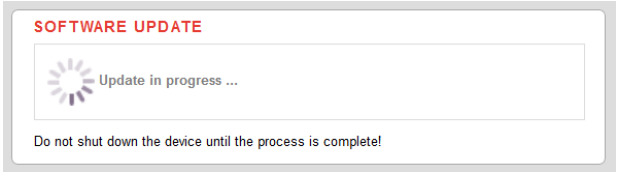


   Unless you have been advised by Sierra Wireless to do so, we recommend that you do not install an unsupported version of the radio module firmware.

3. Click Update.

   The radio module firmware update runs automatically and green check marks appear beside each step as it is completed.

4. When the update is complete, the AirLink router reboots. The Software Update progress window appears.



   When the reboot is complete, you are returned to the Login screen.

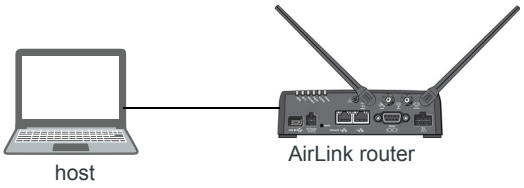
5. After you log in, go to Status > About.
6. Check that the Radio Firmware Version has been updated.

Enterprise LAN Management

You can use AirLink routers in the following configurations:

- Standalone with a connection to a single device

  When using the AirLink router with a single device, ensure that the device is DHCP enabled.



- With a router

  The router allows several devices to use the AirLink router's connection to the network. When using the AirLink router with a router:

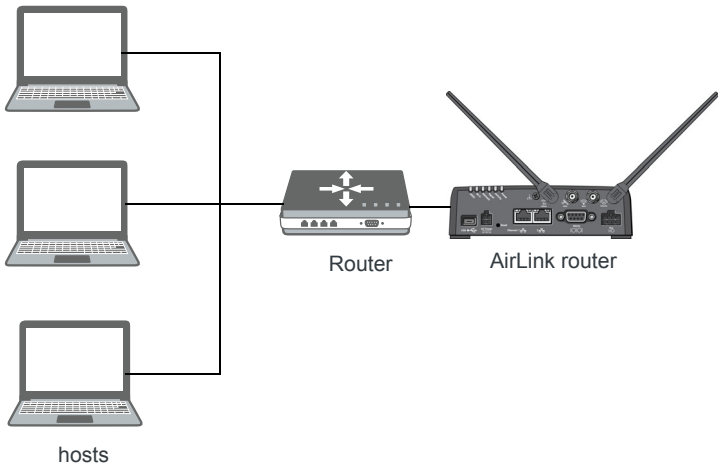
  - Configure the router to be DHCP enabled.

  And either:

  - Configure the router to use Network Address Translation (NAT).

    Or

  - Configure ALEOS (in ACEmanager) to use Host Port Routing. For information on using ALEOS with a router that is not configured to use NAT, see Host Port Routing on page 173.



Note: Other than for VLANs, ALEOS does not provide DHCP addresses to router connected devices.

Over the Air (OTA) Connections

Access AirLink routers

You can use an OTA connection to access AirLink routers that are in either configuration described above (stand alone or with a router).

Access connected devices

To use an OTA connection to access a connected device through the AirLink router, configure the device in ALEOS as the DMZ or port forwarding destination. For information on inbound OTA connections to the host, see DMZ on page 225 and Port Forwarding on page 220.

Configuring Your AirLink Router for use in a PCI Compliant System

The credit card industry requires retailers to comply with Payment Card Industry (PCI) standard to maintain a secure environment when processing payment card transactions. For these transactions, the AirLink router acts as a wireless data conduit for routers and PoSs (point-of-sale-terminals) that have been configured for PCI compliance.

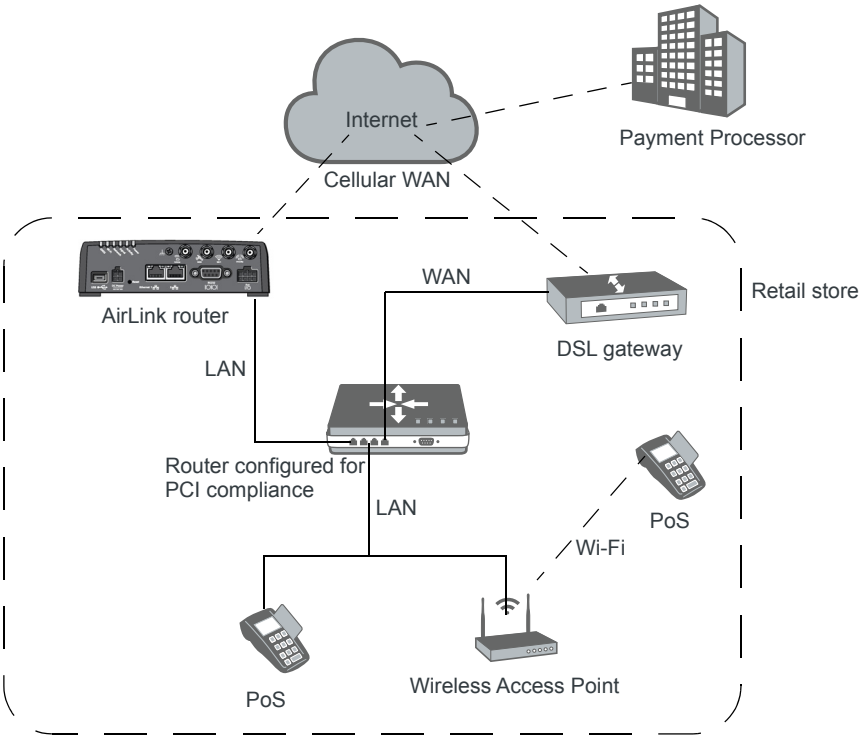


Figure 2-14: Sample PCI compliant network

The PCI compliant network must be set up so that:

- The USBnet is on a different subnet from the point-of-sale-terminal.
- All security protocols must be established from the point-of-sale terminal to the payment processor.
- Payment card terminals must be on a dedicated LAN or VLAN.

- The AirLink router must be connected to a router that is configured for PCI compliance.

Note: The serial port on the AirLink router has no access to the IP data path and does not need to be disabled.

If you are using the AirLink router for a payment card industry application, to meet PCI Data Security Standard compliance requirements the following steps must be done by a PCI certified service company.

For each router:

1. Connect the AirLink router to a router that has been configured for PCI compliance.
2. Log in to ACEmanager:
   - User Name: “user” (entered by default)
   - Default Password:
     - For devices that support unique passwords, the default password is printed on the device label.
     - For other devices, the default password is 12345.

   Note: For system security, and in accordance with PCI recommendations, ensure that you change the default ACEmanager password. The new password must be at least 8 characters long. For more information, see Change Password on page 329.
3. Go to Applications > ALEOS Application Framework and set the ALEOS Application Framework field to Disable.

3: Status

All fields in the Status group are read-only and provide information about the AirLink LX40. Depending on individual settings, the onboard radio module, and the type of network, the actual status pages may look different than the pages shown here.

Tip: *To be sure you are viewing the current status for all fields, click the Refresh button on the upper right side of the screen.*

On the Status tab, you'll find the following pages:

- Home
- Cellular
- Ethernet
- Wi-Fi
- LAN IP/MAC Table
- VPN
- Security
- Services
- Applications
- Policy Routing
- RSR (Reliable Static Routing)
- PNTM (Private Network Traffic Management)
- About

Home

The Home section of the Status tab is the first page displayed when you log in to ACEmanager. It shows basic information about the WAN network connection, the mobile network connection, and important information about the LX40.

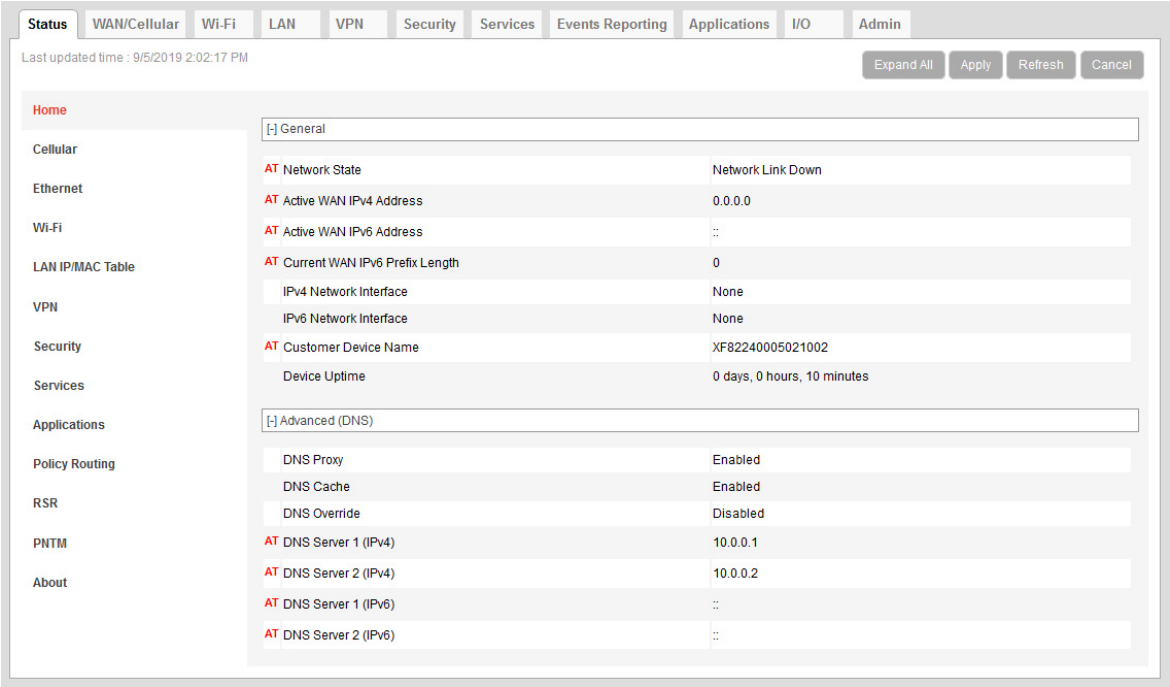


Figure 3-1: ACEmanager: Status > Home

Field	Description
General	
Network State	Current state of the WAN network connection • Network Ready—Connected to a mobile broadband network and ready to transfer data • Network Ready - eSIM Not Activated—The R2C eSIM (if available) has not been activated in ALMS • Network Ready - eSIM Activation State Unknown—The activation state is unknown. This could be because the eSIM activation state has not yet been reported by ALMS (the LX40, the eSIM, and ALMS have not synchronized after device registration or a device reset), or status reports from ALMS have been disabled. Network or server issues may also result in an unknown activation state. If this state persists and you believe the eSIM has been activated, please contact your Sierra Wireless Sales representative. • Connected - No Service • Network Link Down—The network link is not available • Not Connected
Active WAN IPv4 IP Address	The current IPv4 WAN IP address for the router
Active WAN IPv6 IP Address	The current IPv6 WAN IP address for the router
Current WAN IPv6 Prefix Length	The length, in bits, of the WAN IPv6 prefix
IPv4 Network Interface	Current active network interface

Field	Description
IPv6 Network Interface	Current active network interface
Customer Device Name	By default, the name is the serial number of the router. If you have configured a device name in the IP Manager[a] section of the Services > Dynamic DNS tab, that name appears in this field.
Device Uptime	Length of time since the router last rebooted (in days, hours, and minutes)
Advanced (DNS)	
DNS Proxy	Determines which DNS server the connected clients use for domain name resolution • Enabled—DNS Proxy is activated. Connected DHCP clients acquire the AirLink router's IP address as their DNS server. The AirLink router performs DNS lookups on behalf of the clients. • Disabled—Connected DHCP clients acquire the DNS servers used by the router. To set this option, see DNS Proxy on page 177.
DNS Cache	Status of the DNS Local Cache feature • Enabled—The built-in DNS server caches queries and entries, which can reduce WAN traffic overall by sending out less DNS-related traffic. • Disabled—DNS queries and entries are not cached. • To set this option, see DNS Local Cache on page 177.
DNS Override	Override WAN-granted DNS • Enabled—Locally configured DNS servers are used. • Disabled—DNS servers provided by the active WAN connection are used.
DNS Server 1 (IPv4)	1st DNS server IPv4 address currently in use by the WAN connection to resolve domain names into IP addresses
DNS Server 2 (IPv4)	2nd DNS server IPv4 address
DNS Server 1 (IPv6)	1st DNS server IPv6 address currently in use by the WAN connection to resolve domain names into IP addresses
DNS Server 2 (IPv6)	2nd DNS server IPv6 address

a. IP Manager will be deprecated in ALEOS 4.17.0.

Cellular

The Cellular section provides specific information about the connection including the IP address and how much data has been transmitted or received. Some of the information on this ACEmanager page is repeated on the Home page for quick reference.

Cellular status for Ready to Connect eSIM

The Status > Cellular page is labeled **Cellular (R2C Capable)** for devices that support Sierra Wireless R2C eSIM (Ready to Connect embedded SIM), as shown in Figure 3-2. For R2C eSIM-capable devices, the Cellular (R2C Capable) page displays status information about all available external SIM slots and the eSIM. You can find more information about eSIM status items in the following tables.

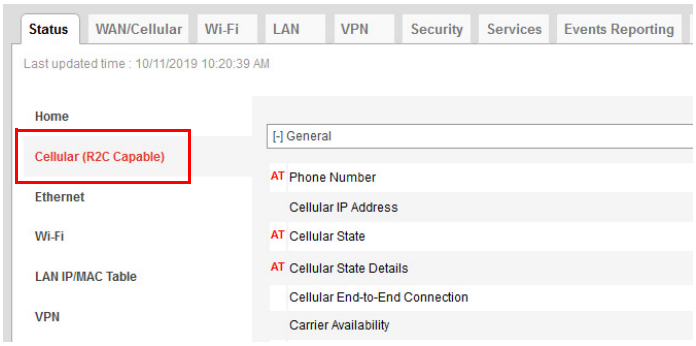


Figure 3-2: ACEmanager Status > Cellular (R2C Capable)

General

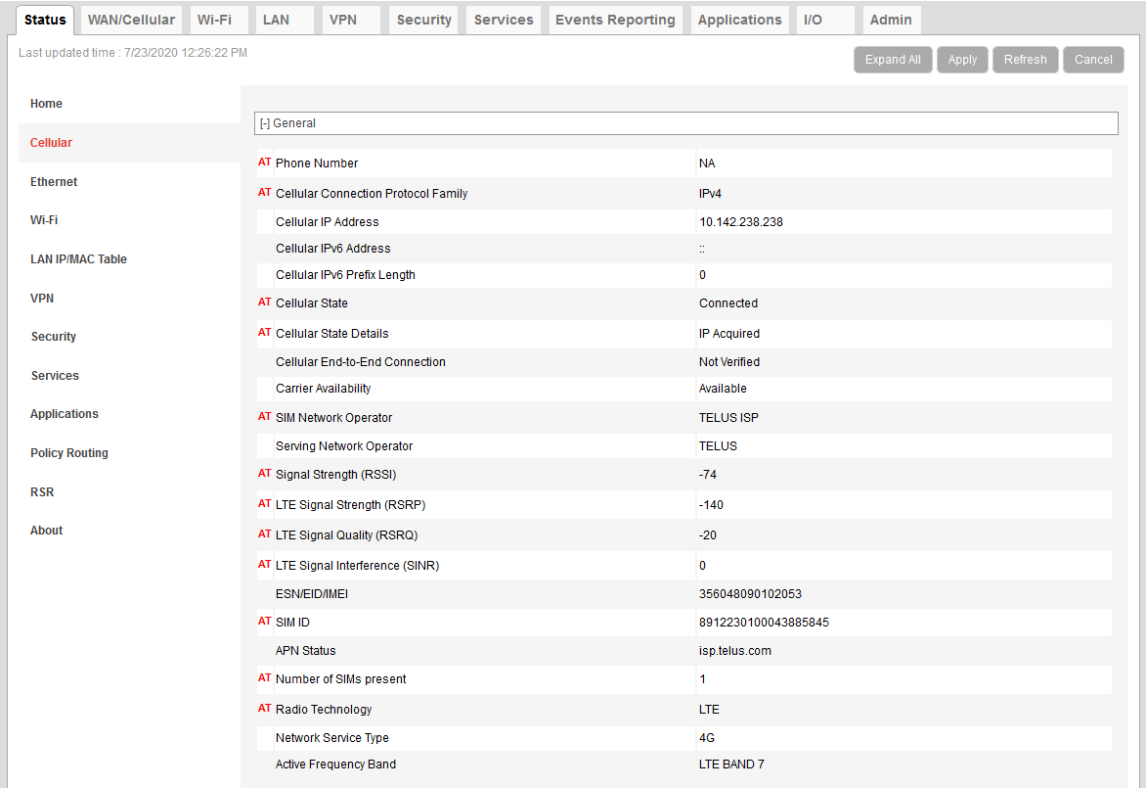


Figure 3-3: ACEmanager: Status > Cellular > General

Table 3-1: Reported Signal Strength and Quality Values

Network	Signal Strength and Quality values
UMTS	• Signal Strength (RSSI) • Signal Quality (ECI0) • Received Signal Power Code (RSCP)
LTE	• Signal Strength (RSSI) • LTE Signal Strength (RSRP) • LTE Signal Quality (RSRQ) • LTE Signal Interference (SINR)

General	
Phone Number	The phone number associated with the Mobile Network Operator account. If the Mobile Network Operator does not allow the account to display the phone number or there is no Mobile Network account for the router, “NA” is displayed.

Cellular Connection Protocol Family	The current IP version of the cellular network connection • IPv4 • IPv6 • Both IPv4 and IPv6 *Note: Cellular Connection Protocol Family, Cellular IPv6 Address and Cellular IPv6 Prefix Length do not appear when only IPv4 connections are possible.*
Cellular IP Address	IPv4 Cellular WAN IP Address If there is no mobile network connection, 0.0.0.0 is displayed.
Cellular IPv6 Address	Shows the IPv6 Cellular WAN IP Address if an IPv6 connection is established.
Cellular IPv6 Prefix Length	Shows the IPv6 prefix length, in bits, if an IPv6 connection is established.
Cellular State	Current state of the cellular connection: • Connected • Not Connected • No Service
Cellular State Details	Provides additional details about the current cellular state, for example the router may not be connected because the SIM card is not installed. Possible messages are: • Disconnected • Connecting • Data connection failed. Waiting to retry • Not Connected - Radio Connect off • Not Connected - Waiting for Activity • No SIM or Unexpected SIM Status • SIM Locked, but bad SIM PIN • SIM PIN Incorrect, 5 Attempts Left • SIM PIN Incorrect, 4 Attempts Left • SIM PIN Incorrect, 3 Attempts Left • SIM PIN Incorrect, 2 Attempts Left • SIM PIN Incorrect, 1 Attempt Left • SIM PIN Incorrect, 0 Attempts Left • SIM Blocked, Bad unlock code • SIM Locked: 10 PUK Attempts Left • SIM Locked: 9 PUK Attempts Left • SIM Locked: 8 PUK Attempts Left • SIM Locked: 7 PUK Attempts Left • SIM Locked: 6 PUK Attempts Left • SIM Locked: 5 PUK Attempts Left • SIM Locked: 4 PUK Attempts Left • SIM Locked: 3 PUK Attempts Left • SIM Locked: 2 PUK Attempts Left • SIM Locked: 1 PUK Attempt Left • SIM Blocked, unblock code incorrect • IP Acquired

<table>
<tr><td>Cellular End-to-End Connection</td><td>Describes the state of the cellular network connection, based on Cellular network monitoring (see Cellular > Monitor on page 103). Possible states are:
Not Verified—The monitoring function is set to disable and therefore the availability of the cellular network cannot be verified.
Pending—The monitoring function is enabled, but has not yet completed its test. Once the first test is complete, this option only appears again if monitoring is disabled and then re-enabled.
Established—The monitoring system has determined that service is available on the cellular network.
Not Established—The monitoring system has determined that the cellular interface has no service (ping test failed).</td></tr>
<tr><td>Carrier Availability</td><td>Indicates whether or not the mobile network operator (carrier) is able to provide service to the router’s radio module
Possible values:
Available
Not Available</td></tr>
<tr><td>SIM Network Operator</td><td>The SIM card’s home network, i.e, the Mobile Network Operator when the router is not roaming</td></tr>
<tr><td>Serving Network Operator</td><td>The network currently in use
This field only appears when the router has a network connection.
If the router is not roaming, this field is the same as the SIM Network Operator field.
If the router is roaming, this field displays the roaming Mobile Network Operator.</td></tr>
<tr><td>Signal Strength (RSSI)</td><td>Received Signal Strength Indicator
The average received signal power measured in the air interface channel
Indicates if there is a strong signal available for the AirLink router to connect to
See also LTE Signal Strength (RSRP) and LTE Signal Quality (RSRQ).
The value varies, depending on the network characteristics and the AirLink router.
<table><tr><th>RSSI</th><th>Signal strength</th></tr><tr><td>> -78 dBm</td><td>Good</td></tr><tr><td>-78 dBm to -93 dBm</td><td>Fair</td></tr><tr><td>-94 dBm to -102 dBm</td><td>Poor</td></tr><tr><td>< -103 dBm</td><td>Inadequate</td></tr></table></td></tr>
<tr><td>Signal Quality (ECI0)</td><td>2G/3G signal quality
Indicates the signal quality with a ratio of the average signal energy to co-channel interference in dB
<table><tr><th>ECI0</th><th>Signal quality</th></tr><tr><td>0 to -6</td><td>Good</td></tr><tr><td>-7 to -10</td><td>Fair</td></tr><tr><td>-11 to -20</td><td>Poor</td></tr></table></td></tr>
<tr><td>ESN/EID/IMEI</td><td>Electronic Serial Number for the internal radio</td></tr>
</table>

SIM ID	Identification number for the SIM card in use
APN Status	Current APN in use by the network connection • (Configured) is a default APN based on the SIM card in use. • (User Entered) is a custom APN entered manually into the configuration. *Note: APN is configured on the WAN/Cellular configuration tab.*
Number of SIMs present	Indicates the number of SIMs (including R2C eSIM, if available) installed in the LX40.
Primary SIM	Indicates which SIM card slot or R2C eSIM (if available) is assigned to be the primary SIM card. If more than one SIM cards are installed, the Primary SIM card is used for network connections.
Secondary SIM	Indicates which SIM card slot or R2C eSIM (if available) is assigned to be the secondary SIM card.
Active SIM	Indicates which SIM card slot or R2C eSIM (if available) is used for the current data connection.
Allow R2C eSIM Usage	Status of the Allow R2C eSIM Usage setting. • Enable—the R2C eSIM is available to be used for network connections • Disable—the R2C eSIM is not available for network connections. Only the external SIM card slots are available.
R2C eSIM Activation Status	Status of the R2C eSIM activation state. This status is retrieved from ALMS. • Unknown—ALMS has not yet reported the R2C eSIM activation state (the LX40, the eSIM, and ALMS have not synchronized after device registration or a device reset), or status reports from ALMS have been disabled. Network or server issues may also result in an unknown activation state. • Activated—ALMS has sent a status reflecting the eSIM is activated. *Note: The R2C eSIM activation status depends on ALMS reporting the activation status to the LX40. Due to system latencies, ALMS may not be aware of the R2C eSIM activation status the first time it connects to the LX40. If the R2C eSIM is activated in the meantime, an Unknown state may persist if the Device Initiated Interval is configured to last an extended period of time. 24 hours is the default setting (see page 236 for more information). If the Unknown state persists for more than 24 hours and you believe the R2C eSIM has been activated, you can click Synchronize System in ALMS. After clicking Synchronize System, the LX40 will synchronize at the next Device Initiated Interval, or you can click Connect on the Services > ALMS page to manually trigger the synchronization. If an unexpected R2C eSIM status persists, contact your Sierra Wireless Sales representative.* • Suspended—ALMS has sent a status reflecting the eSIM account has been suspended. • Terminated—ALMS has sent a status reflecting the eSIM account has been terminated. • Inventory—ALMS has sent a status reflecting the eSIM has been put into inventory and is not active. *Note: With the exception of "Unknown", the last status received from an ALMS default report or synchronization is displayed in ACEmanager. This may not be the actual state of the eSIM if ALMS has not sent an updated status.*

<table>
<tr><td>Radio Technology</td><td>Type of service being used by the router (e.g. LTE, HSPA+, UMTS, HSPA, or GPRS)
If you are connected to a network other than that of your Mobile Network Operator, the network service type indicates that you are roaming (and additional charges may apply).</td></tr>
<tr><td>Network Service Type</td><td>Type of network the router is connected to (e.g. 4G, 3G)</td></tr>
<tr><td>Active Frequency Band</td><td>Current cellular band being used (LTE BAND 2, etc.)</td></tr>
<tr><td colspan="2">Signal Strength and Quality
Different radio technologies have different ways of reporting signal strength and signal quality. The fields displayed in ACEmanager depend on the type of network it is connected to. For details, see Reported Signal Strength and Quality Values on page 39.</td></tr>
<tr><td>Received Signal Code Power (RSCP)</td><td>The RSCP is the power measured by the receiver on a particular physical channel. It provides an indication of signal strength for UMTS connections, and appears under Cellular > Advanced. Expected values are in the range of -50 dB to -120 dB.</td></tr>
<tr><td>LTE Signal Strength (RSRP)</td><td>Reference Signal Received Power
The average signal power of all cell-specific reference signals within the LTE channel
Indicates whether the AirLink router has a strong connection to the wireless network
The value varies, depending on the network characteristics and the AirLink router.
<table><tr><th>RSRP</th><th>Signal strength</th></tr><tr><td>> -105 dBm</td><td>Good</td></tr><tr><td>-105 dBm to -115 dBm</td><td>Fair</td></tr><tr><td>-116 dBm to -1000 dBm</td><td>Poor</td></tr><tr><td>< -1000 dBm</td><td>Inadequate</td></tr></table>See also LTE Signal Quality (RSRQ) and Signal Strength (RSSI).</td></tr>
<tr><td>LTE Signal Quality (RSRQ)</td><td>Reference Signal Received Quality
The RSRQ indicates the quality of the AirLink router’s connection to the wireless network. (Is noise or interference affecting the quality of the connection?) See also Signal Strength (RSSI) and LTE Signal Strength (RSRP).
The value varies, depending on the network characteristics and the AirLink router.
<table><tr><th>RSRQ</th><th>Signal quality</th></tr><tr><td>> -9 dB</td><td>Good</td></tr><tr><td>-9 dB to -12 dB</td><td>Fair</td></tr><tr><td>< -12 dB</td><td>Poor</td></tr></table>Note: For additional information on the LTE network, use the *CELLINFO2? AT command (described on page 416).</td></tr>
</table>

<table>
<tr><td>LTE Signal Interference (SINR Level)</td><td>Signal Interference Plus Noise (SINR) Level only applies to Verizon Wireless LTE networks. The maximum value for each level is:
Level 0 = -9 dB
Level 1 = -6 dB
Level 2 = -4.5 dB
Level 3 = -3 dB
Level 4 = -2 dB
Level 5 = +1 dB
Level 6 = +3 dB
Level 7 = +6 dB
Level 8 = +9 dB</td></tr>
<tr><td>LTE Signal Interference (SINR)</td><td>Signal to noise and interference ratio
Higher values indicate that signal power is much greater than noise and interference.<table><tr><th>SINR</th><th>Throughput</th></tr><tr><td>> 10</td><td>Excellent</td></tr><tr><td>6–10</td><td>Good</td></tr><tr><td>0–5</td><td>Fair</td></tr><tr><td>< 0</td><td>Poor</td></tr></table></td></tr>
</table>

Statistics

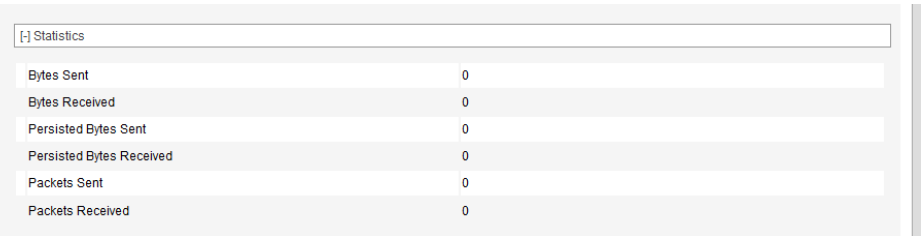


Figure 3-4: ACEmanager: Status > Cellular > Statistics

Statistics	
Bytes Sent	Number of bytes sent to the mobile network since system startup or reboot
Bytes Received	Number of bytes received from the mobile network since system startup or reboot
Persisted Bytes Sent	Number of bytes sent The count starts when the router first goes on air and persists over reboot. The field resets to zero on reset to factory default settings.
Persisted Bytes Received	Number of bytes received The count starts when the router first goes on air and persists over reboot. The field resets to zero on reset to factory default settings.

Packets Sent	Number of packets sent to the network since system startup or reboot
Packets Received	Number of packets received from the network since system startup or reboot

Monitor

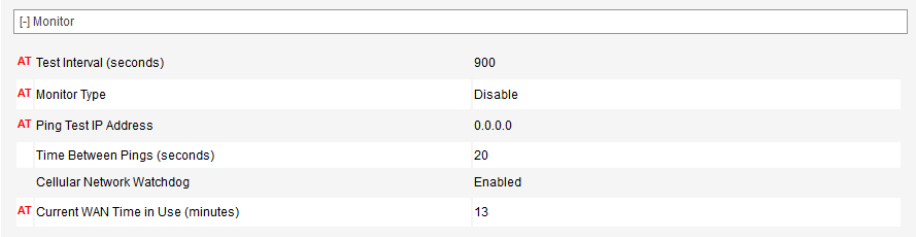


Figure 3-5: ACEmanager: Status > Cellular > Monitor

Monitor	
Test Interval (seconds)	The configured amount of time between tests of the cellular connection
Monitor Type	The configured type of test being run on the interface to diagnose its ability to provide end-to-end connectivity
Ping Test IP Address	The configured IP address used for testing interface connectivity
Time Between Pings (seconds)	The configured time between individual pings
Cellular Network Watchdog	Status of the Cellular Network Watchdog (Enabled or Disabled) See Network Watchdog on page 74.
Current WAN Time in Use (minutes)	The length of time the cellular WAN has been in use

Advanced

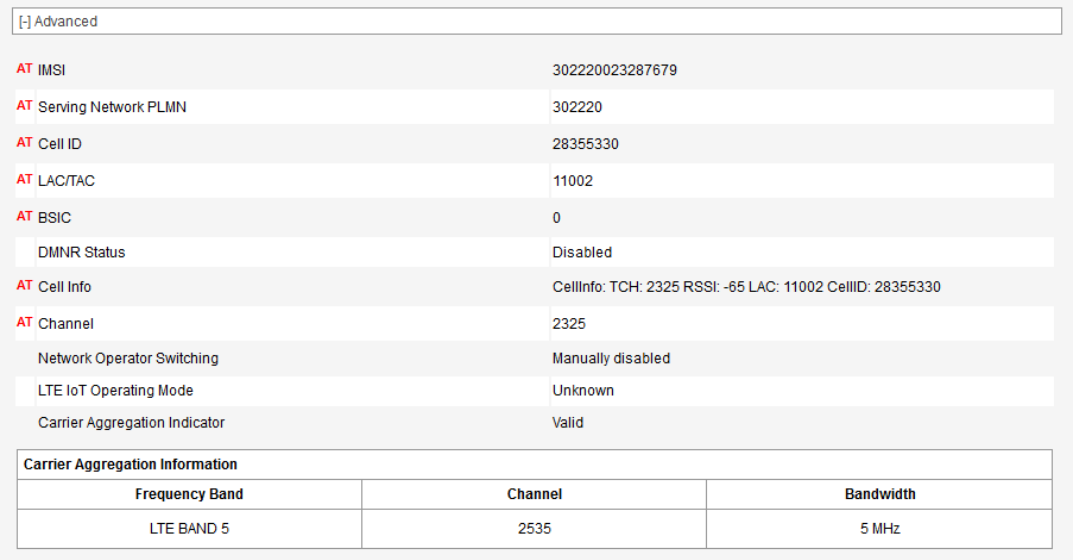


Figure 3-6: ACEmanager: Status > Cellular > Advanced

Advanced	
IMSI	International Mobile Subscriber Identity number
Serving Network PLMN	The PLMN of the currently attached network
Cell ID	Unique number that identifies each base transceiver station (BTS) or sector of a BTS within an LAC
PN Offset	This field appears only for CDMA networks. Base station identifier used in CDMA networks.
LAC/TAC	Location Area Code or Tracking Area Code (LTE)
BSIC	Base Station Identity Code
DMNR Status	Dynamic Mobile Network Routing (DMNR) is only supported on the Verizon Wireless network. DMNR status: • Enabled • Disabled
DMNR Foreign Agent Registration Status	This field only appears if DMNR is enabled. The status of transactions with the Home agent • Pass—Connected subnets registered or de-registered successfully • Fail—Unable to register or de-register connected subnets • Unknown
DMNR Reverse Tunnelling Agent Status	This field only appears if DMNR is enabled. Status of the NEMO tunnel: • Up • Down

Cell Info	Cell information such as the Base Station Identity Code (BSIC), TCH, Received Signal Strength Indicator (RSSI), Location Area Code (LAC), and the cell ID For additional information, including cell info for LTE networks, see *CELLINFO2? on page 416 and LTE Networks on page 501.
Channel	WAN network channel The current active channel number for the mobile network connection
Network Operator Switching	Network Operator Switching status (See Radio Module Firmware on page 354.) Possible status: • OK—The SIM in use matches the currently active radio module firmware. • Manually disabled—SIM-based image switching is disabled on the Admin > Radio Module Firmware screen. • Disabled: <carrier> firmware is not in the local store—The required radio module firmware is not stored on the router. For instructions on how to install the radio module firmware, see Radio Module Firmware on page 354. • Disabled: Unknown MCC/MNC—The router does not recognize the Mobile Country Code (MCC) or the Mobile Network Code (MNC) for the SIM card. • Disabled: SIM card not ready at boot—SIM card error. Ensure that the SIM card is installed properly, and has a valid account associated with it. If the problem persists, contact your Mobile Network Provider. • Disabled: SIM card not usable at boot—The router is unable to read the SIM card. Check the Network State field to ensure that the SIM card is not PIN-blocked. Ensure that the SIM card is installed properly, and has a valid account associated with it. If the problem persists, contact your Mobile Network Provider. • Disabled: DVT-Mode—The router is in an advanced diagnostic mode, normally only used at the factory. Contact your Sierra Wireless authorized distributor. • Disabled: internal error—Indicates a problem with the Network Operator Switching feature. Contact your Sierra Wireless authorized distributor.
LTE IoT Operating Mode	This field appears only if the LX40 is connected to a Cat-M1 or NB-IoT LTE network. The value indicates the connected IoT network type. Possible values: • Cat-M1 • NB-IoT
Sierra SIM Applet Version	The Sierra SIM applet version is displayed if the active SIM is either an R2C eSIM or an external Sierra SIM.
R2C eSIM SIM ID	ICCID of the R2C eSIM (if present)
Carrier Aggregation Indicator	This field appears only for LTE-Advanced networks Indicates whether or not carrier aggregation is enabled Carrier Aggregation Indicator: • Valid—Secondary band/channel information is available • Information not available—No secondary band/channel information is available
Carrier Aggregation Information	Carrier Aggregation Information appears only for LTE-Advanced networks when carrier aggregation is enabled. The Carrier Aggregation Information table displays the following information about multiple SCCs (secondary component carriers) for LTE carrier aggregation: • Frequency Band • Channel • Bandwidth

Ethernet

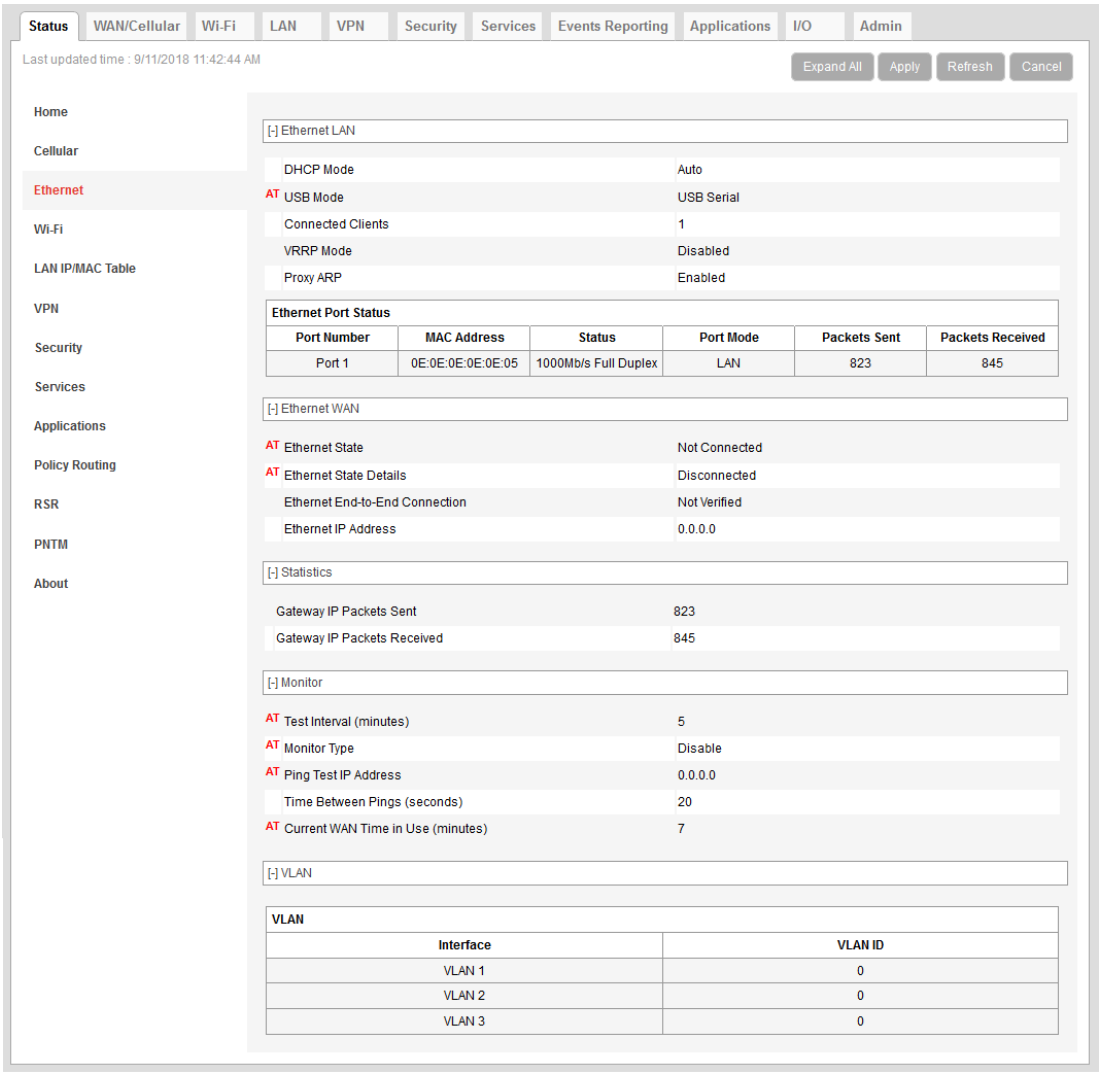


Figure 3-7: ACEmanager: Status > Ethernet

Field	Description
Ethernet LAN	
DHCP Mode	Status of DHCP mode • Server—The AirLink router is acting as a DHCP server for all Ethernet connections. • Disable—The AirLink router is not acting as a DHCP server or client. All devices connected to the AirLink router must have a static LAN IP or use PPPoE. • Auto—Default setting used by authorized AirLink resellers for initial router configuration. See DHCP Mode on page 155 for more information.

Field	Description
DHCP Auto Status	Status of DHCP mode (This field only appears when the DHCP mode is Auto.) • Server—ALEOS is acting as a DHCP server. • Client—ALEOS is acting as a DHCP client.
USB Mode	Which USB port mode is set (USBnet, USB serial, or Disabled)
Connected Clients	Number of connected devices that obtained their IP address through DHCP over Ethernet or USBnet. The value in this field does not include devices connected via PPP or PPPoE.
VRRP Mode	VRRP status
Proxy ARP	Proxy ARP status: • Enabled • Disabled For more information, see Proxy ARP (Primary Gateway) on page 174.
Ethernet Port Status	
Port Number	Port number (The number of Ethernet ports available varies depending on the router.)
MAC Address	MAC addresses of the Ethernet ports
Status	Status of the Ethernet port(s): • Disabled—The Ethernet port has not been enabled (Default) • Link Speed—Link speed depends on the router and the network • Disconnected—No device is connected to the Ethernet port • Disabled (Public IP)—The Connection mode is set to “Ethernet Uses Public IP”. All the Ethernet ports except the Public Mode Ethernet port are automatically disabled.
Port Mode	Mode of each Ethernet port
Packets Sent	Number of packets sent over the Ethernet port
Packets Received	Number of packets received over the Ethernet port
Ethernet WAN	
Ethernet State	Current state of the Ethernet connection: • Connected • Not Connected • No Service
Ethernet State Details	Provides additional details about the current Ethernet connection status. Possible messages are: • IP Acquired • Disconnected • Not configured for WAN

Field	Description
Ethernet End-to-End Connection	Describes the state of the Ethernet network connection, based on Ethernet network monitoring (see Ethernet > Monitor on page 107). Possible states are: • Not Verified—The monitoring function is set to disable and therefore the availability of the Ethernet network cannot be verified. • Pending—The monitoring function is enabled, but has not yet completed its test. Once the first test is complete, this option only appears again if monitoring is disabled and then re-enabled. • Established—The monitoring system has determined that service is available on the cellular network. • Not Established—The monitoring system has determined that the cellular interface has no service (ping test failed).
Ethernet IP Address	Ethernet IP address
Statistics	
Gateway IP Packets Sent	Number of gateway packets sent to the network since system startup or reboot.
Gateway IP Packets Received	Number of gateway packets received from the network since system startup or reboot.
Monitor	
Test Interval (minutes)	The configured amount of time between testing the Ethernet WAN connection
Monitor Type	The configured type of test being run on the interface to diagnose its ability to provide end-to-end connectivity
Ping Test IP Address	The configured IP address used for tests of interface connectivity
Time Between Pings (seconds)	The configured time between individual pings
Current WAN Time in Use	The length of time the Ethernet WAN has been in use
VLAN	
Interface	Identities Interface name of the configured VLANs
VLAN ID	Identities ID of the configured VLANs

Wi-Fi

If you have an AirLink LX40 with Wi-Fi, click the Wi-Fi tab on the left side of the screen to view the Wi-Fi Status. See Wi-Fi Configuration for more information.

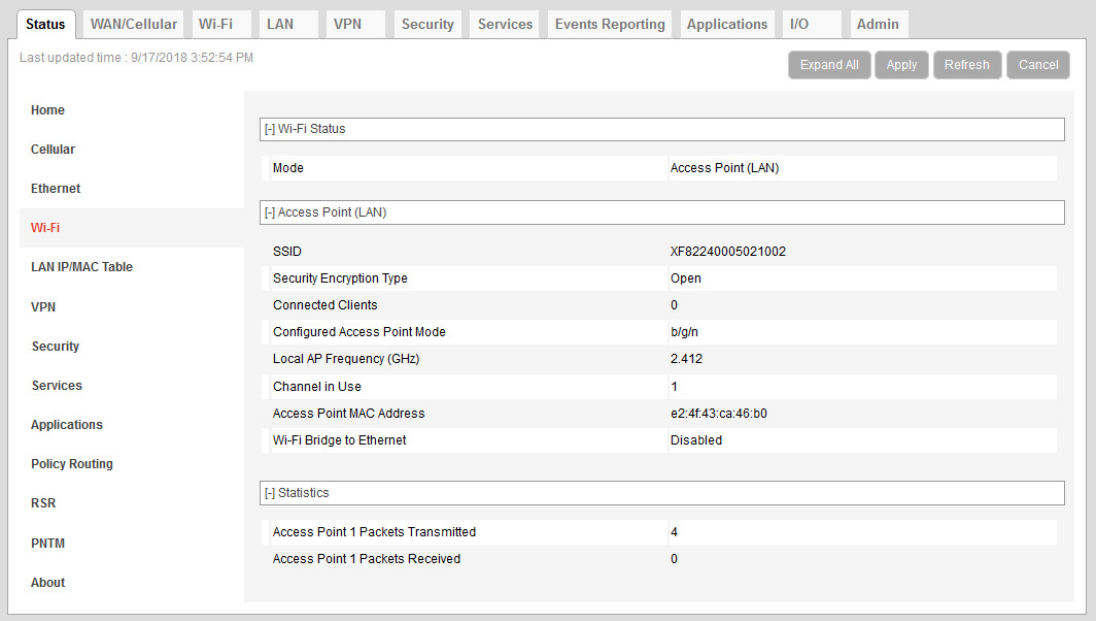


Figure 3-8: ACEmanager: Status > Wi-Fi

Field	Description
Wi-Fi Status	
Mode	Wi-Fi mode. For more information, see Wi-Fi Configuration on page 125.
Access Point (LAN) These fields only appear when the Wi-Fi mode is set to Access Point (LAN).	
SSID	Configured SSID
Security Encryption Type	Wi-Fi security encryption (security authentication) type (i.e. WEP, WPA, WPA2 Personal, WPA2 Enterprise, WPA3 Enterprise)
Connected Clients	Number of connected clients
Configured Access Point Mode	Current Wi-FI access point mode. For example if the access point mode on the router is configured for n/ac Enabled (for 5 GHz band) and the client only supports b/g (2.4 GHz band), the access point mode in use is b/g (2.4 GHz band).
Local AP Frequency (GHz)	Frequency being used by the Access Point
Channel in Use	Channel being used by the Access Point
Access Point MAC Address	MAC address that hosts connect to when the router is configured as an access point. For more information, see Access Point (LAN) Mode on page 133.

Field	Description
Wi-Fi Bridge to Ethernet	Status of the Bridge Wi-Fi to Ethernet field. • Enabled—The Ethernet interface and the Wi-Fi interface share the same subnet. This allows routing between all LAN devices. • Disabled—Wi-Fi LAN devices are isolated from all other LAN devices. (default) See Bridge Wi-Fi to Ethernet on page 136.
Client (WAN) These fields only appear when the Wi-Fi mode is set to Client (WAN).	
Wi-Fi State	Current state of the Wi-Fi connection: • Connected • Not Connected • No Service
Wi-Fi State Details	Provides additional details about the current Wi-Fi connection. Possible messages are: • IP Acquired • Disconnected • Associating • Associated • Connecting
Wi-Fi End-to-End Connection	Describes the state of the Wi-Fi network connection, based on Wi-Fi network monitoring (see Monitor on page 130). Possible states are: • Not Verified—The monitoring function is disabled, and therefore the availability of the Wi-Fi network cannot be verified. • Pending—The monitoring function is enabled, but has not yet completed its test. Once the first test is complete, this option only appears again if monitoring is disabled and then re-enabled. • Established—The monitoring system has determined that service is available on the Wi-Fi network. • Not Established—The monitoring system has determined that the Wi-Fi interface has no service (ping test failed).
SSID	SSID that the AirLink router is connected to or associated with
Security Authentication Type	Wi-Fi security authentication type Possible states are: • WPA-PSK • WPA-PSK-SHA256 • SAE • WPA-EAP • WPA-EAP-SHA256 *Note: WPA can include a 2 (WPA2-PSK or WPA2-EAP-SHA256 for example).*
IP Address	WAN IP address the router received from the access point
RSSI	Signal strength (in dBm) of the remote AP that the Wi-Fi client is connected to.
Wi-Fi Client MAC Address	MAC address the router uses to connect to a Wi-Fi access point when it is configured for Client mode. For more information, see Client (WAN) Mode on page 144.

Field	Description
Remote Access Point Mode	The current access mode for the client/remote AP (b/g/n or n/ac)
Current/Last Used Channel	This field only appears when the Wi-Fi mode selected is Client (WAN). The current channel or the last channel used.
Statistics	
Access Point 1 Packets Transmitted	This field appears in Access Point (LAN) mode. The number of packets transmitted since the last startup/reboot.
Access Point 1 Packets Received	This field appears in Access Point (LAN) mode. The number of packets received since the last startup/reboot.
WAN Packets Transmitted	This field appears in Client (WAN) mode. Wi-Fi WAN packets transmitted
WAN Packets Received	This field appears in Client (WAN) mode. Wi-Fi WAN packets received
Monitor	
Test Interval (seconds)	The configured amount of time between tests of the Wi-Fi connection
Monitor Type	The configured type of test being run on the interface to diagnose its ability to provide end-to-end connectivity
Ping Test IP Address	The configured IP address used for testing interface connectivity
Time Between Pings (seconds)	The configured time between individual pings
Pilot Ping	The pilot ping configuration for the Wi-Fi interface
Link Recovery Method	The configured Link Recovery Method
Keep Interface Active During Link Recovery	The configured router behavior while a link is being recovered.
Maximum Number of Consecutive Link Recovery Attempts	The configured number of Consecutive Link Recovery Attempts
Current WAN Time in Use (minutes)	The time, in minutes, that the router has been connected to the current WAN network. *Note: The value of this field is 0 if the router is not connected to a WAN mobile network.*
Remote AP MAC Address	This field only appears when the Wi-Fi Status is Associated, Connecting, or Connected. The MAC address of the remote access point
Remote AP Frequency (GHz)	This field only appears when the Wi-Fi Status is Associated, Connecting, or Connected. The frequency being used by the remote access point
Successful Pings	

Field	Description
Failed Pings	
Link Recoveries	

LAN IP/MAC Table

The LAN IP/MAC table shows the status of the local network. When the router is configured as a Wi-Fi Access Point, information also appears for Connected and Rejected Wi-Fi clients.

Note: The LAN IP/MAC table does not appear in ALMS.

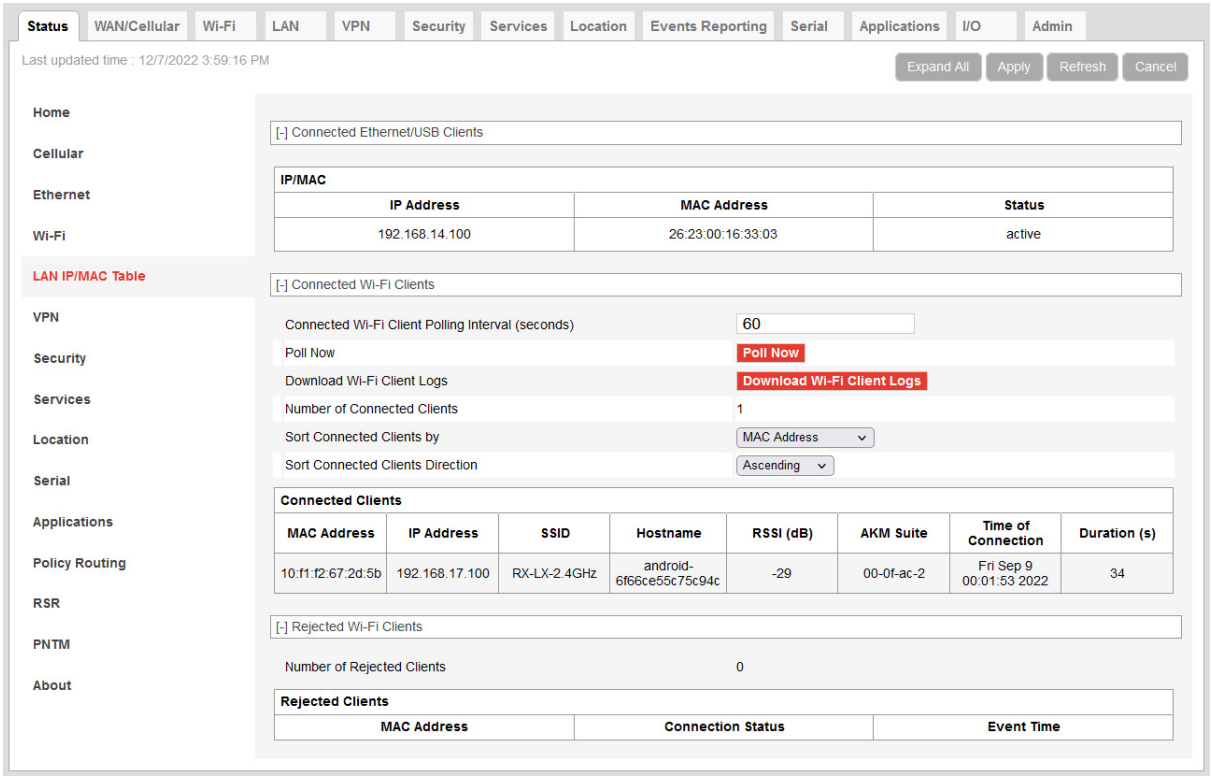


Figure 3-9: ACEmanager: Status > LAN IP/MAC Table

Field	Description
IP/MAC	
IP Address	Local IP Address of devices on the LAN
MAC Address	MAC Address of devices on the LAN
Status	The status of the connection: • active—the connection is up and active • inactive—no recent activity on the connection • authorized—a client whose MAC address is included in the list of authorized MAC addresses is connected via a captive portal. See Captive Portal on page 138. • unauthorized—an unauthorized client attempting to connect to the Wi-Fi network via a captive portal has been given an IP address, but is not connected

Field	Description
Connected Wi-Fi Clients	
Connected Wi-Fi Client Polling Interval (seconds)	Sets the interval for querying the driver and updating the database information about connected clients.
Poll Now	Click to immediately query the driver and update the content of the database. After clicking Poll Now, click the Refresh button to update the Connected Clients table.
Download Wi-Fi Client Logs	Allows you to download the full list of Current and Rejected clients as a .txt file. The Connected Clients table is limited to showing 10 clients, but some AirLink routers allow more than 10 clients to be connected. The log file includes all the information listed in the Connected and Rejected Clients tables.
Number of Connected Clients	Displays the number of currently connected clients.
Sort Connected Clients by	Select on option by which to sort the Connected Clients list in the table. Note that you must click Apply and then Refresh to see the changes. You can sort the list by: • MAC Address (default) • IP Address • SSID • Hostname • RSSI (dB) • Time of Connection • Duration (s)
Sort Connected Clients Direction	Select an option by which to order the Connected Clients list. The options are: • Ascending (default) • Descending
Connected Clients (table)	
MAC Address	MAC Address of the connected client
IP Address	Local IP Address of the connected client
SSID	SSID to which the client is connected
Hostname	Hostname of the connected client
RSSI (dB)	Signal strength of the connection
AKM Suite	Authentication and Key Management suite used for the connection
Time of Connection	Time of the client's most recent connection
Duration (s)	Duration of the client's current connection
Rejected Wi-Fi Clients	
Number of Rejected Clients	Displays the number of rejected clients. If a client tries to connect and is rejected, it appears in the Rejected Clients table. If a rejected client successfully connects, it is removed from the Rejected Clients table and appears in the Connected Clients table.
Rejected Clients (table)	

Field	Description
MAC Address	MAC Address of the rejected client
Connection Status	The reason that the client was rejected
Event Time	Time at which the client attempted to connect

VPN

The VPN section gives an overview of the VPN settings and indicates whether a VPN connection has been made.

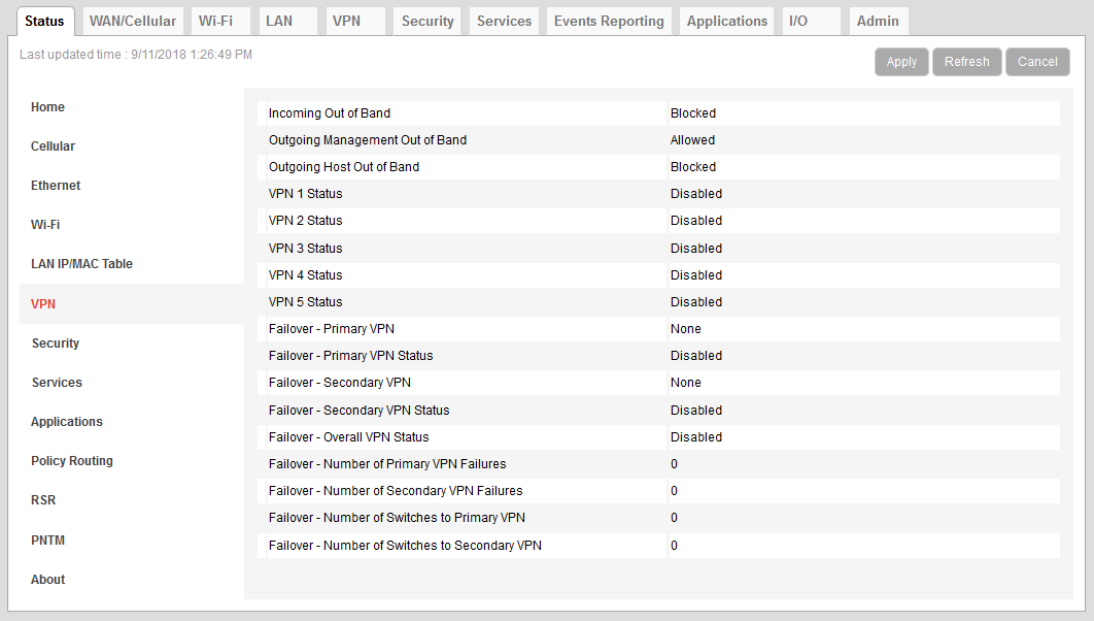


Figure 3-10: ACEmanager: Status > VPN

Field	Description
Incoming Out of Band	Whether Incoming Out of Band traffic is allowed or blocked
Outgoing Management Out of Band	Whether outgoing ALEOS Out of Band traffic is allowed or blocked
Outgoing Host Out of Band	Whether Outgoing Host Out of Band traffic is allowed or blocked

Field	Description

VPN 1 to 5 Status	Status of each VPN connection:
	• Disabled—VPN is disabled (default)
	• Not Connected—The VPN failed to connect. This could be because of a mismatch in the configuration between the client and the server, no data connection on the router, etc.
	• Connected—The VPN is connected and ready to transmit traffic.
	• Configuration Error—This status appears when:
	  • Two VPNs have both the same Local Address and the same Remote Address
	  • More than one VPN has the remote address set to “0.0.0.0”
	  Note: This restriction does not apply to the Additional Remote Subnets.
	When either of these errors exist, only the first of the conflicting VPNs is operational.
	To determine which VPNs are in conflict:
	1. Go to Admin > Configure Log.
	2. For the VPN Subsystem, ensure that Display in Log is set to Yes. The Verbosity can be either Info or Debug.
	3. Click View Log.
	4. The resulting log shows you which VPNs are in conflict.
	Note: You can display the VPN status on the ACEmanager login page. For more information, see Status Screen on page 292.

Failover - Primary VPN	ID of the primary VPN (for VPN Failover) i.e. VPN 1, VPN 2, VPN 3, VPN 4, VPN 5, or None (Default is None.) Setting persists over reboot.
Failover - Primary VPN Status	Status of the primary VPN: • Disabled—VPN Failover is disabled. (default) • Connecting—The VPN is trying to connect to the responder. • Active—The VPN tunnel is ready and transferring traffic. • Backup—This is currently the backup VPN connection. • Failed—Dead Peer Detection (DPD) has determined that the VPN responder is dead, or a ping sent to the VPN host failed. • Out of Service—There have been 5 DPD failures within an hour.
Failover - Secondary VPN	ID of the Secondary VPN (for VPN Failover) i.e. VPN 1, VPN 2, VPN 3, VPN 4, VPN 5, or None (Default is None.) Setting persists over reboot.
Failover - Secondary VPN Status	Status of the Secondary VPN: • Disabled—VPN Failover is disabled. (default) • Connecting—The VPN is trying to connect to the responder. • Active—The VPN tunnel is ready and transferring traffic. • Backup—This is currently the backup VPN connection. • Failed—Dead Peer Detection (DPD) has determined that the VPN responder is dead, or a ping sent to the VPN host failed. • Out of Service—There have been 5 DPD failures within an hour.

Field	Description
Failover - Overall VPN Status	Status of the overall VPN: • Disabled—VPN Failover is disabled. (default) • Connecting—One of the VPNs is trying to connect to the responder. • Active—One VPN tunnel is currently in use. The backup VPN is available. • Backup_Unavailable—One VPN tunnel is currently in use. The backup VPN is not available. • Out of Service—Neither the primary nor secondary VPN is operational. • N/A—The overall VPN status is temporarily not available. Click Refresh.
Failover - Number of Primary VPN Failures	Number of times DPD has failed on the primary VPN since the router has been rebooted or the “Set VPN Policy” button was clicked
Failover - Number of Secondary VPN Failures	Number of times DPD has failed on the Secondary VPN since the router has been rebooted or the “Set VPN Policy” button was clicked
Failover - Number of Switches to Primary VPN	Number of times traffic was switched to the primary VPN since the router has been rebooted or the “Set VPN Policy” button was clicked
Failover - Number of Switches to Secondary VPN	Number of times traffic was switched to the Secondary VPN since the router has been rebooted or the “Set VPN Policy” button was clicked

Security

The Security section provides an overview of the security settings on the AirLink router.

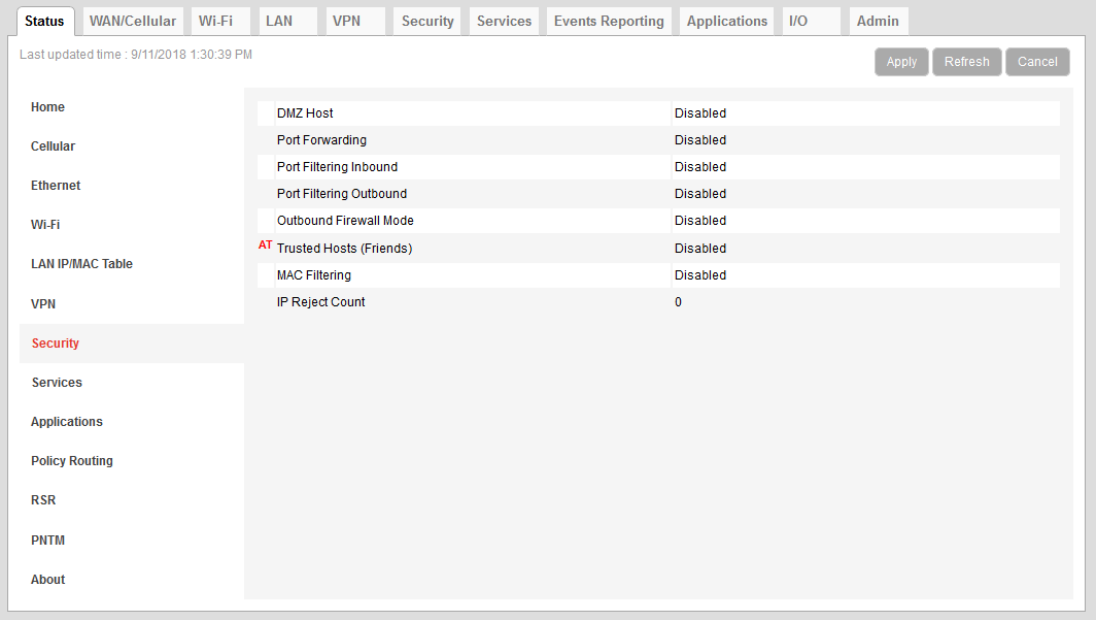


Figure 3-11: ACEmanager: Status > Security

Field	Description
DMZ Host	Setting for the DMZ Host (Automatic, Manual, or Disabled) DMZ defines a single LAN connected device where all unsolicited data should be routed.
Port Forwarding	Status of port forwarding (Enabled or Disabled)
Port Filtering Inbound	Status of inbound port filtering (Allowed Ports, Blocked Ports, or Disabled)
Port Filtering Outbound	Status of outbound port filtering (Allowed Ports, Blocked Ports, or Disabled)
Outbound Firewall Mode	Status of the outbound firewall (Enabled or Disabled)
Trusted Hosts (Friends)	Status of the Trusted Hosts (Friends) list (Disabled or Enabled) When this option is enabled, the AirLink router only accepts connections from trusted remote IP addresses.
MAC Filtering	Status of MAC filtering (Enabled or Disabled)
IP Reject Count	Number of IP addresses that have been rejected

Services

This section shows the status of AirLink services, including ALMS and remote access.

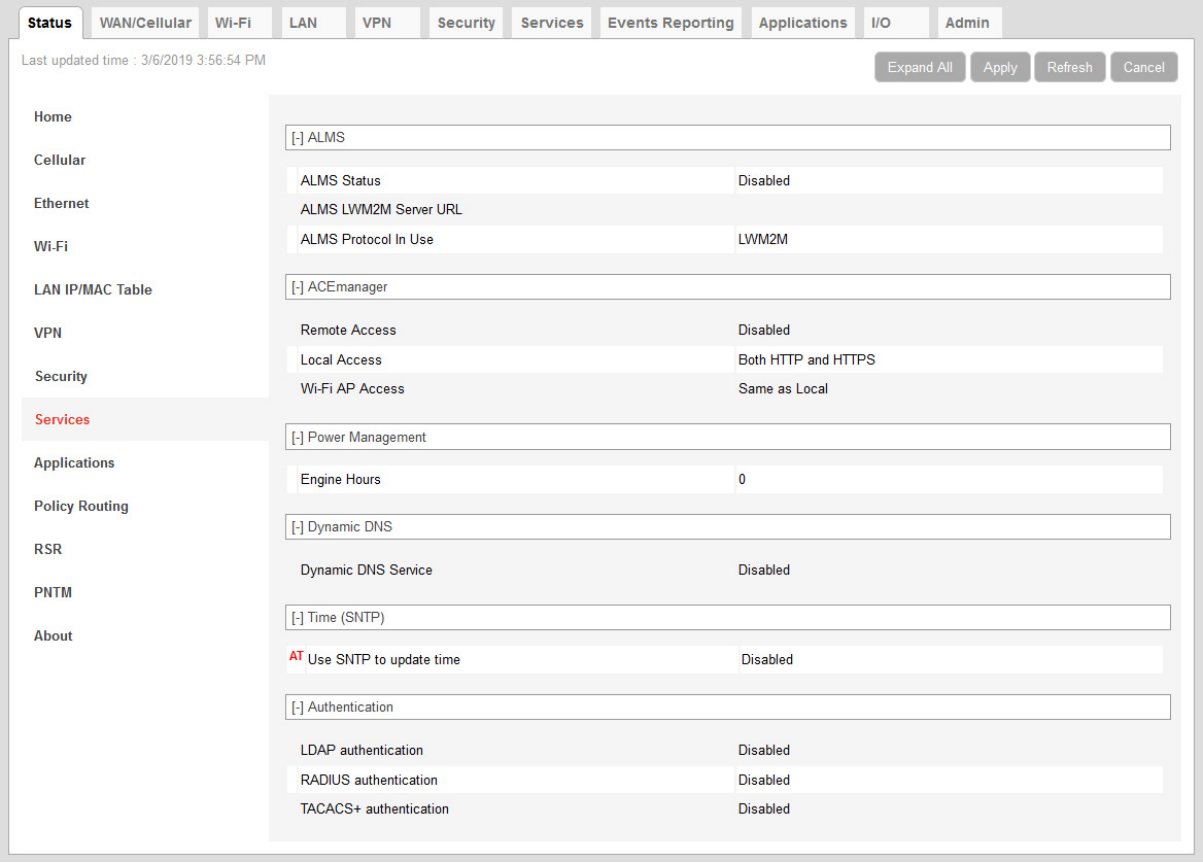
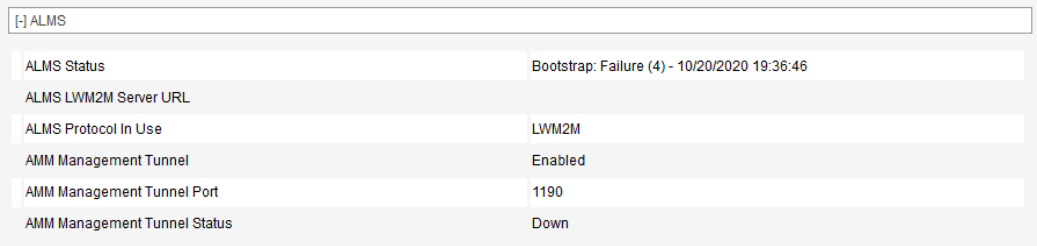


Figure 3-12: ACEmanager: Status > Services

Field	Description
ALMS The status items under ALMS vary according to the services you have enabled. 	
ALMS Status	Status of the connection to the AirLink Management Service For details, see Status on page 237.

Field	Description
ALMS LWM2M Server URL	Shows the LWM2M server URL that is currently in use
ALMS Protocol in Use	Shows the current ALMS Protocol in use (LWM2M or MSCI)
AMM Management Tunnel	Shows the status of the AMM Management Tunnel (Enabled, Disabled).
AMM Management Tunnel Port	Appears when AMM Management Tunnel is enabled. Shows the port used for the OpenVPN connection to AMM (1190 is the default port).
AMM Management Tunnel Status	Appears when AMM Management Tunnel is enabled. Shows whether or not the AMM Management Tunnel is established (Down, Established).
ACEmanager	
Remote Access	ACEmanager remote access (over the WAN link): • Disabled (default) • HTTPS Only • Both HTTP and HTTPS
Local Access	ACEmanager local access (Ethernet, USBnet): • HTTPS Only (default, starting at ALEOS 4.14.0) • Both HTTP and HTTPS
Wi-Fi AP Access	This field only applies to the Wi-Fi model of the LX40. ACEmanager Wi-Fi access: • Same as Local (default) • Disabled
Power Management	
Engine Hours	Time the engine has been running. Depending on your configuration, this is based on: • Voltage on the Power Pin from the vehicle battery (Engine Hours On Voltage Level) • Voltage on the Ignition Sense Pin (Engine Hours Ignition Enable)
Dynamic DNS	
Dynamic DNS Service	Service in use for Dynamic DNS translation
Full Domain Name	If the Dynamic DNS Service is configured to use a 3rd party host, the domain name configured is displayed. If the Dynamic DNS Service is configured to use IP Manager[a], this field does not display.
Time (SNTP)	
Use SNTP to update time	Daily SNTP updates of the system time
Authentication	
LDAP Authentication	Status of the LDAP client: • Enabled • Disabled (default)

Field	Description
RADIUS Authentication	Status of the RADIUS client: • Enabled • Disabled (default)
TACACS+ Authentication	Status of the TACACS+ client: • Enabled • Disabled (default)

a. IP Manager will be deprecated in ALEOS 4.17.0.

Applications

The Applications section of the Status group provides information on the status of the Garmin router and data service.

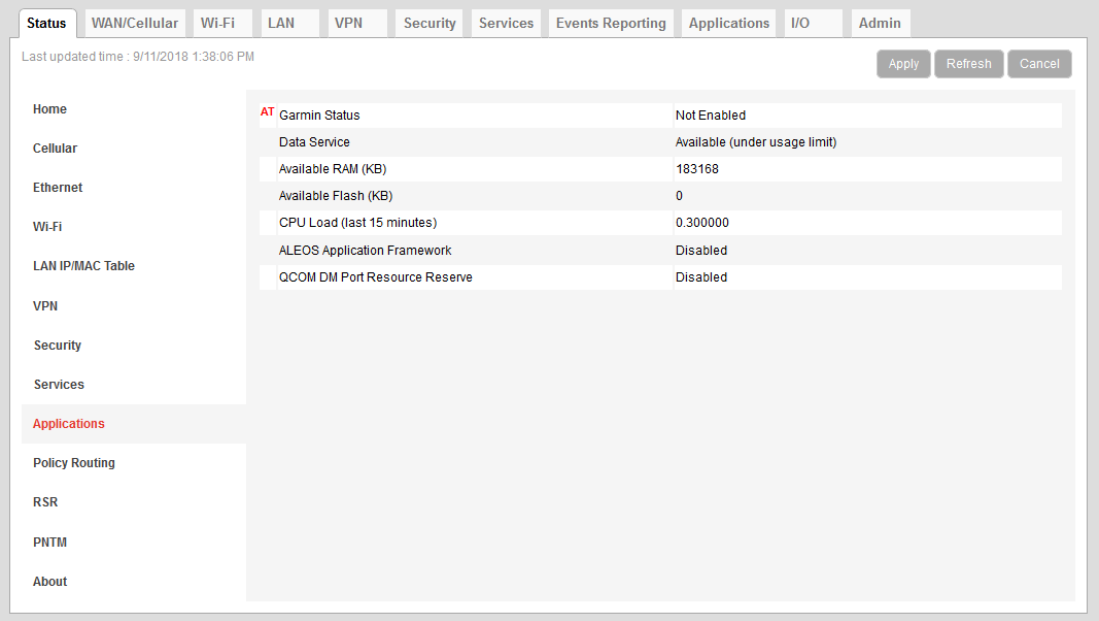


Figure 3-13: ACEmanager: Status > Applications

Field	Description
Data Service	Data Service field displays “Available (under usage limit)” if the configured usage limit has not been exceeded.
Available RAM (KB)	Available RAM in kilobytes (1000 bytes), updated every 30 seconds
Available Flash (KB)	Available Flash on the user partition in kilobytes (1024 bytes), updated every 30 seconds
CPU Load (Last 15 minutes)	CPU load, averaged over the last 15 minutes and updated every 30 seconds The CPU load relates to how many applications are attempting to execute in parallel over the 15-minute period. If the load is greater than 1, some applications are waiting for CPU capacity to become available and may be delayed in launching.
ALEOS Application Framework	Whether ALEOS Application Framework is enabled or disabled
QCOM DM Port Resource Reserve	Reservation of the QCOM DM port: • Disabled (default) • Enabled

Policy Routing

The Policy Routing section of the Status group provides information on the routing policy configuration.

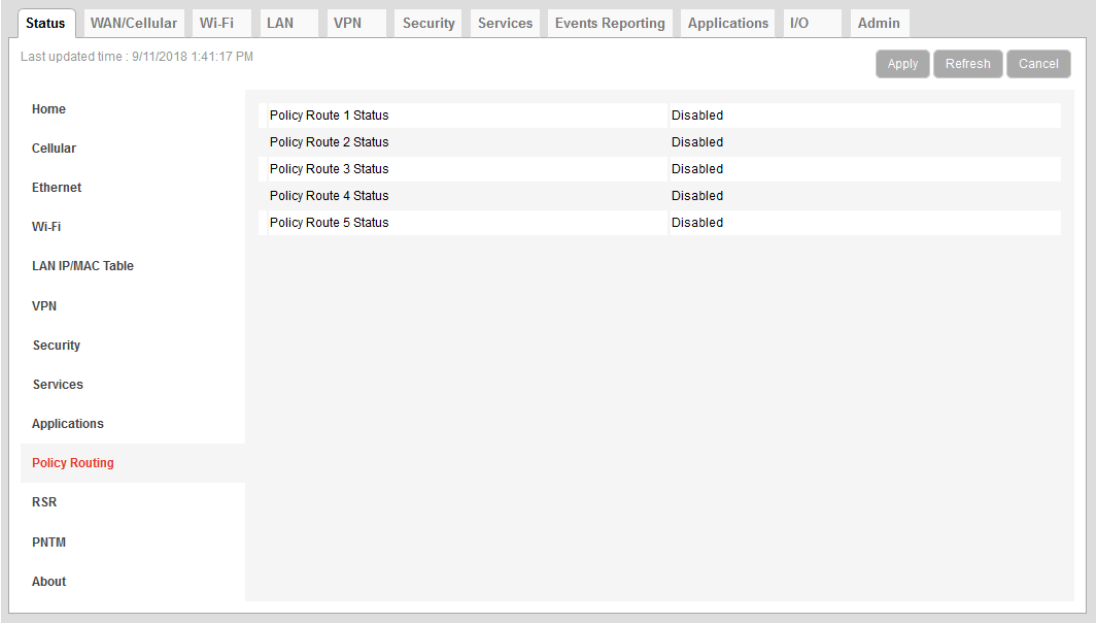


Figure 3-14: ACEmanager: Status > Policy Routing

Field	Description
Policy Route # Status	Displays the Policy Route Status for each of the five configurable policies

RSR (Reliable Static Routing)

The RSR section of the Status group provides basic information about the RSR configuration. For more information, see Reliable Static Routing (RSR) on page 110.

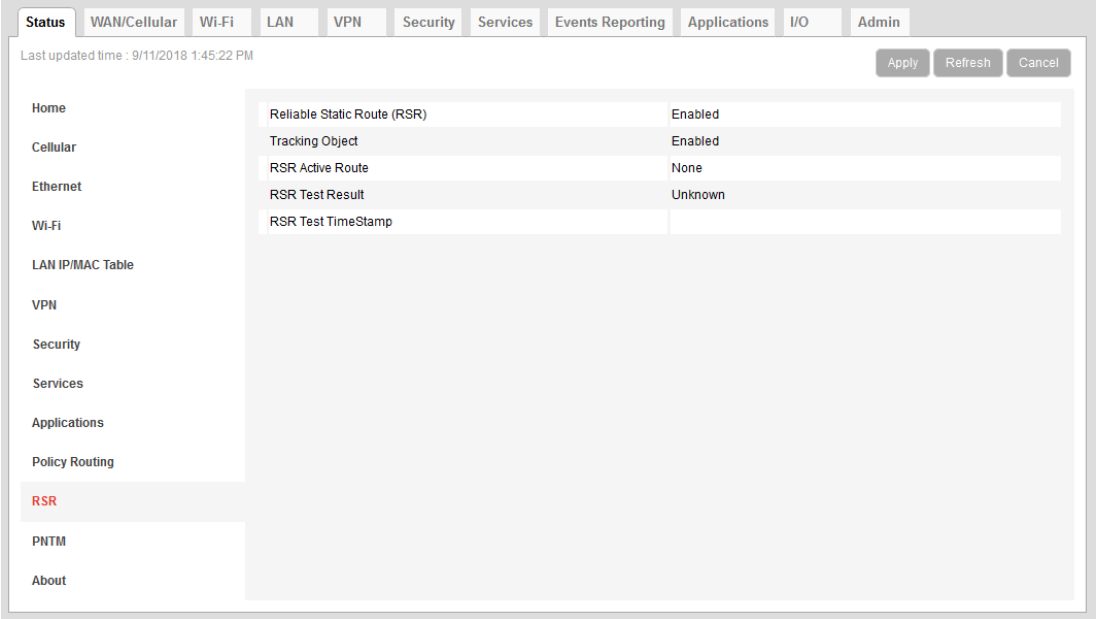


Figure 3-15: ACEmanager: Status > RSR

Field	Description
Reliable Static Route	Status of the Reliable Static Routing feature: • Enabled • Disabled
Tracking Object	Status of the Tracking Object: • Enabled • Disabled
RSR Active Route	Active route for Reliable Static Routing • Primary—Specified network traffic is currently using the configured primary route. • Backup—Specified network traffic is currently using the configured backup route. • None—RSR is not enabled.
RSR Test Result	Result of the most recent Object Tracking test
RSR Test Timestamp	Time of the most recent Object Tracking test

PNTM (Private Network Traffic Management)

The PNTM section of the Status group provides basic information about the PNTM configuration.

Note: PNTM is available only on Verizon Wireless' private network. PNTM status appears only when the LX40 has a Verizon SIM installed.

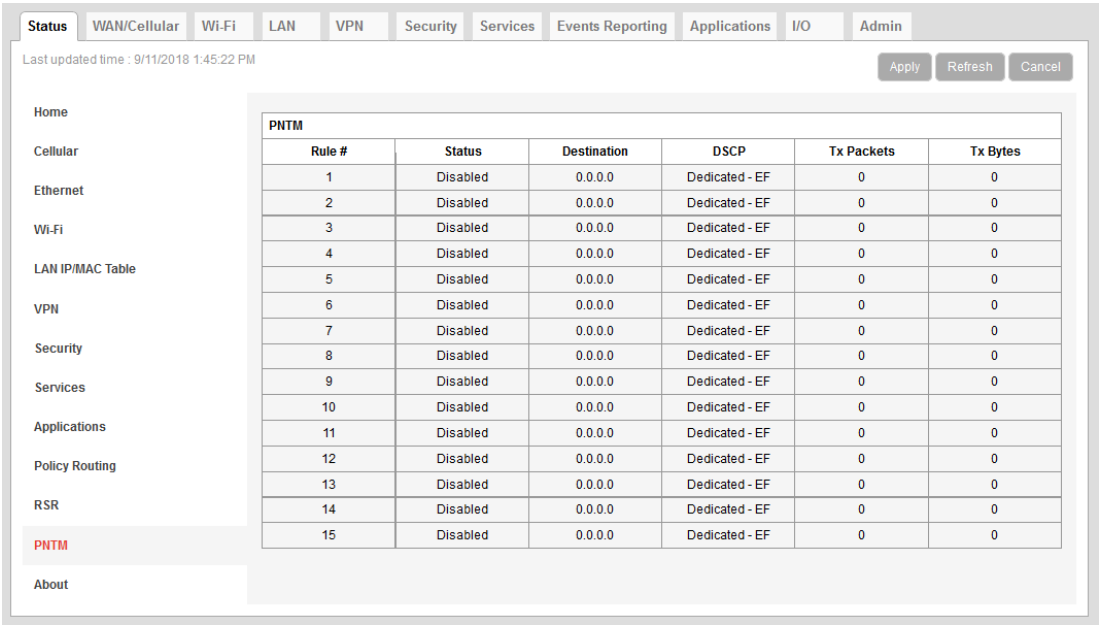


Figure 3-16: ACEmanager: Status > PNTM

Field	Description
Rule #	PNTM rule number
Status	Status of the PNTM rule (Enabled or Disabled)
Destination	The destination IP address
DSCP	The priority level
Tx Packets	Number of packets transmitted
Tx Bytes	Number of bytes transmitted

About

The About section of the Status group provides basic information about the AirLink router.

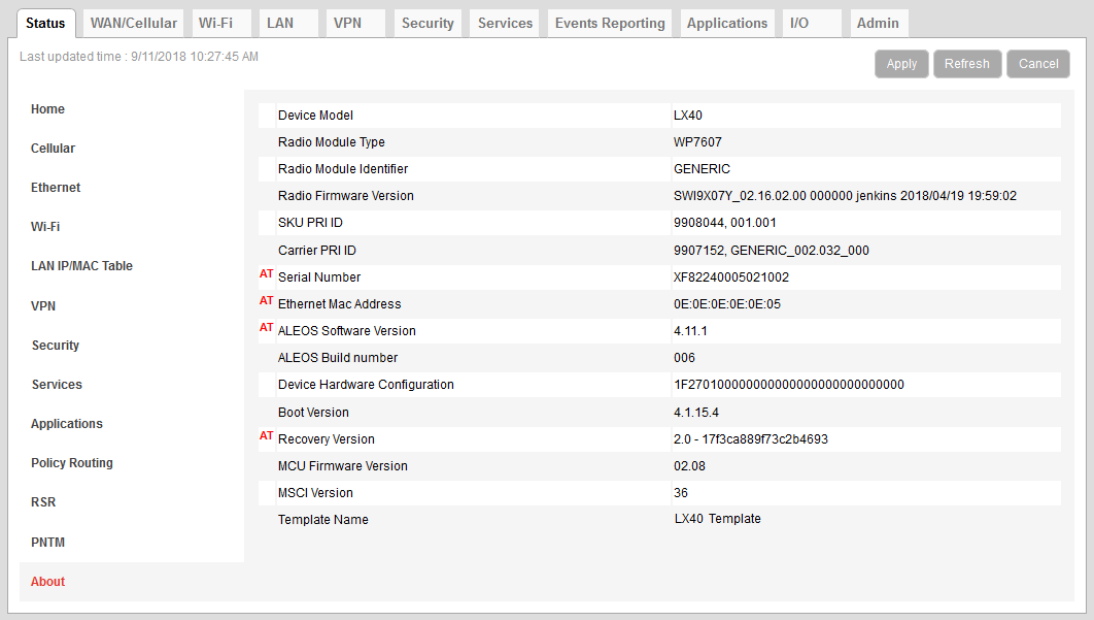


Figure 3-17: ACEmanager: Status > About

Field	Description
Device Model	Model of the router (e.g.,LX40)
Radio Module Type	Model number of the internal radio module (e.g. WP7601, MC7354)
Radio Module Identifier	Identifier for the internal mobile radio module
Radio Firmware Version	Firmware version in the radio module
Radio Hardware Version	Hardware version of the radio module (does not appear for all carriers)
SKU PRI ID	Product Release Instructions ID number
Carrier PRI ID	Product Release Instructions ID number
Serial Number	Serial number used by ALEOS to identify itself for various management applications
Location/RAP Device ID	Device ID used by Location/RAP and other reporting
Ethernet Mac Address	MAC address of the main Ethernet port
ALEOS Software Version	Version of ALEOS software running on the AirLink router
ALEOS Build number	Build number for the ALEOS Software
Device Hardware Configuration	AirLink router's hardware configuration
Boot Version	Version of boot code installed on the router

Field	Description
Recovery Version	Recovery ALEOS version installed
MCU Firmware Version	Version of micro controller unit (MCU) firmware installed on the router
MSCI Version	MSCI version of the ALEOS internal configuration database
Template Name	If you have installed a custom-named template, the name appears here. Otherwise, the field is blank.

4: WAN/Cellular Configuration

The WAN/Cellular tab in ACEmanager allows you to view and modify mobile network connection settings. The settings available depend on the router model and the radio module. This chapter is divided into sections based on the left side menu items.

The first time you power up the router on its home network, it automatically begins the activation/provisioning process and attempts to connect to the network. This process typically takes 5 to 10 minutes. If the router does not automatically connect to the network, see Network Credentials on page 87.

Note: The fields displayed vary depending on the ACEmanager settings.

Monitoring WAN Connections

ALEOS enables you to:

- Monitor each WAN interface—cellular, Ethernet WAN, and Wi-Fi—independently, regardless of which one is active
- Set the priority for each WAN interface

Monitoring confirms whether or not the interface provides connectivity from the router to a ping destination on the WAN. Interface priority enables you to choose which interface has priority and which interface to switch to if the highest-priority interface is not available.

Interface priority checks the link layer connection (for example, in an Ethernet WAN setup, the connection to the router). It does not verify whether or not the router has a WAN connection. With monitoring, you can configure the router to ping a destination on the WAN. If the router does not receive a response to the ping, it attempts to connect to the next highest priority interface. See Figure 4-1 and Table 4-1.

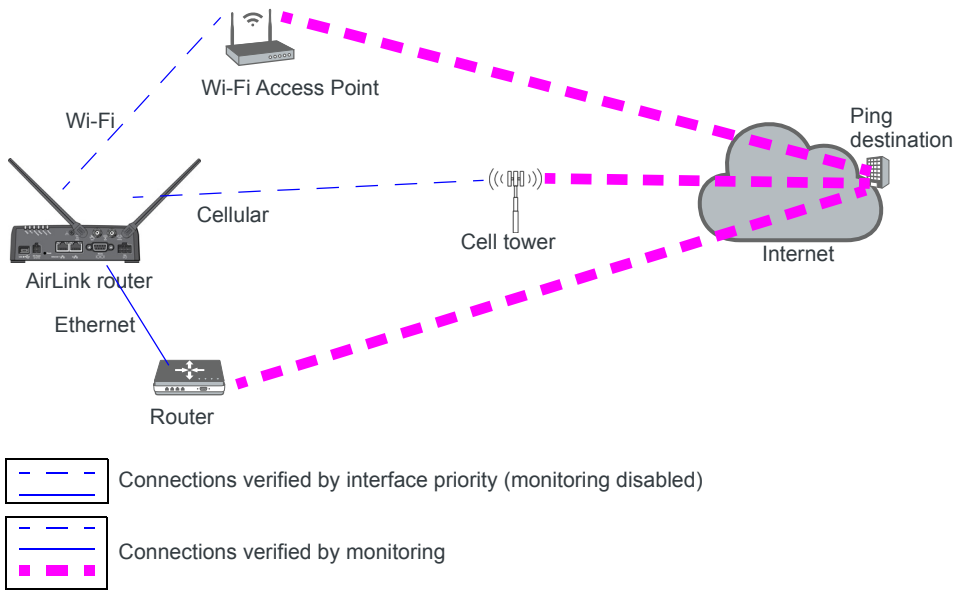


Figure 4-1: Interface priority alone vs. interface priority with monitoring

Table 4-1: Example: Interface Priority with and without Monitoring Enabled

Configured	Interface Priority Configuration Details	What Happens
Interface Priority only	Highest Priority = Ethernet Second Priority = Cellular	• If the router is able to communicate with the router and receive an IP address, it assumes it has WAN connectivity. The router's connection to the WAN is not verified. • If the router is unable to establish communication with the router (i.e. no IP address, cable unplugged) it attempts to connect to the cellular network.
Interface Priority plus Monitoring	Highest Priority = Ethernet Second Priority = Cellular	• If the router receives a response to a ping sent over the Ethernet WAN network, it uses the Ethernet WAN interface. • If the router does not receive a response to a ping sent over the Ethernet WAN, it attempts to connect to the cellular network.

Related Features

The network watchdog is also part of the monitoring process. If none of the WAN interfaces are available, the network watchdog, if configured, reboots the router after the configured period with no WAN connection. If you have Accelerated Interface Scan enabled, ALEOS attempts to regain connectivity on one of the available interfaces until the reboot occurs.

As a final strategy, if the network watchdog fails to re-establish connectivity, there is a backoff mechanism whereby the router waits for 1 hour before starting the network watchdog mechanism again to prevent frequent rebooting.

To configure these options, see the following sections:
- Interface Priority—See Interface Priority on page 73.
- Monitoring Cellular network—See Cellular > Monitor on page 103.
- Monitoring Ethernet WAN network—Ethernet > Monitor on page 107.
- Configuring the Network Watchdog—Network Watchdog on page 74.

General

Interface Priority

This screen allows you to set the WAN interface priority. If multiple available interfaces have the same priority, the order of priority is: Ethernet, and cellular.

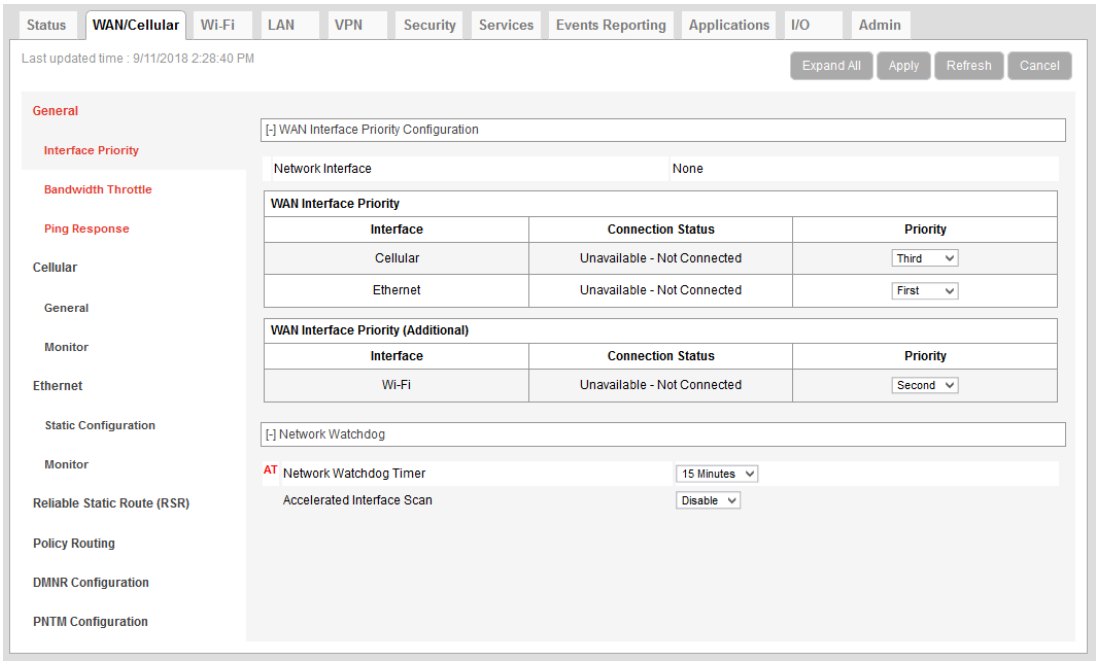


Figure 4-2: ACEmanager: WAN/Cellular > General > Interface Priority

Field	Description
WAN Interface Priority Configuration	
Network Interface	Read-only field that shows the current network interface or None if the router does not have a network connection.

Field	Description
WAN Interface Priority	
Priority	Rank the available WAN interfaces by selecting the order of priority. The highest priority interface will become the default route for IP traffic. The default order of priority is: • Ethernet—First • Cellular— If the highest-priority interface is not available, the router attempts to connect to the second-highest priority interface. Interface priority is evaluated as follows: • Ethernet—Does the AirLink router have an IP address from the connected router? • Cellular—Can the router access the Mobile Network Operator's network? **Tip:** *To ensure end-to-end connectivity (router to destination), enable monitoring for the relevant interfaces. See Cellular > Monitor on page 103, Ethernet > Monitor on page 107.* *Note: Changes to the interface priority take effect without a reboot.*
Network Watchdog	
Network Watchdog Timer	Network Watchdog Timer If there is no WAN connection for the time configured in this field, the router reboots. Options are: • Disable—When this field and the Accelerated Interface Scan field are set to Disable, the router never reboots as a result of lack of network connectivity. • 5 Minutes • 10 Minutes • 15 Minutes (Default) • 30 Minutes • 45 Minutes • 1 Hour
Accelerated Interface Scan	If this option is enabled, the router sends out a ping every 30 seconds while the router is waiting to reboot (according to the Network Watchdog Timer configuration). This option is only available if the network watchdog is enabled.

Bandwidth Throttle

This feature helps you manage your data account by allowing you to configure the AirLink router to restrict the real-time available bandwidth. You can:

- Place limits on traffic (uplink, downlink, or both)
- Allow for burst of traffic on the uplink, downlink, or both, while still maintaining the over-all desired bandwidth limit

Traffic that exceeds the limits is dropped. Status fields keep running tallies of data sent and received and the number of uplink and downlink packets dropped.

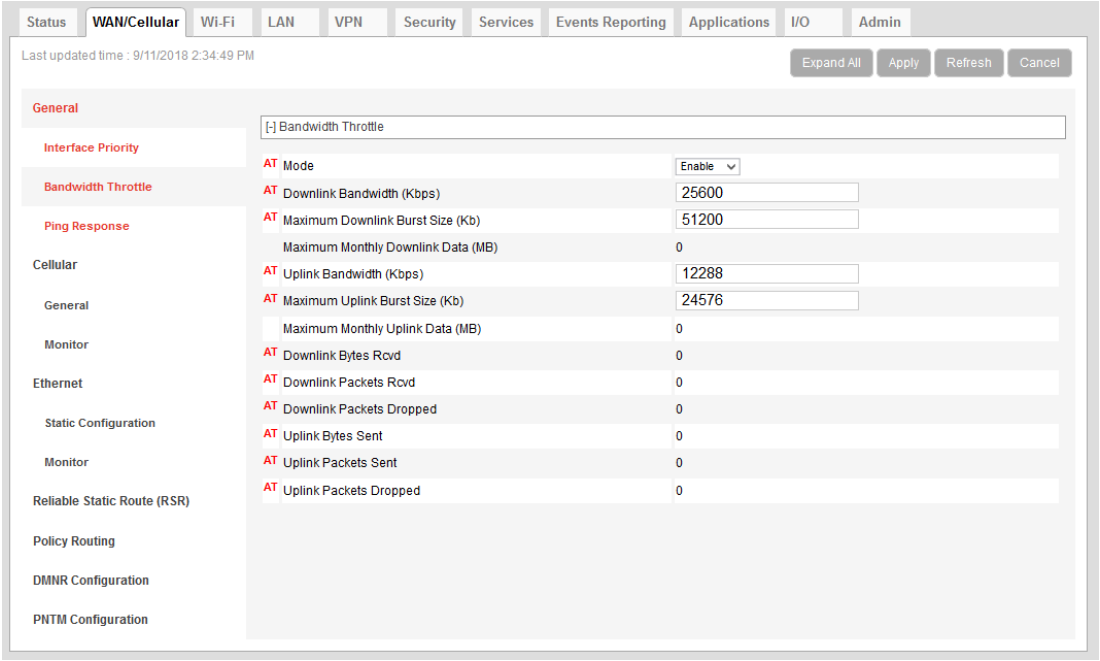


Figure 4-3: ACEmanager: WAN / Cellular > General > Bandwidth Throttle

Field	Description
Bandwidth Throttle	
Mode	Allows you to Enable or Disable the feature Default is Disable.
Downlink Bandwidth (Kbps)	The maximum downlink bandwidth in Kilobits per second (Kbps) This is the long-term bandwidth limit. Options are: • 0–512000 (500 Mbps) Default is 25600. 0 = feature disabled for downlink traffic

Field	Description
Maximum Downlink Burst Size (Kb)	Maximum size for bursts of downlink traffic in Kilobits (Kb) This field allows the AirLink gateway to handle temporary bursts of downlink traffic without dropping packets. When the actual downlink traffic is less than the value configured in the Downlink Bandwidth (Kbps) field, ALEOS collects credits that can be used for bursty traffic. The value in this field is the maximum amount of credit that can be collected. Options are: • 64–512000 (500 Mb) Default is 51200. *Note: Sierra Wireless recommends that the Maximum Downlink Burst Size be set at 2x the value configured in the Downlink Bandwidth (Kbps) field. If the Maximum Downlink Burst Size is set at more than 60x the value configured in the Downlink Bandwidth (Kbps) field, the bandwidth throttle feature is disabled for downlink traffic.*
Maximum Monthly Downlink Data (MB)	An estimate of the maximum monthly downlink data in Megabytes (MB), based on the value set in the Downlink Bandwidth (Kbps). Maximum monthly downlink data (MB) = Downlink bandwidth × 2592000 ÷ 8192 Where: 2592000 is the number of seconds in a month (30 days/month) 1 MB = 1024 KB; 1024 × 8 = 8192 Kb/MB
Uplink Bandwidth (Kbps)	The maximum uplink bandwidth in Kilobits per second (Kbps) This is the long-term bandwidth limit. Options are: • 0–204800 (200 Mbps) Default is 12288. 0 = feature disabled for uplink traffic
Maximum Uplink Burst Size (Kb)	Maximum size for bursts of uplink traffic in Kilobits (Kb) This field allows the AirLink router to handle temporary bursts of uplink traffic without dropping packets. When the actual uplink traffic is less than the value configured in the Uplink Bandwidth (Kbps) field, ALEOS collects credits that can be used for bursty traffic. The value in this field is the maximum amount of credit that can be collected. Options are: • 32–204800 (200 Mb) Default is 24576. *Note: Sierra Wireless recommends that the Maximum Uplink Burst Size be set at 2x the value configured in the Uplink Bandwidth (Kbps) field. If the Maximum Uplink Burst Size is set at more than 60x the value configured in the Uplink Bandwidth (Kbps) field, the bandwidth throttle feature is disabled for uplink traffic.*
Maximum Monthly Uplink Data (MB)	An estimate of the maximum monthly uplink data i in Megabytes (MB), based on the value set in the Uplink Bandwidth (Kbps) Maximum monthly uplink data (MB) = Uplink bandwidth × 2592000 ÷ 8192 Where: 2592000 is the number of seconds in a month (30 days/month) 1 MB = 1024 KB; 1024 × 8 = 8192 Kb/MB
Downlink Bytes Rcvd	Number of downlink bytes received The value is updated every 30 seconds, and is reset to zero on router reboot or reset to factory default settings.

Field	Description
Downlink Packets Rcvd	Number of downlink packets received The value is updated every 30 seconds, and is reset to zero on router reboot or reset to factory default settings.
Downlink Packets Dropped	Number of downlink packets dropped because the limits set in Downlink Bandwidth (Kbps) and Maximum Downlink Burst Size (Kb) have been exceeded The value is updated every 30 seconds, and is reset to zero on router reboot or reset to factory default settings.
Uplink Bytes Sent	Number of uplink bytes sent The value is updated every 30 seconds, and is reset to zero on router reboot or reset to factory default settings.
Uplink Packets Sent	Number of uplink packets sent The value is updated every 30 seconds, and is reset to zero on router reboot or reset to factory default settings.
Uplink Packets Dropped	Number of uplink packets dropped because the limits set in Uplink Bandwidth (Kbps) and Maximum Uplink Burst Size (Kb) have been exceeded The value is updated every 30 seconds, and is reset to zero on router reboot or reset to factory default settings.

Ping Response

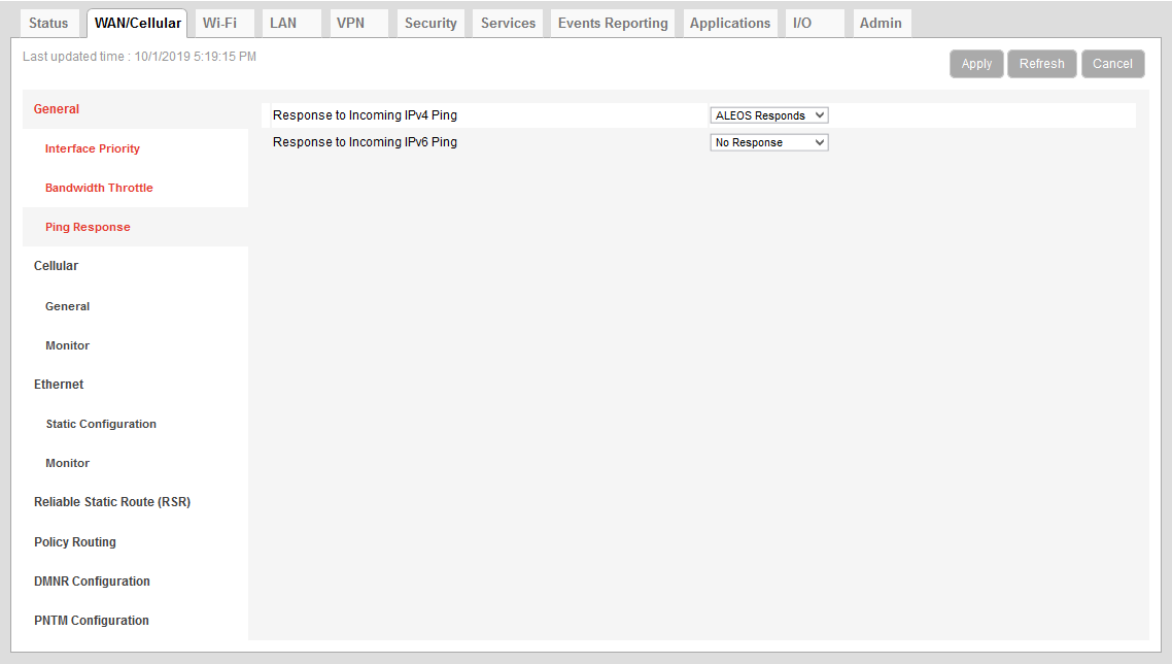


Figure 4-4: ACEmanager: WAN / Cellular > General > Ping Response

Field	Description
Response to Incoming IPv4 Ping	When an IPv4 ping is received by the router from a remote location, the Response to Incoming Ping redirects it to the selected location. • No response: The incoming ping is completely ignored. • ALEOS Responds (default): ALEOS responds to the incoming ping. • Pass to Host: The ping is forwarded to the DMZ host with any response from the host forwarded back to the OTA location. If no host is connected, there is no ping response. *Note: Some Mobile Network Operators may block all ICMP traffic on their network. When ICMP is blocked by the operator, a ping sent to the router from a remote location is not received.*
Response to Incoming IPv6 Ping	When an IPv6 ping is received by the router from a remote location, the Response to Incoming Ping redirects it to the selected location. • No response (default): The incoming ping is completely ignored. • ALEOS Responds: ALEOS responds to the incoming ping. *Note: Some Mobile Network Operators may block all ICMP traffic on their network. When ICMP is blocked by the operator, a ping sent to the router from a remote location is not received.*

Cellular

General

The General Page contains the following sections:

- Multi SIM: Multiple SIM Card Support
- Manual SIM Switching
- Automatic SIM Switching
- Network Credentials
- Band Setting
- Cellular Watchdog
- Advanced

Cellular configuration for Ready to Connect eSIM

The WAN/Cellular > Cellular page is labeled **Cellular (R2C Capable)** for devices that support Sierra Wireless R2C (Ready to Connect) eSIM, as shown in Figure 4-5. For R2C eSIM-capable devices, the Cellular (R2C Capable) page displays Multi-SIM settings for external SIM slots and the eSIM. If your LX40 does not support an R2C eSIM, Multi-SIM settings do not appear. You can find more information about Multi-SIM settings in Multi SIM: Multiple SIM Card Support on page 81, Automatic SIM Switching on page 83 and Multiple SIM Configuration on page 97.

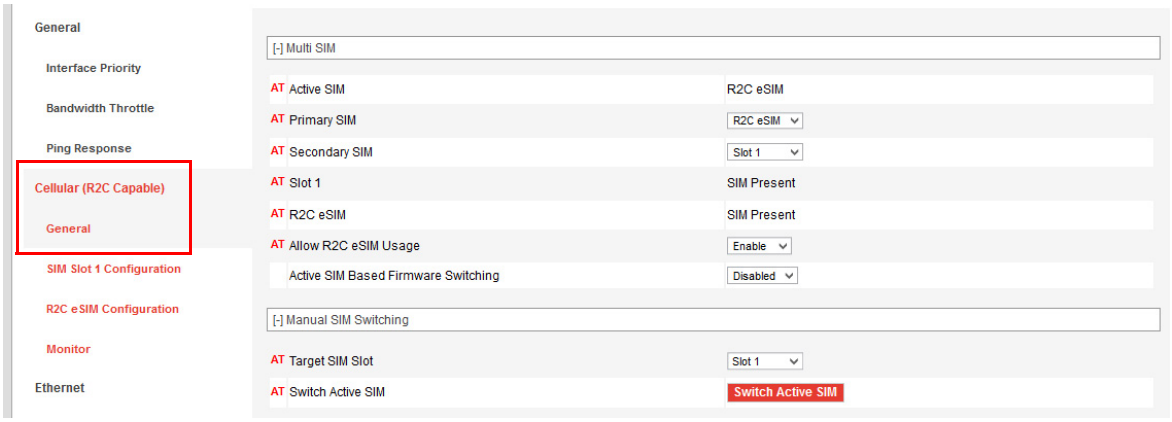


Figure 4-5: ACEmanager WAN/Cellular > Cellular (R2C Capable) > General

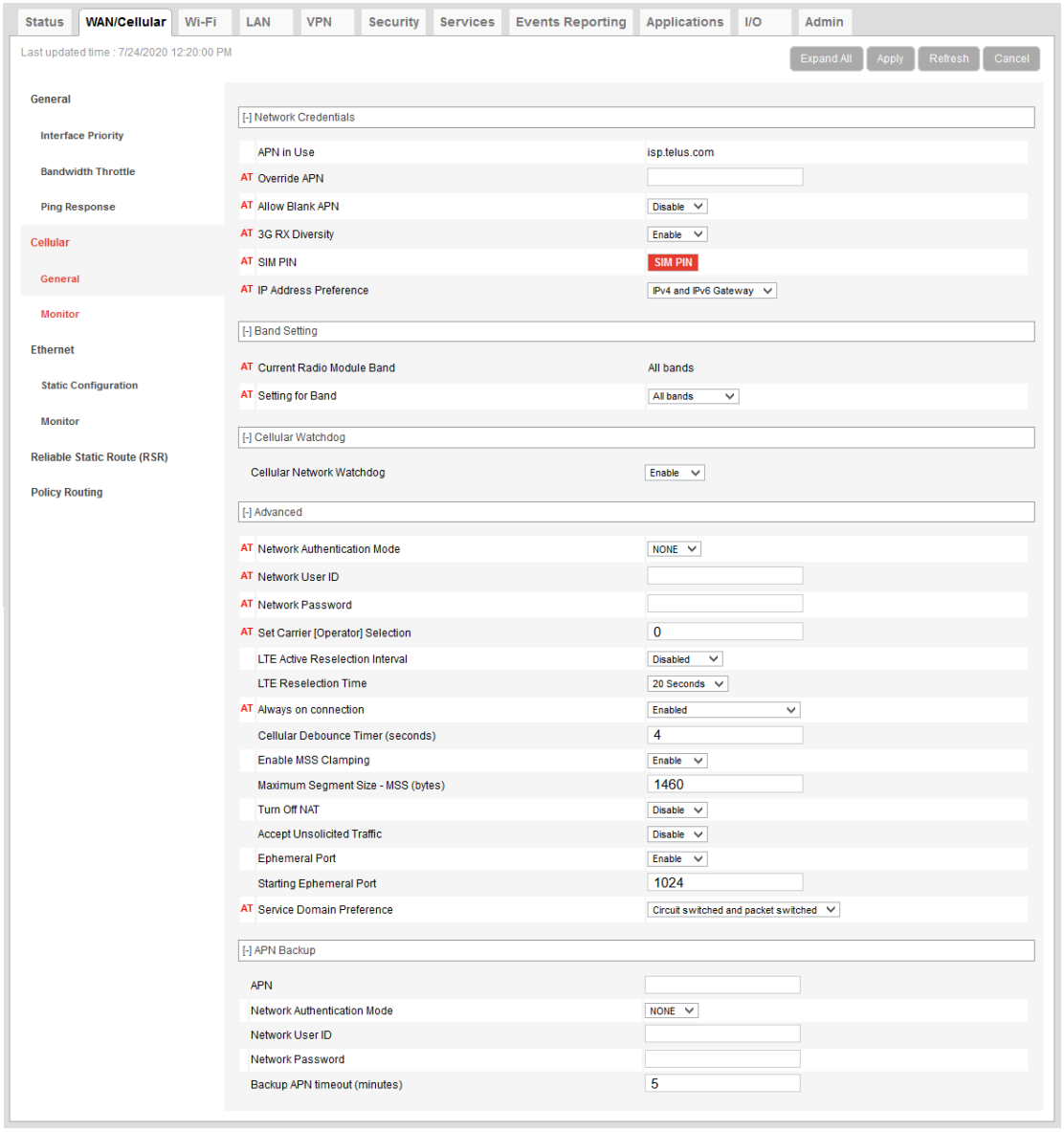


Figure 4-6: ACEmanager: WAN / Cellular > Cellular > General

Multi SIM: Multiple SIM Card Support

The AirLink LX40 is capable of supporting a primary SIM card. Depending on product variant, a Ready to Connect eSIM may also be available. By default, the external SIM card is the primary SIM card. To configure which SIM card is the primary SIM card, see Primary SIM on page 81.

When the LX40 powers up or reboots, it detects how many and which SIM cards are inserted. It connects to the cellular network using the primary SIM card, if present. If there is no SIM card in the primary SIM card slot, the LX40 connects to the mobile network using the secondary SIM card.

You can configure Automatic SIM Switching to respond to changes in the cellular network state, or you can switch SIM cards manually using the Switch Active SIM button or the *SWITCHSIM AT command.

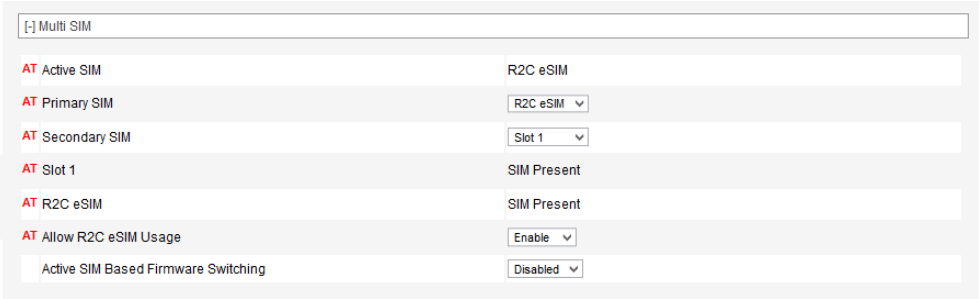


Figure 4-7: ACEmanager: WAN / Cellular > Cellular > General (Multi-SIM R2C Capable)

Field	Description
Multi SIM	
Active SIM	Shows the location of the Active SIM card, i.e. the SIM card account that is used for the current data connection. You can also use the *ACTIVESIM? AT Command to query which SIM card is currently being used for the data connection.
Primary SIM	Select the primary SIM card. If multiple SIM cards are installed, the Primary SIM card is used for network connections. Options are: • Slot 1—The external SIM card is the primary SIM card. (default) • R2C eSIM (if available)—The R2C eSIM is the primary SIM. If there is no SIM card in the primary SIM card slot, the router connects to the cellular network using the secondary SIM. You can also use the *PRIMARYSIM AT Command to query or set the primary SIM card slot.
Secondary SIM	Selects the SIM card slot or R2C eSIM (if available) to be the Secondary SIM card.
Slot 1	Indicates whether or not a SIM card is inserted in SIM slot 1 You can also use the *SIM1PRESENT? AT Command to query the presence of a SIM card in slot 1.

Field	Description
R2C eSIM	Indicates whether or not a Ready to Connect eSIM is present on the LX40.
Allow R2C eSIM Usage	Select whether to allow the LX40 to use the Ready to Connect eSIM for network connections. • Enable (default) • Disable *Note: R2C eSIM is disabled by default in ALEOS 4.13.0, and enabled by default in ALEOS 4.14.0 and later. After updating ALEOS from release 4.13.0 to 4.14.0 or later, the new default setting takes effect only after you reset the LX40 to factory defaults.* *You can also manually enable Allow R2C eSIM Usage after the update, if required. The new setting takes effect after restarting the LX40.*
Active SIM Based Firmware Switching	Enable or disable SIM-based radio module image switching. • Enable—Allows SIM switches to also trigger radio module firmware image switches if installed SIM cards require different radio module firmware. When enabled, the Active Radio Module Firmware status appears, and the range of the Secondary Network Timeout changes from 10–255 minutes to 1–5 hours (1 default). *Note: Enable this feature for fixed (stationary) applications only. Ensure that the Network Watchdog Timer and Cellular Watchdog timer are disabled. Otherwise, the LX40 could reboot and switch back to the primary SIM (which is normal SIM switching behavior) while cellular service is still relying on the secondary network for its connection.* *Note: The firmware image switch can take 5 to 10 minutes. During this time, the WAN interface connection will be interrupted.* • Disabled—The LX40 does not automatically select the appropriate radio module firmware when SIM switching occurs. You can manually switch the active SIM and then manually switch the radio module firmware (see Manually Selecting the Radio Module Firmware on page 358).

Manual SIM Switching

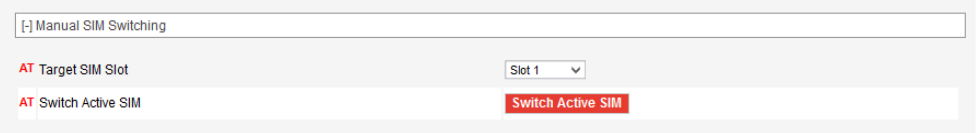


Figure 4-8: ACEmanager: WAN / Cellular > Cellular > General (Multi-SIM R2C Capable)

Field	Description
Target SIM Slot	Select the inactive SIM to be the active SIM card. Options vary according to your product variant, but may include: • Slot 1 • R2C eSIM (if available)
Switch Active SIM	If the LX40 has multiple SIM cards installed, click the Switch Active SIM button to switch to the target SIM card. No reboot is required, but you may need to refresh the screen in order to see the change.

Automatic SIM Switching

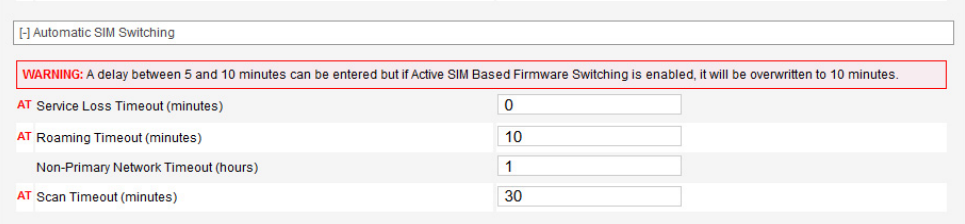


Figure 4-9: ACEmanager: WAN/Cellular > Cellular > General > Automatic SIM Switching

If you have multiple SIM cards installed, you can use the Automatic SIM switching fields to configure the circumstances in which the LX40 automatically switches the SIM card being used for network connectivity. The configurable cases are:

- Service Loss Timeout—switch SIMs if the network's data connection is lost for x minutes
  - If Cellular > Monitor is enabled, the Cellular Monitor ping test determines whether the end-to-end connection is lost. If the ping test fails, the Service Loss Timeout begins.
- Roaming—switch SIMs if roaming for x minutes
- Secondary network—if the router has been connected to the secondary SIM for x minutes, switch to the primary SIM. Use this parameter if you prefer the router to use the primary SIM whenever possible.
- Scan Timeout—After a Service Loss Timeout and an attempted switch to the secondary SIM, the Scan Timeout switches the router back to the primary SIM if no connection is made during the timeout. Similarly, if the router does not connect to the primary cellular network after startup or reboot, the Scan Timeout triggers the router to use the secondary SIM.

These settings work together, so it's important to plan how you want automatic SIM switching to work before configuring these fields.

Note: Sierra Wireless recommends that whenever you configure automatic SIM switching, you include a setting for Scan Timeout. This helps to ensure that if the desired network is not available, the router maintains a data connection by attempting to connect to the other network.

If you intend to use Active SIM Based Firmware Switching, disable the Scan Timeout by setting it to 0. This ensures the firmware image switch does not take place if the router cannot connect to the secondary network.

Service loss example

In this example, the desired outcome is to use the primary SIM (for example, a less expensive network connection) whenever possible, but if necessary, to switch to the secondary SIM to maintain the data connection.

The Network Watchdog and Cellular Watchdog are both disabled or configured for a longer interval than the Service Loss Timeout, which enables SIM switching to persist. The watchdogs may prompt the router to reboot, which causes the router to revert to using the primary SIM card.

Note: If Active SIM Based Firmware Switching is enabled, switching to the secondary SIM also loads the appropriate radio module firmware for the secondary SIM card. As well, if Active SIM Based Firmware Switching is enabled, the Secondary Network Timeout changes from minutes (as shown in Figure 4-10) to hours.

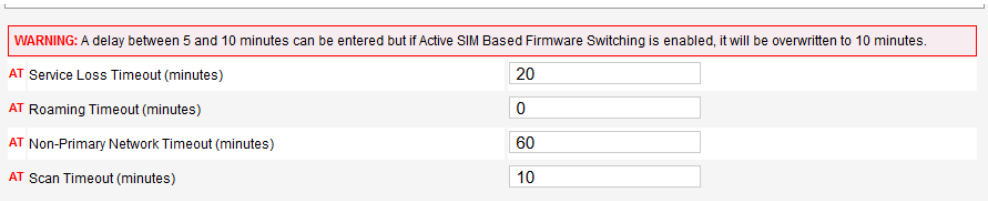


Figure 4-10: ACEmanager: WAN/Cellular > Automatic SIM Switching

With this configuration:

- If the LX40 loses the data connection on the primary SIM for 20 minutes, it switches to the secondary SIM.

  Note: If Active SIM Based Firmware Switching is enabled, switching to the secondary SIM also loads the appropriate radio module firmware for the secondary SIM card.

- If the LX40 connects to the network using the secondary SIM, it uses the secondary SIM for 60 minutes and then attempts again to connect to the primary SIM's network for another 10 minutes.
- If the LX40 cannot connect to the secondary network for 10 minutes (the Scan Timeout), it attempts to reconnect using the primary SIM for another 20 minutes.

Note: The "service loss" used for automatic SIM switching is based on network information about the cellular connection. You can also use the Cellular Monitor to trigger the change in cellular network state. This enhances your network monitoring capability by sending pings to a configured IP address to confirm your end-to-end connection. If the ping test fails, then the Service Loss Timeout begins, followed by the SIM switch. To configure the Cellular Monitor, see Cellular > Monitor on page 103.

Roaming example

In this example, the desired outcome is to avoid roaming as much as possible, but if the roaming network is the only one available, to maintain a data connection.

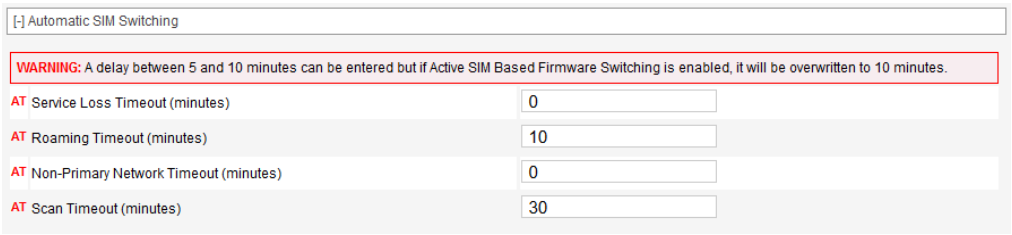


Figure 4-11: ACEmanager: WAN/Cellular > Automatic SIM Switching (Roaming example)

With this configuration:

- If the LX40 is roaming, for example, on the primary SIM for 10 minutes, it switches to the secondary SIM.
- If the secondary SIM's network is not immediately available, the LX40 continues to attempt to connect for 30 minutes. The LX40 switches to the secondary SIM's network as soon as it becomes available. If, after 30 minutes, the LX40 is still unable to establish a data connection with the secondary SIM, the LX40 switches back to the primary SIM.

Automatic SIM Switching	
Service Loss Timeout (minutes)	If the data connection is lost for more than the configured time (in minutes), the router switches to the inactive SIM card. Options are: • 0—The feature is disabled (default) • 10–255 (5–255 if Active SIM Based Firmware Switching is disabled) You can also use the *MSNOSERVICETOUT AT Command to configure or query this setting. **Tip:** *If you prefer to use the Primary SIM account as much as possible, configure the Non-Primary Network Timeout (minutes)/(hours) and the Scan Timeout (minutes) so the router will periodically check, and switch back to the Primary network when it becomes available.*
Roaming Timeout (minutes)	If the router has been roaming for longer than the time (in minutes) configured in this field, it automatically switches to the inactive SIM card. Options are: • 0—The feature is disabled (default) • 10–255 You can also use the *MSROAMINGTOUT AT Command to configure or query this setting. This option is useful if the router frequently crosses an international border where there are different Mobile Network Operators in each country. You can set up the router with two SIM cards—one for a Mobile Network Operator in each country. The router then automatically switches to the SIM that is not roaming (after a configured delay) whenever the router crosses the border.

Non-Primary Network Timeout (minutes)/ (hours)	If the router has been connected to a network using a secondary SIM card for the time configured in this field (in minutes), it automatically switches to the primary SIM card. This allows you to configure the router to fall back to the primary network if, for example, the data rate is better on the primary network. Note that the LX40 will switch SIM cards again if the Service Loss Timeout (minutes) threshold is met again. Example: After switching back to the primary SIM card (with the Service Loss Timeout set to 30), if there is a service loss for 30 minutes, the SIM will switch to the non-primary SIM card and the Non-Primary Network Timeout begins again. Options are: • 0—The feature is disabled (default) • 10–255 (minutes) • 0–255 (hours, see **Note** below) *Note: If Active SIM Based Firmware Switching is enabled, the range changes to 0–255 hours (default is 0, disabled).* You can also use the *MSSECONDARYTOUT AT Command to configure or query this setting.
Scan Timeout (minutes)	If the router has been trying to connect to a network for more than the configured time (in minutes), the router switches to the other SIM card. Options are: • 0—The feature is disabled (default) • 10–255 You can also use the *MSSCANTOUT AT Command to configure or query this setting. *Note: If you are using Automatic SIM switching, this field should always be configured.* *Note: The automatic SIM switch is initiated if the router is unable to establish a data connection or if the SIM card is unable to register on the network. If this is a new SIM card, check that the APN in Use is correct and that it is able to register on the network.*

Network Credentials

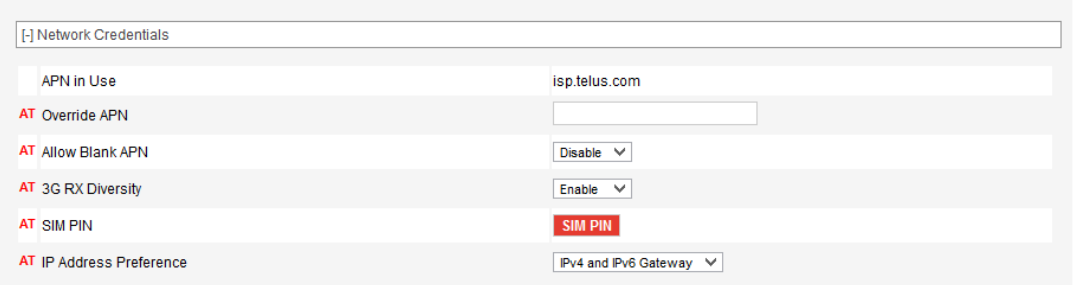


Figure 4-12: ACEmanager: WAN / Cellular > Cellular > General > Network Credentials

Network Credentials	
APN in Use	The APN in use for the current mobile network connection. When you power on the AirLink router, the APN the router is using for authentication on the mobile network is displayed. • If a user-entered Override APN is configured, the Override APN is displayed. • If there is no Override APN configured, an automatically selected APN is displayed. • When Allow Blank APN is enabled, “APN Unknown - Chosen by Network” appears. If ALEOS is unable to find the appropriate APN to use (No APN found), contact your Mobile Network Operator for the APN and enter it in the Override APN field.
Override APN	The APN entered in this field takes priority over the automatically selected APN or a blank APN. 1. Enter the APN in this field (maximum 100 characters). 2. Click Apply. 3. Click Reboot. *Note: If you reset the router to factory defaults, you have the option to preserve the custom APN, if entered. See Reset Configuration on page 340.* *Note: For routers on the Sprint network, the correct APN is automatically sent to the router. Leave this field blank unless specifically asked by Sprint to enter an APN.*
Allow Blank APN	Allows connection with a blank APN for supported networks. *Note: ALEOS will only use a blank APN if both Allow Blank APN is enabled and the Override APN field is blank.* Options are: • Enable—ALEOS attempts to connect to the network and acquire an APN from the network. • Disable (default)—ALEOS automatically selects an APN, or uses a manually entered Override APN.

RX Diversity (3G only)	Allows two antennas to provide a more reliable connection • Disable • Enable (default) If you are not using a diversity antenna, diversity should be disabled. *Note: Two antennas are required when connecting to an LTE network.*
SIM PIN	Click this button to configure the PIN for the SIM card. For more information, see SIM PIN on page 99.
IP Address Preference	Use this field to select the preferred IP Address version. To use IPv6, it must be supported by your Mobile Network Operator and your account (SIM and APN). Options are: • IPv4—When the router connects to the mobile network, it is assigned only an IPv4 address. • IPv4 and IPv6 Gateway—When the router connects to the mobile network, it is assigned an IPv4 address and an IPv6 address. The IPv6 address and routing information are passed to the LAN clients so that they can acquire IPv6 addresses and pass IPv6 traffic over the mobile network. *Note: The LAN client must have IPv6 enabled and must be configured to use SLAAC (Stateless address auto configuration). The IPv6 address and routing information, and DNS servers are passed to the LAN clients via SLAAC.* *Note: Other than routing IPv6 packets between the WAN and the LAN, no other AirLink features (except VPN) are supported on IPv6.* The IP addresses are displayed on the Status > Home screen. *Note: For more information, see IPv6 Support on page 96.*

Band Setting

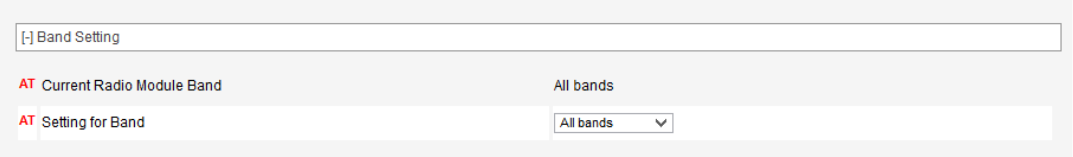


Figure 4-13: ACEmanager: WAN / Cellular > Cellular > General > Network Credentials

Current Radio Module Band	Band reported by the radio module as the one currently in use.
Setting for Band	For setting band details for your router, see Setting for Band on page 504.

Cellular Watchdog

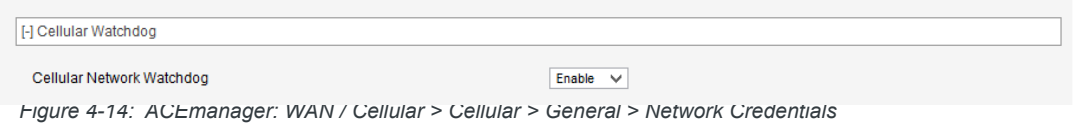


Figure 4-14: ACEmanager: WAN / Cellular > Cellular > General > Network Credentials

Cellular Network Watchdog	Cellular Network Watchdog Options are: • Enable—When this Watchdog is enabled, the router reboots after several failed attempts to attach to the mobile network. (default) • Disable—When this field and the Network Watchdog Timer field are both set to Disable, the router never reboots as a result of lack of network connectivity.

Advanced

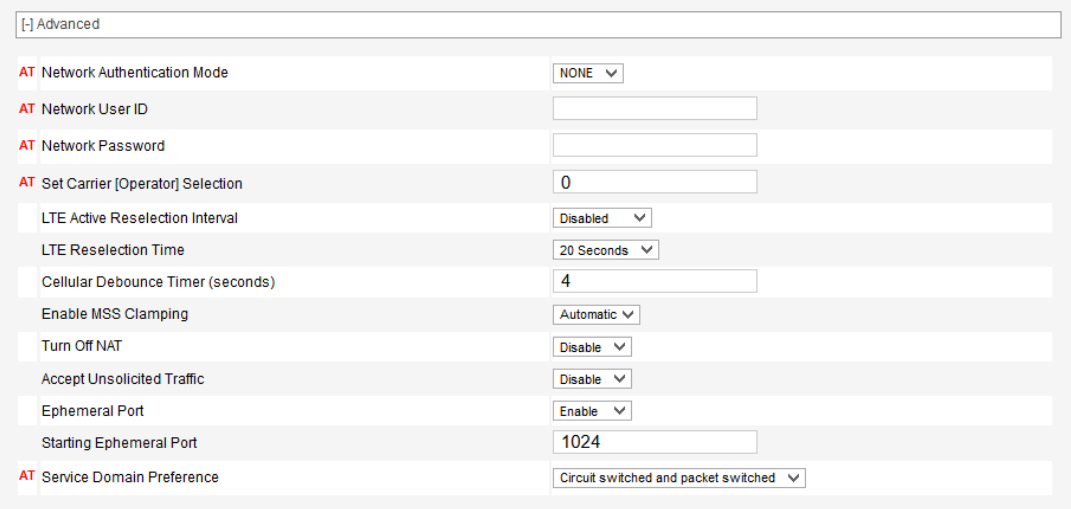
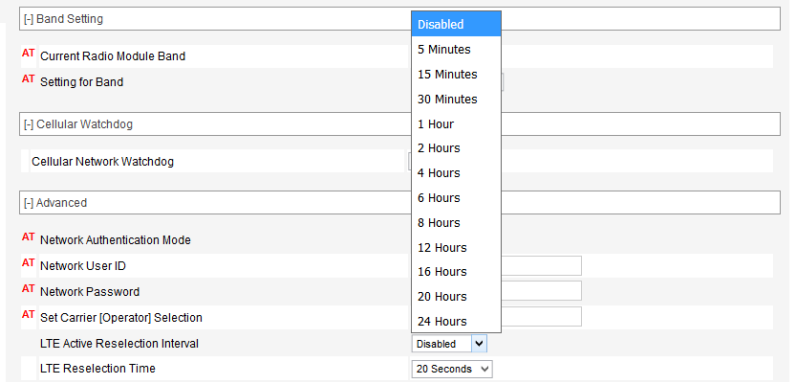


Figure 4-15: ACEmanager: WAN / Cellular > Cellular > General > Advanced

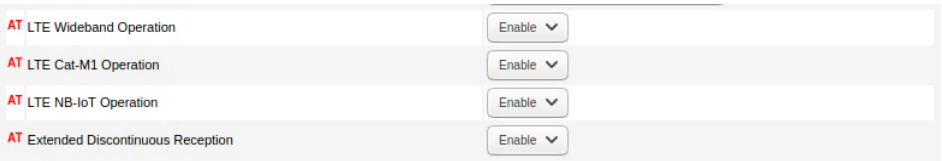
Network Authentication Mode	Specifies the authentication method to use when connecting to a mobile network Options are: • NONE • CHAP • PAP (default)
Network User ID	Network User ID The login that is used to log in to the mobile network, when required. • Maximum 128 characters
Network Password	Network Password is the password that, when required, is used to log in to the mobile network. • Maximum 30 characters
Set Carrier (Operator) Selection	Manually specify an operator. Enter the desired parameters in the following format: mode[,format[,oper]] • mode= 0: Automatic—any affiliated carrier [default] • mode= 1: Manual—use only the operator <oper> specified • mode= 4: Manual/automatic—if manual selection fails, goes to automatic mode • format= 0: Alphanumeric (“name”) • format= 2: Numeric • oper=”name” See also +COPS on page 428 and *NETOP? on page 413. Note: Not all carriers or accounts allow specifying the operator. If the carrier doesn't support it, this command may appear to fail.

LTE Active Reselection Interval	This feature assists the router to revert back to an LTE network if one becomes available.
	When an LTE AirLink router is connected to a non-LTE network, it may not hand over to an LTE network when one becomes available if data is being continuously transmitted or received.
	When the LTE Active Reselection Interval timer is configured, the AirLink router temporarily halts uplink data for the length of time configured in the LTE Reselection Time field if the router is connected to a non-LTE network. This allows the radio module to go idle and reconnect to an LTE network, if one is available.
	Note:
	• *If the LTE signal that the AirLink router receives is weaker than the HSPA+ signal, the router may not revert to LTE, depending on the local network characteristics.*
	• *This feature should be disabled:*
	  • *If the SIM in the router is not provisioned to work on an LTE network*
	  • *If the router is roaming*
	To use this feature:
	1. From the drop-down menu in the LTE Active Reselection Interval field, select how long the AirLink router is not on an LTE network before the reselection process begins. (Disabled is the default.)
	 
	2. Click Apply.
	3. Reboot the router.

LTE Reselection Time	Use this field to set how long the router radio should attempt to find and connect to an LTE network (i.e. how long the reselection process described in LTE Active Reselection Interval should last). Data for transmission during the reselection process is buffered. Options are: • 15 seconds • 20 seconds (default) • 25 seconds • 30 seconds

Always on connection	This field is intended for International routers on the Vodafone network.
	This option allows you to configure the AirLink router to use minimal wireless network resources when there has not been any outgoing WAN network traffic.
	• Enabled—The AirLink router maintains a mobile network data connection. (default)
	• Disabled - Connect on traffic—The AirLink router only establishes a mobile network data connection:
	  • When there is network traffic
	  • If SMS Wakeup is configured and the router receives the specified type of SMS (For information on configuring SMS Wakeup, see SMS Wakeup on page 268.)
	*Note: You can also use AT*RADIO_CONNECT to switch the mobile network connection on and off. See *RADIO_CONNECT on page 436.*

Connection Timeout (minutes)	This field is intended for International routers on the Vodafone network. This field only appears when Always on connection is set to Disabled - Connect on traffic, and defines the timeout period for Always on connection. If there is no outgoing packet through the WAN interface during the period set in this field (in minutes), the AirLink router disables the WAN connection. This timer is triggered after every outgoing packet, except AT*IPPINGADDR keep alive packets. • 2–65535 minutes (default is 2) *Note: You can also use AT*TRAFWUPTOUT to set the timeout period. See *TRAFWUPTOUT on page 440.*
Cellular Debounce Timer (seconds)	Use this field to configure how long it takes for the router to respond after cellular service is lost. This timer can prevent service interruptions caused by brief cellular network outages. • 0–20 seconds (default is 4)
Enable MSS Clamping	MSS (Maximum TCP Segment Size) Clamping controls the maximum packet size used for TCP connections between a local (LAN-side) host and a remote host over the cellular WAN interface. MSS Clamping helps avoid possible issues with sending and receiving large TCP packets over the cellular network when other standard MTU mechanisms do not appear to be working with your installation. Options are: • Manual—MSS is clamped to the specified maximum value bi-directionally for all inbound (remote-to-LAN) and outbound (LAN-to-remote) TCP connections when the TCP session is established using the cellular interface. • Automatic (default)—MSS is clamped at 40 bytes (20 byte IP header + 20 byte TCP header) less than the MTU of the cellular interface. • Disable
Maximum Segment Size - MSS (bytes)	When MSS Clamping is set to Manual, set the Maximum TCP Segment Size • 256–1460 bytes (default is 1460)
Turn Off NAT	When enabled, ALEOS routes outbound packets from connected devices without performing NAT on them. For example, when a connected device that has an IP address of 192.168.13.100 sends data to a remote destination, the outbound packets have a source IP of 192.168.13.100. If you are configuring RADIUS Framed Route, set this field to Enable. For more information, see RADIUS Framed Route on page 168. In most other cases, it is best to leave this field at the default setting (Disable).

Accept Unsolicited Traffic	If you are configuring RADIUS Framed Route, set this field to Enable. For more information, see RADIUS Framed Route on page 168. In most other cases, it is best to leave this field at the default setting (Disable).
Ephemeral Port	Enable or Disable the Ephemeral Port feature • Disable—The source port in packets the AirLink router receives from a connected device and then sends out is not changed. The source port assigned to the packet when it was created in the customer's connected device is used. (default) • Enable—The AirLink router changes the source port on all outgoing NATed UDP packets, using the range configured in the Starting Ephemeral Port field.
Starting Ephemeral Port	This field appears only when the Ephemeral Port field is set to Enable. It allows you to set the starting port range used by a LAN device as the source port for over-the-air (OTA) destinations using NAT. *Note: This field is intended for advanced users only. In most cases, use the default value.* The NAT for the LAN device uses a range of 1000 ports as source ports for OTA destinations beginning with the configured Ephemeral port. Options are: • 1024 (default)–64535 If you have a network with multiple LAN devices that are sending data to the same server and the server is not receiving data from one (or more) of the devices, it may be because the Mobile Network Operator has a WAN firewall that is blocking the ports used by the NAT for over-the-air (OTA) destinations. This field enables you to avoid the blocked ports by changing the source port range used to send the data. For example, some users have found that changing the starting port to 42000 has resolved the issue. *Note: The ephemeral port setting does not affect any outbound traffic initiated by the device such as Location reports, Events Reporting, Device Initiated ALMS connection, etc.*
Service Domain Preference	Controls whether the LTE radio attaches to the cellular network in Circuit switched mode (CS-Only), Packet Switched mode (PS-Only), or Circuit switched and Packet switched modes (CS+PS). Leaving at the default setting is recommended. Changing the setting to Packet switched may resolve connection issues related to Circuit switched mode. Options are: • Circuit switched • Packet switched • Circuit switched and packet switched (default)
Cellular IOT Preferences The following settings appear for WP7702-equipped devices only. Sierra Wireless recommends leaving these settings at default unless you experience problems with your application. 	
LTE Wideband Operation	Appears only for WP7702-equipped devices. Enables or disables LTE Wideband operation. Options are: • Enable (default) • Disable

LTE Cat-M1 Operation	Appears only for WP7702-equipped devices. Enables or disables LTE Cat-M1 operation. Options are: • Enable (default) • Disable
LTE NB-IOT Operation	Appears only for WP7702-equipped devices. Enables or disables LTE NB-IOT operation. When enabled, Sierra Wireless recommends disabling LTE Cat-M1 and LTE Wideband operation. Options are: • Enable (default) • Disable
Extended Discontinuous Reception	Appears only for WP7702-equipped devices. Enables or disables extended discontinuous reception (eDRX or extended sleep mode). By default, the WP7702 radio is configured to support an extended sleep mode (eDRX enabled) when idle to conserve power. However, if using a static IP, eDRX prevents the radio from responding to inbound connection requests. For static IP scenarios, it is necessary to disable eDRX to allow inbound connections, albeit at the expense of higher average current consumption. Options are: • Enable (default) • Disable

APN Backup

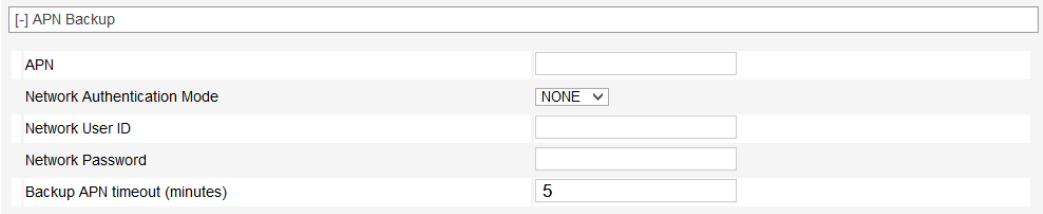


Figure 4-16: ACEmanager: WAN / Cellular > Cellular > General > APN Backup

APN Backup

This feature enables you to configure a backup APN to be used as a backup network connection mechanism, only if the primary APN is not available. When it is enabled, the LX40 connects to the backup APN only if it is unable to connect to the primary APN.

Note: Do not configure a backup APN for routers on the Sprint network. For more information, contact Sprint.

APN	Enter the backup APN (maximum 100 characters).
Network Authentication Mode	Specifies the authentication method to use when connecting to a mobile network Options are: • NONE • CHAP • PAP (default)
Network User ID	Network User ID The login that is used to log in to the mobile network, when required. • Maximum 128 characters
Network Password	Network Password is the password that, when required, is used to log in to the mobile network. • Maximum 30 characters
Backup APN timeout (minutes)	Configures how long the LX40 attempts to connect using the primary APN at startup. If no connection is established after the timeout, the LX40 attempts to connect using the backup APN. If there is still no connection, the cellular watchdog reboots the LX40. Range: 3 to 255 (5 default)

IPv6 Support

IPv6 support is available for cellular network connections. The LAN connections can be Ethernet or Wi-Fi (depending on your router model), but the WAN connection must be an active cellular connection.

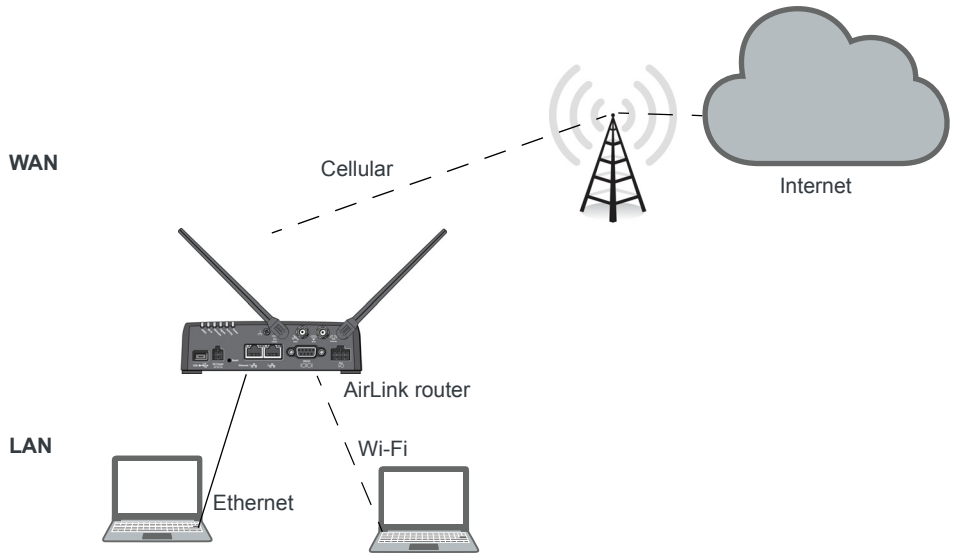


Figure 4-17: IPv6 support network

To configure the LX40 to use IPv6 addressing:

1. In ACEmanager, go to the Status > Home screen.
2. If the Network Interface field value is anything other than Cellular, go to the WAN/Cellular screen > WAN Interface Priority Configuration section and set the priority for Cellular to First.
3. Reboot the router.

IPv6 Technical Implementation Details

Sierra Wireless IPv6 supports:

- Linux operating system
- SLAAC addressing for clients
- Router advertisement for the IPv6 DNS server addresses

Note: Make sure rdnssd daemon is installed on your LAN client to take the IPv6 DNS server addresses.

Troubleshooting tip: If you experience problems with Internet access, try setting the MTU for LAN clients to 1280.

Multiple SIM Configuration

To configure multiple SIM cards:

1. In ACEmanager, go to WAN/Cellular, and from the left menu, select either SIM Slot 1 Configuration or R2C eSIM Configuration.

   The following examples show how to configure SIM Slot 1. The steps are the same for other SIM slots.

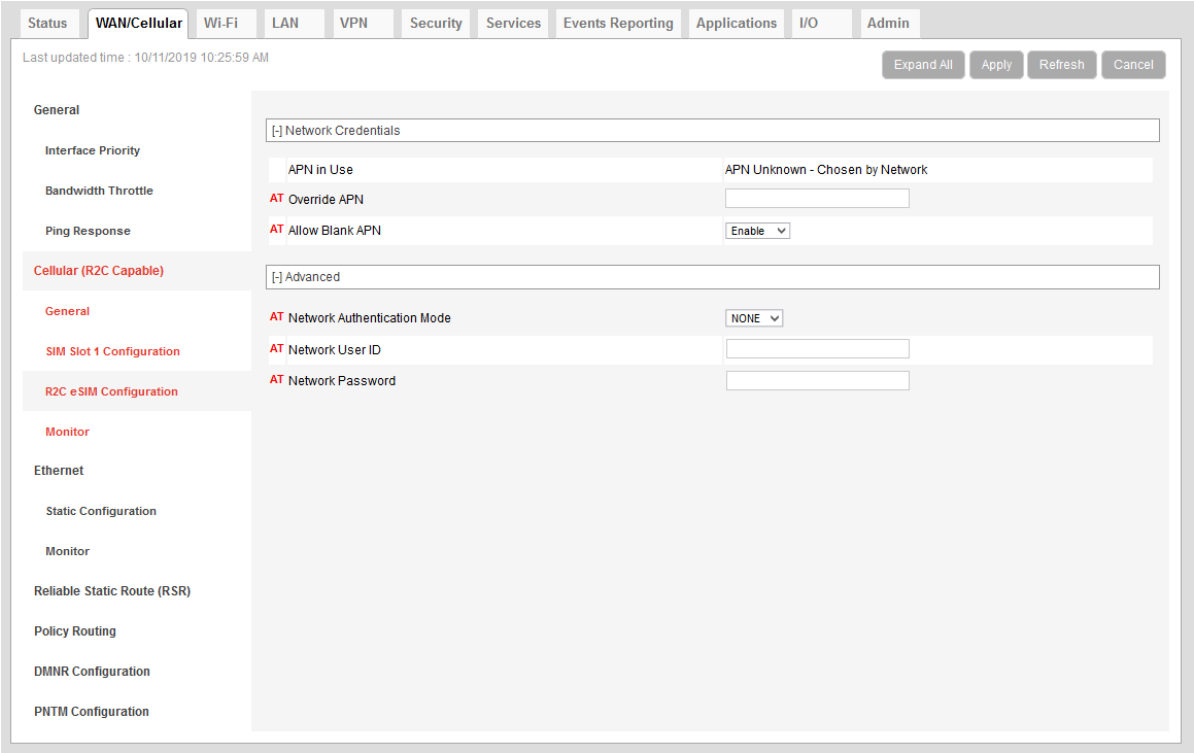


Figure 4-18: ACEmanager: WAN/Cellular > R2C eSIM Configuration

2. Use the information in the following table to configure the SIM card.

Field	Description
Network Credentials	
Note: If the router does not automatically connect to the network, you may need to manually configure your APN using the User Entered APN field. You may also need to contact your Mobile Network Operator to confirm the APN and activation status of your router.	
APN in Use	This field only appears for the Active SIM. The APN in use for the current mobile network connection. When you power on the AirLink router, the APN the router is using for authentication on the mobile network is displayed. • If a user-entered Override APN is configured, the Override APN is displayed. • If there is no Override APN configured, an automatically-selected APN is displayed. If ALEOS is unable to find the appropriate APN to use (No APN found), contact your Mobile Network Operator for the APN and enter it in the Override APN field.
Override APN	The APN entered in this field takes priority over the automatically selected APN or a blank APN. 1. Enter the APN in this field (maximum 100 characters). 2. Click Apply. 3. Click Reboot. *Note: If you reset the router to factory defaults, you have the option to preserve the custom APN, if entered. See Reset Configuration on page 340.*
Allow Blank APN	Allows connection with a blank APN for supported networks. *Note: ALEOS will only use a blank APN if both Allow Blank APN is enabled and the Override APN field is blank.* Options are: • Enable—ALEOS attempts to connect to the network and acquire an APN from the network. • Disable (default)—ALEOS automatically selects an APN, or uses a manually entered Override APN.
SIM PIN	Click this button to configure the PIN for the SIM card in SIM slot 1. For more information, see SIM PIN on page 99. By default, the router does not use a SIM PIN for the SIM in slot 1.
Advanced	
Network Authentication Mode	Specifies the authentication method to use when connecting to a mobile network Options are: • NONE • CHAP • PAP (default)
Network User ID	Network User ID The login that is used to log in to the mobile network, when required. • Maximum 128 characters

Field	Description
Network Password	Network Password is the password that, when required, is used to log in to the mobile network. • Maximum 30 characters
APN Backup This feature enables you to configure a backup APN to be used as a backup network connection mechanism, only if the primary APN is not available. When it is enabled, the LX40 connects to the backup APN only if it is unable to connect to the primary APN.	
APN	Enter the backup APN (maximum 100 characters).
Network Authentication Mode	Specifies the authentication method to use when connecting to a mobile network Options are: • NONE • CHAP • PAP (default)
Network User ID	Network User ID The login that is used to log in to the mobile network, when required. • Maximum 128 characters
Network Password	Network Password is the password that, when required, is used to log in to the mobile network. • Maximum 30 characters
Backup APN timeout (minutes)	Configures how long the LX40 attempts to connect using the primary APN at startup. If no connection is established after the timeout, the LX40 attempts to connect using the backup APN. If there is still no connection, the cellular watchdog reboots the LX40. The timeout also applies in the case of a SIM switch. If the timeout expires with no connection to the primary APN, the LX40 attempts to use the backup APN. Range: 3 to 255 (5 default)

SIM PIN

If you have a SIM card with a PIN configured, you can configure ALEOS to enter the PIN on reboot, so human intervention is not required.

Note: R2C eSIM does not support SIM PIN.

This feature has two requirements:

- A PIN-locked SIM card—Contact your Mobile Network Operator to ensure that they support this feature and to obtain a PIN-locked SIM card and PIN.
- The SIM PIN feature in ACEmanager must be enabled. See Enable the SIM PIN.

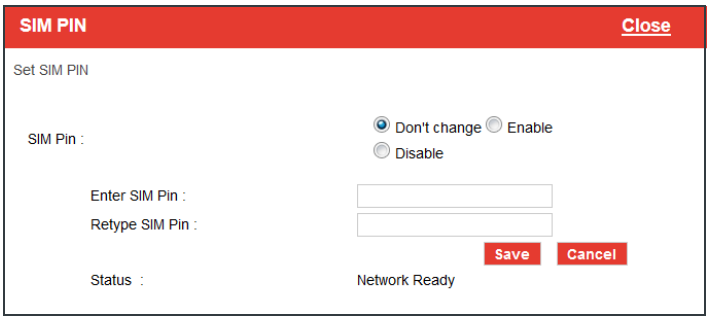
If the AirLink router has a PIN-locked SIM installed and this feature is not enabled in ACEmanager, the AirLink router is unable to go on air and the Network Status field on the Status > Home screen displays the message “SIM PIN incorrect, # attempts left”.

*Note: On routers with ALEOS 4.7.0 or later, you can use AT Commands to enable, disable, or change the SIM PIN the SIM card requests when the router boots up. For details, see *CHGSIMPIN on page 426 and *ENASIMPIN on page 429.*

Enable the SIM PIN

To enable or enter the SIM PIN:

1. In ACEmanager, go to WAN/Cellular > General.
2. Click the SIM PIN button. The following pop-up window appears.



3. Select Enable.
4. Enter the PIN (obtained from your Mobile Network Operator or set using *CHGSIMPIN—see page 426) twice and click Save.
5. Reboot the AirLink router.

After rebooting:

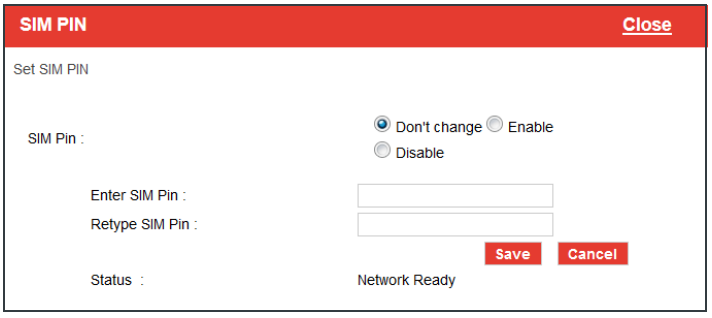
- The AirLink router uses the configured PIN on subsequent reboots.
- The SIM PIN pop-up window shows the default settings. “Don’t change” is selected and the SIM PIN fields are blank. “Don’t change” indicates that the PIN is used in the same way on every boot.

Note: If you enter an incorrect PIN, the AirLink router is unable to go on air, and the Network Status field on the Status > Home screen displays “SIM PIN incorrect, # attempts left”. The failed PIN is not retried on subsequent reboots to prevent exhausting the available number of retries with repeated attempts with an incorrect PIN.

Change the SIM PIN ALEOS Enters at Reboot

To change the SIM PIN ALEOS enters at reboot:

1. In ACEmanager, go to WAN/Cellular > General.
2. Click the SIM PIN button. The following pop-up window appears.



3. Select Enable.
4. Enter the new PIN twice and click Save.
5. Reboot the AirLink router.

After rebooting:

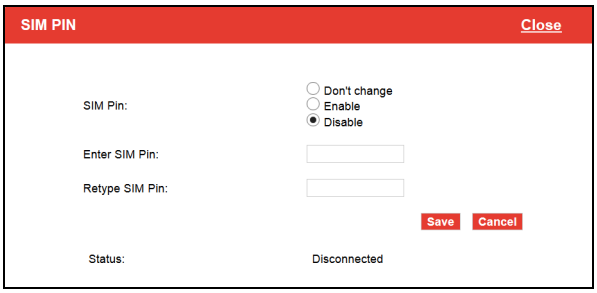
- The AirLink router uses the configured PIN on subsequent reboots.
- The SIM PIN pop-up window shows the default settings. Don't change is selected and the SIM PIN fields are blank. "Don't change" indicates that the PIN is used in the same way on every boot.

Note: If you enter an incorrect PIN, the Network Status field on the Status > Home screen displays "SIM PIN incorrect, # attempts left". The failed PIN is not retried on subsequent reboots to prevent exhausting the available number of retries with repeated attempts using an incorrect PIN.

Disable the SIM PIN

To disable the SIM PIN:

1. In ACEmanager, go to WAN/Cellular > General.
2. Click the SIM PIN button. The following pop-up window appears.



3. Select Disable.
4. Enter the PIN twice and click Save.

   If you enter an incorrect PIN or no PIN, the feature will not be disabled.
5. Reboot the AirLink router.

After rebooting:

- The AirLink router no longer uses the stored PIN on subsequent reboots.
- The SIM PIN pop-up window shows that the feature is Disabled.

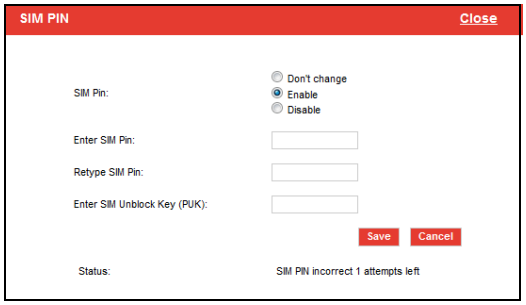
Unblocking a SIM PIN

When you enable, change or disable a SIM PIN, you have a set number of attempts to enter the correct PIN, depending on your Mobile Network Operator. If the correct PIN is not entered in the allotted number of attempts, the SIM PIN becomes blocked and you need a PUK code to unblock it.

To unblock a SIM PIN:

1. Contact your Mobile Network Operator to obtain a PUK code.
2. In ACEmanager, go to WAN/Cellular > General.
3. Click the SIM PIN button.

   When the PIN is blocked, an additional field (Enter SIM Unblock Key (PUK)) appears.



4. Select Enable.
5. Enter the new PIN code.

6. Enter the PUK and click Save.

   Be careful when entering the PUK. You have a limited number of attempts to enter the correct PUK (generally 10) before the SIM card is disabled. If the PUK does not unblock the SIM PIN after the first few attempts, contact your Mobile Network Operator.

   If you have exhausted all the alloted attempts to enter the correct PUK, the Mobile Network Operator may give you a new SIM card, or a new code to enable your existing SIM card.

   To enter the code:

   a. Remove the SIM card from your AirLink router (following the instructions in the AirLink router Hardware User Guide) and insert it in a cell phone that accommodates a MiniSIM (2FF) card.

   b. Enter a new code provided by the Mobile Network Operator and then return the SIM card to the AirLink router.

Cellular > Monitor

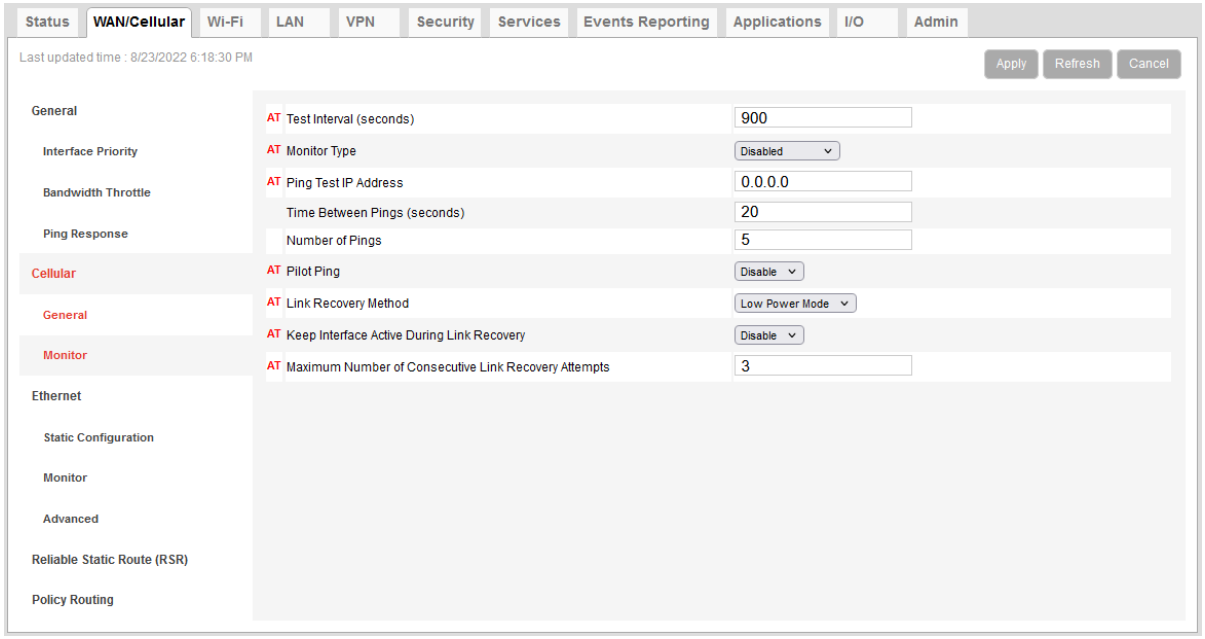


Figure 4-19: ACEmanager: WAN / Cellular > Cellular > Monitor

Use these fields to monitor the cellular network connection.

Field	Description
Test Interval (seconds)	The amount of time between tests of the cellular connection. Available range is: • 1–15300 seconds (Default is 900.) Most applications work well with an interval of 900 to 3600 seconds (15 to 60 minutes).
Monitor Type	Determines the type of test run on the interface to diagnose its ability to provide end-to-end connectivity for this interface. Options are: • Disabled—No end-to-end diagnostic runs and the service state cannot be verified. Therefore it is assumed that this interface provides service if an IP is assigned. • Traffic Monitor—A ping test is only performed if there is no traffic during the configured interval. • Ping Test—A ping is sent at the end of the test interval regardless of whether or not there has been any traffic during the interval (i.e. if the interface receives ingress traffic regularly, no additional traffic is generated by the router). *Note: Using pings to monitor the interface may accrue data charges. Each individual ping is approximately 98 bytes (196 bytes for ping sent plus ping response).*
Ping Test IP Address	Enter the IP address to ping.
Time Between Pings (seconds)	Time between individual pings Available range is: • 1–20 seconds (Default is 20.) If the first ping fails, the AirLink router sends additional pings at the configured interval. If all pings fail, the AirLink router declares the service state as “Not Established” and attempts to switch to another interface according to the Interface Priority (see page 73) configuration, and interface availability. If this field is set to 10 (with Number of Pings set to 5) and the test is started and fails, the interface does not provide service for a total of 50 seconds.
Number of Pings	Sets the number of consecutive missed pings before the AirLink router declares the service state as “Not Established” and attempts to switch to another interface. Available range is: • 1–12 (Default is 5.)
Pilot Ping	Enable or disable a pilot ping for the cellular interface. When enabled, the pilot ping performs a ping test as soon as the interface becomes active. After the initial ping test, regular ping tests continue at the configured interval. Options are: • Disable (default) • Enable
Link Recovery Method	Selects the method the router uses to recover the link after ping monitor failure. Options are: • Low Power Mode (default)—Resets the cellular interface by forcing the radio module into, and out of, low power mode. • Disable

Field	Description
Keep Interface Active During Link Recovery	Sets the router behavior while an interface is recovered. You can set whether the current interface remains active during recovery, or if the router switches to another WAN interface while the recovery is attempted. Options are: • Disable (default)—The router fails over to the next highest priority interface until the ping monitor can validate the formerly active interface. • Enable—The router does not switch to the secondary WAN interface while attempting WAN recovery.
Maximum Number of Consecutive Link Recovery Attempts	Configures whether the router indefinitely attempts to recover the interface or if only a configurable number of sequential recovery attempts are allowed before ALEOS gives up on the interface and invokes the network watchdog. After configuring a link recovery method for a particular WAN interface, you can configure the Maximum Number of Consecutive Link Recovery Attempts. Once the configured number of recovery attempts has been reached, no further recoveries are attempted until the interface is recovered, at which point the count is reset. When set to 0, there is no limit to the number of consecutive recovery attempts. • Range: 0–255 (3 default)

Ethernet

Static Configuration

Before configuring the Ethernet WAN mode, go to LAN > Ethernet and ensure that the Ethernet port is set to WAN.

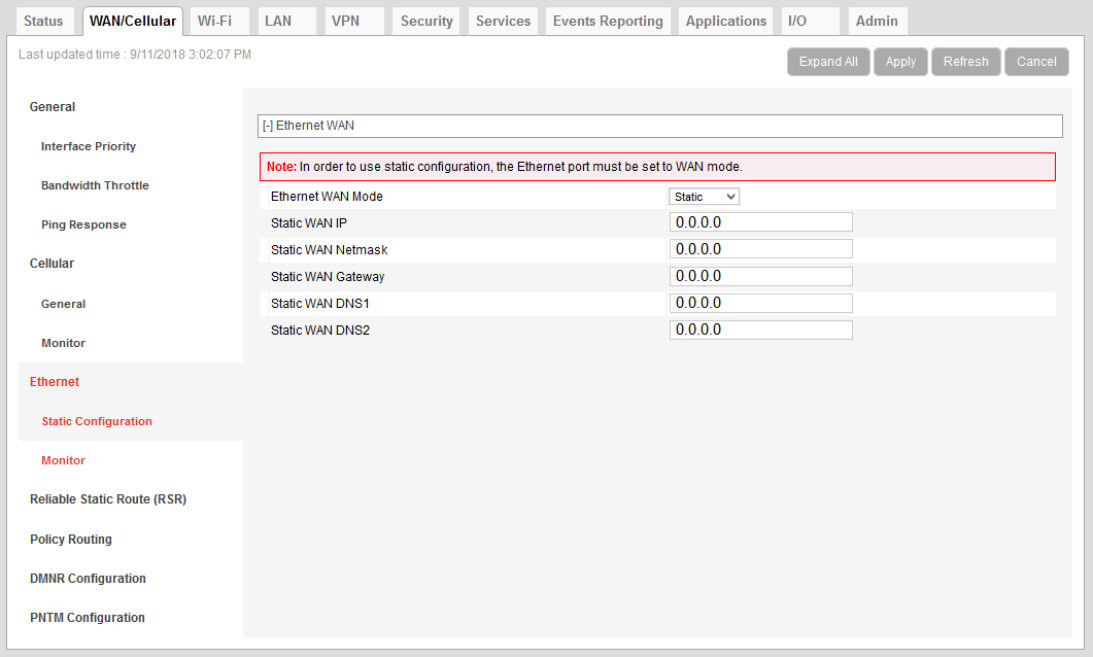


Figure 4-20: ACEmanager: WAN / Cellular > Ethernet > Static Configuration

Field	Description
Ethernet WAN	
Ethernet WAN Mode	Set the Ethernet WAN IP address mode Options are: • Dynamic (default)—WAN IP address is assigned by the DHCP server • Static—Choose this mode to statically assign an IP address when required. After you select Static, click Apply.
Static WAN IP	Enter the static IP address for the AirLInk LX40 Example: 192.168.0.55
Static WAN Netmask	Enter the subnet mask Example: 255.255.255.0
Static WAN Gateway	Enter the static IP address for the router Example: 192.168.0.1
Static WAN DNS1	Enter the static IP address for the primary DNS server[a] Example: 192.168.0.2

Field	Description
Static WAN DNS2	Enter the static IP address for the secondary DNS server[a] Example: 192.168.0.3
Note: Changes take effect after the AirLink router is rebooted.	
a.) If you have enabled DNS Override on the LAN > Global DNS screen, those settings override Static WAN DNS1 and Static WAN DNS2.	

Ethernet > Monitor

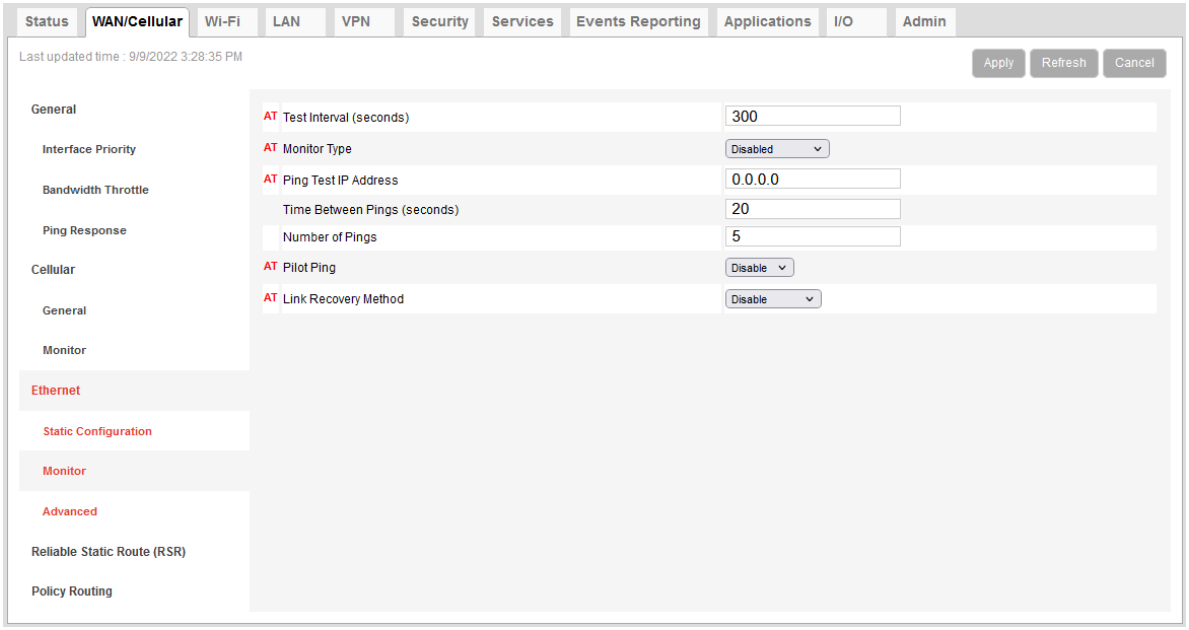


Figure 4-21: ACEmanager: WAN / Cellular > Ethernet > Monitor

Field	Description
Test Time Interval (seconds)	The amount of time between tests of the Ethernet WAN connection. Available range is: • 1–15300 seconds (Default is 300.) Most applications work well with an interval of 900 to 3600 seconds (15 to 60 minutes).
Monitor Type	Determines the type of test run on the interface to monitor its ability to provide end-to-end connectivity for this interface. Options are: • Disabled—No end-to-end diagnostic runs and the service state cannot be verified. Therefore it is assumed that this interface provides service if an IP is assigned. • Traffic Monitor—A ping test is only performed if there is no traffic during the configured interval. • Ping Test—A ping is sent at the end of the test interval regardless of whether or not there has been any traffic during the interval (i.e. if the interface receives ingress traffic regularly, no additional traffic is generated by the router). *Note: Using pings to monitor the interface may accrue data charges. Each individual ping is approximately 98 bytes (196 bytes for ping sent plus ping response).*
Ping Test IP Address	Enter the IP address to ping.
Time Between Pings (seconds)	Time between individual pings Available range is: • 1–20 seconds (Default is 20.) If the first ping fails, the AirLink router sends additional pings at the configured interval. If all pings fail, the AirLink router declares the service state as “Not Established” and attempts to switch to another interface according to the Interface Priority (see page 73) configuration, and interface availability. If this field is set to 10 (with Number of Pings set to 5) and the test is started and fails, the interface does not provide service for a total of 50 seconds.
Number of Pings	Sets the number of consecutive missed pings before the AirLink router declares the service state as “Not Established” and attempts to switch to another interface. Available range is: • 1–12 (Default is 5.)
Pilot Ping	Enable or disable a pilot ping for the Ethernet interface. When enabled, the pilot ping performs a ping test as soon as the interface becomes active. After the initial ping test, regular ping tests continue at the configured interval. Options are: • Disable (default) • Enable
Link Recovery Method	Selects the method the router uses to recover the link after ping monitor failure. Options are: • Power Cycle—Power cycles the Ethernet interface to reset it • Disable (default)

Field	Description
Keep Interface Active During Link Recovery	Sets the router behavior while an interface is recovered. You can set whether the current interface remains active during recovery, or if the router switches to another WAN interface while the recovery is attempted. Options are: • Disable (default)—The router fails over to the next highest priority interface until the ping monitor can validate the formerly active interface. • Enable—The router does not switch to the secondary WAN interface while attempting WAN recovery.
Maximum Number of Consecutive Link Recovery Attempts	Configures whether the router indefinitely attempts to recover the interface or if only a configurable number of sequential recovery attempts are allowed before ALEOS gives up on the interface and invokes the network watchdog. After configuring a link recovery method for a particular WAN interface, you can configure the Maximum Number of Consecutive Link Recovery Attempts. Once the configured number of recovery attempts has been reached, no further recoveries are attempted until the interface is recovered, at which point the count is reset. When set to 0, there is no limit to the number of consecutive recovery attempts. • Range: 0–255 (3 default)

Reliable Static Routing (RSR)

Reliable Static Routing enables you to force specified traffic to use different routing rules (rather than the default, which is usually cellular) to direct specified traffic (from or to either the AirLink router or a connected device) to a designated primary route. If the primary route fails, the specified traffic uses a backup route.

First, you designate specific traffic to use the primary route, based on the destination IP address and subnet mask. A configured Tracking Object Test verifies the validity of the primary route. If the test fails, the backup route is used. The Tracking Object Test continues to run and as soon as it returns a “Pass”, traffic is switched back to the primary route.

You can direct the traffic to a network or to an individual host.

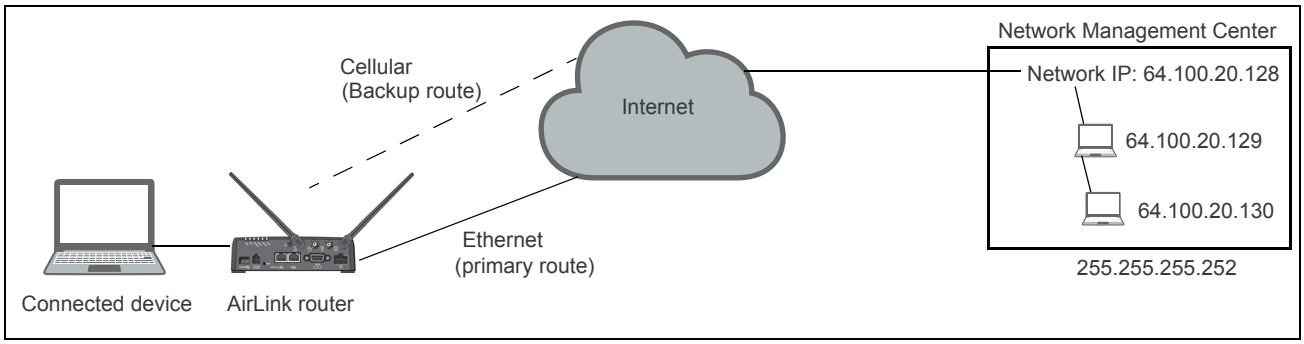


Figure 4-22: RSR directed to a destination network

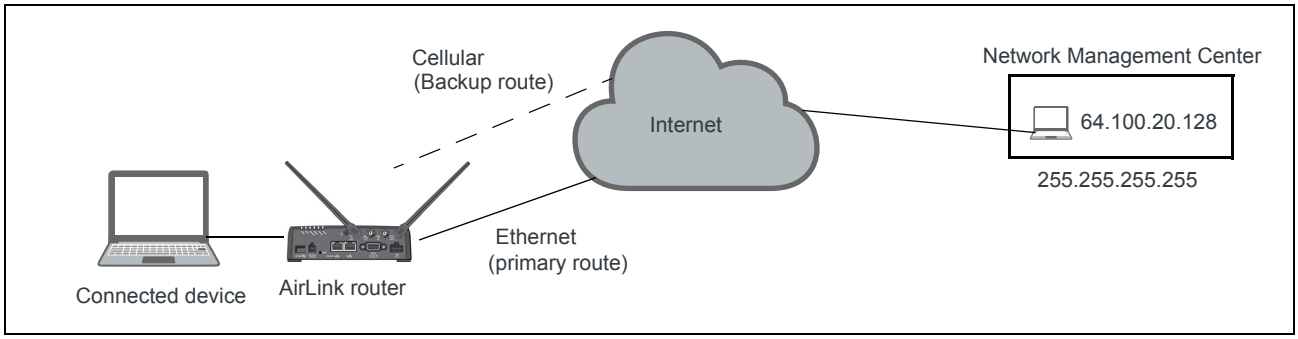


Figure 4-23: RSR directed to a destination IP address (individual host)

In a business continuity application where the router also has a routable IP address from a wireline gateway connection (as shown in Figure 4-24) the IT administrator may prefer to use that lower cost connection for data sourced from the AirLink router, such as SNMP or ALMS data. When reliable static routing is configured, the Tracking Object tests the validity of the primary route, and data from the AirLink router is transmitted through the primary route (in this example, the wireline connection). If the tracking object determines that the primary route is down, data is transmitted through the backup (in this example, the wireless connection).

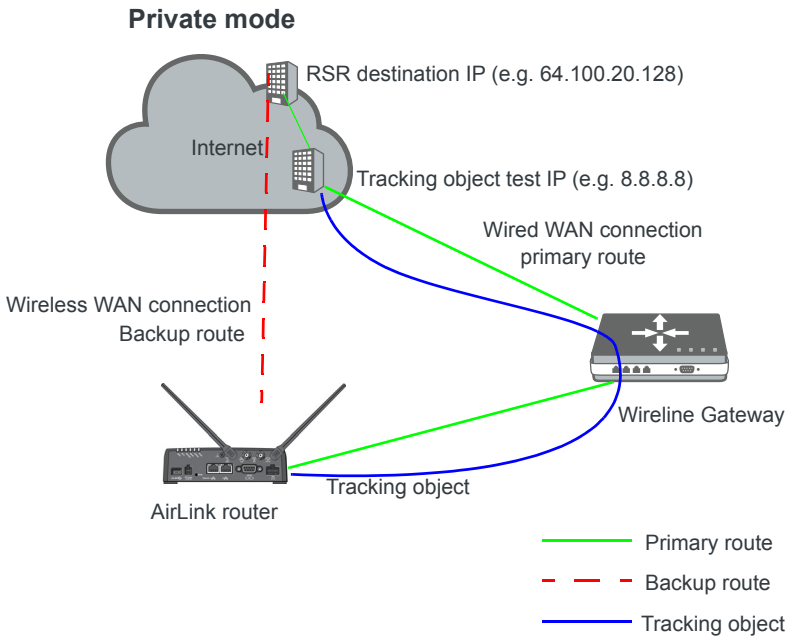


Figure 4-24: Private Mode with Reliable Static Routing

Sierra Wireless recommends a Private Mode network (Figure 4-24) as the most reliable configuration to use in a business continuity failover application as defined in the AirLink Hardware User Guide with Reliable Static Routing and Reverse Telnet.

To configure Reliable Static Routing:

1. Connect the hardware as shown in Figure 4-24.
2. Use the Tracking Object to test the connection:
   a. In ACEmanager, go to WAN/Cellular > Reliable Static Route (RSR).

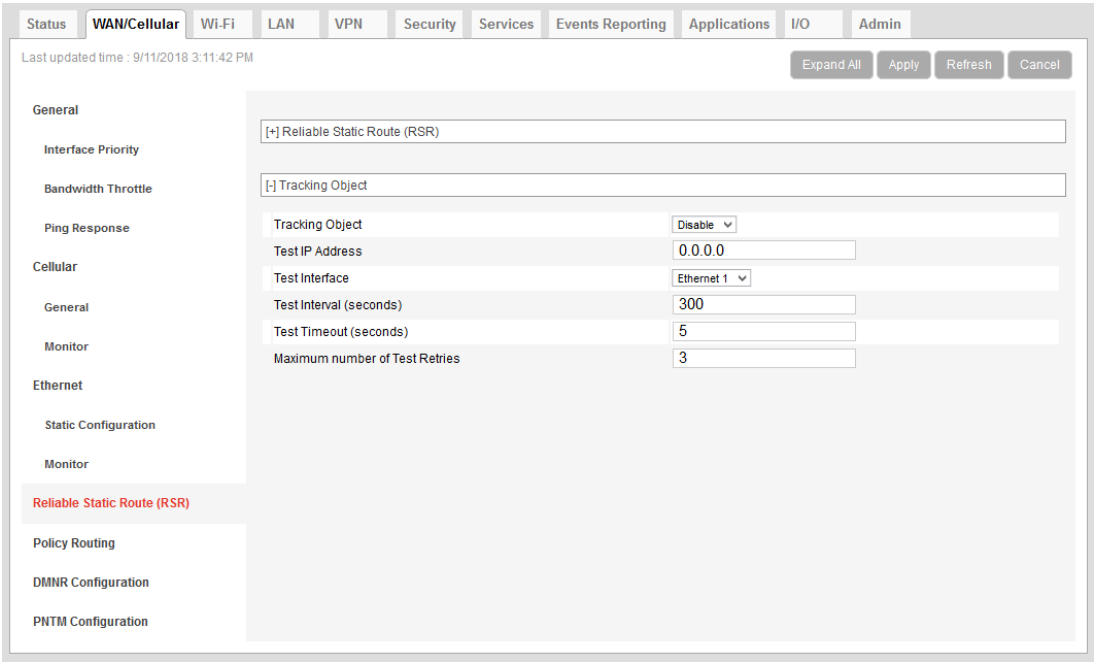


Figure 4-25: ACEmanager: WAN/Cellular > Reliable Static Route (RSR) >Tracking Object

b. Under Tracking Object, enter the Test IP address, using a host behind the router that has a reliable IP address, such as 8.8.8.8.

c. From the drop-down menu, select Ethernet 1 as the Test Interface.

d. Leave the default values for the Test Interval, Test Timeout, and Maximum number of retries.

e. In the Tracking Object field, select Enable.

f. Click Apply.

g. The Tracking Object pings the Test IP address configured in step b. In ACEmanager go to Status > RSR and note the result in the RSR Test Result field.

3. Disable Tracking Object.

Note: Configure all the other fields before setting the Enable/Disable Reliable Static Routing field. Once you enable RSR, some fields on this page are not editable.

4. Go to WAN/Cellular > Reliable Static Route (RSR) > Reliable Static Route (RSR).

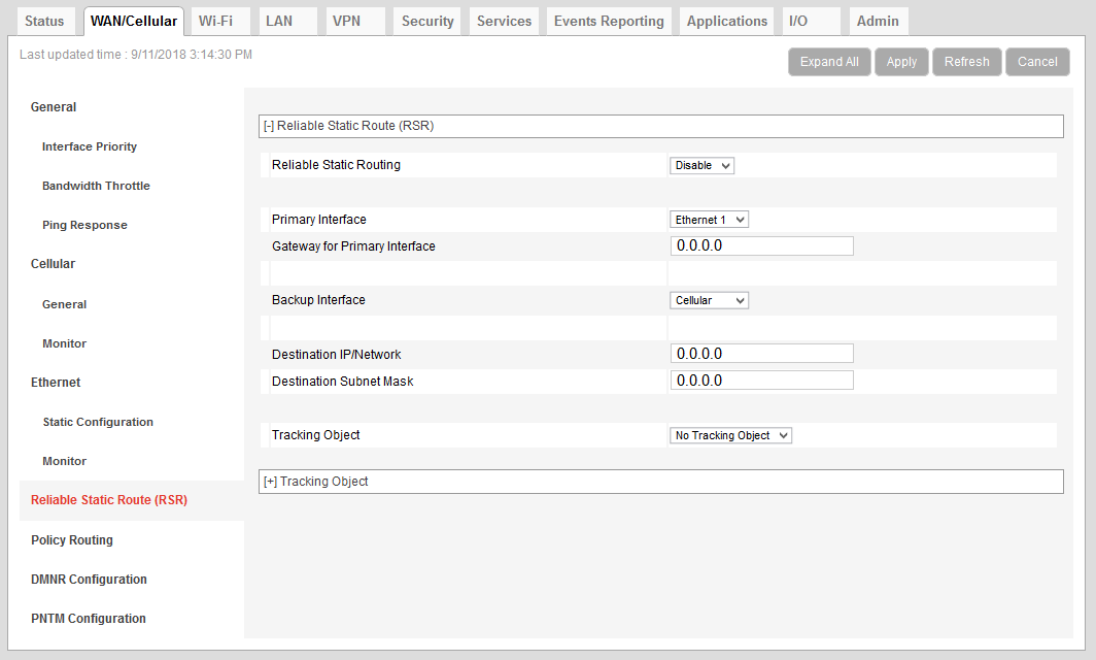
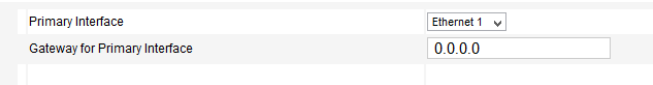


Figure 4-26: ACEmanager: WAN/Cellular > Reliable Static Route (RSR) > Reliable Static Route (RSR)

5. Select the interfaces for the primary and backup routes. The options are:
   - Ethernet 1 (default for primary route)
   - USB
   - Wi-Fi
   - Cellular (default for backup route)

   If you select Ethernet 1, you are given the option to enter a Gateway IP address that is used as the next hop for reaching the destination network.[1]

   - If the Tracking Object test completed in step 2 was successful, leave this field at the default value (0.0.0.0).
   - If the Tracking Object test completed in step 2 failed, enter the Gateway IP address in this field.

6. Set the Destination IP/Network and Destination Subnet Mask.

   To configure the RSR destination as a network for this example, enter:
   - 64.100.20.128 in the Destination IP/Network field.
   - 255.255.255.252 in the Destination Subnet Mask field.

   To configure the RSR destination as an individual host for this example, enter:
   - 64.100.20.128 in the Destination IP/Network field.
   - 255.255.255.255 in the Destination Subnet Mask field.

7. Set the Tracking Object (Tracking Object 1 or No Tracking Object). Normally, you would select Tracking Object 1 from the drop-down menu.

1. This applies to both the primary and the Backup interface.

8. Under Tracking Object, leave the Enable/Disable Tracking Object set at Disable until you finish configuring the other Tracking Object fields.
9. Enter the Test IP address (normally an IP address within the Traffic Selection Criteria Network/Subnet).
10. From the drop-down menu, select the desired Test Interface (normally the same interface as the primary route). Options are:
    - Ethernet 1
    - USB
    - Wi-Fi
    - Cellular
11. Enter the Test Interval in seconds. This is the interval between Tracking Object Tests.

    For most applications, the default values for the Test Interval, Test Timeout, and Maximum number of retries should be fine.

    If you want to change these values, be aware of the following:
    - Selecting a short test interval increases network traffic and may lead to false failures if the network is busy.
    - Selecting a long test interval may mean that traffic does not switch to the secondary route quickly enough when the primary route fails.
    - The test interval must be greater than the product of Test Timeout × Maximum number of Test Retries.
      [Test Interval] > [Test Timeout] × [Maximum number of Retries]
12. Enter the Test Timeout in seconds. This is the time to wait for a response. If this time expires before a response is received, the test attempt fails.
13. Enter the Maximum number of Test Retries. If the first Tracking Object Test fails, this is the number of times the router sends additional test messages (without receiving a response) before it declares the test as failed and switches the specified traffic to the backup network.
14. In the Tracking Object field, select Enable.
15. In the RSR field, select Enable.

Note: Alway click Apply after enabling or disabling this feature.

Go to Status > WAN/Cellular to check the RSR Test Result and confirm that traffic is being sent through the primary route. If the RSR Test Result field indicates that the Tracking Object Test has failed, validate the connectivity of the primary path. (A test result of Unknown indicates that the test has not yet run.)

Policy Routing

You can use Policy Routing to configure up to 5 policy routing rules used to determine the WAN interface over which outbound traffic is sent. When policy routing is configured, all traffic from the router is compared to the rules, in order of priority. If a match is found, the traffic flows over the WAN interface specified by the rule. If no match is found or the selected interface is not available, the active WAN interface is used.

Do not include devices in the policy if they need to access ACEmanager.

You can create rules based on the following components:

- Destination IP address/destination subnet mask
- Destination port
- Source IP address/source subnet mask
- Source port

Any component left with its default value is excluded from the traffic filtering.

Examples:

- If Source IP/subnet mask and Destination IP/subnet mask are configured, traffic from specific LAN hosts with a remote destination matching the configured destination IP and subnet mask uses the policy and is sent over the configured interface. All other traffic uses the current active WAN interface.
- If only the Destination port is configured, traffic from the router or from any connected device being sent to the configured remote port uses the policy. All other traffic uses the current active WAN interface.

Note: It is possible to configure a policy routing rule in such a way that you could lose the network connection you are using to configure the router with ACEmanager. For example, if you are using ACEmanager through an Ethernet connection to configure the router with IP address 192.168.13.100 and you inadvertently configure a rule to send all traffic destined for 192.168.13.100 over the cellular interface, the Ethernet connection you are using to configure the router will be lost. If that happens, use a different IP address.

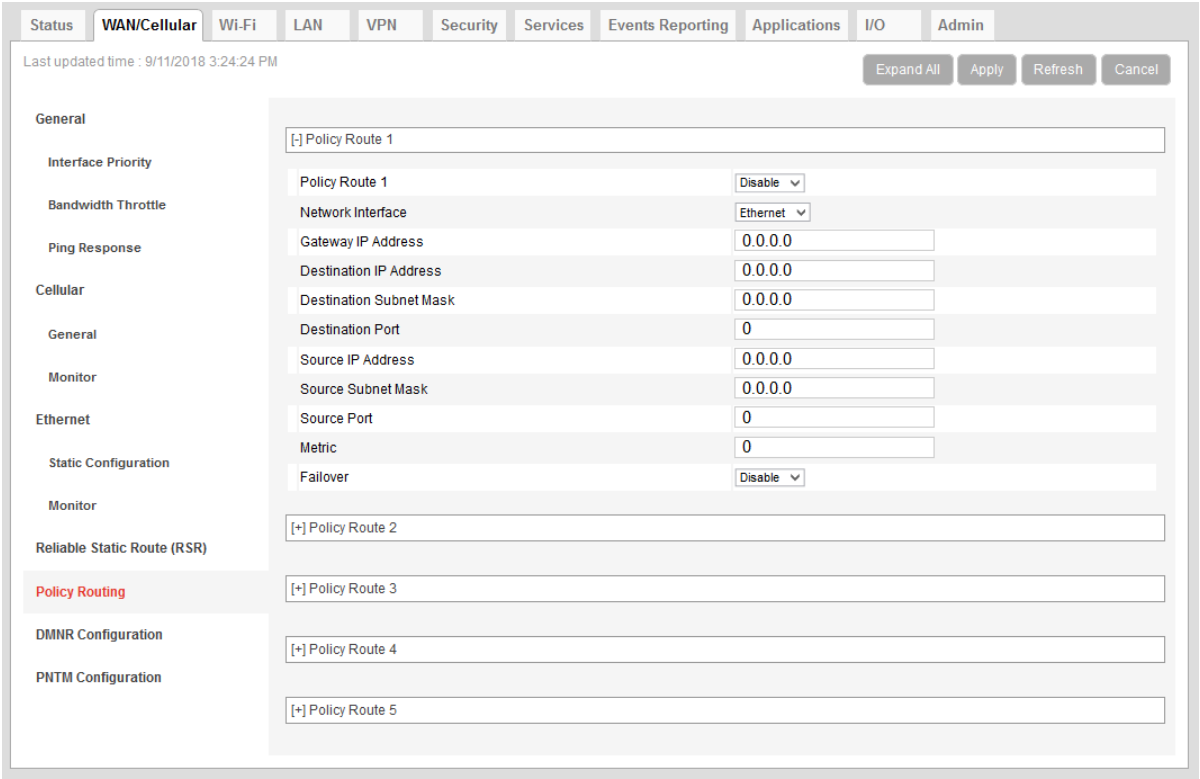


Figure 4-27: ACEmanager: Policy Routing

Field	Description
Policy Route	
Policy Route #	Configure all the relevant fields for the policy routing rule before you set this field to Enable. Once the rule is enabled, none of the other fields are editable. Options are: • Disable (default) • Enable *Note: Always click Apply after enabling or disabling this feature.*
Policy Route # Status	This field shows the status of the rule. It only appears when the policy route rule is enabled.
Network Interface	The interface over which configured traffic exits the router once the rule is enabled Options are: • Ethernet • Cellular • Wi-Fi (only available on the Wi-Fi version of the LX40)
Gateway IP Address	This field only appears if Ethernet or Wi-Fi is selected in the Network Interface field. Enter the remote gateway IP address for the selected network. *Note: This field is optional.*
Destination IP Address	Enter the destination IP address or subnet for traffic that this policy routing rule applies to. *Note: The destination IP or subnet cannot be the same as the ping test IP used for monitoring the cellular, Ethernet, or Wi-Fi interface. (See Monitoring WAN Connections on page 71.)*
Destination Subnet Mask	Enter the destination subnet mask for traffic that this policy routing rule applies to. If a destination IP is used, the subnet mask must be configured. For a single destination, use 255.255.255.255 as the subnet mask.
Destination Port	Enter the destination port for traffic that this policy routing rule applies to.
Source IP Address	Enter the source IP address for traffic that this policy routing rule applies to.
Source Subnet Mask	Enter the source subnet mask for traffic that this policy routing rule applies to. If the source IP is used, the subnet mask must be configured. For a single source, use 255.255.255.255 as the subnet mask. *Note: /26 to /31 subnet masks are also supported.*
Source Port	Enter the source port for traffic that this policy routing rule applies to.
Metric	Set the priority for the policy routing rule. The lower the number the higher the priority. Range is: 0–99
Failover	When failover is enabled, if outbound traffic cannot flow over the configured network interface, it flows over the current active interface.

Dynamic Mobile Network Routing (DMNR)

Note: DMNR is supported only on the Verizon Wireless network. These settings appear only when the LX40 has a Verizon SIM installed.

DMNR provides direct communication between customer sites (for example, between remote subnets and the corporate data center) through a Mobile Network Operator's (MNO's) private network (isolated from Internet traffic).

DMNR creates a tunnel between the home agent on the MNO's private network and the AirLink router.

Note: Primary Access Mode DMNR is supported only *on Ethernet LANs. DMNR is not supported on Wi-Fi LANs, nor on Wi-Fi bridged to Ethernet configurations (Bridge Wi-Fi to Ethernet).*

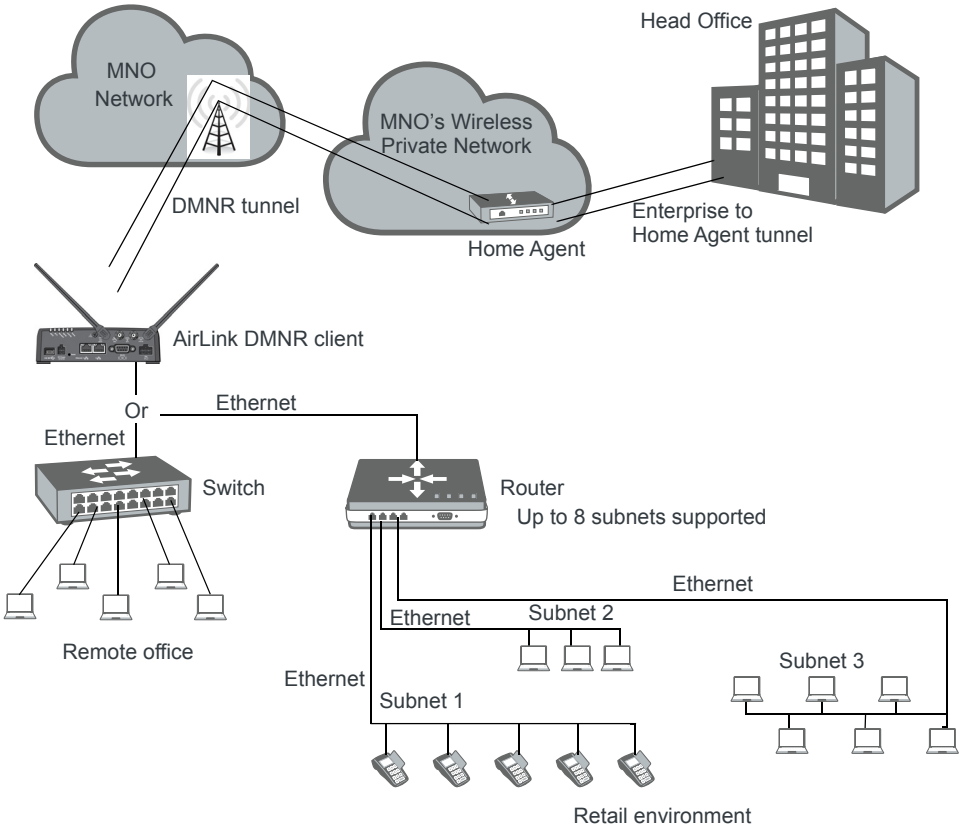


Figure 4-28: DMNR Configuration

Before configuring DMNR:

1. Go to LAN > DHCP/Addressing and ensure that the Host Connection Mode is set to All Hosts Use Private IPs (default).
2. Go to LAN > Host Port Routing and set the Primary Gateway field to Disable.
3. Go to LAN > Ethernet > Device IP and change the default address from 192.168.13.x to the same subnet as the DMNR subnet.

4. Go to VPN and disable any VPNs you have set up.

   Once DMNR is configured, all traffic from the connected LANs goes through the DMNR tunnel.
5. Go to Security > Port Forwarding and set the DMZ Enabled field to Disable.
6. Reboot the router.

Note: For the DMNR registration process to complete successfully, there must be a switch, router, or other device physically connected to the AirLink router's Ethernet port.

Note: Ensure that the default route of the switch or router points to the AirLink router.

To configure DMNR:

1. Go to WAN/Cellular > DMNR Configuration.

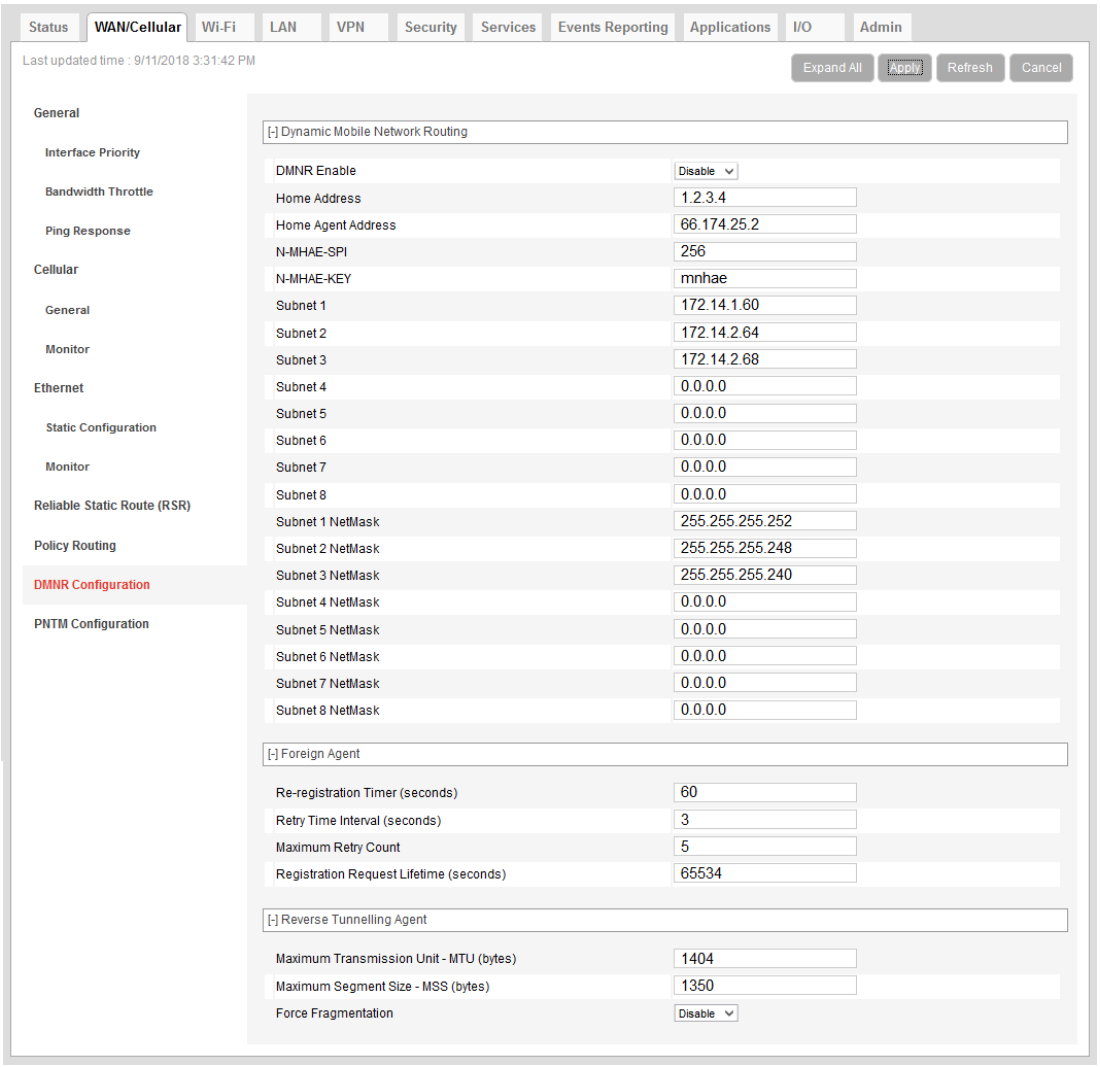


Figure 4-29: ACEmanager: WAN/Cellular > DMNR Configuration

2. Configure the fields as outlined in the following table.

Field	Description
Dynamic Mobile Network Routing	
DMNR Enable	Enables Dynamic Mobile Network Routing. Options are: • Enable • Disable (default)[a] *Note: Configure all the other parameters first and then set this field to Enable. When this field is set to Enable, the other fields in this window are read-only.* *Note: Alway click Apply after enabling or disabling this feature.*
Home Address	Enter a home address for the AirLink router. This address is used to distinguish the AirLink router used for DMNR. Use 1.2.3.4 for all routers configured for DMNR. This field cannot be left blank.
Home Agent Address	IP address of the Home Agent (available from your Mobile Network Operator)
N-MHAE-SPI	NEMO Authentication Extension Security Parameter Index (available from your Mobile Network Operator)
N-MHAE-KEY	NEMO Authentication Extension Key (available from your Mobile Network Operator) *Note: The value regularly used successfully for routers on the Verizon Wireless network (subject to change) is VzWNeMo.*
Subnet 1 – 8	Enter the IP addresses for the subnets you want to include in the DMNR network. You can configure up to 8 subnets. 0.0.0.0 indicates that the subnet is not configured. *Note: If you want to remove a subnet from the DMNR configuration, replace the IP address with 0.0.0.0 rather than deleting it.*
Subnet 1 – 8 NetMask	Enter the subnet masks for the subnets you want to include in the DMNR network. 0.0.0.0 indicates that the subnet mask is not configured. *Note: If you want to remove a subnet mask from the DMNR configuration, replace the IP address with 0.0.0.0 rather than deleting it.*

a. If you disable DMNR when the DMNR tunnel is up, no disconnect message is sent, resulting in a temporary mismatch between the reachability of the (NEMO) subnets on the router and the Home Agent.

3. Click the + beside Foreign Agent and Reverse Tunnelling Agent.
4. Configure the Foreign Agent and Reverse Tunnelling Agent.

Field	Description
Foreign Agent	
Re-registration Timer (seconds)	The frequency with which the foreign agent re-registers its subnets • If the registration status is Down, the foreign agent re-registers its subnets when the time configured in this field expires. • If the registration status is Up, the frequency with which the foreign agent re-registers its subnets is equal to the Registration Response Lifetime minus the value configured in this field. The Registration Response Lifetime is usually equal to the Registration Request Lifetime (seconds). Once you have enabled DMNR, you can confirm the Registration Response Lifetime in ACEmanager. Options are: • 1–60 seconds (Default is 60.)
Retry Time Interval (seconds)	The interval (in seconds) between retries if the re-registration fails. Options are: • 1–5 seconds (Default is 5.)
Maximum Retry Count	Maximum number of re-registration tries allowed. Options are: • 0–5 (Default is 3.)
Registration Request Lifetime (seconds)	Enter the desired registration lease time (in seconds). Options are: • 0–65534 seconds (Default is 65534.)
Reverse Tunnelling Agent	
Maximum Transmission Unit - MTU (bytes)	Use this field to set the tunnel MTU for packets sent over the DMNR/GRE tunnel. Note that the tunnel adds 24 bytes to each packet so the tunnel MTU should be set at least 24 bytes lower than the Mobile Network MTU in order to avoid packet fragmentation. Options are: • 576–1500 (Default is 1404.)
Maximum Segment Size - MSS (bytes)	Use this field to set the TCP maximum segment size for the packets (in bytes). Options are: • 68–1436 (Default is 1350.)
Force Fragmentation	Allows you to override the “Do not fragment” bit in the incoming packet header and send large packets through the DMNR tunnel Options are: • Enable—The “Do not fragment” bit in the incoming packet header is cleared. This setting is useful if you need to send large packets or you do not know the MTU of all the routers in the network path. • Disable—The “Do not fragment” bit in the incoming packet header is respected. If the bit is set, packets larger than the MTU are dropped. If the bit is clear, packets larger than the MTU are fragmented and sent. (Default)

5. In the DMNR Enable field, select Enable.

   Once DMNR is enabled, the fields are read-only. If you want to change any of the field entries, set the DMNR Enable field to Disable, make the required change, and then set the field to Enable.

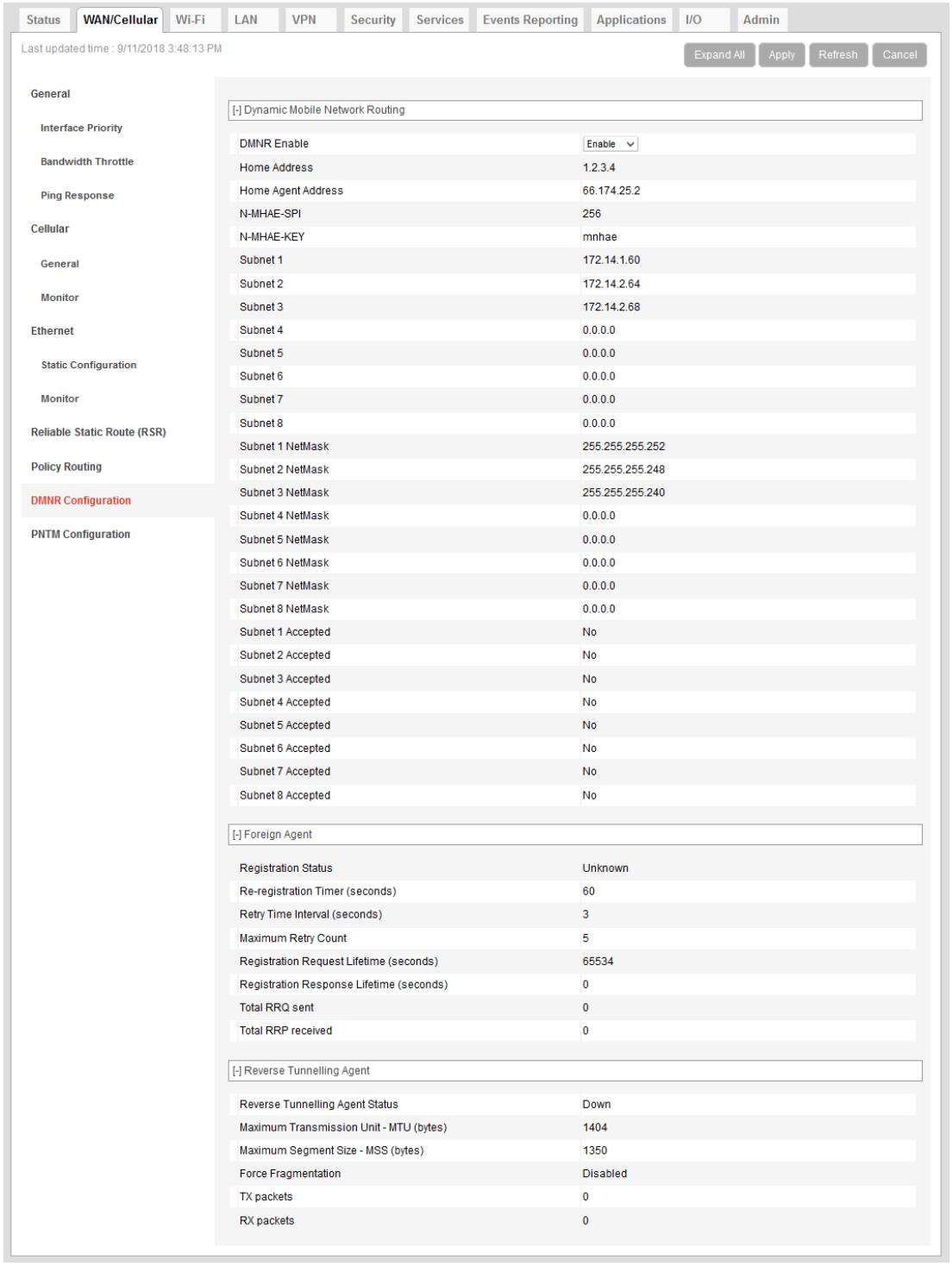


Figure 4-30: ACEmanager: WAN/Cellular > DMNR Enabled

Once DMNR is enabled, additional status fields appear, as described in the following table.

Field	Description
Dynamic Mobile Network Routing	
Subnet 1–8 Accepted	Confirms that the subnet configuration is accepted. Options displayed are: • Yes—The subnet is configured and accepted. • No—The subnet is not configured or not accepted.
Foreign Agent	
Registration Status	Foreign agent registration status Options displayed are: • Pass—A response has been received from the Home Agent. • Fail—No response from the Home Agent. • Unknown—Initial state
Registration Response Lifetime (seconds)	Shows the length of the current lease time (in seconds).
Total RRQ sent	Number of Registration Requests sent
Total RRP received	Number of Registration Responses received
Reverse Tunnelling Agent	
Reverse Tunnelling Agent Status	DMNR tunnel status This field only appears when DMNR is enabled. Options displayed are: • Up—DMNR tunnel is up. • Down—DMNR tunnel is down.
Force Fragmentation	Status of the Force Fragmentation field • Enabled • Disabled For more information, see Force Fragmentation on page 120.
TX packets	Number of packets transmitted The counter is reset when: • DMNR is disabled. • When the DMNR tunnel (Reverse Tunnelling Agent Status) is down.
RX packets	Number of packets received The counter is reset when: • DMNR is disabled. • When the DMNR tunnel (Reverse Tunnelling Agent Status) is down.

PNTM Configuration

Note: This feature is available only on Verizon Wireless' private network. These settings appear only when the LX40 has a Verizon SIM installed.

You can use Private Network Traffic Management (PNTM) to tag and prioritize traffic for up to 15 destinations.

For more information on private networking, contact Verizon Wireless.

To configure PNTM:

1. In ACEmanager, go to WAN/Cellular > PNTM Configuration.

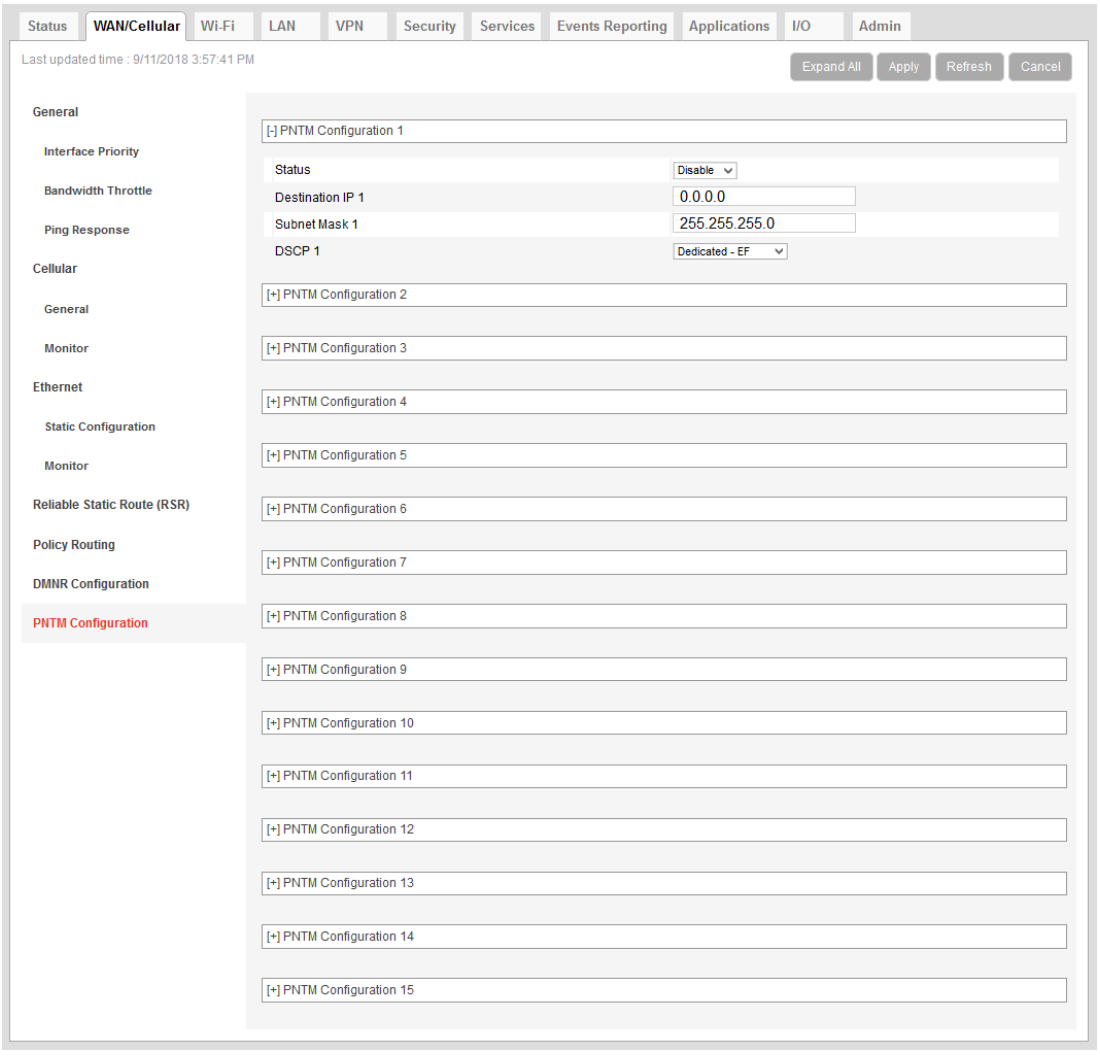


Figure 4-31: ACEmanager: WAN/Cellular > PNTM Configuration

2. Configure the PNTM parameters as described in the following table.

Field	Description
PNTM Configuration #	
Status #	Configure all the fields for the PNTM before you set this field to Enable. Once the PNTM is enabled, all the fields are read-only and this field shows the status of the PNTM connection. *Note: Always click Apply after enabling or disabling this feature.*
Destination IP #	Enter the destination IP address.
Subnet Mask #	Enter the destination subnet mask.
DSCP #	Select the desired priority level.

5: Wi-Fi Configuration

ALEOS provides Wi-Fi configuration capabilities and support for the Wi-Fi model of AirLink LX40 router.

Wi-Fi works in one of the following modes:

- Access Point (LAN) Mode
- Client (WAN) Mode

The configuration options vary, depending on the mode selected.

Note: The Wi-Fi tab appears ONLY on the Wi-Fi model of the AirLink LX40 router.

Interoperability Notes

The following guidelines can help you in configuring Wi-Fi for your environment.

Bandwidth Usage

An Access Point can be configured on the LX40 to use 20, 20/40 or 80 MHz channel sizes with 802.11n/802.1ac channels. Sierra Wireless recommends using 80 Mhz channels for the following reasons:

- Potentially higher data transfer rates
- Increased spectral efficiency, leading to potential power consumption reduction on connected client devices for data transfer.
- Avoids interoperability issues. Older devices that support 20 or 20/40 Mhz mode only are compatible with 80 Mhz channels.

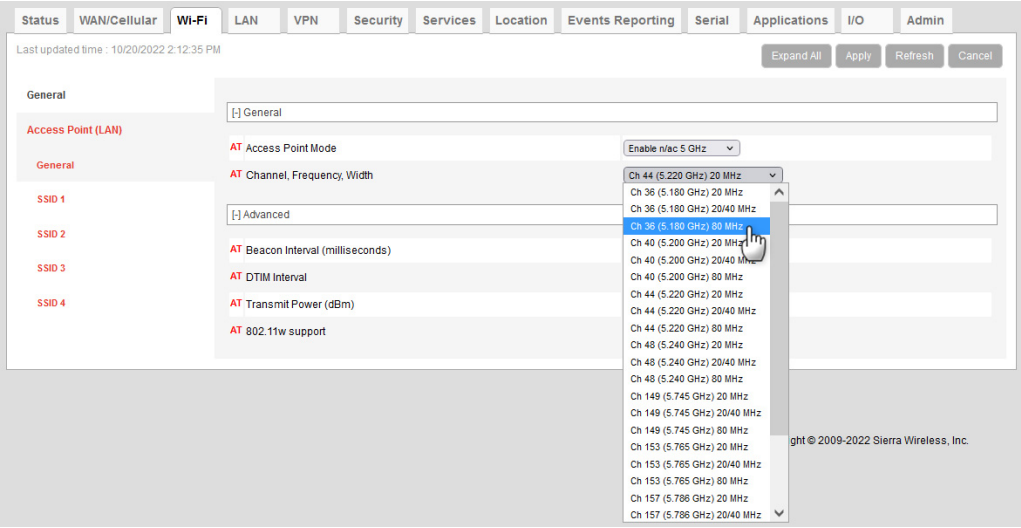


Figure 5-1: Wi-Fi Selecting Bandwidth

Security Modes for WPA2

The LX40 provides two security modes, TKIP and AES, in WPA2 mode as defined in the 802.11 standard.

TKIP is an insecure security method and deprecated by 802.11 standard. The router provides the TKIP option only for backward compatibility with older devices. Using TKIP is strongly discouraged for the following reasons:

- Not secure. Encryption can be broken remotely.
- 802.11n and 802.11ac standards have deprecated the use of TKIP.

When choosing TKIP in n/ac mode on the LX40, n/ac mode is disabled, and the maximum data rate is 54 Mbps only.

WEP Security

WEP is an insecure security method and deprecated by 802.11 standard. The LX40 provides the option only for backward compatibility with older devices. Using WEP is strongly discouraged for the same reasons as TKIP above.

Note: The WEP Authentication Security Type will be deprecated in ALEOS 4.17.0.

802.11w Support

The 802.11w standard provides Management Frame Protection and extends AES-CCMP to management frames as well. Management frame protection avoids management frame spoofing; for example, a third party spoofing a disconnect to/from an Access Point.

The LX40 provides three settings for 802.11w support:

- Disabled
- Optional (default)
- Required

Optional is the default setting for the following reasons:

- When the router is in Client Mode, and the Access point requires management frame protection.
- When the router is in Access Point Mode, and some clients require management frame protection, while some do not.
- The default mode of operation is WPA3 Personal Transition Mode (see below), which minimally requires the setting to be Optional.

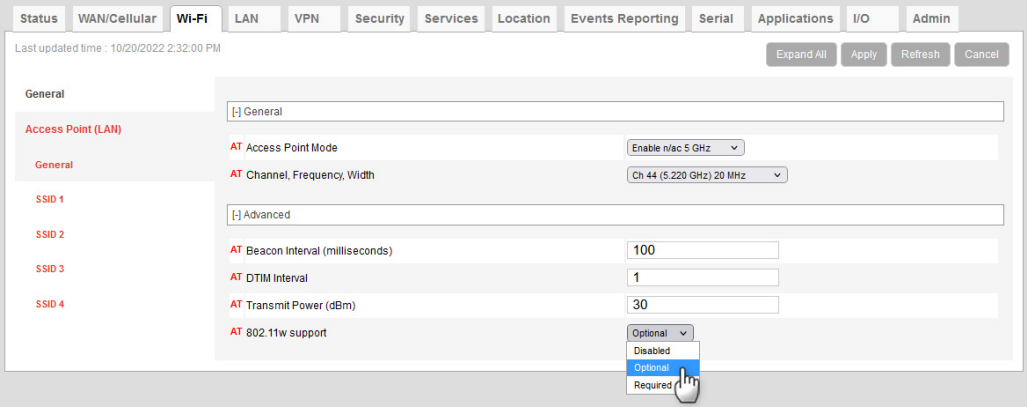


Figure 5-2: Wi-Fi Selecting 802.11w support

802.11w Interoperability

TKIP is a deprecated 802.11 security method and not supported with Management Frame protection.

802.11w Interoperability in Client Mode

Sierra Wireless recommends setting 802.11w support to Optional. Some Access Points may have interoperability issues in this mode, in which case, set 802.11w support to Disabled.

Set 802.11w support to Required only when 802.11w is enabled on the Access Point.

802.11w Interoperability in Access Point Mode

802.11w is an optional feature on the 802.11 standard, and some devices are known to fail when 802.11w support is set to Optional on the LX40 operating as an Access Point.

Sierra Wireless recommends setting 802.11w support to Optional; however in case of connection failures for clients, set 802.11w support to Disabled.

When 802.11w support is set to Disabled, any client devices that require management frame protection will not be able to connect.

Security Modes for WPA3

The LX40 provides only AES (CCMP) encryption for all WPA3 modes of operation. TKIP is no longer supported with these modes.

The LX40 has two modes of operation for WPA3 Personal:

- WPA3 Personal only

  This requires protected management frames. 802.11w support must be set to Required. The interoperability for this is explained above.

  This mode uses SAE for authentication, which may not be supported on older clients attempting to connect to the device.
- WPA3 Personal Transition Mode (Default)

This allows protected management frames. 802.11w support can be set to Optional or Required. The interoperability for this is explained above.

This mode allows using SAE for authentication, but also allows using WPA2-PSK / WPA2-PSK-SHA256, to support both WPA2 and WPA3 clients attempting to connect to the device.

For devices that are able to connect with SAE, protected management frames must be negotiated for the association.

The LX40 provides two modes of operation for WPA3 Enterprise:

- WPA3 Enterprise only

  This requires protected management frames. 802.11w support must be set to Required. The interoperability for this is explained above.

  This does not allow using IEEE 802.1X with SHA-1, and uses IEEE 802.1X with SHA-256 instead, which may not be supported on older clients attempting to connect to the device.

  In WPA3 Enterprise Only mode, there is no longer an option to not use the Client CA certificate when using PEAP Authentication as a WPA3 client.
- WPA3 Enterprise Transition Mode

  This allows using protected management frames. 802.11w support can be set to Optional or Required. The interoperability for this is explained above.

  This allows the usage of both IEEE 802.1X with SHA-1 and IEEE 802.1X with SHA-256.

  In WPA3 Enterprise Transition Mode, there is no longer an option to not use the Client CA certificate when using PEAP Authentication as a WPA3 client.

Summary

Sierra Wireless recommends the use of WPA3, where WPA3 Personal Transition Mode is the default. These modes require setting 802.11w support to Optional or Required, depending on the specific mode. This may cause interoperability issues with older clients, in which case WPA2 modes of operation can be used with 802.11w support set to Disabled instead.

General

To configure the Wi-Fi settings:

1. In ACEmanager, go to Wi-Fi > General.

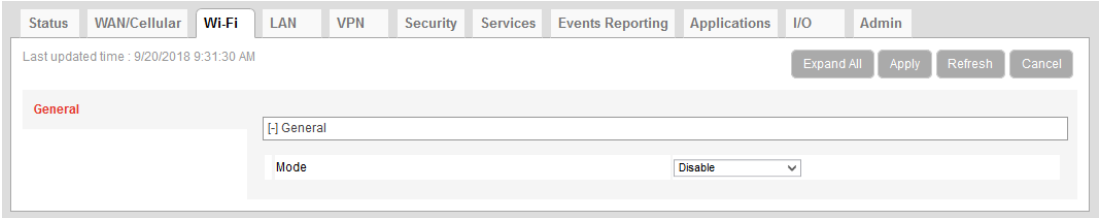


Figure 5-3: ACEmanager: Wi-Fi > General

Field	Description
General	
Mode	Allows you to choose the Wi-Fi mode of operation. The options are: • • Disable (default) • Access Point (LAN) (See page 133.) • Client (WAN) (See page 144.)

2. Select the Wi-Fi mode, and click Apply.
   The fields available on the General screen depend on the option chosen.

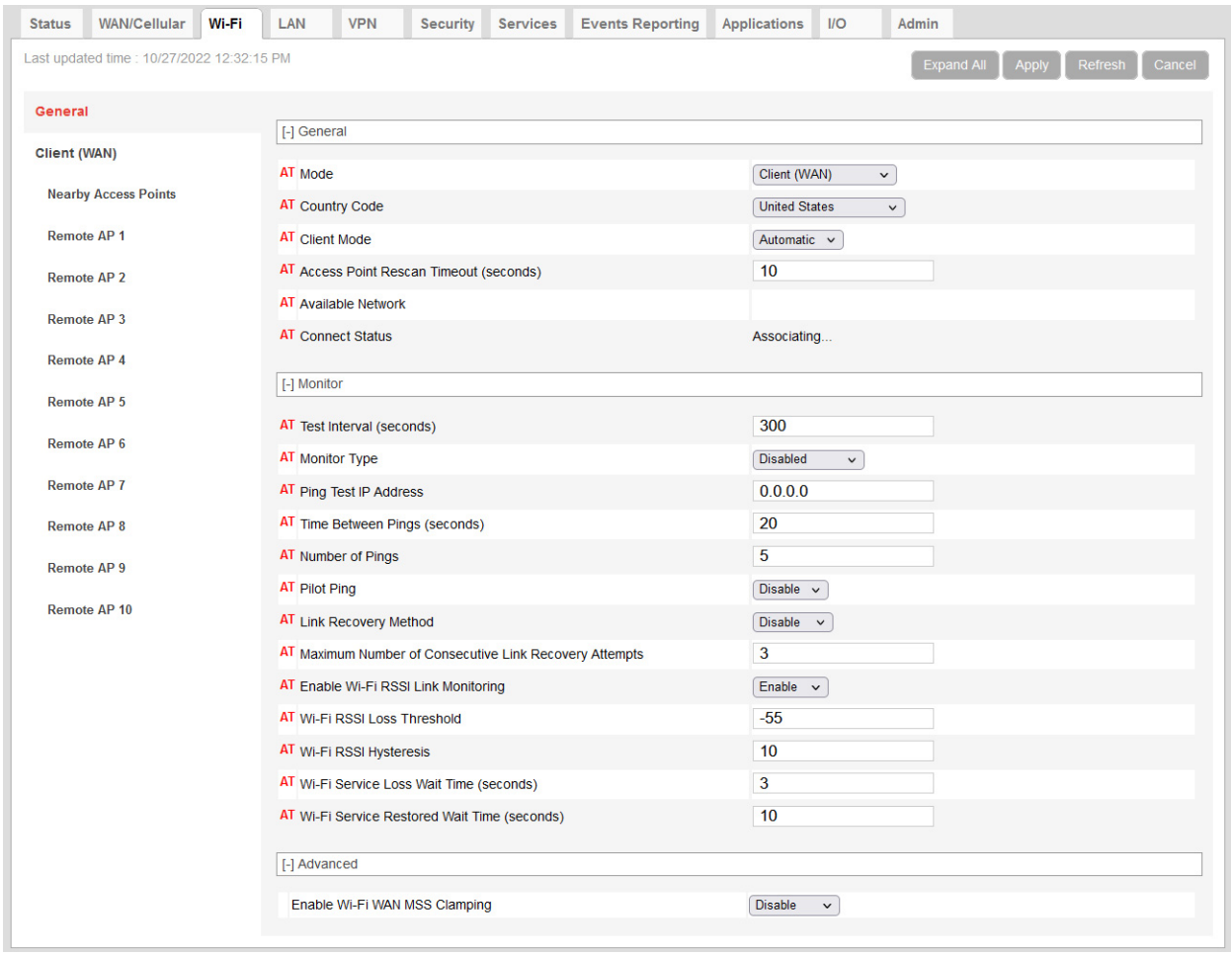


Figure 5-4: ACEmanager: Wi-Fi > General > Client (WAN) Mode

3. On the General screen, you can configure:

Field	Description
General	
Mode	See Mode on page 129.
Country Code	To ensure that the router conforms to any national restrictions regarding allowable Wi-Fi channels, select the country in which the router will be operating. (Default is United States.) *Note: The default Country Code setting enables the maximum number of Wi-Fi channels. All other Country Code settings configure a subset of channels; they do not enable channels beyond those available in the default setting.*
Client Mode	Appears when Mode is set to Client (WAN). Allows you to choose the connection mode. Options are: • Automatic (default)—The WAN connection automatically switches from the mobile broadband network to a Wi-Fi network whenever a configured Wi-Fi Access Point (AP) is within range. • Manual—When Manual is selected, click the Connect button to connect to an available access point.
Access Point Rescan Timeout (seconds)	This field only appears when Client Mode is set to Automatic. Determines how often the AirLink router re-scans for a configured Access Point when it is not connected to an Access Point. Options are: • 10—3600 seconds (Default is 10) *Note: It is best to leave the default value.*
Available Network	Identifies the currently associated Wi-Fi network Only one Wi-Fi network is shown, even if additional networks are configured and in range.
Connect Status	Indicates the router's connection status: • Not Connected—The router is not connected to a Wi-Fi network, and none of the configured networks are available. • Connecting—The router is connecting to a Wi-Fi network. • Connected—The router is connected to the Wi-Fi network shown in the Available Network field. • Associating—The router is searching for a Wi-Fi network in the configured list of APs. • Associated—The router has found a Wi-Fi network, but is not connected to it.
Monitor	
Test Interval (seconds)	The amount of time between tests of the Wi-Fi connection. Available range is: • 1–15300 seconds (Default is 300) Most applications work well with an interval of 900 to 3600 seconds (15 to 60 minutes).

Field	Description
Monitor Type	Determines the type of test run on the interface to diagnose its ability to provide end-to-end connectivity for this interface. Options are: • Disabled—No end-to-end diagnostic runs and the service state cannot be verified. Therefore it is assumed that this interface provides service if an IP is assigned. • Traffic Monitor—A ping test is only performed if there is no traffic during the configured interval. • Ping Test—A ping is sent at the end of the test interval regardless of whether or not there has been any traffic during the interval (i.e. if the interface receives ingress traffic regularly, no additional traffic is generated by the router). *Note: Using pings to monitor the interface may accrue data charges. Each individual ping is approximately 98 bytes (196 bytes for ping sent plus ping response).*
Ping Test IP Address	Enter the IP address to ping.
Time Between Pings (seconds)	Time between individual pings Available range is: • 1–20 seconds (Default is 20) If the first ping fails, the AirLink router sends additional pings at the configured interval. If all pings fail, the AirLink router declares the service state as “Not Established” and attempts to switch to another interface according to the Interface Priority (see page 73) configuration, and interface availability. If this field is set to 10 (with Number of Pings set to 5) and the test is started and fails, the interface does not provide service for a total of 50 seconds.
Number of Pings	Sets the number of consecutive missed pings before the AirLink router declares the service state as “Not Established” and attempts to switch to another interface. Available range is: • 1–12 (Default is 5)
Pilot Ping	Enable or disable a pilot ping for the Wi-Fi interface. When enabled, the pilot ping performs a ping test as soon as the interface becomes active. After the initial ping test, regular ping tests continue at the configured interval. Options are: • Disable (default) • Enable
Link Recovery Method	Selects the method the router uses to recover the link after ping monitor failure. Options are: • Re-scan—Drops the Wi-Fi connection and re-scans the network for a stronger connection. • Disable (default)
Keep Interface Active During Link Recovery	Sets the router behavior while an interface is recovered. You can set whether the current interface remains active during recovery, or if the router switches to another WAN interface while the recovery is attempted. Options are: • Disable (default)—The router fails over to the next highest priority interface until the ping monitor can validate the formerly active interface. • Enable—The router does not switch to the secondary WAN interface while attempting WAN recovery.

Field	Description
Maximum Number of Consecutive Link Recovery Attempts	Configures whether the router indefinitely attempts to recover the interface or if only a configurable number of sequential recovery attempts are allowed before ALEOS gives up on the interface and invokes the network watchdog. After configuring a link recovery method for a particular WAN interface, you can configure the Maximum Number of Consecutive Link Recovery Attempts. Once the configured number of recovery attempts has been reached, no further recoveries are attempted until the interface is recovered, at which point the count is reset. When set to 0, there is no limit to the number of consecutive recovery attempts. • Range: 0–255 (3 default)
Enable Wi-Fi RSSI Link Monitoring	Enables the router to monitor RSSI to determine whether to switch the network interface. When the RSSI is consistently below the loss threshold for a qualification period, the network interface switches from Wi-Fi to Cellular. When RSSI is consistently high enough for a qualification period, the network interface switches back from Cellular to Wi-Fi. Options are: • Enable (when enabled, additional RSSI settings appear) • Disable
Wi-Fi RSSI Loss Threshold	Sets the level at which the Wi-Fi signal is considered to be “lost” (defined as an absolute signal strength in dBm) Available range is: • -100 – -20 dBm (Default is -55 dBm)
Wi-Fi RSSI Hysteresis	Sets the signal level at which the Wi-Fi signal is considered to be “acquired” (defined as a relative level above the Loss Threshold in dB) Available range is: • 0–30 dB (Default is 10 dB)
Wi-Fi Service Loss Wait Time (seconds)	Sets the timer for the “loss” state. If the signal level is consistently below the Loss Threshold for the Service Loss Wait Time, the link is considered “lost” and the router switches network interfaces. Available range is: • 0–3600 seconds (Default is 3)
Wi-Fi Service Restored Wait Time (seconds)	Sets the timer for the “acquired” state. If the signal level is consistently above the Loss Threshold + RSSI Hysteresis for the Service Restored Wait Time, the link is considered “restored” and the router resumes using Wi-Fi as the WAN interface. Available range is: • 0–3600 seconds (Default is 10)

Field	Description
Advanced	
Enable Wi-Fi MSS Clamping	MSS (Maximum TCP Segment Size) Clamping controls the maximum packet size used for TCP connections between a local (LAN-side) host and a remote host over the Wi-Fi WAN interface. MSS Clamping helps avoid possible issues with sending and receiving large TCP packets over the cellular network when other standard MTU mechanisms do not appear to be working with your installation. Options are: • Manual—MSS is clamped to the specified maximum value bi-directionally for all inbound (remote-to-LAN) and outbound (LAN-to-remote) TCP connections when the TCP session is established using the Wi-Fi interface. • Automatic (default)—MSS is clamped at 40 bytes (20 byte IP header + 20 byte TCP header) less than the MTU of the Wi-Fi interface. • Disable
Maximum Segment Size - MSS (bytes)	When MSS Clamping is set to Manual, set the Maximum TCP Segment Size • 256–1460 bytes (default is 1460)

Access Point (LAN) Mode

In this mode, the AirLink router acts as an access point.

To configure Access Point (LAN) mode:

1. Select Access Point (LAN) from the drop-down menu in the Mode field.
2. Click Apply.
3. If you have not already done so, configure the General settings.
4. On the left menu, under Access Point (LAN), select General.

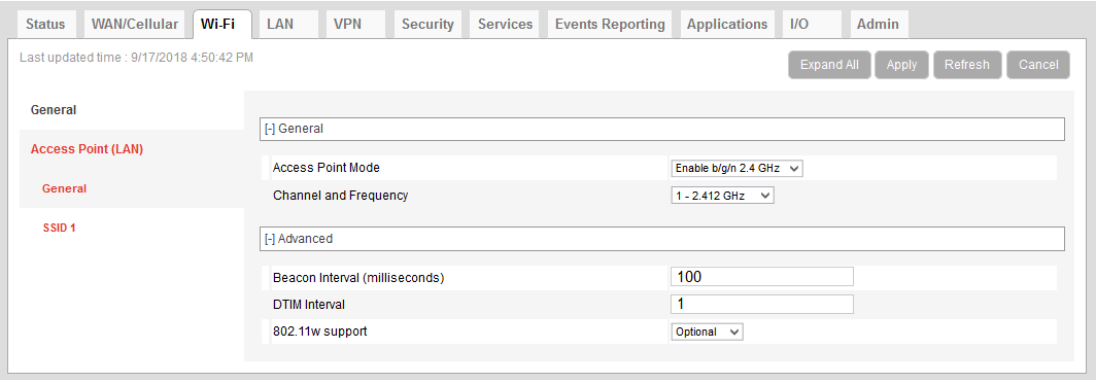


Figure 5-5: ACEmanager: Wi-Fi > Access Point (LAN)

Field	Description
General	
Access Point Mode	The access point mode configures operation for either n/ac or b/g/n. Options are: • Enable b/g/n (default) (for 2.4 GHz band) • Enable n/ac (for 5 GHz band)
Channel, Frequency, Width	This field only appears when n/ac is selected in the Access Point Mode field. Select from the list of Wi-Fi channel/frequency/width in the 5 GHz band. Each option includes the channel, frequency, and bandwidth. When a wider channel is available, higher data rates are possible. Choosing the 5 GHz band enables faster and more efficient Wi-Fi. The available 5 GHz channels are Ch 36, Ch 40, Ch 44, Ch 48, Ch 149, Ch 153, Ch 157, Ch 161, Ch 165. Default: Ch 36 (5.180 GHz) 20 MHz *Note: The drop-down list displays the channels that are supported by the LX40. Depending on the regulatory restrictions in the country selected in the Country Code field, some listed channels may not be operational. For more information, see The Wi-Fi channel I selected is not working. on page 500.* *Note: If you select WPA Personal security authentication along with n/ac, note that only 20 MHz channels can be used with WPA Personal. For example,* Ch 36 (5.180 GHz) 20 MHz *or* Ch 165 (5.825 GHz) 20 MHz *can be used. See Security Authentication type on page 137.*
Channel and Frequency	This field only appears when b/g/n is selected in the Access Point Mode field. Select from the list of Wi-Fi channel/frequency. The available 2.4 GHz channels are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 Default: 1– 2.412 GHz. *Note: The drop-down list displays the channels that are supported by the router. Depending on the regulatory restrictions in the country selected in the Country Code field, some listed channels may not be operational For more information, see The Wi-Fi channel I selected is not working. on page 500.*
Advanced	
Beacon Interval (milliseconds)	How frequently the AirLink router sends periodic message (beacons) to advertise its availability (in milliseconds) Options are: • 1–65535 milliseconds (Default is 100)

Field	Description
DTIM Interval	The number of beacons the client device can sleep through before waking up to check for messages For example, if the DTIM Interval is set to 3, the client wakes up every third beacon. The higher the setting in the DTIM Interval field, the longer the client device can sleep, and the more battery power the client device can potentially save. However, high DTIM intervals can also reduce throughput to the client. Options are: • 1–255 (Default is 1)
802.11w support	Enable 802.11w operation. The 802.11w standard uses Security Association Query Requests to ensure that clients are legitimate. Options are: • Disabled (default) • Optional • Required When Optional is selected, devices that support 802.11w will be protected, while other devices will still connect to the router. Select Required to force 802.11w operation. The router will reject unsupported clients and access points.

5. On the left menu, select SSID1.

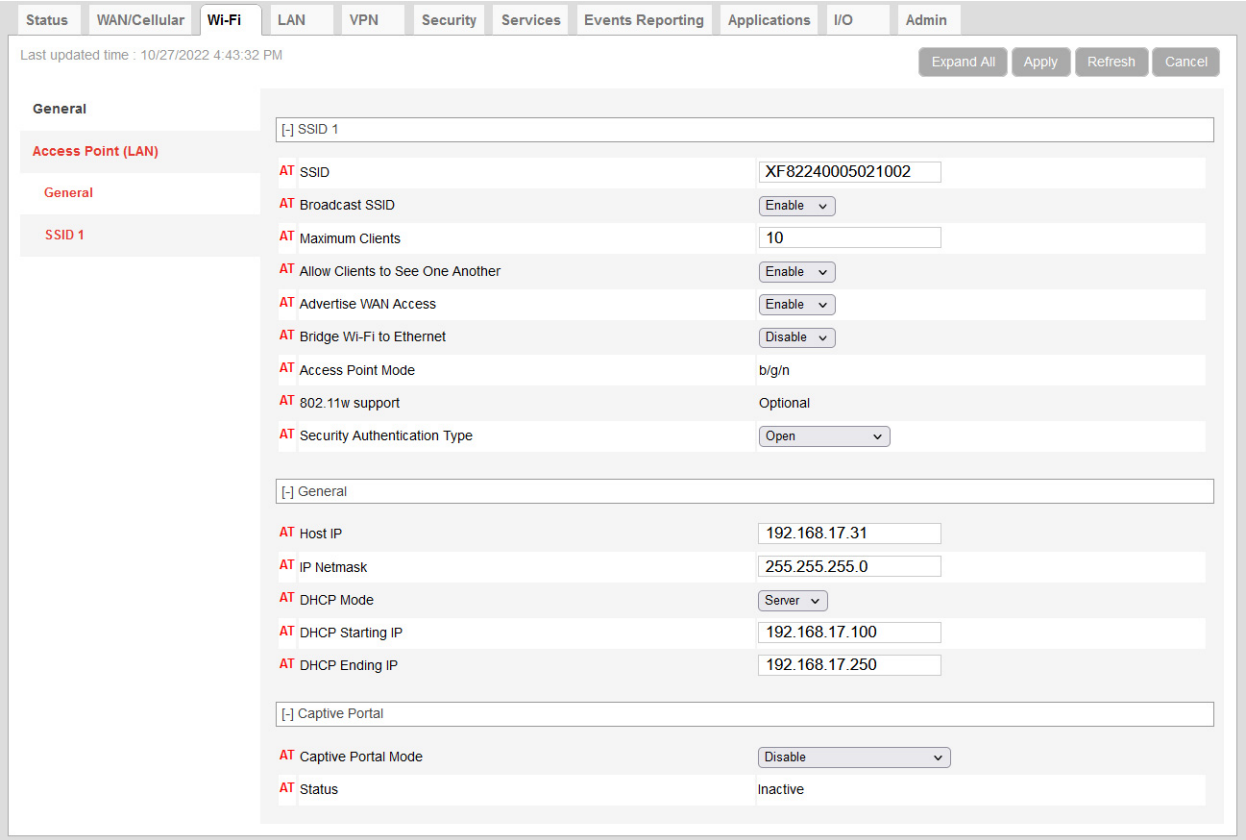


Figure 5-6: ACEmanager: Wi-Fi > Access Point (LAN) > SSID1

SSID #	
SSID	You can set the SSID or it can be automatically generated (default). The SSID (Service Set Identifier) default value is the same as the serial number which appears on the label on the bottom of the LX40. You can only configure one SSID. The maximum length for the SSID is 32 characters. It can include: • Upper and lower case letters • Numbers • Spaces • Special characters: ‘ - = [ ] \ ; ’ , . / ~ ! @ # $ % ^ & * ( ) _ + { } | : ”< > ? Special characters used must also be supported by connected devices. The SSID is case-sensitive.
Broadcast SSID	Choose whether or not to broadcast the SSID Options are: • Enable (default)—SSID is broadcast • Disable—SSID is hidden (not broadcast) *Note: The option to hide the SSID is provided as a convenience and does not enhance security.*
Maximum Clients	Indicates the maximum number of concurrent users (clients) supported Options: • 1 to 10 (Default is 10.)
Allow Clients to See One Another	Enabled by default. If you do not want clients on the network to be able to see each other, select Disable.
Advertise WAN Access	Enable or disable advertising the default router to Wi-Fi clients. When disabled, clients can still communicate with other LAN clients, but will not have Wi-Fi access to the WAN through this SSID. Options are: • Enable (default) • Disable *Note: If DHCP Server Option 003 is set to 0.0.0.0, no router is advertised to the attached client on the selected interface. This effectively does the same thing as disabling Advertise WAN Access, but on the selected interface. See DHCP Server Options on page 158.*
Bridge Wi-Fi to Ethernet	This field allows you to create a unified bridge (virtual interface) between the AirLink router’s Wi-Fi and Ethernet interfaces. Options are: • Enable—the Ethernet interface and the Wi-Fi interface share the same subnet. The Wi-Fi devices get their DHCP IP addresses from the Ethernet pool (when Ethernet DHCP is enabled). This allows routing between all LAN devices. • Disable—Wi-Fi is a separate LAN subnet from the Ethernet LAN. There is no routing between the two interfaces and their connected devices. (default)
Access Point Mode	Displays the access point mode selected in the General settings.

Security Authentication type	Select the authentication type. Options are: • Open—No authentication is needed when this option is selected. This option allows any user to connect to the AP and is generally not recommended. • WEP • WPA Personal • WPA2 Personal • WPA2/WPA3 Enterprise
General Available only when the Wi-Fi has its own subnet (Bridge Wi-Fi to Ethernet is disabled.)	
Host IP	Displays the AP's IP address. Default: 192.168.17.31
IP Netmask	Displays the subnet IP netmask of the Wi-Fi network. Default: 255.255.255.0
DHCP Mode	Sets how IP addresses are assigned on the network. Options are: • Server (default)—Client IP addresses and DHCP leases are managed by the AirLink router • Relay—Client DHCP requests are forwarded to, and assigned by, an external DHCP server. For more information, see DCHP Relay on page 166.
DHCP Relay Server	Appears when DHCP Mode is set to Relay. Enter the IP address of the DHCP Relay Server. *Note: DHCP Relay servers must be specified by IP address. Specifying by hostname is not supported.*
Starting IP	Appears when DHCP Mode is set to Server. Displays the beginning IP address to be served. Default: 192.168.17.100
Ending IP	Appears when DHCP Mode is set to Server. Displays the ending IP address to be served. Default: 192.168.17.250
Captive Portal See Captive Portal.	

Captive Portal

Captive portal enables you to redirect traffic from unauthenticated clients to a specified portal before granting devices full Internet access.

Two modes of captive portal are available:
- Simple Captive Portal
- Authenticated Captive Portal

Note: Captive portal is only available when the Wi-Fi mode is set to Access Point (LAN).

Simple Captive Portal

The Simple Captive Portal mode does not require a subscription service or RADIUS server to run.

When the Simple Captive Portal is selected and configured, new user Wi-Fi access point traffic is routed to the Simple Captive Portal landing page where the user is asked to accept the configured terms and conditions by pressing the “Accept” button.

When connected to the Wi-Fi access point, the only accessible ports on the LX40 are:
- Port 2050, used to display the landing page
- Port 53 for DNS
- Port 67 for DHCP

The Simple Captive Portal landing page is customizable. You can add disclaimer text (plain text) and a single image to the landing page using an AAF application. For more information, contact your Sierra Wireless partner or see the Sierra Wireless Source.

Note: Simple Captive Portal cannot be used with a Wi-Fi access point configured to bridge Wi-Fi to Ethernet.

Simple Captive Portal does not provide any content filtering or walled garden functionality.

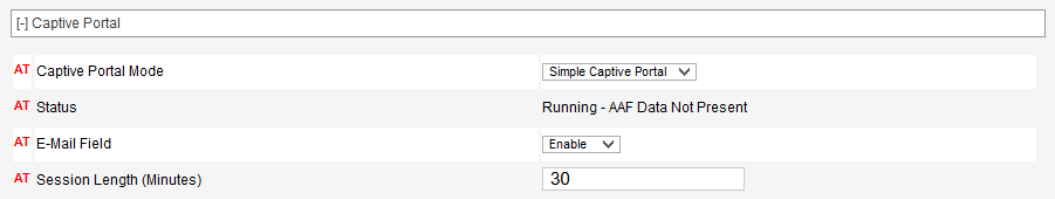


Figure 5-7: ACEmanager: Wi-Fi > SSID 1 > Simple Captive Portal

Captive Portal Mode	Selects or Disables the captive portal Options are: • Disable (default) • Simple Captive Portal • Authenticated Captive Portal
Status	Shows the current status of captive portal Possible statuses include: Idle, Inactive, Disabled, Initializing, Running, Stopped, and Error. This field also displays error messages when there is an error with the configuration of captive portal. The “Running” status can also include a description of problems with Simple Captive Portal customization, such as a missing image file, or a disclaimer text file that is too large (“Running - Image File Not Present and Disclaimer File Too Large”, for example).
E-mail Field	Enables or disables a prompt for the user to enter an e-mail address on the splash page. Email addresses are written to the ALEOS logs. *Note: Simple Captive Portal uses HTML input type=”email”. Email addresses may be automatically validated, depending on browser support.* Options are: • Enable (default) • Disable
Session Length (Minutes)	Configures how long a session lasts in minutes. This allows a user to access the web for the configured duration. The access control is based on the user’s device MAC address. If the user’s device rotates its MAC address, the user may not have web access for the configured duration. After the configured duration, or if the user’s device rotates the MAC address, the user is returned to the splash screen. If a user disconnects from the Wi-Fi access point and then re-connects while the session is still active, the user resumes their existing session. If the router is rebooted, all authenticated sessions are cleared. Range: 0 (no limit) to 1440 (default is 30)

Authenticated Captive Portal

Authenticated Captive Portal has three components:
- Redirecting HTTP traffic
- Providing website authentication
- Managing RADIUS server accounts

Note: Captive Portal replaces the Wi-Fi Landing Page feature from previous versions of ALEOS. After you have configured Captive Portal settings, you can direct traffic to a page hosted by the captive portal solution you are using.

Redirecting HTTP traffic is handled by the AirLink LX40. For website authentication and managing RADIUS server accounts, use a solution compatible with Coova Chilli such as Colony Networks or HotspotSystem.

Before you begin:

1. Set Wi-Fi mode to Access Point (LAN).

2. On the SSID 1 page, ensure Bridge Wi-Fi to Ethernet is set to Disable.

To configure the router to redirect HTTP traffic:

1. On the Wi-Fi screen, select SSID 1 on the side menu.
2. In the Captive portal section, set the Captive Portal Mode to Authenticated Captive Portal and configure the other fields in this section as described in the following table.

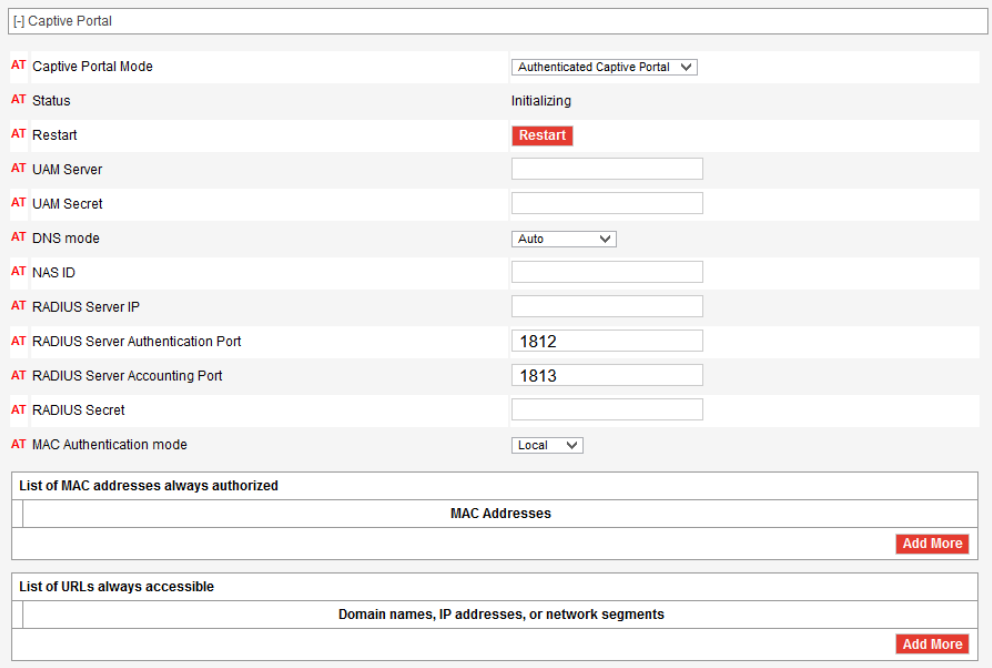


Figure 5-8: ACEmanager: Wi-Fi > SSID 1 > Authenticated Captive Portal

Note: You can also use AT Commands to configure Captive Portal fields. See Wi-Fi on page 445.

Captive Portal Mode	Selects or Disables the captive portal Options are: • Disable (default) • Simple Captive Portal • Authenticated Captive Portal
Status	Shows the current status of captive portal Possible statuses include: Idle, Inactive, Disabled, Initializing, Running, Stopped, and Error. This field also displays error messages when there is an error with the configuration of captive portal.
Restart	Use the Restart button to restart the feature with the current configuration.
UAM Server	URL of the portal to which you want to redirect users. This portal must be hosted by a Coova Chilli-compatible server solution.
UAM Secret	Shared secret between the router and the captive portal. You must configure the shared secret on both the router and the captive portal side.

DNS mode	Select the DNS method used to inform the client about the DNS address to use for host name resolution. Options are: • Auto (default)—The Mobile Network Operator's DNS server is used • Any DNS • User Defined—Overrides the default DNS server with the DNS server configured in the DNS IP1 and DNS IP2 fields.
DNS IP1	This field only appears when DNS mode is set to "User Defined". User defined DNS IP 1
DNS IP2	This field only appears when DNS mode is set to "User Defined". User defined DNS IP 2
NAS ID	RADIUS NAS Identifier for each device accessing a portal
RADIUS Server IP	IP of the computer where the RADIUS server is running
RADIUS Server Authentication Port	The UDP port used for RADIUS authentication requests Default port is 1812.
RADIUS Server Accounting Port	The UDP port used for RADIUS accounting requests Default port is 1813.
RADIUS Secret	Shared secret with the RADIUS server
MAC Authentication Mode	Select the MAC authentication mode. Options are: • Local (default)—Allows you to enter a list of authorized MAC addresses • Server—Allows you to authorize the host from RADIUS (outside of ALEOS)
List of MAC addresses always authorized	This field is only visible when the MAC authentication mode is set to Local. List the MAC address of devices that do not require authentication for Internet access. The maximum number of entries is 10.
List of URLs always accessible	List the URLs that are accessible prior to authentication, using the Domain names, IP addresses, or network segments. The maximum number of entries is 10.

3. Click Restart or reboot the router.

   After a non-authenticated client connects to the access point and attempts to access a Web page (on port 80), the request is directed to the captive portal. After the client is authenticated by the captive portal, the client should be able to access the Internet.

WEP

When you choose WEP in the Wi-Fi Security Authentication Type field, an additional section appears:

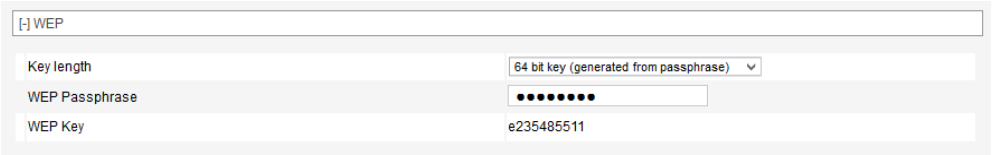


Figure 5-9: ACEmanager: Wi-Fi > Access Point WEP section

Note: ALEOS provides WEP only for backward compatibility with older equipment. WEP is an unsecured authentication type, and is deprecated by the 802.11 standard. Sierra Wireless strongly discourages the use of WEP for the same reasons as TKIP use is discouraged (see page 143).

Field	Description
Key length	Length of the security key to use Options are: • 64 bit key (generated from passphrase) (default) • 128 bit key (generated from passphrase) • Custom Key—64 or 128 bit key (user specifies 5 or 10 hex characters)
WEP Passphrase	WEP passphrase to be used • 8–26 alphanumeric ASCII characters This field does not appear if the Custom Key option is selected in the Key length field.
WEP Key	Displays the WEP key in hex characters The WEP Key is generated from the WEP Passphrase when you select 64-bit key or 128-bit key in the Key length field*. This is the Key required by AP clients to connect to the router. To generate the WEP Key: 1. Set the Key length. 2. Enter the WEP Passphrase. 3. Click Apply. 4. Reboot the router. The current WEP Key is displayed in ACEmanager only after rebooting. * If you selected Custom Key in the Key length field, enter the desired custom key in hex characters only (5–10 hex characters). When logging in with a Custom Key, you can enter the hex characters or the ASCII equivalent. For example, if the custom key is 68656c6c6f, you can log in using 68656c6c6f or the ASCII equivalent (hello).

WPA/WPA2 Personal

If WPA Personal or WPA2 Personal are selected for the Wi-Fi Security Authentication Type field, a WPA/WPA2 Personal section appears.

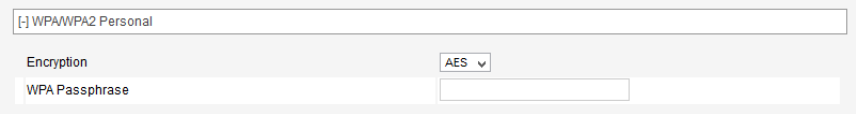


Figure 5-10: ACEmanager: Wi-Fi > Access Point WPA/WPA2 security options

Field	Description
WPA/WPA2 Personal	
Wi-Fi Encryption	Specify the encryption type for WPA or WPA2 authentication. Options are: • AES (default) • TKIP *Note: Do not select TKIP when 802.11w support is Optional or Required. TKIP is a deprecated Wi-Fi security protocol and is not supported with 802.11w Protected Management Frames.*
WPA Passphrase	Specify the WPA Passphrase AP clients use to connect to the router. Default: None. The WPA Passphrase must be 8 to 63 characters long. It can include: • Upper and lower case letters • Numbers • Spaces • Special characters: ‘ - = [ ] \ ; ’ , . / ~ ! @ # $ % ^ & * ( ) _ + { } | : ”< > ? Special characters used must also be supported by connected devices. The WPA Passphrase is case-sensitive. If your password is not at least 8 characters long, a warning message appears when you click Apply. •••• Length must be 8 or more characters Enter a valid password, click an empty area on the page to remove the warning, and then click Apply again.

WPA2/WPA3 Enterprise

If WPA2 Enterprise or WPA3 Enterprise is selected for the Wi-Fi Security Authentication Type field, a WPA2/WPA3 Enterprise section appears.

Network administrators can use WPA2/WPA3 Enterprise to design network Authentication around their specific needs and policies, and to change or revoke access rights for individual users. WPA2/WPA3 Enterprise uses RADIUS authentication.

Note: WPA3 Enterprise Authenication is available only SSID 1.

Figure 5-11: ACEmanager: Wi-Fi > Access Point WPA2/WPA3 Enterprise security options

Field	Description
WPA2/WPA3 Enterprise	
RADIUS Authentication Server IP Address	IP address for the RADIUS Authentication Server
RADIUS Authentication Server Port	RADIUS Authentication Server port number Default is 1812
Shared Secret	The shared secret is an ASCII string, typically up to 64 characters
RADIUS Accounting Server IP Address	IP address for the RADIUS Accounting Server
RADIUS Accounting Server Port	RADIUS Accounting Server port number Default is 1813
Shared Secret	The shared secret is an ASCII string, typically up to 64 characters

Client (WAN) Mode

In Client Mode, the AirLink router acts as a Wi-Fi client and can connect to an access point. While connected, the Wi-Fi or WAN link is primarily an uplink for the AirLink router and all connected devices. All outbound traffic is routed over the Wi-Fi connection instead of the mobile broadband connection.

Client Mode has been tested with the top 5 WLAN Access Point vendors: Cisco®, Aruba Networks®, Motorola™, HP®, and NETGEAR®.

You can configure up to 10 Access Points for each AirLink router. Only one Access Point is used at a time for the client connection. Having additional APs configured allows for portability. You can view available APs in the area on the Nearby Access Points table.

Under Wi-Fi > General, select Client Mode in the Wi-Fi Mode field, and in the left menu, select Client (WAN).

To configure Client (WAN) mode:

1. Select Client (WAN) from the drop-down menu in the Mode field.
2. Click Apply.
3. If you have not already done so, configure the General settings.
4. On the left menu, select Client (WAN), and select the desired Remote AP from the list in the left menu.

Note: Access Points that have already been configured have a dot beside them.

Nearby Access Points

The Nearby Access Points table shows you the access points within range of the LX40 Wi-Fi, and includes each access point's:

- SSID
- Channel
- Frequency
- Security Flags—[CCMP], [PSK], [ESS], [TKIP], [SAE]
- Signal level
- BSSID, or MAC address

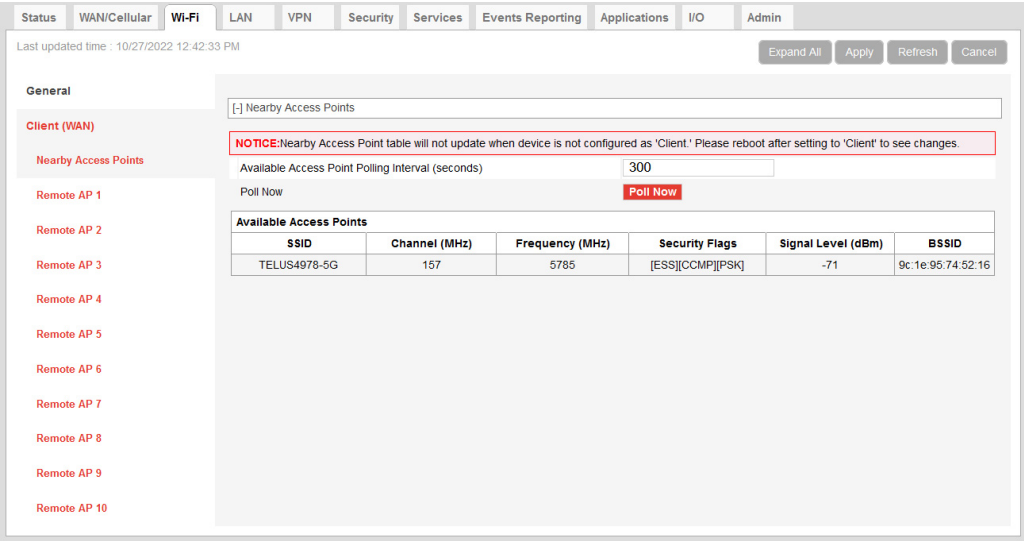


Figure 5-12: ACEmanager: Wi-Fi > Client (WAN) > Nearby Access Points

Field	Description
Nearby Access Points	
Available Access Point Polling Interval (seconds)	Sets the interval to automatically scan for available access points. Options are: • 10–3600 seconds (300 default)
Poll Now	Click to scan for available access points. To update the table, click the Refresh button.

Remote AP Settings

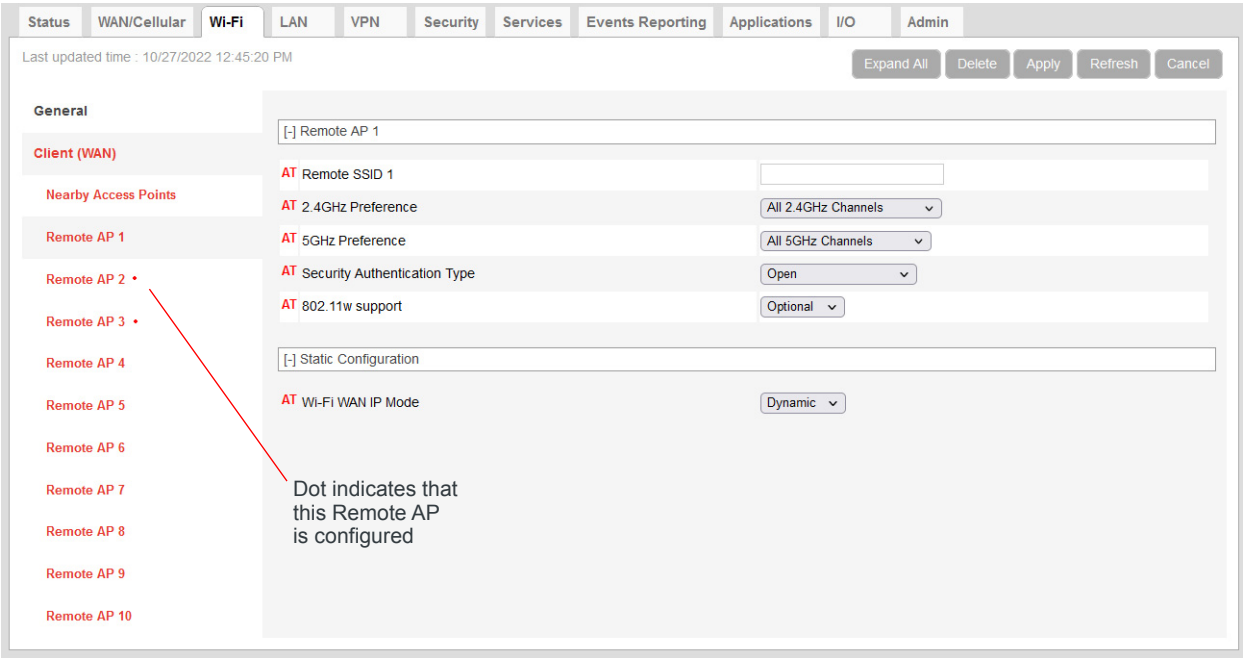
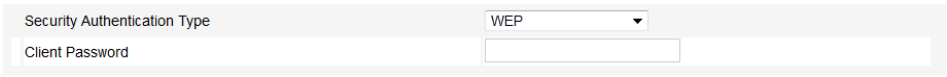
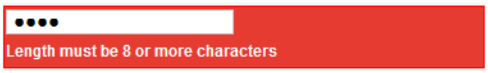
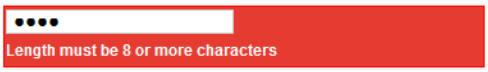


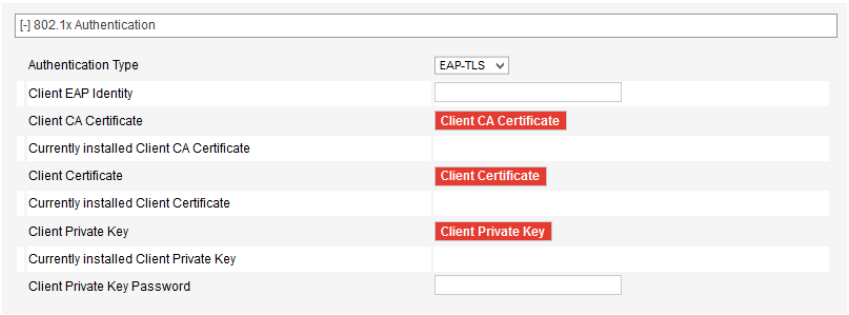
Figure 5-13: ACEmanager: Wi-Fi Client (WAN) Remote AP configuration

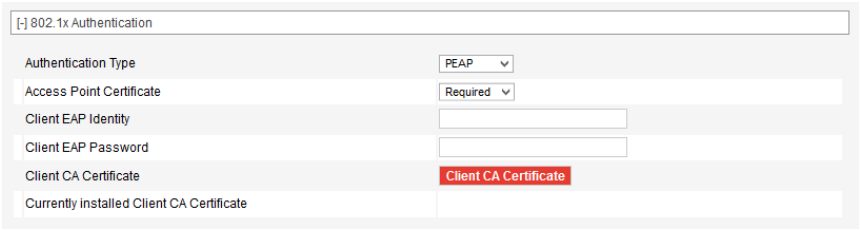
Field	Description
Remote AP 1, Remote AP 2... Remote AP 10	
Remote SSID(#)	Use this field to configure the remote access point you want the AirLink router to be able to scan for and connect to. The router scans for available APs in the order they are configured in ACEmanager, so you may want to configure the most commonly used AP as Remote Wi-Fi AP 1. For the Remote AP SSID, the router supports: • Upper and lower case letters • Numbers • Spaces • Special characters: ‘ - = [ ] \ ; ’ , . / ~ ! @ # $ % ^ & * ( ) _ + { } | : ”< > ? Special characters used must also be supported by connected devices. The SSID is case-sensitive. *Note: The configured parameters for the remote AP must be accurate. The AirLink router does not prompt if there is a mismatch.*

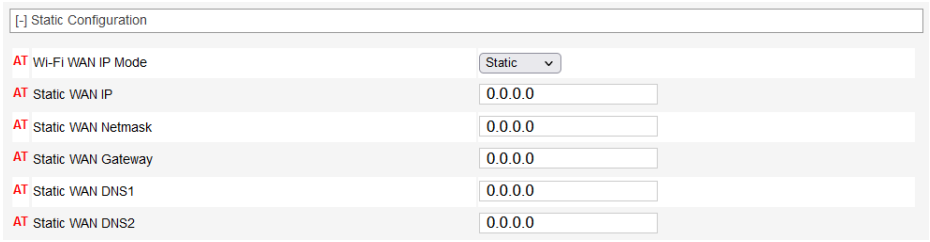
Field	Description
2.4GHz Preference	Select the 2.4GHz channels that the router uses for Wi-Fi. The LX40 will scan and associate to the Access Points that are operating on the specified channels and frequencies. The options are: • Not Preferred—The LX40 will only connect to an Access Point operating on 2.4 GHz channels if an Access Point operating on 5GHz channels is not available. • All 2.4GHz Channels • Specific 2.4GHz Channels *Note: Setting both 2.4GHz and 5GHz Preference fields to Not Preferred will create an Invalid Configuration file. The Wi-Fi Client will fail to associate to a Remote Access Point.*
Specific 2.4GHz Channels	When Specific 2.4GHz Channels is selected under 2.4GHz Preferences, the Specific 2.4GHz Channels field appears. Enter the desired 2.4GHz channels as a comma-delimited list; for example, 1,6,11. *Note: Enter only channels that the LX40 supports. These channels are listed under the Channel, Frequency, Width and Channel and Frequency settings. If you enter unsupported channels or channels that are excluded by your Country Code settings, these channels will not take effect. See also The Wi-Fi channel I selected is not working.*
5GHz Preference	Select the 5GHz channels that the router uses for Wi-Fi. The LX40 will only scan and associate to the Access Points that are operating on the specified channels and frequencies. The options are: • Not Preferred—The LX40 will only connect to an Access Point operating on 5GHz channels if an Access Point operating on 2.4GHz channels is not available. • All 5GHz Channels • Specific 5GHz Channels *Note: Setting both 2.4GHz and 5GHz Preference fields to Not Preferred will create an Invalid Configuration file. The Wi-Fi Client will fail to associate to a Remote Access Point.*
Specific 5GHz Channels	When Specific 5GHz Channels is selected under 5GHz Preferences, the Specific 5GHz Channels field appears. Enter the desired 5GHz channels as a comma-delimited list; for example, 36,40,149. *Note: Enter only channels that the LX40 supports. These are listed under the Channel, Frequency, Width and Channel and Frequency settings. If you enter unsupported channels or channels that are excluded by your Country Code settings, these channels will not take effect. See also The Wi-Fi channel I selected is not working.*

Field	Description
Security Authentication Type	Use this field to configure the authentication type used by the access point. Options are: • Open—No authentication is needed when this option is selected. Connecting to an Open (no authentication) AP is generally not recommended. (default) • WEP—Connecting to a WEP AP is generally not recommended since it offers very low authentication/encryption. • WPA/WPA2 Personal • WPA2 Enterprise • WPA3 Enterprise *Note: If the Access Point requires a secondary authentication through a landing page, the router cannot enter those credentials. This type of AP may not allow full functionality for the router or devices connected to the AirLink router.*
802.11w support	Enable 802.11w operation. The 802.11w standard uses Security Association Query Requests to ensure that clients are legitimate. Options are: • Disabled (default) • Optional • Required When Optional is selected, devices that support 802.11w will be protected, while other devices will still connect to the router. Select Required to force 802.11w operation. The router will reject unsupported clients and access points.
The remaining fields depend on the option chosen in the Remote AP Security Authentication Type field.	
WEP	 Client Password—Enter a WEP password. The WEP password must be 8 to 125 characters long. It can include: • Upper and lower case letters • Numbers • Spaces • Special characters: ‘ - = [ ] \ ; ’ , . / ~ ! @ # $ % ^ & * ( ) _ + { } | : ”< > ? Special characters used must also be supported by connected devices. The WEP password is case-sensitive. If your password is not at least 8 characters long, a warning message appears when you click Apply.  Enter a valid password, click an empty area on the page to remove the warning, and then click Apply again.

Field	Description
WPA/WPA2 Personal	 Client Password—Enter a WPA password. The WPA password must be 8 to 63 characters long. It can include: • Upper and lower case letters • Numbers • Spaces • Special characters: ‘ - = [ ] \ ; ’ , . / ~ ! @ # $ % ^ & * ( ) _ + { } | : ”< > ? Special characters used must also be supported by connected devices. The WPA password is case-sensitive. If your password is not at least 8 characters long, a warning message appears when you click Apply.  Enter a valid password, click an empty area on the page to remove the warning, and then click Apply again.
WPA2 Enterprise/WPA3 Enterprise	
Authentication Type	Select either: • EAP-TLS—Extensible Authentication Protocol-Transport Layer Security • PEAP—Protected Extensible Authentication Protocol

Field	Description
Authentication Type	If you select EAP-TLS, the following fields appear:  • Client EAP Identity—Enter the Extensible Authentication Protocol (EAP) Identity. The Client EAP Identity is an ASCII string. • Client CA Certificate—Click the Client CA Certification button, navigate to the certificate file and click Upload file. • Currently Installed Client CA Certificate—Status field shows the current Client CA Certificate file name. • Client Certificate—Click the Client Certification button, navigate to the certificate file and click Upload file. • Currently Installed Client Certificate—Status field shows the current Client Certificate file name. • Client Private Key—Click the Client Private Key button, navigate to the desired file and click Upload file. • Currently Installed Client Private Key—Status field shows the current Client Private Key. • Client Private Key Password—Enter the Private Key password. The Client Private Key Password is an ASCII string. *Note: The certificate and certificate key must meet the following conditions:* • *The certificate must be an X.509 certificate* • *The certificate and the private key must be in .pem format, and they must be in separate files.* • *There is no limit to the size of the private key, but the larger the key, the more the performance is affected. Sierra Wireless recommends that the key does not exceed 2048 bits.* *Note: The LX40 supports pre-defined cipher suites using 128-bit cipher algorithms.*

Field	Description
	If you select PEAP, the following fields appear:  • Access Point Certificate—Select whether to use PEAP Authentication with or without a Client CA Certificate. By default, using the certificate is required (and the Client CA Certificate must be installed). *Note: If you select Not Used and click Apply, you must accept a warning that this configuration may put your system at risk.* • Client EAP Identity—Enter the Extensible Authentication Protocol (EAP) Identity. The Client EAP Identity is an ASCII string. • Client EAP Password—Enter the EAP password. • Client CA Certificate—Click the Client CA Certification button, navigate to the certificate file and click Upload file. • Currently Installed Client CA Certificate—Status field shows the current Client CA Certificate file name. *Note: The certificate and certificate key must meet the following conditions:* • *The certificate must be an X.509 certificate* • *The certificate and the private key must be in .pem format, and they must be in separate files.* • *There is no limit to the size of the private key, but the larger the key, the more the performance is affected. Sierra Wireless recommends that the key does not exceed 2048 bits.* *Note: The LX40 supports pre-defined cipher suites using 128-bit cipher algorithms.*

Field	Description
Static Configuration 	
Wi-Fi WAN IP Mode	Configure Wi-Fi WAN mode to dynamic or static assignment. When set to Static, you can configure a static Wi-Fi IP address for the LX40. This allows an access point to give out a specific IP address to a specific LX40. For example, this could allow an in-vehicle camera to automatically upload video upon return to a depot with Wi-Fi infrastructure. Options are: • Dynamic (default) • Static
Static WAN IP	When in Static WAN IP Mode, enter the static WAN IP address.
Static WAN Netmask	When in Static WAN IP Mode, enter the static WAN Netmask.
Static WAN Gateway	When in Static WAN IP Mode, enter the static WAN Gateway IP address.
Static WAN DNS1	When in Static WAN IP Mode, enter the static WAN DNS1 IP address.
Static WAN DNS2	When in Static WAN IP Mode, enter the static WAN DNS2 IP address.

6: LAN Configuration

You can use the AirLink LX40 to route data between one or more connected devices and the Internet via the mobile network.

The following LAN interfaces are available:
- Ethernet
- USB

Port Use

Applications running on a LAN client such as a router or laptop must use different ports from those used by ALEOS features on the AirLink LX40. For a list of inbound ports used by ALEOS, see Inbound Ports Used by ALEOS on page 503.

DHCP/Addressing

This page governs the DHCP and addressing for all interfaces.

The LAN Address Summary is a display of the IP addresses assigned to interfaces on their respective configuration pages. To change the addressing for the Ethernet interface, go to the Ethernet side menu. To change the addressing for the USBnet interface, go to the USB side menu. To change the addressing for the Wi-Fi interface, go to the Wi-Fi tab.

The DHCP/Addressing page includes the following sections:
- General
- IP Passthrough
- DHCP Reservation List
- DHCP Server Options
- DHCP Client Options
- DHCP Vendor Specific Options

General

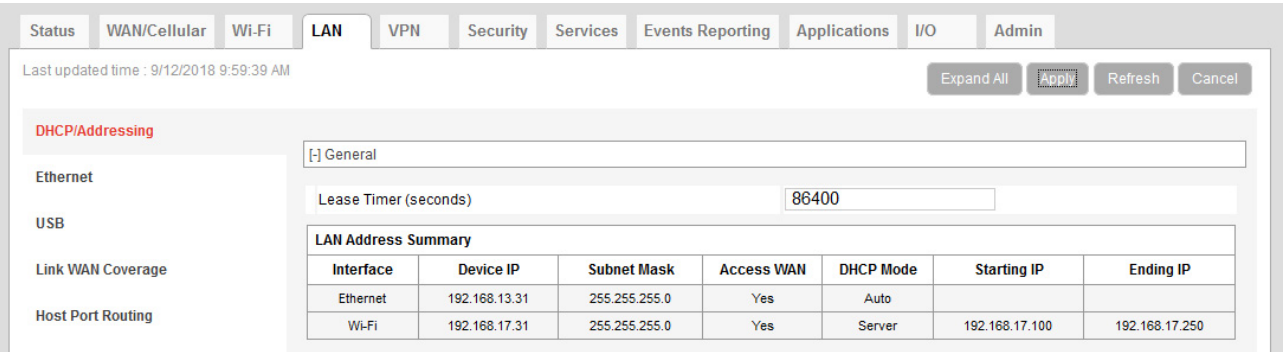


Figure 6-1: ACEmanager: LAN > DHCP/Addressing > General

Field	Description
General	
Lease Timer (seconds)	The amount of time the DHCP client is given for the use of the IP address (in seconds) Options are: • 120–4294967295—Number of seconds the IP address is leased for. If you want to set the value to “infinity”, enter 4294967295 (equivalent to 136 years). The actual maximum value depends on the maximum supported by your DHCP client. The default lease time is 86400 seconds (24 hours).
LAN Address Summary Displays the interfaces which have been enabled. By default, only the Ethernet and USBNET Interfaces are enabled. This table also includes VLAN if configured and Wi-Fi if it is configured as Access Point (LAN) and not bridged to Ethernet.	
Interface	The physical interface port or VLAN ID *Note: If Wi-Fi is bridged to Ethernet, “Ethernet/Wi-Fi” is displayed.*
Device IP	The IP address of the AirLink router for the specified interface port. By default, this is set to 192.168.13.31 for Ethernet,192.168.17.31 for Wi-Fi, and 192.168.14.31 for USB/net.
Subnet Mask	Subnet mask indicates the range of device IP addresses that can be reached directly. Changing this limits or expands the number of clients that can connect to the AirLink router. The default of 255.255.255.0 means that 253 IP addresses can connect to the AirLink router. Uses 192.168.13. as the first three octets of the IP address if the router IP is 192.168.13.31. *Note: Do not use the same IP addresses/subnet mask for WAN and LAN connections. For example, you cannot have 192.168.13.0/24 as a LAN subnet if the WAN the router is connecting to is using 192.168.13.0/24.*
Access WAN	Appears if the interface is configured to allow connected device(s) access to the Internet *Note: Internet access cannot be disabled for Ethernet or Wi-Fi hosts.*
DHCP Mode	Indicates whether or not the interface has a DHCP server enabled to provide dynamically allocated IP addresses provided to connected devices. The DHCP Mode status for Ethernet can be Auto, Server, or Relay. The DHCP Mode status for USB or Wi-Fi interfaces can be Server or Relay. *Note: The DHCP server can only be disabled for Ethernet and VLAN.*
Starting IP	Ethernet DHCP pool starting IP address (DHCP low address)
Ending IP	The ending IP for the interface (DHCP high address). If the starting and ending IP are the same, there is a single address in the pool and only one connected device receives an IP address from the DHCP server for that interface. Some interfaces, such as USB, can only have a single device connection. For others, statically assigned IP addresses in the same subnet, but outside of the DHCP pool, can still connect and use the router in the same way as a DHCP connected device.

IP Passthrough

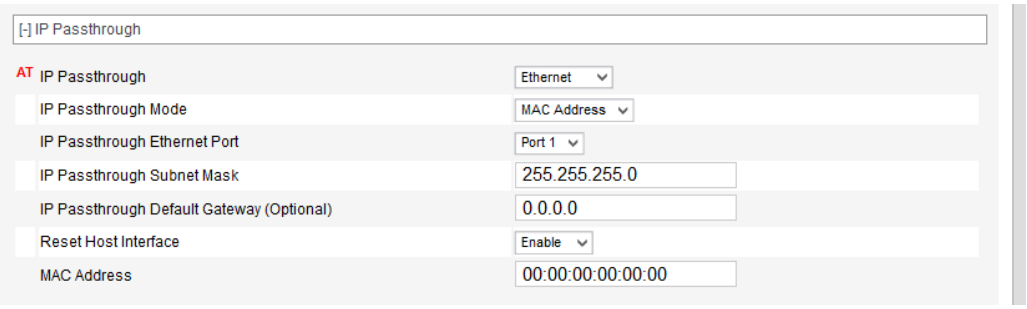


Figure 6-2: ACEmanager: LAN > DHCP/Addressing > IP Passthrough

Field	Description
IP Passthrough In IP Passthrough mode, the AirLink router passes the WAN IP address to the selected LAN interface or device. *Note: IP Passthrough is only available on the WAN cellular interface. In order for IP Passthrough to work, and for inbound packets to be forwarded to the LAN interface or device, the setting DMZ Host Enabled must be set to Automatic.*	
IP Passthrough	Select the interface that will be used for IP passthrough. Options are: • Disabled—Private IP addresses are used (default) • Ethernet—Ethernet interface is used for IP passthrough • USB—USB interface is used for IP passthrough • Serial DUN—Serial DUN interface is used for IP passthrough
IP Passthrough Mode	Choose the IP passthrough mode. Options are: • First Host—The first connected device gets the WAN IP. Subsequent devices do not receive an IP address. (default) • MAC Address—This option is available for the Ethernet interface only. The device with the configured MAC address gets the WAN IP. Subsequent devices use the private IP address corresponding to the interface configured in IP Passthrough.
IP Passthrough Subnet Mask	Enter the IP passthrough subnet mask. This field does not appear when IP Passthrough is set to Serial DUN. The default setting is 255.255.255.0
IP Passthrough Default Gateway (Optional)	Configure the address of the IP passthrough default gateway. The default setting is 0.0.0.0
Reset Host Interface	When this option is enabled, the host interface is reset when the device gets a new WAN IP. Options are: • Enable (default) • Disable
MAC Address	When IP Passthrough Mode is set to MAC Address, enter the MAC address of the device that you want to receive the WAN IP.

DHCP Reservation List

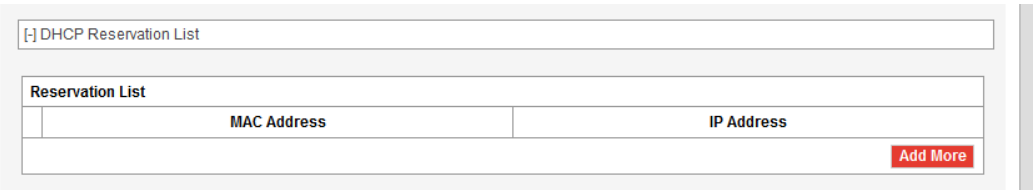


Figure 6-3: ACEmanager: LAN > DHCP/Addressing > DHCP Reservation List

Field	Description
DHCP Reservation List	
Reservation List	Use this list to reserve IP addresses for up to 20 connected devices, based on their MAC addresses. This feature is useful if you have multiple connected devices behind the AirLink router where you need to use DHCP addressing and also need to assign a specific IP addresses to some devices. To reserve an IP address: 1. Click Add More. 2. Complete the MAC Address and IP Address fields. The device does not need to be connected when you complete these fields. 3. Click Apply. To delete a reserved IP address, click the X beside the reserved IP address. *Note:* • *A reserved IP address must be from a private subnet configured for the applicable interface. For example, 192.168.13.10 for an Ethernet connected device.* • *When Host Connection Mode is set to Public for a particular interface, the DHCP reservations for that interface are overridden. Any device connected to the specified interface (and port for Ethernet) receives the public IP. Any other device connected to the same interface type does not receive any IP from DHCP.* • *The reservation list supports Ethernet and Wi-Fi hosts.* • *If Wi-Fi Bridge to Ethernet mode is enabled, you can reserve an IP address for a Wi-Fi connected device in the Ethernet range only.*
MAC Address	Enter the MAC address of the device you want to reserve an IP address for.
IP Address	Enter the IP address you want to reserve for the device.

DHCP Server Options

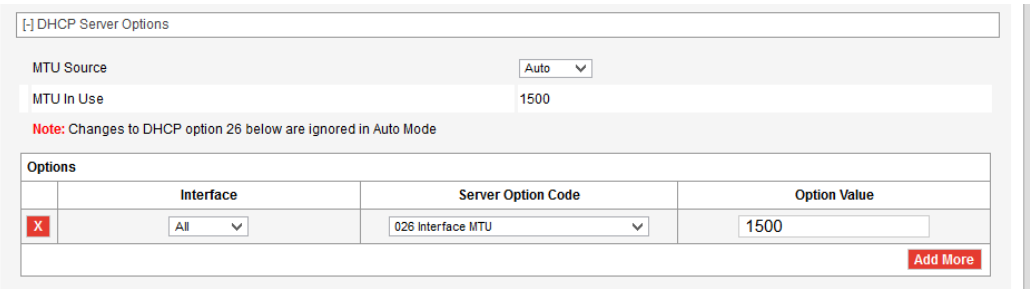


Figure 6-4: ACEmanager: LAN > DHCP/Addressing > DHCP Server Options

Field	Description
DHCP Server Options Enables IT Administrators to configure up to 10 DHCP options, allowing you to push DHCP options to connected devices.	
MTU Source	Use this field to select where the Maximum Transmit Unit (MTU) value for LAN and Wi-Fi clients is obtained. Options are: • Auto—The MTU value distributed to clients is obtained from the radio module. This option ensures that all interfaces use the same MTU as the radio module. (default) When Auto is selected in this field, the MTU value configured for Option Code 026 Interface MTU is ignored. • Manual—The MTU value configured for the Server Option Code 026 Interface MTU is distributed to clients. *Note: If you are using a new SIM card for the first time, Auto MTU takes effect after the second reboot.*
MTU in Use	This field only appears when MTU Source is set to Auto. Displays the Maximum Transmit Unit (MTU) value (from the radio module) being distributed to clients
Interface	Select the interface to use: • All (default) • Ethernet • USB • Wi-Fi (only available for LX40 with Wi-Fi) *Note: VLAN hosts only receive the DHCP options when the Interface is set to All.*

Field	Description
Server Option Code	Choose from the options in the drop-down menu. For a list of supported Option Codes, see Table 6-1. For additional information on the option codes, refer to the Internet Engineering Task Force (IETF) memorandum on Internet Protocols and Standards, RFC 2131. *Note: When MTU Source is set to Auto, the MTU value configured for Server Option Code 026 Interface MTU is ignored.*
Option Value	The format for the option value depends on the Server Option Code selected, as formats must conform with RFC 2132. For a list of accepted formats for each of the supported DHCP Option Codes, see Table 6-1. Use a comma to separate multiple values.

Table 6-1: Supported DHCP Options

DHCP Option	Type of entry	Accepted values (if applicable)
002 Time Offset	32-bit unsigned integer	-43200–43200[a]
003 Router[b]	1 or more IP addresses	
006 Domain Name Server	1 or more IP addresses	
007 Log Server	1 or more IP addresses	
009 LPR Server	1 or more IP addresses	
012 Hostname	ASCII string	No spaces (_ and - are valid)
013 Boot File Size	16-bit unsigned integer	1–65535
015 Domain Name	Fully Qualified Domain Name (FQDN)	
016 Swap Server	1 or more IP addresses	
017 Root Path	ASCII string	
018 Extension Path	ASCII string	
019 IP Forward Enable/Disable	Single octet Boolean	0 (Disable) or 1 (Enable)
020 Non-Local Source Routing	Single octet Boolean	0 (Disable) or 1 (Enable)
021 Policy Filter	1 or more pairs of IP addresses or IP address/mask pairs	
022 Max Datagram Reassembly Size	16-bit unsigned integer	576–65535
023 IP TTL	8-bit unsigned integer	1–255
026 Interface MTU	16-bit unsigned integer	68–65535 (Default is 1500.)
027 All Subnets Are Local	Single octet Boolean	0 (Disable) or 1 (Enable)

Table 6-1: Supported DHCP Options

DHCP Option	Type of entry	Accepted values (if applicable)
031 Perform Router Discovery	Single octet Boolean	0 (Disable) or 1 (Enable)
032 Router Solicitation Address	Single IP address	
034 Trailer Encapsulation	Single octet Boolean	0 (Disable) or 1 (Enable)
035 ARP Timeout	32-bit unsigned integer	6–65535
036 Ethernet Encapsulation	Single octet Boolean	0 (Disable) or 1 (Enable)
037 TCP TTL	8-bit unsigned integer	1–255
038 TCP Keepalive	32-bit unsigned integer	0–65535
040 NIS Domain	ASCII string	Domain name
041 NIS Server	Single IP address	
042 NTP Server	Single IP address	
044 NetBIOS Name Server	1 or more IP addresses	
045 NetBIOS Datagram Distribution Server	1 or more IP addresses	
046 NetBIOS Node Type	8-bit unsigned integer	1, 2, 4, or 8
047 NetBIOS Scope	ASCII string	
048 X Windows System Font Server	1 or more IP addresses	
049 X Windows System Display Manager	1 or more IP addresses	
064 NIS+ Domain	Domain name	
065 NIS+ Server	Single IP address	
066 TFTP Server	ASCII string or IP address	Name, domain name, or IP address
067 Bootfile Name	ASCII string	Name
068 Mobile IP Home	1 or more IP addresses	
069 SMTP Server	1 or more IP addresses	
070 POP3 Server	1 or more IP addresses	
071 NNTP Server	1 or more IP addresses	
074 IRC Server	1 or more IP addresses	

a. The time offset is entered as seconds. See Table 6-2 for a list of hour/second conversions.
b. If DHCP Server Option 003 is set to 0.0.0.0, no router is advertised to the attached client on the selected interface. This effectively does the same thing as disabling Advertise WAN Access, but on the selected interface.

Table 6-2: Time Offset Hour/Second conversions

Hour	Seconds	Hour	Seconds
0	0		
1	3600	**-1**	-3600
2	7200	**-2**	-7200
3	10800	**-3**	-10800
4	14400	**-4**	-14400
5	18000	**-5**	-18000
6	21600	**-6**	-21600
7	25200	**-7**	-25200
8	28800	**-8**	-28800
9	32400	**-9**	-32400
10	36000	**-10**	-36000
11	39600	**-11**	-39600
12	43200	**-12**	-43200

DHCP Client Options

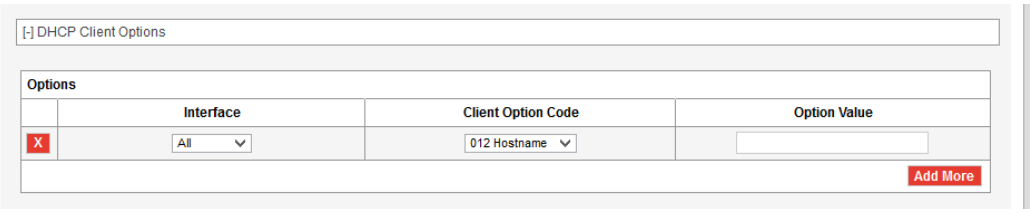


Figure 6-5: ACEmanager: LAN > DHCP/Addressing > DHCP Client Options

Field	Description
DHCP Client Options Enables IT Administrators to push DHCP Option 12 to connected devices.	
Interface	Select the interface to use: • All (default) • Ethernet • Wi-Fi (only available for LX40 with Wi-Fi) *Note: VLAN hosts only receive the DHCP options when the Interface is set to All.*

Field	Description
Client Option Code	Option 12 Hostname is the only option available.
Option Value	Text string with no spaces (_ and - are valid).

DHCP Vendor Specific Options

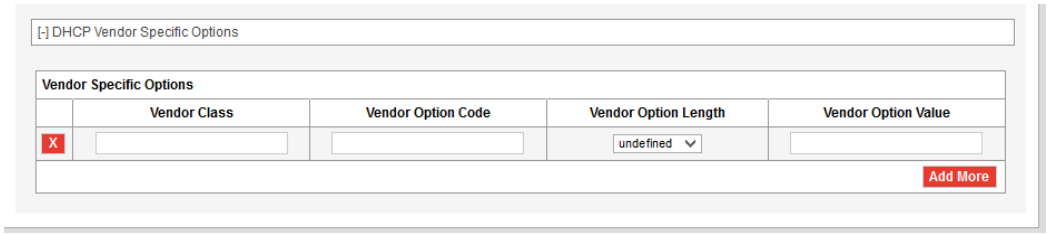


Figure 6-6: ACEmanager: LAN > DHCP/Addressing > DHCP Vendor Specific Options

Field	Description
DHCP Vendor Specific Options Enables IT Administrators to configure up to 5 vendor-specific options	
Vendor Class	Enter the vendor class
Vendor Option Code	Enter the vendor option code. Possible entries are: • 0–255
Vendor Option Length	This field allows you to specify the DHCP vendor specific option length in order to ensure that the DHCP datagram is correctly formatted for the DHCP client. Options are: • Undefined—Use this setting for IP addresses and strings (default) • 1 byte—Use for decimal values of 255 or less • 2 bytes—Use for decimal values between 256 and 65535 • 4 bytes—Use for decimal values greater than 65535 *Note: If the size used for the data is not correct, the option is ignored by the client.*
Vendor Option Value	Enter the vendor option value in one of the following formats: • Dotted-quad IPv4 address • Decimal number • Colon-separated hex digits • Text string Use a comma to separate multiple values.

Ethernet

The AirLink LX40 is equipped with an Ethernet port that can be enabled or disabled as needed. When the port is disabled, the connected device cannot connect via Ethernet, and ARP queries do not receive responses on the port.

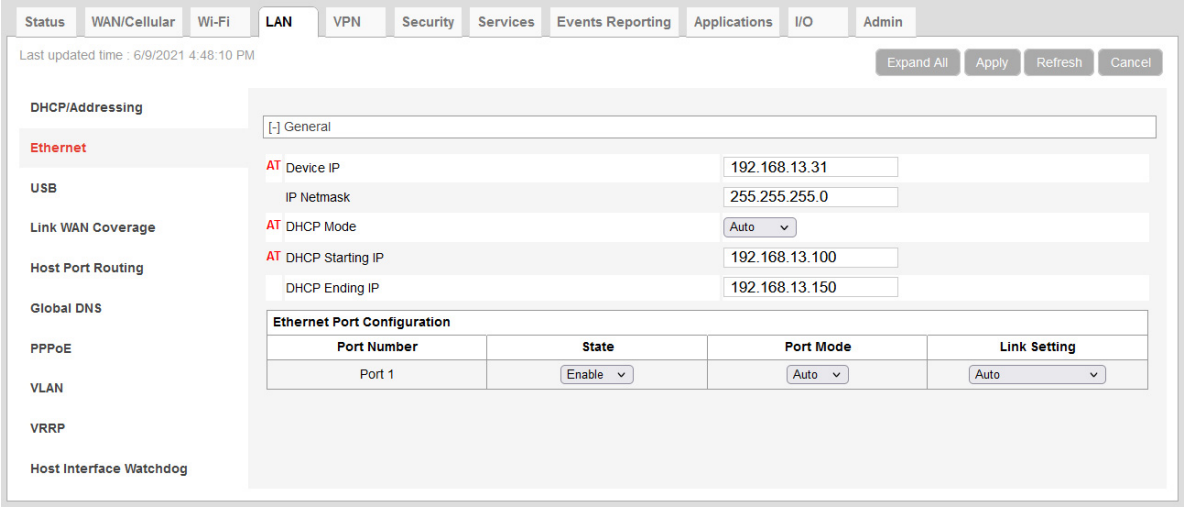


Figure 6-7: ACEmanager: LAN > Ethernet

Field	Description
General	
Device IP	The Ethernet IP address of the AirLink router. By default this is set to 192.168.13.31.
IP Netmask	The Netmask given to any Ethernet DHCP client Default is 255.255.255.0.
DHCP Mode	Determines how DHCP operates on the Ethernet interface Options are: • Server—The AirLink LX40 acts as a DHCP server for all Ethernet connections. • Disable—The AirLink LX40 acts as neither a DHCP server or client. All devices connected to the AirLink router must have a static LAN IP or use PPPoE. • Auto—When the LX40 is powered on or reboots, it attempts to determine if a DHCP server is present on the Ethernet network. If a DHCP server is found, the router obtains an IP address and it can communicate with AirLink Management Service (ALMS). If a DHCP server is not found, the LX40 becomes a DHCP server. (default) When using Auto DHCP, set the Ethernet port as Auto or LAN (not WAN). See Mode on page 165. For a full-featured auto DHCP, see Ethernet WAN Auto Mode. Most of the time you can leave this field set to the default value. • Relay—DHCP requests are forwarded to, and assigned by, an external DHCP server. For more information, see DCHP Relay on page 166.

Field	Description
DHCP Relay Server	Appears when DHCP Mode is set to Relay. Enter the IP address of the DHCP Relay Server. *Note: DHCP Relay servers must be specified by IP address. Specifying by hostname is not supported.*
DHCP Starting IP	Ethernet DHCP pool starting IP address Default is 192.168.13.100. *Note: If only one computer or device is connected directly to the Ethernet port, this is the IP address it is assigned.*
DHCP Ending IP	The ending IP address for the Ethernet interface DHCP pool Default is 192.168.13.150.
Ethernet Port Configuration	
Port Number	Ethernet Port number The number of Ethernet ports available varies depending on the router model.
State	State of the Ethernet Port (Enable or Disable) *Note: When the port is disabled, the device ignores any physical connection to the Ethernet port.*

Field	Description
Mode	You can set the following modes on the Ethernet port: • Auto—When the router is powered on or reboots, it attempts to determine if a DHCP server is present on the Ethernet network. If a DHCP server is found, the router obtains an IP address from the DHCP server. If no DHCP server is found, the port acts as a bridged LAN connection. • LAN—The Ethernet port acts as a LAN connection. WAN— The port is used as a WAN connection. Any security settings configured on the router, such as DMZ, IP filters, and port forwarding rules apply to this WAN connection.
Link Setting	Configures the Ethernet port speed and duplex setting Most of the time you can leave the default setting and the device you are connecting automatically negotiates the speed and duplex setting with the AirLink router. However, if the connected device has a fixed setting, use this field to change the AirLink router setting to match that of the connected device. *Note: If you select 100 Mb Full Duplex or 10 Mb Full Duplex for the router, ensure that the same speed is selected on the connected device.* The options are: • Auto—(default) The router auto-negotiates with the connected device to use the fastest speed possible—10 Mb, 100 Mb, or 1000 Mb. For best results, ensure that the connected device is also set to auto-negotiation. If your highest priority is power saving, select one of the 100 Mb or 10 Mb settings. • 100 Mb Full Duplex • 100 Mb Half Duplex • 10 Mb Full Duplex • 10 Mb Half Duplex You can view the current speed and duplex setting on the Status > Ethernet page. See page 49.

DCHP Relay

By using DHCP Relay, you can configure the Wi-Fi SSID so that DHCP leases are managed by an external DHCP server rather than the ALEOS-based server on-board the AirLink router.

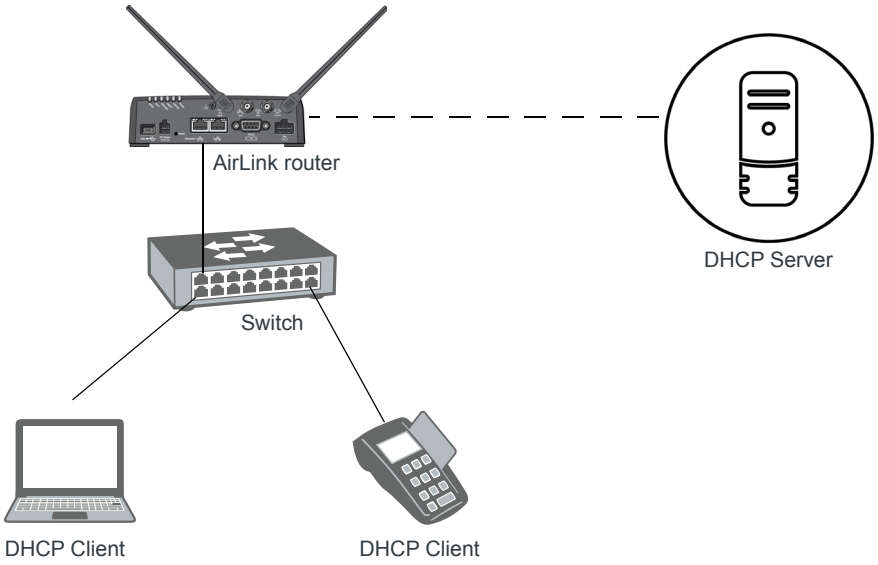


Figure 6-8: DHCP Relay Overview

In the example shown in Figure 6-8, a DHCP client is requesting an IP address. In DHCP Server mode, the IP address would be supplied to the DHCP client by the AirLink Router. However, by selecting DHCP Relay mode, the DHCP request is forwarded to the external DHCP relay server, which can then assign an address to the client.

DHCP Relay is supported on the Ethernet, USB and Wi-Fi interfaces. Each interface can have its own DHCP relay server configured, or you can use the same DHCP relay server for multiple interfaces. DHCP relay servers must be specified by IP address. Specifying by hostname is not supported.

The DHCP Relay configuration for an interface is ignored if that interface is configured for IP passthrough.

Note: DHCP Relay does not prevent you from assigning IP addresses that are outside the subnet for the configured interface. Please ensure that the DHCP relay server provides IP addresses within a valid range.

Using a DHCP relay server on an internal network

In the example shown in Figure 6-9, several AirLink routers are in a fixed location; a warehouse, for example. The routers have a WAN connection on the same network (10.0.0.0/8 in this example). Each router is configured with a /24 subnet within this network so the first ALEOS router will get 10.0.0.0/24, the second router will get 10.0.1.0/24, etc. Within each AirLink router's network are several devices that receive IP addresses from a central DHCP relay server.

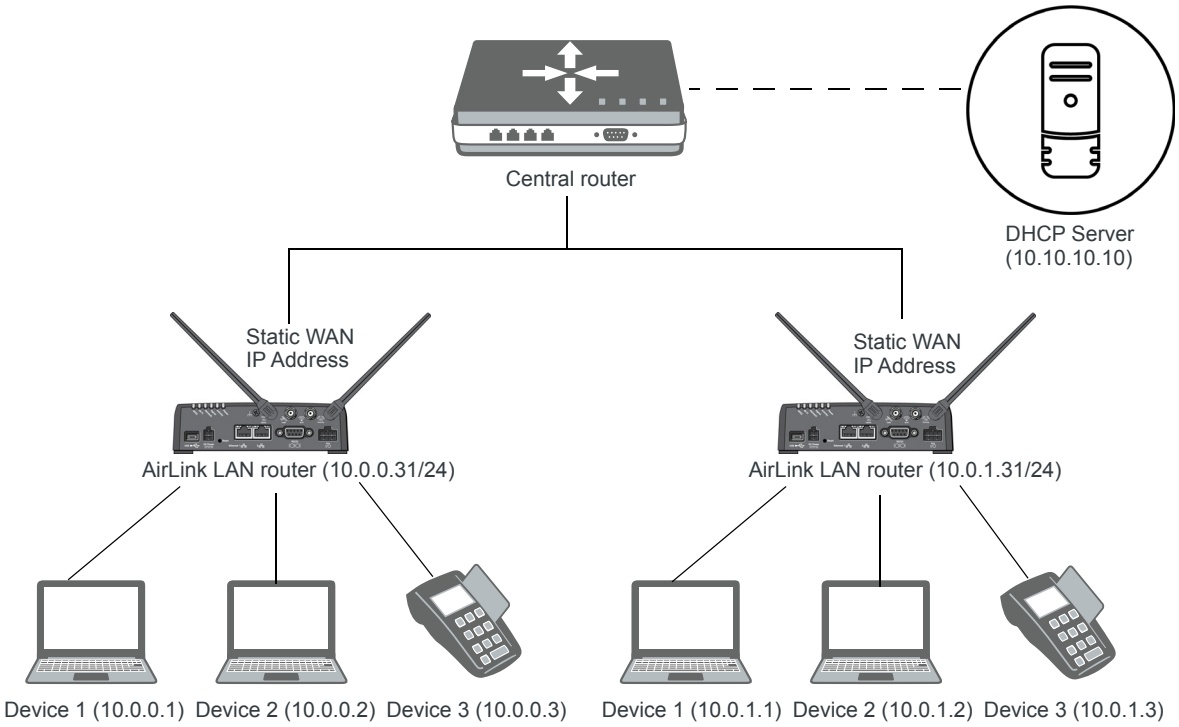


Figure 6-9: DHCP Relay Server on an Internal Network

As each connected device is powered on, it sends a DHCP request. This request triggers the AirLink router to send a unicast DHCP request out the WAN interface. When this request reaches the central router, the central router routes the request to the DHCP server. The DHCP server then generates and sends a response back to the IP address associated with the AirLink router interface on which the request was made.

Note: Any routers between the AirLink router and the DHCP server must have routes configured that allow the response to be routed back to the AirLink router. The AirLink router itself must have a static IP address.

Finally, the typical DHCP handshake takes place and IP addresses are assigned to the connected devices.

Using a DHCP relay server on a VPN

In this scenario, each AirLink router is in a different location; for example, installed in vehicles. Each AirLink router is configured to connect to a central VPN server and the DHCP server is located on the remote end of that VPN connection.

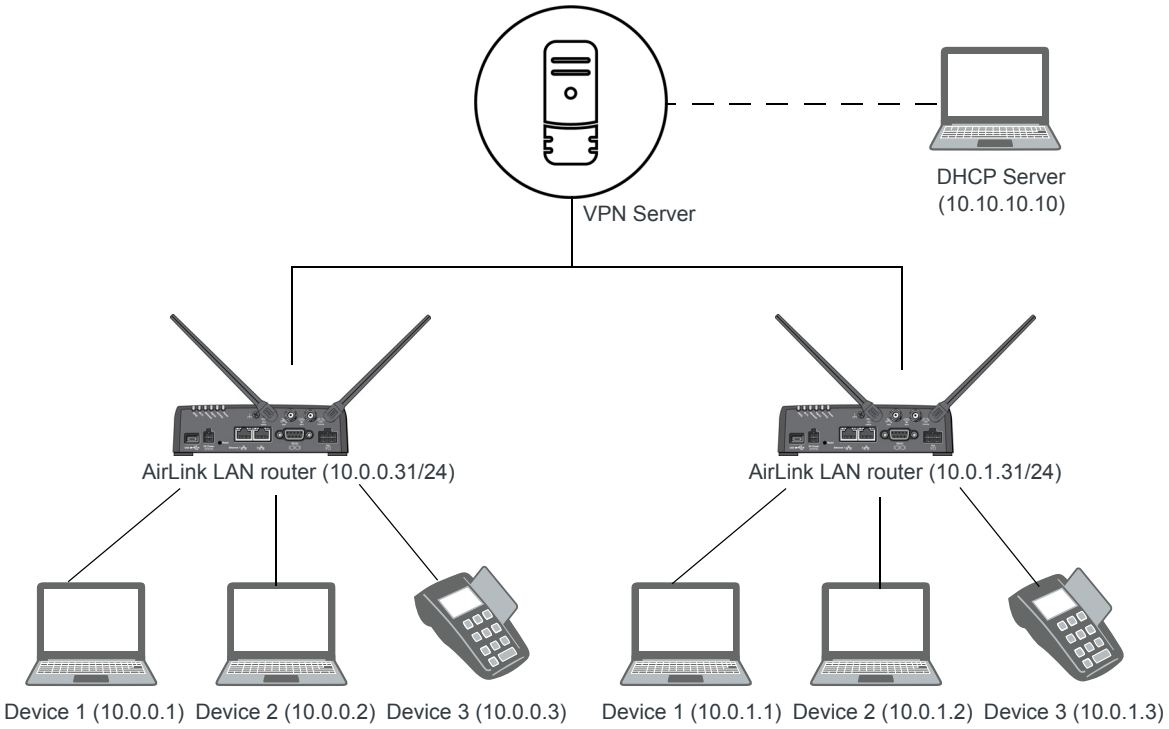


Figure 6-10: DHCP Relay Server on a VPN

In order to make the DHCP relay feature work over the Internet you must use a VPN server. This is because when the DHCP server crafts its response to the DHCP inquiry, it will send the response to the IP address associated with the AirLink router interface that the request came from, which will be a private IP address. By using the VPN server, you can keep within private networks without exposing traffic to the wider Internet.

RADIUS Framed Route

If you have a private APN that is authenticated with a unique user name and password through a RADIUS authentication server, Framed Route enables you to associate a pool of IP address (for example a /24 subnet) with that user name, effectively creating a remote branch of a private corporate network. Refer to the RADIUS specifications for more details.

For an AirLink router to work effectively with Framed Route, set the following two fields on the LAN > Ethernet screen to “Enable”:

- Accept Unsolicited Traffic—Enabling this field allows a device on the corporate network to dial out to a device connected on the LAN side of the AirLink router.
- Turn Off NAT—Enabling this field allows traffic from the LAN side of the AirLink router to flow back to the corporate network.

USB

The AirLink LX40 is equipped with a USB port that increases the methods by which you can send and receive data from a connected computer. You can set up the USB port to work as either a virtual Ethernet port or a virtual serial port, or you can disable it to prevent access by USB. You may need to install a USB driver to use these modes. For more information, see Installing the USB Drivers on page 170.

By default, the port is set to work as a virtual Ethernet port.

Note: Sierra Wireless recommends that you use a USB 2.0 cable with your AirLink LX40 and connect directly to your computer for best throughput.

To change the USB port to allow virtual serial port communication:

1. In ACEmanager, go to LAN > USB, and choose USB Serial as the USB Device Mode. To disable the USB port, select Disable from the same menu.

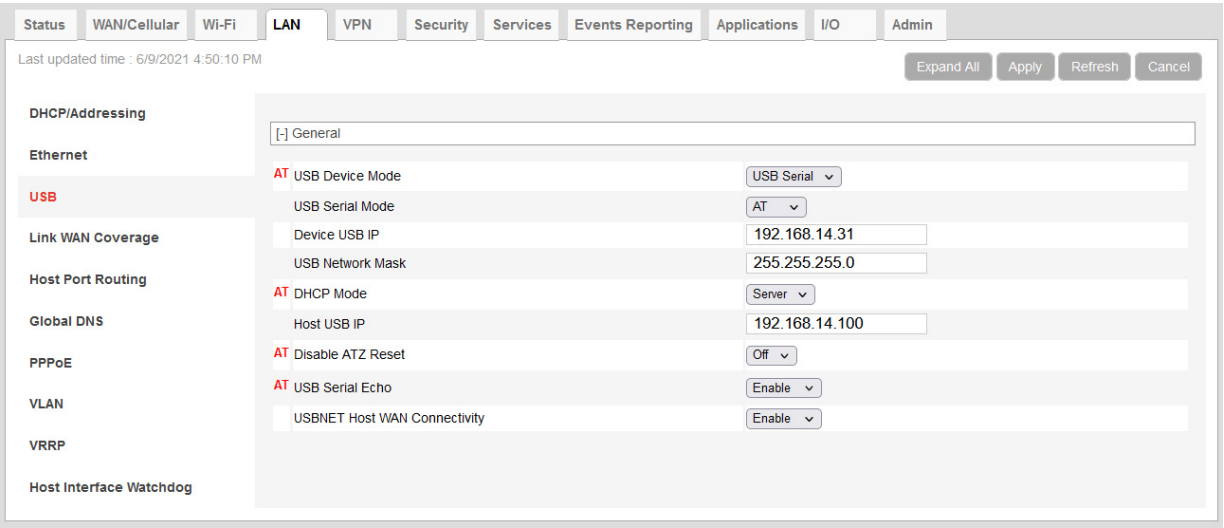


Figure 6-11: ACEmanager: LAN > USB

Field	Description
General	
USB Device Mode	The USB mode on router startup • USB Serial—USB port acts as a virtual Serial port. (default) • USBNET—USB port acts as a virtual Ethernet port. • Disabled—USB port is disabled. You can also configure this parameter using the AT Command *USBDEVICE. See *USBDEVICE on page 444. *Note: A reboot is required to activate the USB mode change.*

Field	Description
USB Serial Mode	When USB Device Mode is set to USB Serial, select the USB Serial Mode. Options are: • AT (default) • PPP
Device USB IP	The USBNET IP address of the AirLink router. By default this is set to 192.168.14.31.
USB Network Mask	Use this field to configure a subnet mask for USBNET Default is 255.255.255.0
DHCP Mode	Sets how IP addresses are assigned on the network. Options are: • Server (default)—IP addresses and DHCP leases are managed by the AirLink router • Relay—DHCP requests are forwarded to, and assigned by, an external DHCP server. For more information, see DCHP Relay on page 166.
DHCP Relay Server	Appears when DHCP Mode is set to Relay. Enter the IP address of the DHCP Relay Server. *Note: DHCP Relay servers must be specified by IP address. Specifying by hostname is not supported.*
Host USB IP	The IP for the computer or device connected to the USB port
USB Serial Echo	The AT command echo mode when the USB is configured as a virtual serial port Options: • Enable—Echoes commands to the computer (so you can see what you type) (default) • Disable—Does not echoes commands to the computer (you cannot see what you type)
USBNET Host WAN Connectivity	Controls access to the WAN over the USB port Options are: • Enable—USB can be used to access the WAN (default) • Disable—Access to the WAN over USB is blocked.

Installing the USB Drivers

A USB driver is required if you want to use the USB port on the router as a virtual serial port (USB Serial). If you want to use the USB port as a virtual Ethernet port (USBnet), a driver is not required as the default Microsoft Windows 7 and Windows 8 drivers are used.

To install the USB Serial drivers for Windows 7 and Windows 8:

1. Go to source.sierrawireless.com and download the USB Serial Driver One-Click Tool.
2. Double-click the downloaded file (AirLink_Serial_<version number>.exe).
3. As the drivers installs, a progress box appears in the lower right-hand corner of the monitor.

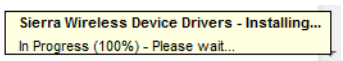


Figure 6-12: USB Serial One-Click Tool progress window

4. In ACEmanager, go to LAN > Ethernet and set the USB Device Mode field to USB Serial.
5. Connect a router to the computer using a USB cable.
   The driver installation completes and a window opens indicating the Serial Port number.

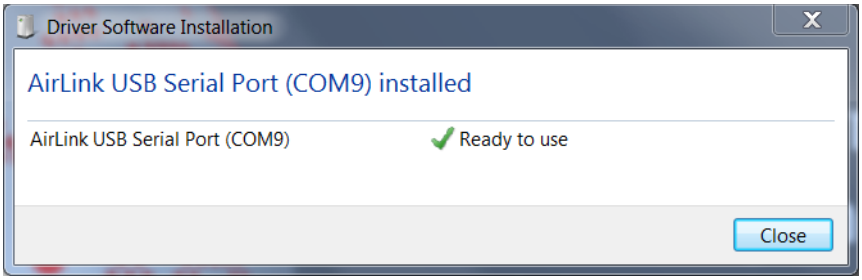


Figure 6-13: USB Serial Driver Installation Complete

At any time, you can open Device Manager to check the Serial Port number.

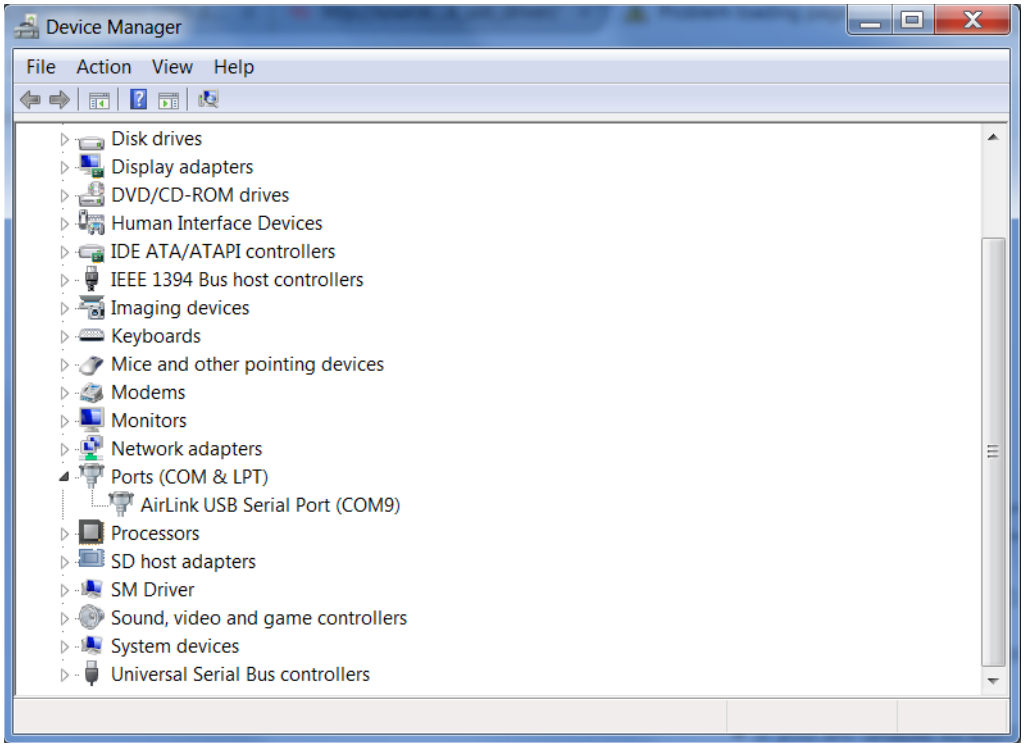


Figure 6-14: Device Manager

Note: USB serial and USBnet drivers available at source.sierrawireless.com also work with Linux CDC-ACM drivers.

Note: The COM port number assigned by driver installation is the next port that is available. The port number might vary depending on the number of devices connected (using serial or virtual serial).

Once the driver is installed, you can use the USB port just like a standard serial port.

Link WAN Coverage

You can link WAN coverage to a selected LAN port (Ethernet or USB). If the AirLink router loses WAN coverage, the selected port is disabled for a configurable duration.

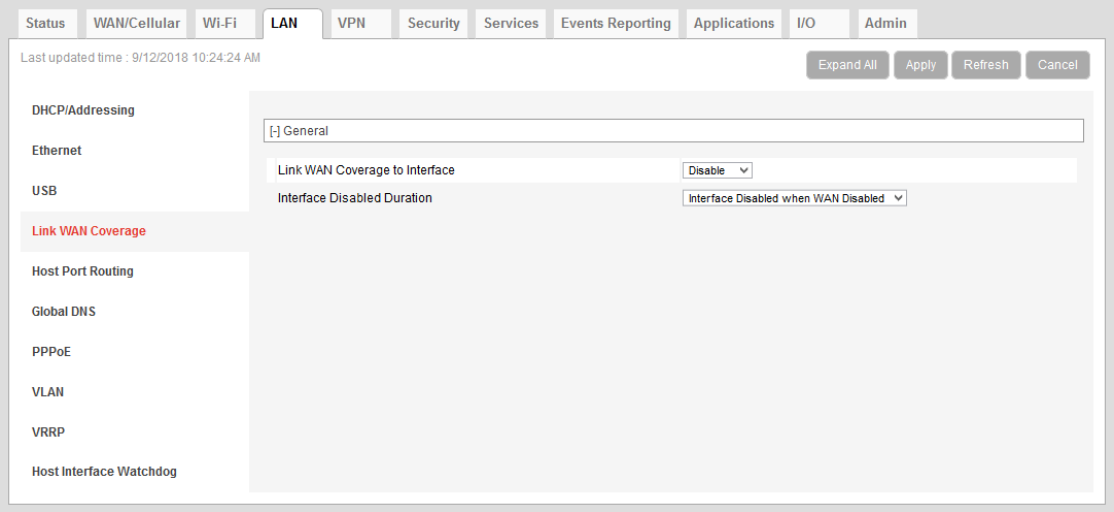


Figure 6-15: ACEmanager: LAN > Link WAN Coverage

Field	Description
General	
Link WAN coverage to Interface	This disables the specified port when there is no WAN connection. Options are: • Disable (default) • Ethernet • USB
Interface Disabled Duration	Sets the period of time (in seconds) that the LAN interface is disabled when linking a LAN port to the WAN. Either the Ethernet or the USB LAN port can be linked to the WAN connection, but not at the same time. Options are: • Interface Disabled when WAN is disconnected (default) • 5 seconds • 10 seconds • 15 seconds • 20 seconds • 25 seconds • 30 seconds

Host Port Routing

Host port routing enables the AirLink router to handle network communication for up to two non-NATed networks behind the gateway or router connected to the AirLink router. The following illustration shows a typical network configuration.

Note: The AirLink router does not handle addressing for devices behind the router or gateway.

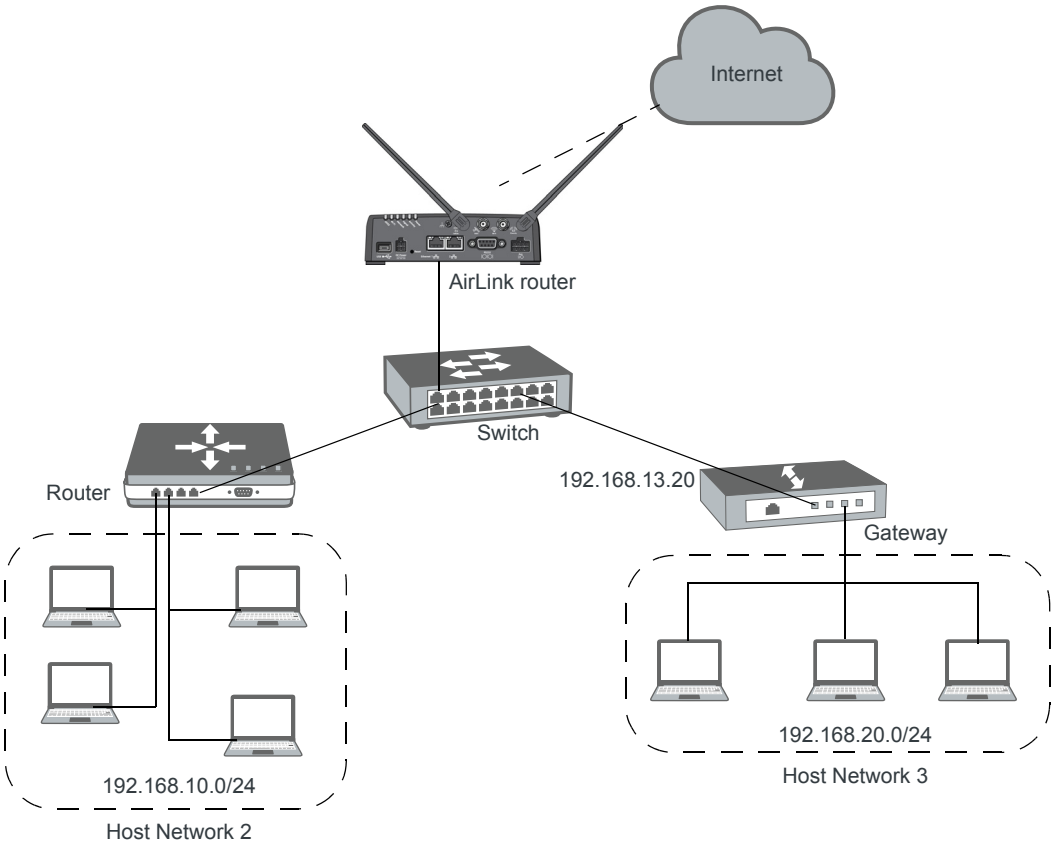


Figure 6-16: Host Port Routing Network Configuration

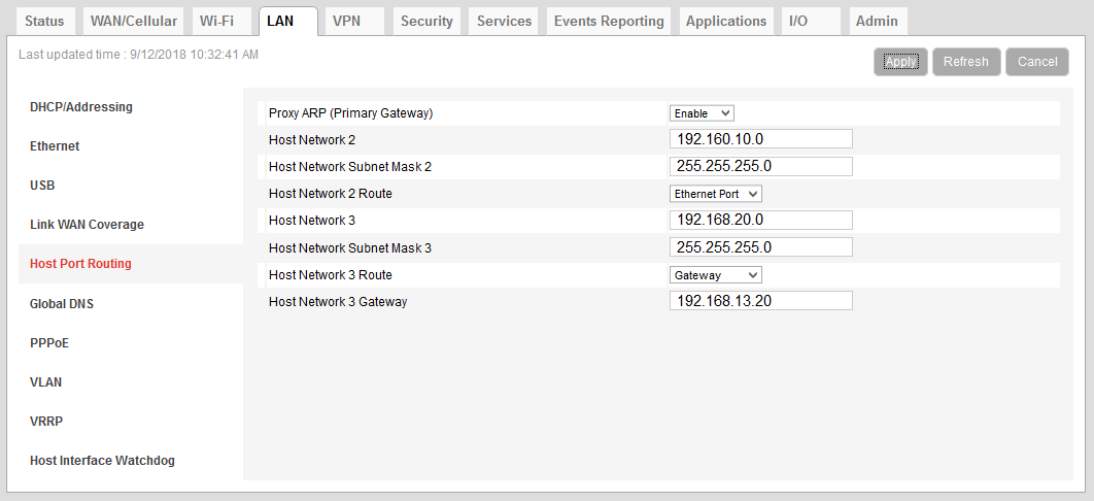


Figure 6-17: ACEmanager: LAN > Host Port Routing

Field	Description
Proxy ARP (Primary Gateway)	When enabled, the AirLink router responds to Address Resolution Protocol (ARP) requests to resolve WAN addresses for devices on the connected LANs. In doing so, the router becomes the primary gateway for connected LANs. Default is Enabled.
Host Network 2 **Host Network 3**	Enter the IP address for Host Network 2 and 3. These are LAN networks connected to the AirLink router behind a router or gateway. They do not have the same IP range as the AirLink router LAN network. For example, 192.168.10.0.
Host Network Subnet Mask 2 **Host Network Subnet Mask 3**	The subnet for the applicable network. For example, 255.255.255.0, which would with the setting above define a secondary network of 192.168.10.0/24.

Host Network 2 Route **Host Network 3 Route**	Choose the appropriate option, depending on how ARP requests are handled on the network. Options are: • Ethernet— Select this option if the network uses a router that acts as an ARP proxy for addresses on subnets connected to it. For example, in Figure 6-17 on page 174, when traffic is destined for host 192.168.10.100 in network 2, the AirLink router sends an ARP request for 192.168.10.100. *Note: If Proxy ARP is not enabled on the router, the transmission fails (destination unreachable).* • Gateway—Select this option if the network uses a device that does not handle ARP requests for network devices attached to it. When Gateway is selected, ALEOS handles ARP requests for the connected LAN devices. Any traffic destined for a host on the network behind a gateway is routed, by the device, through the gateway IP. For example, in Figure 6-17 on page 174, when traffic is destined for host 192.168.20.100 in network 3, the AirLink router sends an ARP request for the gateway (192.168.13.20), not the host. When you select Gateway, Proxy ARP is not required on the router.
Host Network 2 Gateway **Host Network 3 Gateway**	Enter the IP address for the gateway. This setting appears after selecting Gateway in the Host Network Route field and clicking Apply.

Global DNS

When the mobile network grants the IP address to the device, it includes the IP addresses of its DNS servers. Global DNS allows you to override the Mobile Network Operator's DNS settings for all connected devices. This is useful when the connected devices need to use a private network.

Note: If there are no alternate DNS servers defined, the default is the WAN network DNS server.

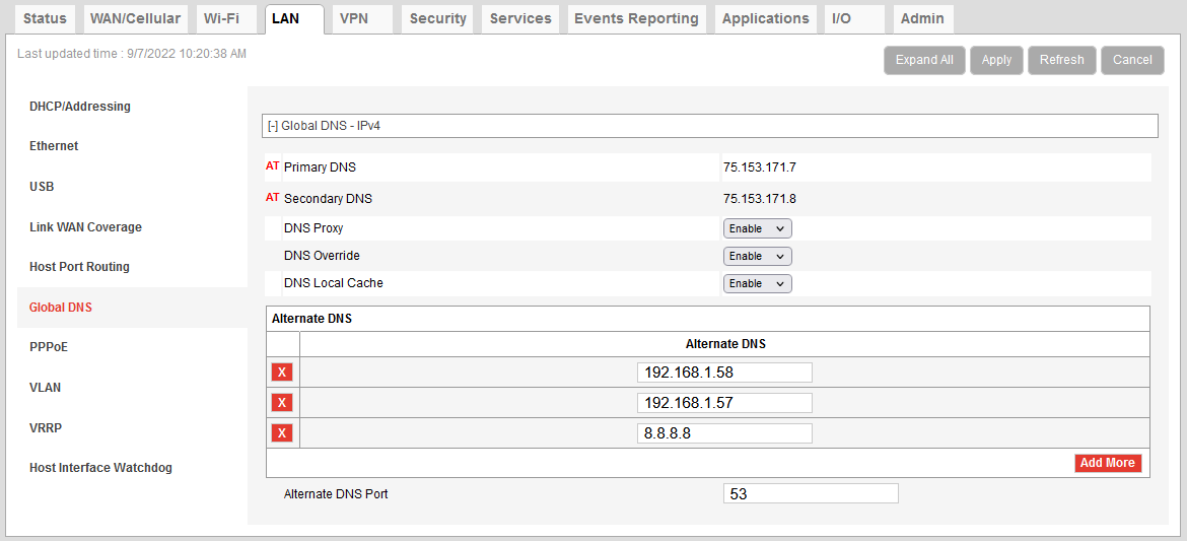


Figure 6-18: ACEmanager: LAN > Global DNS

Field	Description
Primary DNS	Primary Mobile Network Operator's DNS IP Address. This and the secondary DNS are generally granted by the mobile network along with the Network IP.
Secondary DNS	Secondary Mobile Network Operator's DNS IP Address

Field	Description

DNS Proxy	Determines whether or not the AirLink router is used as a DNS proxy server.
	Note: Using the AirLink router as a proxy DNS server can help reduce mobile network data use.
	Options are:
	• Enable (default) —All connected DHCP clients (PPP, PPPoE, Wi-Fi, USBNET, and Ethernet) send their DNS IP address resolution requests to the AirLink router. The AirLink router performs DNS lookups on behalf of the DHCP client.
	  • If the AirLink router is able to resolve the request, it sends a response to the DHCP client.
	  • If the AirLink router does not have the necessary information to resolve the request, it sends the request to the DNS server configured in the DNS Override field. When the AirLink router receives a response, it forwards it to the DHCP client and saves the information so that it can resolve the same request in the future.
	• Disable—All connected DHCP clients send their DNS IP address resolution requests to the DNS server received from the mobile network or the alternate server specified by DNS Override, if enabled. The AirLink router is not used as a DNS server.

DNS Override	Overrides the Mobile Network Operator's DNS address with the DNS server configured in the Alternate DNS field(s). Options are: • Disable (default)—Mobile Network Operator's DNS server is used • Enable—Alternate DNS server is used In order to ensure consistent DNS resolution, DNS override, when configured, applies to all WAN interfaces, including Ethernet WAN with static IP configuration. (See Static Configuration on page 106.)
DNS Local Cache	Configures caching for the router's DNS server. Options are: • Enable (default)—The built-in DNS server caches queries and entries, which can reduce WAN traffic overall by sending out less DNS-related traffic. • Disable—DNS queries and entries are not cached.
Alternate DNS	Configure up to four alternate DNS servers to use instead of the Mobile Network Operator's DNS server. Each server is queried in order, from first to last.
Alternate DNS Port	If you want to specify the port on the connected device that the AirLink router sends IP address resolution responses to: 1. Ensure that the DNS Override field is set to Enable. 2. Enter the desired port number in this field. 3. Click Apply. When this field is set to 53 (default) or 0, packets are sent to port 53, the standard DNS port.

PPPOE

PPPoE (Point-to-Point Protocol over Ethernet) allows a point-to-point connection while using Ethernet. Just like the dial up protocol on which it is based, PPPoE can use traditional user name and password authentication to establish a direct connection between two Ethernet devices on a network (e.g., your AirLink router and your computer or router).

examples for PPPoE with your AirLink router:

- Backup connectivity solution for your network
- Individualized Internet connection on a LAN
- Password restricted Internet connection

Only one computer, router, or other network device at a time can connect to the AirLink router using PPPoE. If you are using the AirLink router connected to a router as a back up Internet connection for your network, you should configure the router to use the PPPoE connection and not the individual computers.

Note: To configure a PPPoE connection on some operating systems, you need administrator privileges to the computer you are configuring or access granted by an administrator on the network to add/remove devices to your computer.

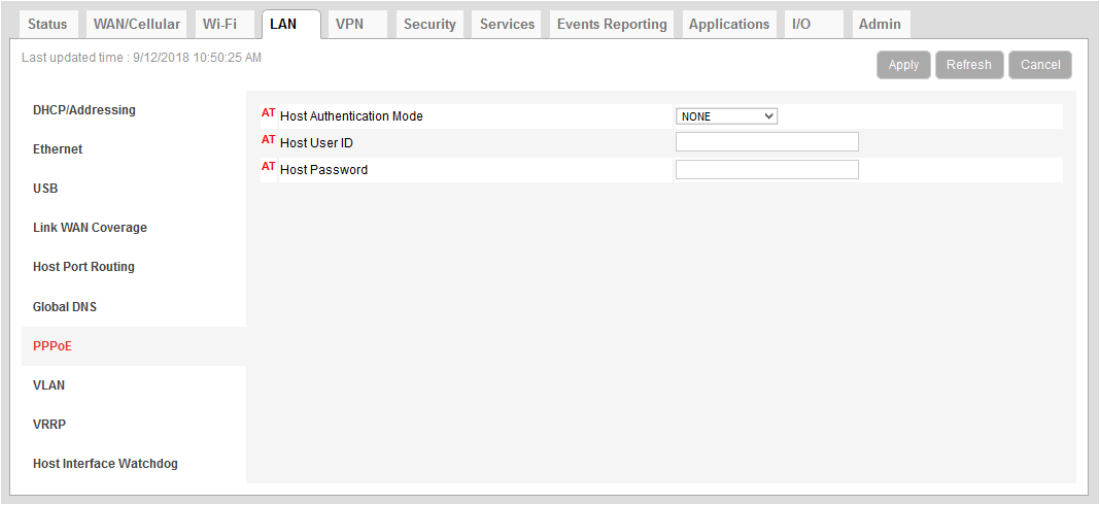


Figure 6-19: ACEmanager: LAN > PPPoE

Field	Description
Host Authentication Mode	Host Authentication Mode: Use PAP or CHAP to request the user login and password during PPP or CHAP negotiation on the host connection. The username and password set in *HOSTUID and *HOSTPW is used. • NONE (default) • PAP and CHAP • CHAP

Field	Description
Host User ID	User ID for authentication (up to 64 bytes)
Host Password	Password for authentication

Configure the AirLink router to Support PPPoE

Note: You must disable the DHCP server for PPPoE to work.

To configure an AirLink router to support PPPoE:

1. In ACEmanager, go to LAN > Ethernet.
2. Under General, in the DHCP Server Mode field, select Disable.

Note: PPPoE authentication is optional. If you use PPPoE authentication, no other tethered LAN connection will have network access, regardless of whether or not the PPPoE host is connected. If you are using non-authenticated PPPoE, other tethered LAN connections will have network access until a PPPoE host is connected.

3. If you want to use authenticated PPPoE:
   a. Go to LAN > PPPoE, and in the Host Authentication Mode field, select PAP and CHAP.
   b. In the Host User ID, enter a user ID for the PPPoE connection.
   c. In the Host Password field, enter a password for the PPPoE to connection.
4. Click Apply.
5. Reboot the router.

Tip: *If you leave Host User ID and Host Password blank, any computer or device can connect to the AirLink router using PPPoE.*

Note: ACEmanager shows the existing value for the PPPoE password as stars (****).

Optional: Configure the Device Name

1. In ACEmanager, go to Services > Dynamic DNS.
2. In the Service field, select IP Manager[1].
3. Under Dynamic IP, enter a name in the Device Name field, such as AirLink router or the ESN. The name can be up to 20 characters long.

   The name you choose for Device Name does not affect the connection, but may need to be configured in PPPoE settings for the router, device, or computer you connect to your AirLink router.

1. IP Manager will be deprecated in ALEOS 4.17.0.

Configuring a PPPoE Connection in Windows 7

1. In Windows 7, go to Start > Control Panel.

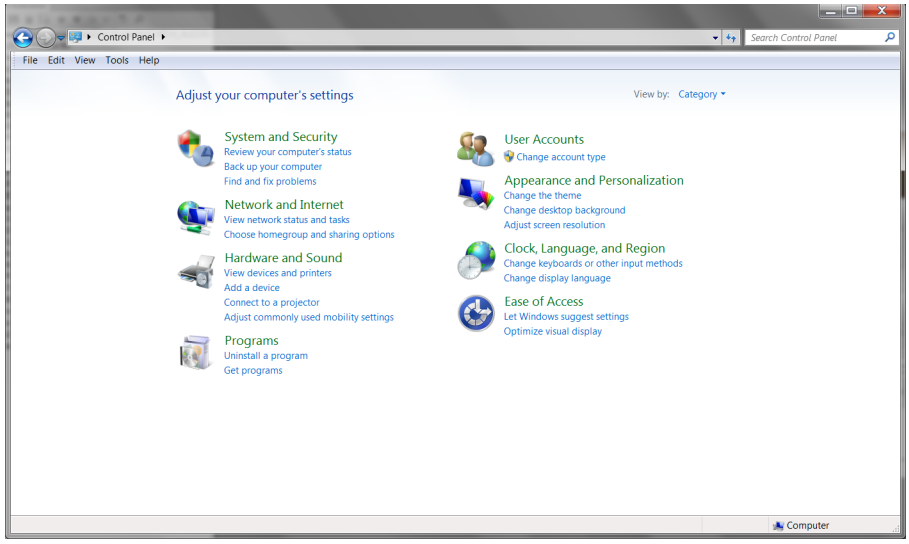


Figure 6-20: Windows 7: Control Panel

2. Select Network and Internet.

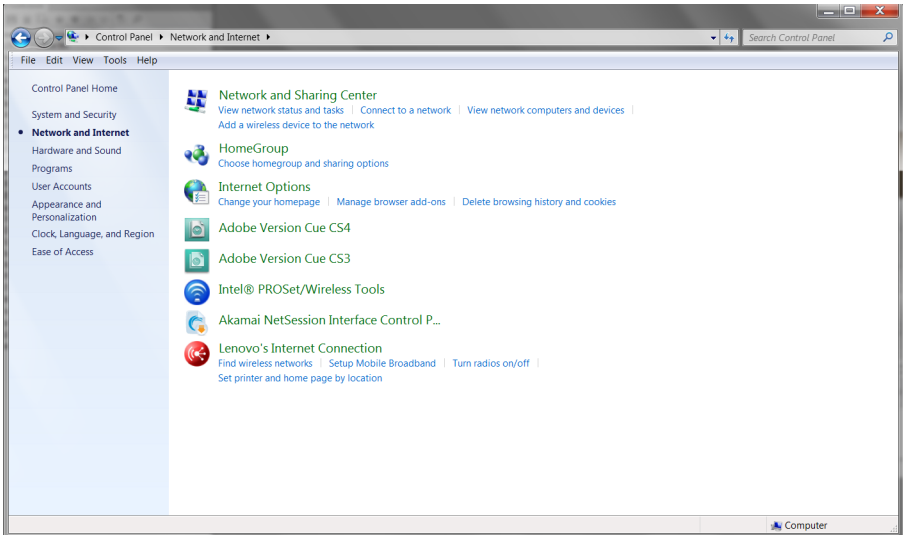


Figure 6-21: Windows 7: Control Panel > Network and Internet

3. Select Network and Sharing Center.

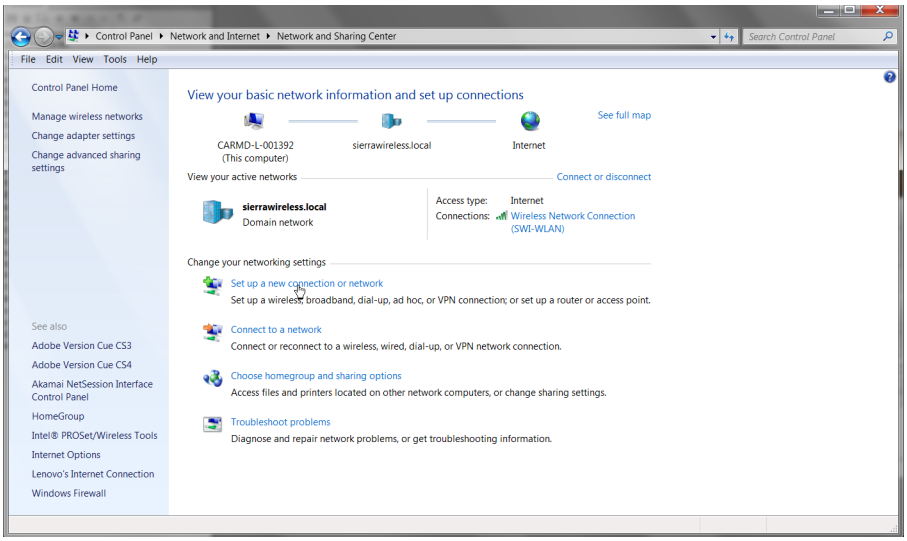


Figure 6-22: Windows 7: Control Panel > Network and Sharing Center

4. In the middle of the page, under Change your networking settlings, select Set up a new connection or network.

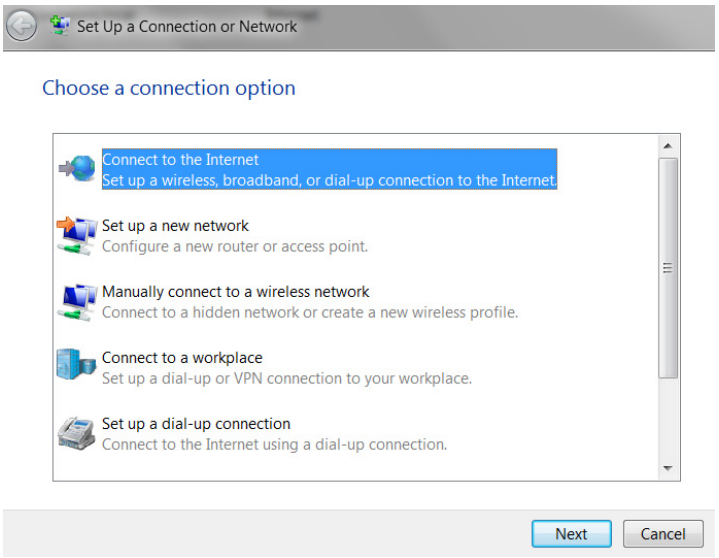
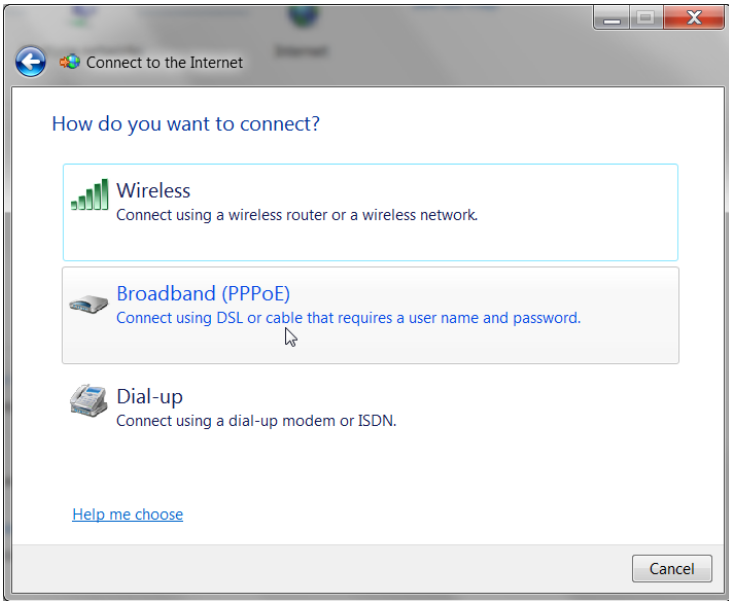
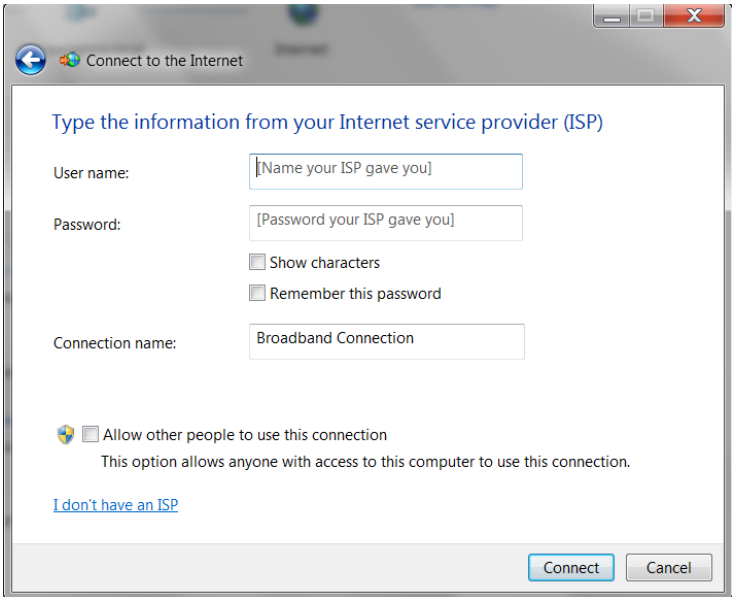


Figure 6-23: Set Up an Connection or Network

5. Select Connect to the Internet and click Next.



6. Select Broadband (PPPoE).



7. If you are using authenticated PPPoE, enter the User name and Password you configured in ACEmanager.
8. If desired, change the Connection name to something such as PPPoE that clearly identifies the connection.
9. Click Connect.

For subsequent connections, you can click the network icon in the Task bar ( ) and select the PPPoE connection.

VLAN

ALEOS supports up to three Virtual Local Area Networks (VLANs) on its Ethernet port. VLANs are logical groupings of network devices that share the same broadcast domain. All devices on the same VLAN can ping each other without routing. ALEOS does not support routing between VLANs.

Note: The VLANs must also be configured on the switch.

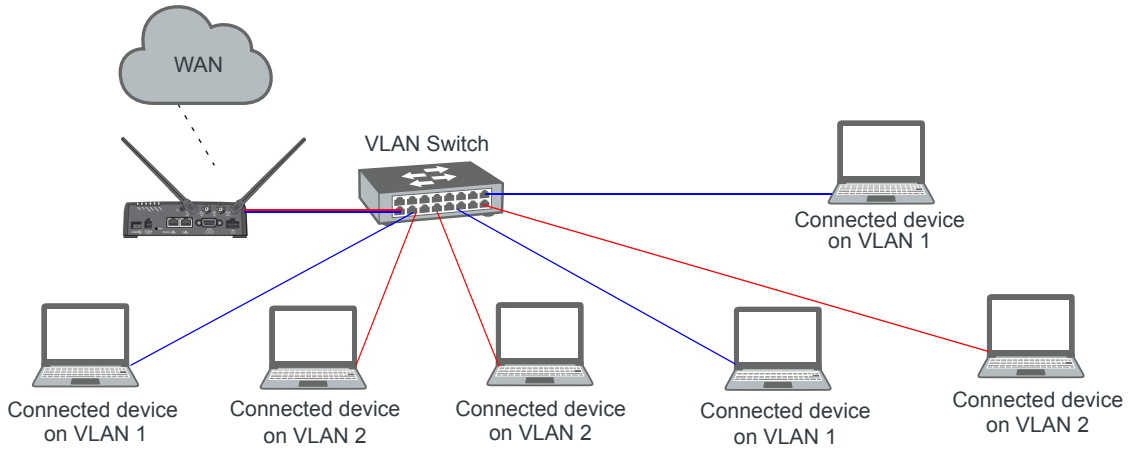


Figure 6-24: VLAN network configuration

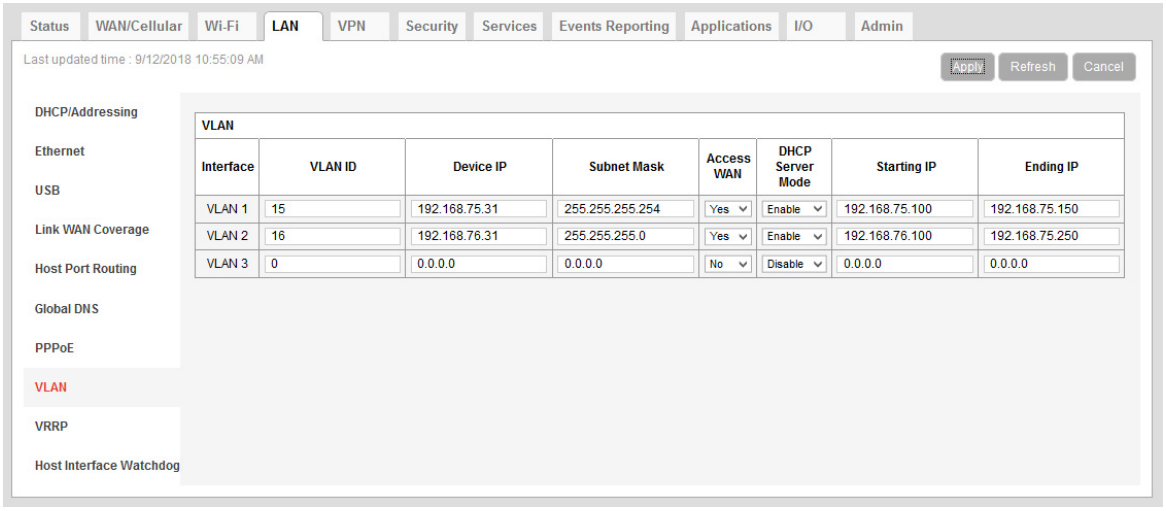


Figure 6-25: ACEmanager: LAN > VLAN

Field	Description
Interface	Displays the three VLANs you can configure
VLAN ID	VLAN ID • 0—VLAN is disabled (default) • 1–4094—Valid range for VLAN ID
Device IP	The IP address of the AirLink router for that VLAN interface
Subnet Mask	The subnet mask indicates the range of host IP addresses that can be reached directly. Changing the subnet mask limits or expands the number of devices that can connect to the AirLink router.
Access WAN	Choose whether or not devices on the configured VLAN have access to the WAN. • Disable (default) • Enable
DHCP Server Mode	Choose whether or not the AirLink router acts as a DHCP server Options are: • Enable—AirLink router acts as the DHCP server • Disable (default)
Starting IP	VLAN interface DHCP pool starting IP address
Ending IP	VLAN interface DHCP pool ending IP address

VRRP

VRRP (Virtual Router Redundancy Protocol) enables you to configure a backup WAN connection to be used if the primary connection fails. You can configure VRRP on the AirLink router's Ethernet port.

You configure a VRRP Master and VRRP Backup device(s) and set their priorities. The device with the highest priority (normally the VRRP Master) becomes the primary route for the data connection.

The VRRP Master and Backups share a common virtual IP.

One common scenario is to use a 3rd party router for the primary connection and the AirLink router for the backup connection.

Note: VLAN does not function with VRRP or VPN. Do not configure VLAN with VRRP or VPN.

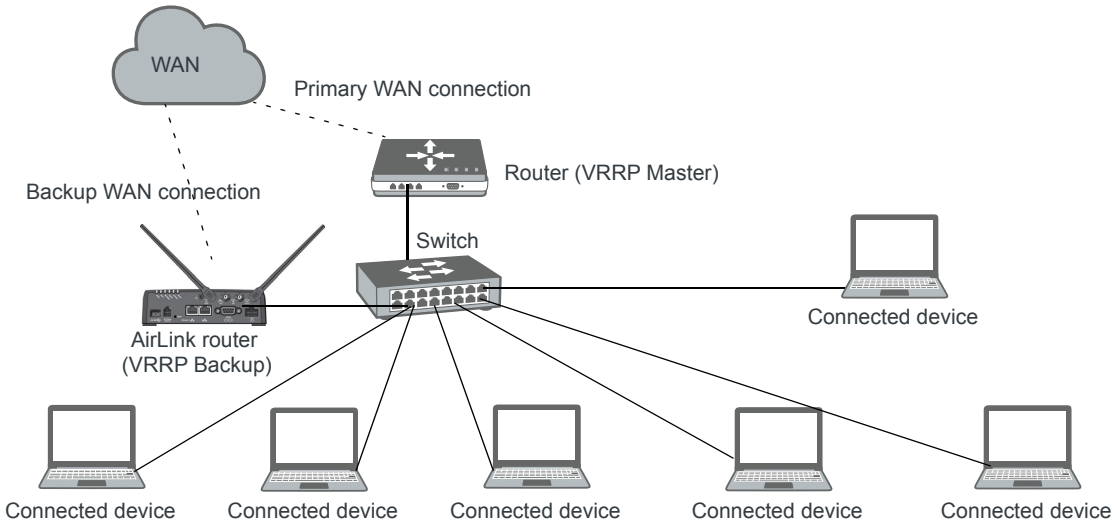


Figure 6-26: VRRP Network Configuration

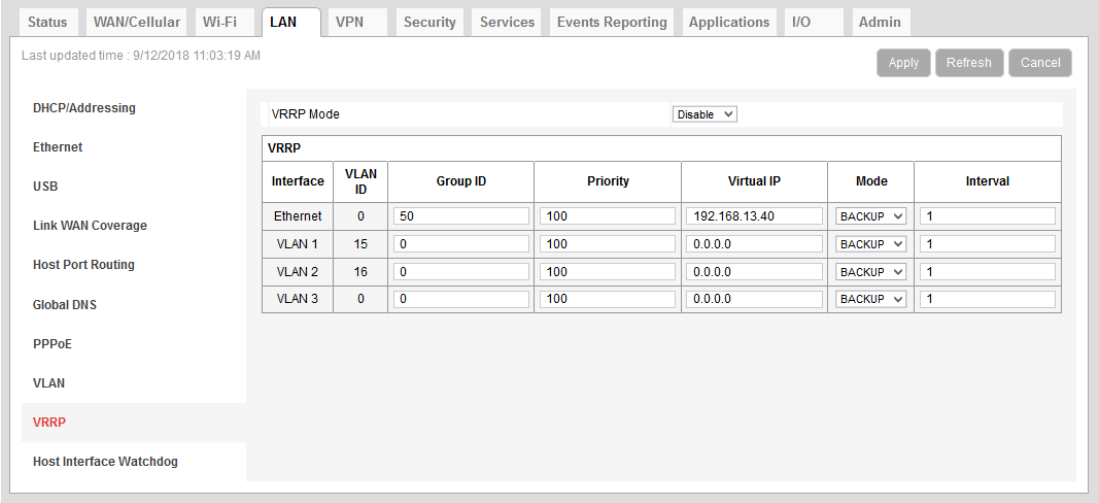


Figure 6-27: ACEmanager: LAN > VRRP (no VLANs)

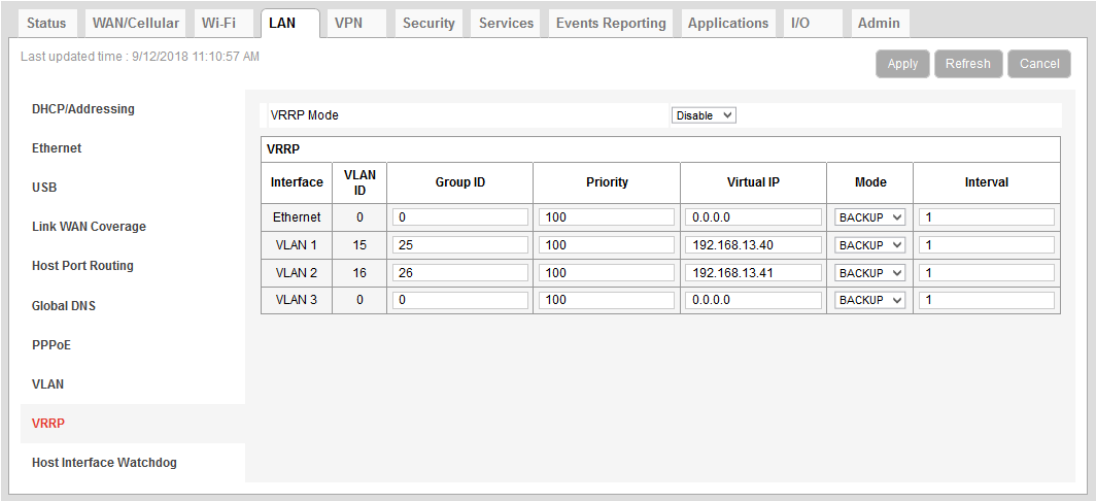


Figure 6-28: ACEmanager: LAN > VRRP (VLANs)

You can also set up VRRP using two AirLink routers—one configured as the VRRP Master and the other as the VRRP Backup. The Backup AirLink router provides an alternate route when the Master AirLink router loses coverage.

For example, if you have cellular accounts with two different Mobile Network Operators (MNOs) you might prefer to use MNO A's connection, but to maintain continuity, you would like traffic to switch to MNO B if A's network is down and switch back to A's network once the connection is re-established.

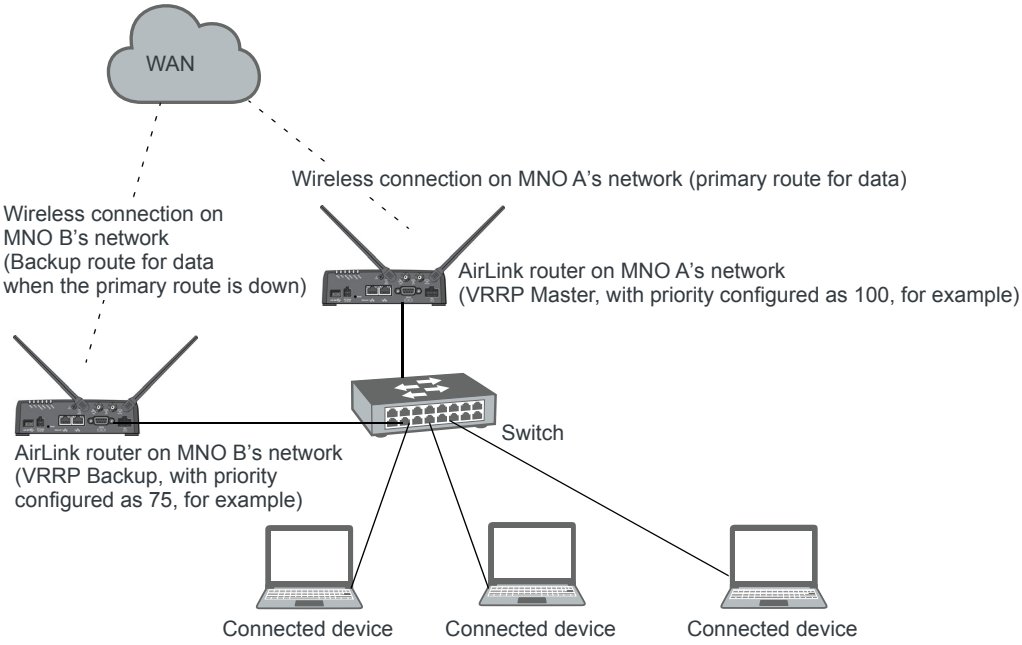


Figure 6-29: VRRP Network Configuration using two AirLink routers

Field	Description
VRRP Enabled	Allows you to activate VRRP. Options are: • Enable • Disable (default) *Note: VLAN does not function with VRRP or VPN. Do not configure VLAN with VRRP or VPN.*
VRRP — The Group ID, and Virtual IP address must be the same on the VRRP Master and VRRP Backup devices	
Interface	Displays Ethernet port on AirLink router and the VLAN numbers
VLAN ID	Displays the VLAN ID This value is inherited from the LAN > VLAN screen. (See VLAN on page 183.) *Note: VLAN does not function with VRRP or VPN. Do not configure VLAN with VRRP or VPN.*
Group ID	Enter the VRRP Group ID. Configure the VRRP Master (for example, the 3rd party router) and the VRRP Backup (for example the AirLink router) with the same Group ID. Options are: • 0–255 (Default is 0.)
Priority	Use this field to configure the priority for the AirLink router. The device with the highest priority (typically a 3rd party router) provides the primary data traffic route. If the device loses its connection to the WAN, its priority number drops. If the device fails, then when the failure is detected, the next highest priority router becomes the active router. The priority number configured on the VRRP Backup (typically the AirLink router) should be less than the initial priority number on the VRRP Master and greater than the value that the VRRP Master's priority number would be if it drops as a result of losing its WAN connection. For example, if the VRRP Master router has an initial priority number of 200 that drops to 80 if it loses its WAN connection, setting the AirLink router's priority to 100 ensures that it becomes the primary route if the VRRP Master loses its WAN connection. When the 3rd party router re-establishes its connection, its priority returns to 200 and it once again becomes the primary route for data. Options are: • 1–255 (Default is 100.)
Virtual IP	Configure the same virtual IP for the VRRP Backup (typically the AirLink router) and the VRRP Master (typically a 3rd party router). The virtual IP must be unique within the LAN subnet and cannot be within a pool of addresses assigned via DHCP.

Field	Description
Mode	Indicates the initial mode for the AirLink router Options are: • MASTER • BACKUP (default) *Note: Designating a device as "Master" in this field does not make it the primary route for data unless it is also given a higher priority number than the VRRP Backup device. See Priority.*
Interval	If the AirLink router is acting as VRRP Master, it advertises its Master status at the interval (in seconds) configured in this field. Options are: • 1–65535 seconds (Default value is 1.)

Host Interface Watchdog

The Host Interface Watchdog provides a way for you to ensure that the LAN connection is alive. You can use this feature to monitor:

- A host connected to the LAN via an Ethernet or USB connection
- A host computer associated with a router that has the Wi-Fi mode is set to “Access Point” or “Both” (See Global DNS on page 176).

When the Host Interface Watchdog is enabled, ALEOS sends a ping to the connected device at configured intervals. You can disable Force Keepalive to only send a ping when there is no traffic on the LAN interface. (See Force LAN Keepalive on page 190.)

If there is no response to the ping, the LAN interface is reset.

Note: The network interface is automatically determined from the IP address and the LAN configuration. If you have multiple interfaces bridged (see Bridge Wi-Fi to Ethernet on page 136) all interfaces in the bridge and the bridge itself are reset.

After the interface comes back up, ALEOS sends another ping to the connected device. If there is still no response to this ping, the AirLink router reboots. After a reboot caused by the LAN Interface Watchdog, ALEOS waits an hour before attempting pings to prevent repeated frequent reboots.

Note: DUN (PPP) is not supported. If the IP address for the host is on a DUN network, the feature is disabled.

Note: The feature is not disabled when the interface uses Public Mode, but it cannot monitor the host interface unless the mobile network provides a static IP.

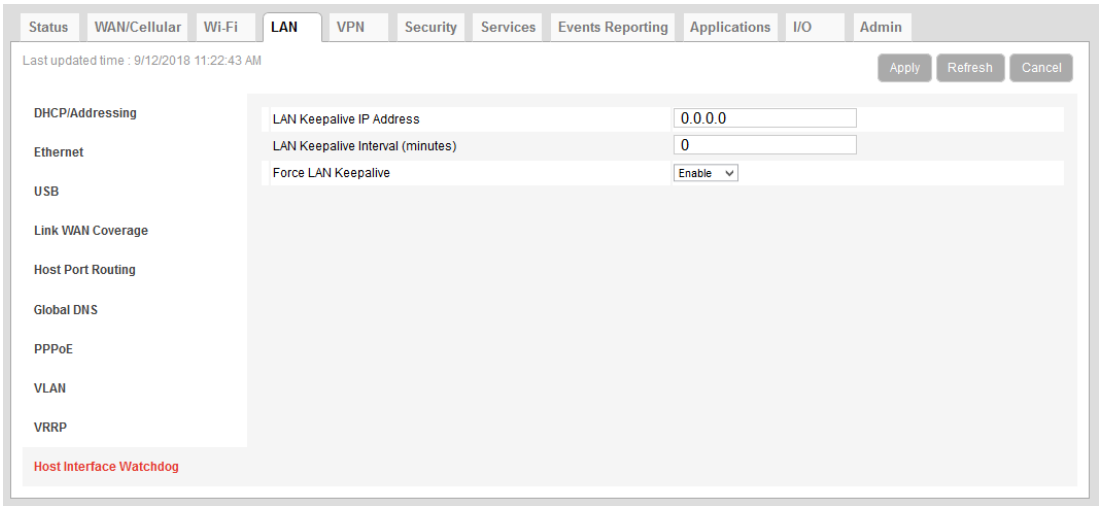


Figure 6-30: ACEmanager: LAN > Host Interface Watchdog

Field	Description
LAN Keepalive IP address	Enter the IP address of the device to ping If a device IP address is not configured, the Host Interface Watchdog is disabled.
LAN Keepalive Interval (minutes)	The interval (in minutes) at which ALEOS pings the LAN-connected device Options are: 1–1440 If this field is set to 0, the Host Interface Watchdog is disabled. (default) To prevent the router from rebooting frequently when a connection is not available, if the router reboots as a result of a failed keepalive ping, it waits 60 minutes before sending another keepalive ping. Once the ping is successful, the router returns to the interval configured in this field.
Force LAN Keepalive	• Enabled (default)—The network interface statistics are not monitored and a ping is always sent at the interval configured in the Keepalive Interval field. • Disabled—The network interface statistics are monitored and connectivity is assumed when there is traffic received. A ping is only sent when there is no traffic for a period greater than the interval set in the Keepalive Interval field.

7: VPN Configuration

The AirLink LX40 can act as a Virtual Private Network (VPN) device, providing enterprise VPN access to any device connected to the AirLink router even when a device has no VPN client capability on its own. The AirLink router supports three types of VPN: IPsec, GRE, and OpenVPN. The LX40 can support up to five VPN tunnels at the same time.

Note: Dynamic Mobile Network Routing (DMNR) is not compatible with VPN tunnels. If you are using DMNR, disable all VPN tunnels.

Note: VLAN does not function with VRRP or VPN. Do not configure VLAN with VRRP or VPN.

General

On the General page you can select your IPsec Implementation and reset all VPN tunnels so that the LX40 doesn't have to be rebooted in order for changes to be used.

The available settings on the General page depend on which IPsec implementation you have selected.

Standard Vs. Legacy IPsec Implementation

The AirLink LX40 supports Legacy IPsec implementation (in place prior to ALEOS 4.12.0) or the new Standard IPsec implementation. Sierra Wireless recommends that you migrate any existing Legacy VPN implementations to the Standard version for increased features and support. For configuration information, see IPsec (Legacy) on page 197 and IPsec (Standard) on page 203.

The Standard implementation is fully IKEv1 and IKEv2 compliant, and supports MOBIKE when operating over IKEv2. Standard implementation also offers increased security through certificate-based authentication and a larger set of cryptographic algorithms than the Legacy implementation. You can use Standard for Host-terminated or LAN-terminated applications (see Figure 7-3).

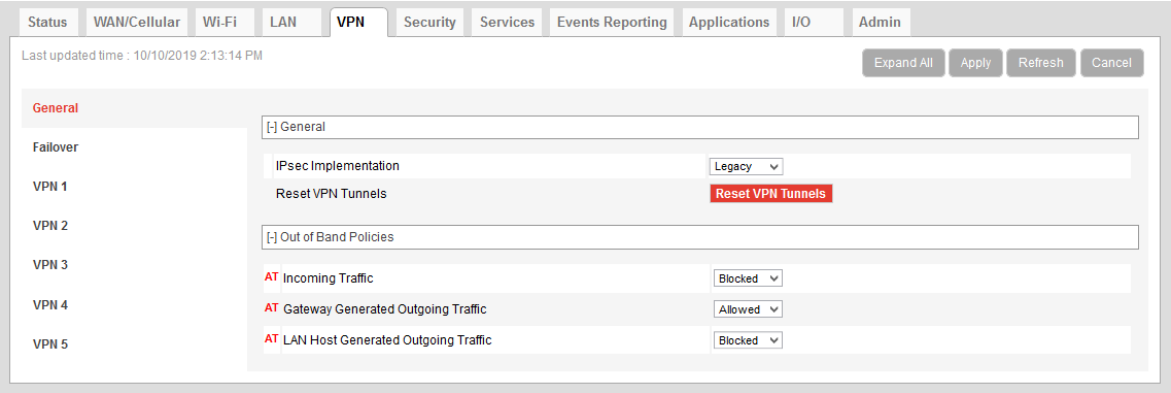


Figure 7-1: ACEmanager: VPN > General (Legacy)

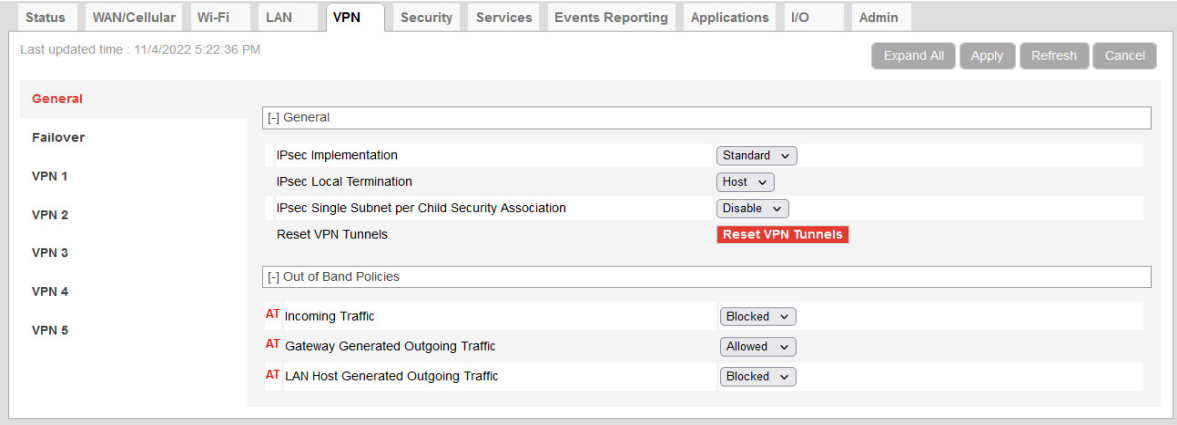


Figure 7-2: ACEmanager: VPN > General (Standard)

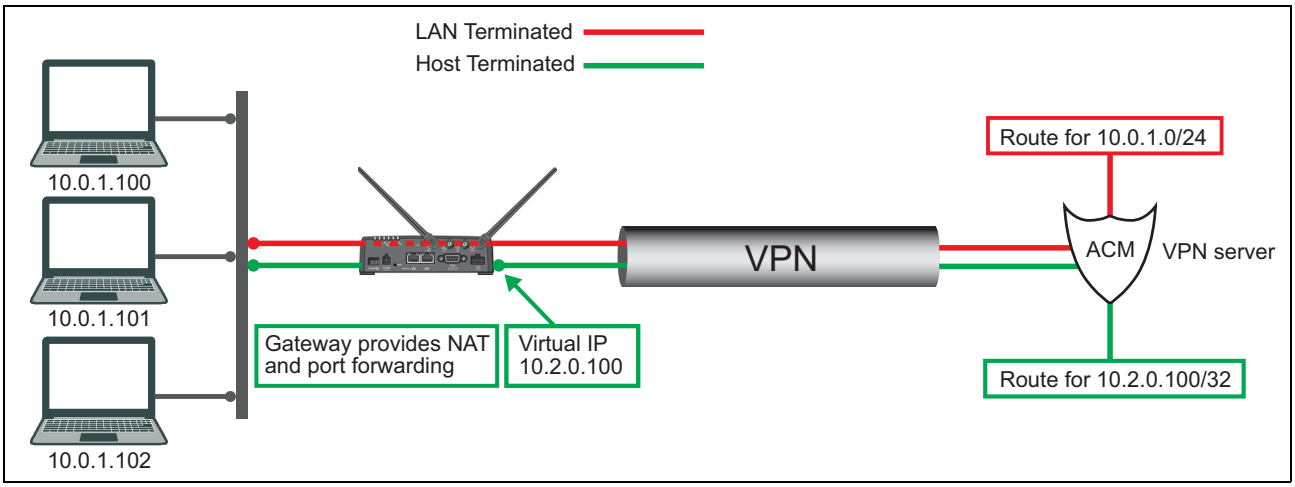


Figure 7-3: IPsec VPN Local Termination types

Field	Description
General	
IPsec Implementation	Selects the IPsec Implementation. • Legacy • Standard For more information, see IPsec Overview on page 196, IPsec (Legacy) on page 197, and IPsec (Standard) on page 203. *Note: Legacy and Standard implementations are independent. Once you have configured IPsec tunnels for Standard VPN implementation, if you change IPsec Implementation to Legacy, you must reconfigure IPsec tunnels for the Legacy implementation.*

Field	Description
IPsec Local Termination	Available only with Standard IPsec Implementation. Select where the VPN tunnel terminates. Local termination type: • LAN (default)—Network terminated. Use for LAN-to-LAN configuration. • Host—Host terminated. Use for Host-to-LAN configuration.
IPsec Single Subnet per Child Security Association	**Important:** *This option should only be enabled for connection to Cisco ASA (and similar VPN servers). For all other VPN servers, leave this option disabled.* Available only with Standard IPsec Implementation. Selecting this option enables the use of multiple local and/or remote LAN-to-LAN subnets or multiple remote Host-to-LAN subnets when connecting to a Cisco ASA (Adaptive Security Appliance) or similar server using IKEv2. For any other configurations, this option should not be selected. Options are: • Disable (default)—All subnets use the same child SA, per IKEv2 default settings. • Enable—A separate child SA is created for each remote subnet.
Reset VPN Tunnels	Resets and reconfigures all VPN tunnels. After making VPN configuration changes, click this button to reset the VPN tunnels and begin using the new settings. Rebooting the device is not necessary.
Out of Band Policies The AirLink LX40 supports out-of-band traffic, where some traffic can be routed through an encrypted VPN, while other incoming and/or outgoing traffic is routed through the public Internet (“Out of Band” traffic). Out-of-band configurations should be set up with care, as a configuration with both an enterprise VPN and access to the public Internet can inadvertently expose company resources.	
Incoming Traffic	Controls incoming public Internet traffic. Options are: • Blocked—Incoming public Internet traffic is blocked. Only traffic through the VPN tunnel is allowed. (default) • Allowed—Incoming public Internet traffic is allowed.
Gateway Generated Outgoing Traffic	Controls outgoing AirLink router-generated traffic. • Blocked—Outgoing traffic from the AirLink router to the public Internet is blocked. Only traffic through the VPN tunnel is allowed. • Allowed—Outgoing traffic from the AirLink router to the public Internet is allowed. (default)
LAN Host Generated Outgoing Traffic	Controls outgoing LAN Host-generated traffic. Options are: • Blocked—Public Internet traffic from the host device is blocked. Only traffic through the VPN tunnel is allowed. (default) • Allowed—Public Internet traffic from the host device is allowed.

VPN Failover

VPN Failover is only available for IPsec VPN tunnels. To use this feature, configure a primary and a secondary VPN tunnel. Dead Peer Detection (DPD) verifies the status of the active connection. For example, if the primary/active VPN goes down (i.e. DPD detects that the end device is not responding) traffic is automatically switched to a backup VPN tunnel. The VPN Failover feature continues to ping the VPN responder for the tunnel that has gone down. If configured to do so, once the primary VPN tunnel is up, traffic automatically reverts to the primary VPN. Status fields on the Failover page inform you of the current status of the two VPNs.

Note: For VPN Failover to work correctly, VPN server addresses must be able to respond to ICMP echo requests. If the VPN server/firewall device does not respond to ICMP echo requests, then the VPN Failover feature may not fail over and/or revert correctly.

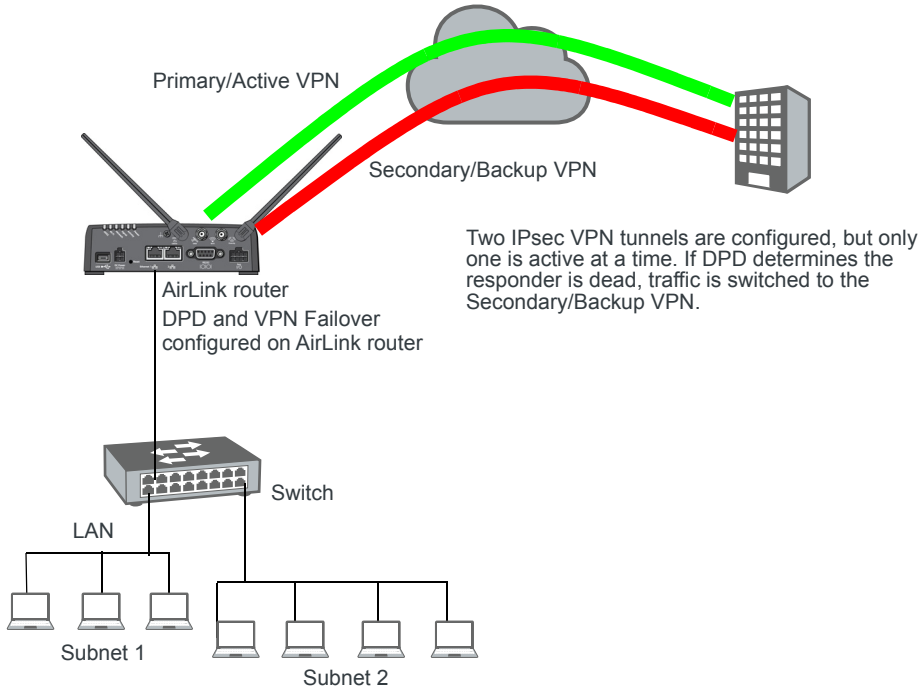


Figure 7-4: VPN Failover Configuration

To configure VPN Failover:

1. Configure two IPsec VPN tunnels. The one you want to designate as the primary VPN must have Dead Peer Detection configured. For the Secondary VPN, you only need to configure the remote gateway address. For other settings, such as the local and remote subnets, the secondary VPN uses the same settings as the primary VPN.

   For instructions on configuring IPsec VPN tunnels, see IPsec (Legacy) on page 197 and IPsec (Standard) on page 203.
2. Go to VPN > Failover and configure the first three fields. See the table following the screen shot for details.
3. Click Apply and Reset VPN Tunnels or reboot the AirLink router.

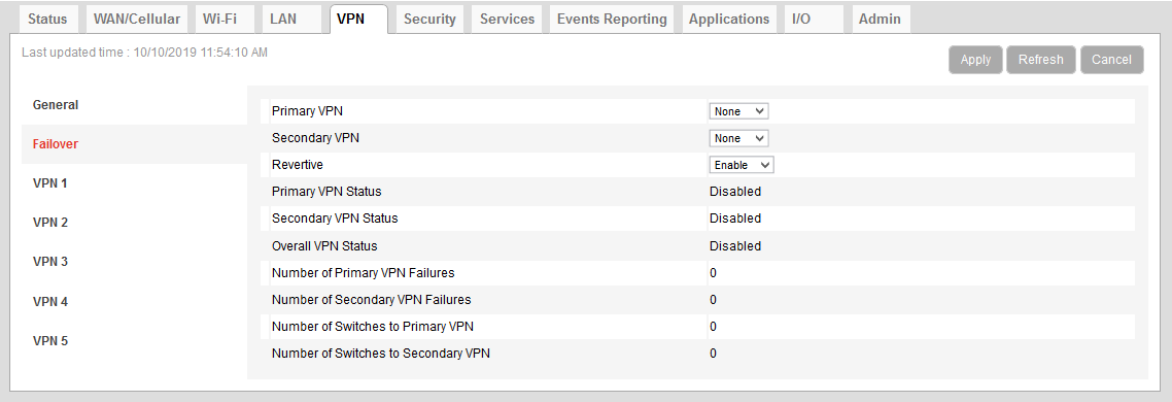


Figure 7-5: ACEmanager: VPN > Failover

Field	Description
Primary VPN	ID of the primary VPN (for VPN Failover): VPN 1, VPN 2, VPN 3, VPN 4, VPN 5, or None (default)
Secondary VPN	ID of the Secondary VPN (for VPN Failover): VPN 1, VPN 2, VPN 3, VPN 4, VPN 5, or None (default)
Revertive	When VPN Failover is configured and this field is set to Enable, traffic automatically switches from the Secondary VPN back to the primary VPN when the failure is resolved and the primary VPN tunnel is up again. Options are: • Enable (default) • Disable
Primary VPN Status	Status of the primary VPN: • Disabled (default)—VPN Failover is disabled. • Connecting—The VPN is trying to connect to the responder. • Active—The VPN tunnel is ready and transferring traffic. • Backup—This is currently the backup VPN connection. • Failed—Dead Peer Detection (DPD) has determined that the VPN responder is dead, or a ping sent to the VPN host failed. • Out of Service—There have been 5 DPD failures within an hour.
Secondary VPN Status	Status of the Secondary VPN: • Disabled (default)—VPN Failover is disabled. • Connecting—The VPN is trying to connect to the responder. • Active—The VPN tunnel is ready and transferring traffic. • Backup—This is currently the backup VPN connection. • Failed—Dead Peer Detection (DPD) has determined that the VPN responder is dead, or a ping sent to the VPN host failed. • Out of Service—There have been 5 DPD failures within an hour.

Field	Description
Overall VPN Status	Status of the overall VPN: • Disabled—VPN Failover is disabled. (default) • Connecting—One of the VPNs is trying to connect to the responder. • Active—One VPN tunnel is currently in use. The backup VPN is available. • Backup_Unavailable—One VPN tunnel is currently in use. The backup VPN is not available. • Out of Service—Neither the primary nor secondary VPN is operational. • N/A—The overall VPN status is temporarily not available. Click Refresh.
Number of Primary VPN Failures	Number of times DPD has failed on the primary VPN since the device last lost its WAN connection.
Number of Secondary VPN Failures	Number of times DPD has failed on the Secondary VPN since the device last lost its WAN connection.
Number of Switches to Primary VPN	Number of times traffic was switched to the primary VPN since the device last lost its WAN connection.
Number of Switches to Secondary VPN	Number of times traffic was switched to the Secondary VPN since the device last lost its WAN connection.

IPsec Overview

The IP protocol that drives the Internet is inherently insecure. Internet Protocol Security (IPsec), which is a standards-based protocol, secures communications of IP packets over public networks.

IPsec is a common network layer security control and is used to create a virtual private network (VPN).

Note: ALEOS offers two IPsec implementations: Standard and Legacy (compatible with ALEOS releases prior to 4.12.0). All installations are encouraged to upgrade to ALEOS 4.12.0 to take advantage of the new Standard implementation, with its increased security. For configuration information, see IPsec (Legacy) on page 197 and IPsec (Standard) on page 203.

The advantages of using the IPsec feature includes:

- Data Protection: Data Content Confidentiality allows you to protect your data from any unauthorized view, because the data is encrypted (encryption algorithms are used).
- Access Control: Access Control implies a security service that prevents unauthorized use of a Security Gateway, a network behind a gateway or bandwidth on that network.
- Data Origin Authentication: Data Origin Authentication verifies the actual sender, thus eliminating the possibility of forging the actual sender's identification by a third-party.
- Data Integrity: Data Integrity Authentication allows both ends of the communication channel to confirm that the original data sent has been received as transmitted, without being tampered with in transit. This is achieved by using authentication algorithms and their outputs.

The IPsec architecture model includes the Sierra Wireless AirLink router as a local gateway at one end, communicating through a VPN tunnel with a remote VPN gateway at the other end. The remote gateway is connected to a remote network and the VPN is connected to the local network. You can configure up to three remote subnets.

The IPsec VPN employs the IKE (Internet Key Exchange) protocol to set up a Security Association (SA) between the AirLink LX40 and AirLink Connection Manager or a Cisco (or Cisco compatible) enterprise VPN server. IPsec has two phases for setting up an SA between peer VPNs. Phase 1 creates a secure channel between the LX40 VPN and the enterprise VPN, thereby enabling IKE exchanges. Phase 2 sets up the IPsec SA that is used to securely transmit enterprise data.

Note: If you configure custom settings, they are saved and the tunnel can be disabled and re-enabled without needing to re-enter the settings. For a successful configuration, all settings for the VPN tunnel must be identical between the AirLink LX40 VPN and the enterprise VPN server.

You can also configure VPN Failover for IPsec VPN tunnels. For more information, see VPN Failover on page 194.

IPsec (Legacy)

The Legacy IPsec implementation was in place prior to ALEOS 4.12.0. You can configure IPsec tunnels in Legacy mode if you absolutely must retain an existing configuration. Otherwise, Sierra Wireless recommends using the Standard IPsec implementation. For more information, see Standard Vs. Legacy IPsec Implementation on page 191.

To configure an IPsec VPN tunnel in Legacy mode:

1. In ACEmanager, go to VPN.
2. On the General page, under IPsec Implementation, select Legacy.
3. Select the VPN you want to configure (1, 2, 3, 4, or 5).
4. In the VPN Type field, select IPsec Tunnel. The screen expands to show the IPsec Tunnel fields.

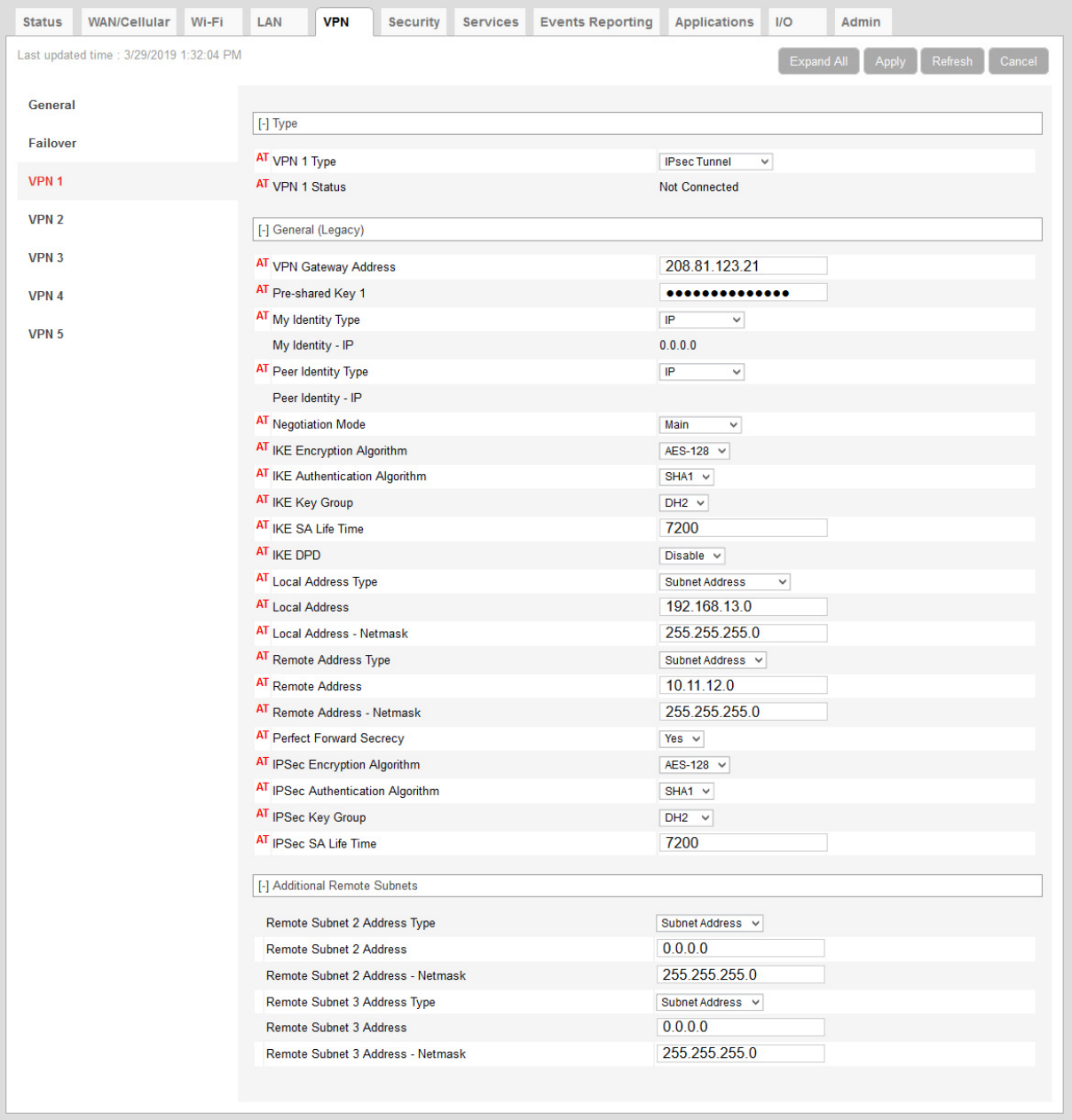


Figure 7-6: ACEmanager: VPN > VPN 1 > IPSec Tunnel (Legacy)

5. See the following table for instructions on completing the IPsec Tunnel fields.
6. Once the configuration is complete, click Apply and Reset VPN Tunnels or reboot the AirLink router.
7. Check the VPN Status field to confirm the status of the VPN connection.

Field	Description
Type	
VPN # Type	Use this field to select the type of VPN tunnel. If you configure custom settings, they are saved and the tunnel can be disabled and re-enabled without needing to re-enter the settings. Options are: • Tunnel Disabled (default) • IPsec Tunnel • GRE Tunnel • OpenVPN Tunnel (only available for VPN 1)

VPN # Status	Status of the VPN connection:
	• Not Enabled—VPN is disabled (default)
	• Not Connected—The VPN failed to connect. This could be because of a mismatch in the configuration between the client and the server, no data connection on the device, etc.
	• Connected—The VPN is connected and ready to transmit traffic.
	• Configuration Error—This status appears when:
	  • Two VPNs have the same Local Address and Remote Address
	  • More than one VPN has the remote address set to “0.0.0.0”
	When either of these errors exist, only the first of the conflicting VPNs is operational.
	To determine which VPNs are in conflict:
	1. Go to Admin > Configure Log.
	2. For the VPN Subsystem, ensure that Display in Log is set to Yes. The Verbosity can be either Info or Debug.
	3. Click View Log.
	4. The resulting log shows you which VPNs are in conflict.
	Note: You can display the VPN status on the ACEmanager login page. For more information, see Status Screen on page 292.

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td colspan="2">General (Legacy)</td></tr>
<tr><td>VPN Gateway Address</td><td>The IP address of the server that this VPN client connects to. This address must be open to connections from the AirLink router. The default VPN Gateway IP Addresses are static address on Sierra Wireless Servers. They are:

<table>
<tr><th>VPN</th><th>Gateway IP Address</th></tr>
<tr><td>1</td><td>208.81.123.21</td></tr>
<tr><td>2</td><td>208.81.123.22</td></tr>
<tr><td>3</td><td>208.81.123.26</td></tr>
<tr><td>4</td><td>208.81.123.23</td></tr>
<tr><td>5</td><td>208.81.123.24</td></tr>
</table>

You can use these default IP addresses to confirm that an IPsec connection can be established with your wireless configuration before making any configuration changes, and as an example to model your VPN configuration after.

Note: For VPN Failover to work correctly, VPN server addresses must be able to respond to ICMP echo requests. If the VPN server/firewall device does not respond to ICMP echo requests, then the VPN Failover feature may not fail over and/or revert correctly.</td></tr>
<tr><td>Pre-shared Key 1</td><td>The pre-shared key (PSK) is used to initiate the VPN tunnel.
• Pre-shared key length: Maximum supported length is 128 characters.
• Valid characters are: 1234567890abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ!%-~@#$^*
• Invalid characters: ><?&</td></tr>
<tr><td>My Identity Type</td><td>Sets the host authentication ID. Options are:
• IP (default)—The My Identity - IP field appears with the WAN IP address assigned by the carrier
• FQDN—The My Identity - FQDN field appears. Enter a fully qualified domain name (FQDN) e. g., modemname.domainname.com
• User FQDN—The My Identity - FQDN field appears. Enter a User FQDN whose values should include a username (e.g. user@domain.com)</td></tr>
<tr><td>My Identity - IP or My Identity - FQDN</td><td>• My Identity—IP appears only when IP is selected from the My Identity Type drop-down menu. The WAN IP address assigned by the carrier appears.
• My Identity—FQDN appears only when User FQDN or FQDN is selected from the My Identity Type drop-down menu. Enter an FQDN or User FQDN.

Note: If you are using a FQDN for your device (My Identity Type) either:
• Set up a Dynamic DNS on the Services > Dynamic DNS tab (See Dynamic DNS on page 250) or
• Use a DNS server as your domain host</td></tr>
</table>

Field	Description
Peer Identity Type	Required in some configurations to identify the client or peer side of a VPN connection. Options are: • IP (default)—The Peer Identity - IP field appears with the IP address of a VPN server set up by Sierra Wireless for your testing purposes • FQDN—The Peer Identity - FQDN field appears. Enter an FQDN (e. g. modemname.domainname.com) • User FQDN—The Peer Identity - FQDN field appears. Enter a User FQDN whose values should include a username (e.g., user@domain.com)
Peer Identity - IP or **Peer Identity - FQDN**	• Peer Identity—IP appears only when IP is selected from the Peer Identity Type drop-down menu. The VPN Gateway IP Address appears. • Peer Identity—FQDN appears only when User FQDN or FQDN is selected from the Peer Identity Type drop-down menu. Enter the Peer FQDN or Peer User FQDN.
Negotiation Mode	Enable Aggressive mode for the VPN. Aggressive mode offers increased performance at the expense of security. Options are: • Main (default) • Aggressive
IKE Encryption Algorithm	Determines the type and length of encryption key used to encrypt/decrypt IKE packets. 3DES supports 168-bit encryption. AES (Advanced Encryption Standard) supports both 128-bit and 256-bit encryption. Options are: DES, 3DES, AES-128 (default), and AES-256
IKE Authentication Algorithm	MD5 is an algorithm that produces a 128-bit digest for authentication. SHA is a more secure algorithm that produces a 160-bit digest. Options are: MD5 and SHA1 (default)
IKE Key Group	Options are: DH1, DH2 (default), or DH5
IKE SA Life Time	Determines how long the VPN tunnel is active in seconds. Options are: 180 to 86400; Default: 7200
IKE DPD	Dead Peer Detection (DPD) Options are: • Disable (default) • Enable When DPD is enabled, the AirLink router checks to see if the server is still present if there has been no traffic for a configured interval. If it does not receive an acknowledgment, it retries at 5 second intervals. If there is no acknowledgment after 5 retries, the status of the VPN is set to Not Connected and the device attempts to renegotiate IPSEC security parameters with its peer. *Note: Sierra Wireless recommends that you Enable IKE DPD. Otherwise the AirLink router has no way of detecting that the connection to the VPN server is still available.*
IKE DPD Interval (seconds)	Use this field to set the DPD interval (in seconds). If there has been no traffic for the period of time set in this field, the AirLink router retries checking with the server, as described in IKE DPD. Options are: 0 to 3600 (default is 1200) If this field is set to 0, DPD monitoring is turned off (or disabled as described in the IKE DPD section), but the AirLink router still responds to DPD requests from the server.

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>Local Address Type</td><td>The network information of the device. Options are:
Subnet Address (default)
Use the Host Subnet
Single Address</td></tr>
<tr><td>Local Address</td><td>Device subnet address</td></tr>
<tr><td>Local Address - Netmask</td><td>Device subnet mask information
Default: 255.255.255.0</td></tr>
<tr><td>Remote Address Type</td><td>The network information of the IPsec server behind the IPsec gateway. Options are:
Subnet Address (default)
Single Address</td></tr>
<tr><td>Remote Address</td><td>The IP address or subnet of the device(s) connected to the router
If the remote address is 0.0.0.0, the remote address netmask should also be 0.0.0.0.
Note that you can only have one remote address of 0.0.0.0 for all the VPNs.
Default values are:<table><tr><th>VPN</th><th>Remote Address</th></tr><tr><td>1</td><td>10.11.12.0</td></tr><tr><td>2</td><td>10.11.13.0</td></tr><tr><td>3</td><td>10.11.14.0</td></tr><tr><td>4</td><td>10.11.15.0</td></tr><tr><td>5</td><td>10.11.16.0</td></tr></table></td></tr>
<tr><td>Remote Address - Netmask</td><td>Remote subnet mask information
Default: 255.255.255.0
0.0.0.0 is allowed for the remote address subnet mask as long as the remote address is also 0.0.0.0.</td></tr>
<tr><td>Perfect Forward Secrecy</td><td>Perfect Forward Secrecy (PFS) is enabled by default. Leave the default setting in this field.
To disable PFS, see IPsec Key Group.</td></tr>
<tr><td>IPsec Encryption Algorithm</td><td>Determines the type and length of encryption key used to encrypt/decrypt ESP (Encapsulating Security Payload) packets. 3DES supports 168-bit encryption. AES (Advanced Encryption Standard) supports both 128-bit and 256-bit encryption.
Options are: None, DES, 3DES, AES-128 (default), and AES-256.</td></tr>
<tr><td>IPsec Authentication Algorithm</td><td>Can be configured with MD5 or SHA1. MD5 is an algorithm that produces a 128-bit digest for authentication. SHA is a more secure algorithm that produces a 160-bit digest.
Options are: None, MD5 and SHA1 (default)</td></tr>
</table>

Field	Description
IPsec Key Group	Use this field to select the DH (Diffie-Hellman) group pre-shared key length used for authentication, or to disable Perfect Forward Secrecy (PFS). The DH group number determines the length of the key used in the key exchange process. Longer keys are more secure, but take longer to compute. Also note that both peers in the VPN exchange must use the same DH group. PFS is enabled by default. It adds additional security because each session uses a unique temporary public/private key pair to generate the shared secret. One key cannot be derived from another. This ensures previous and subsequent encryption keys are secure, even if one key is compromised. *Note: In the Legacy IPsec implementation, it is not possible to disable PFS. If PFS is set to disabled in ACEmanager, the LX40, by default, negotiates PFS using the DH2 key group.* Options are: • None—Disables PFS • DH1—Uses DH Group 1 (key length is 768 bits) • DH2—Uses DH Group 2 (default—key length is 1,024 bits) • DH5—Uses DH Group 5 (key length is 1,536 bits)
IPsec SA Life Time	Determines how long the VPN tunnel is active in seconds Options are: 180 to 86400; Default: 7200
Additional Remote Subnets	
Remote Subnet 2 Address Type	The network information for subnet 2 IPsec server behind the IPsec gateway. Options are: Subnet Address (default) and Single Address
Remote Subnet 2 Address	The IP address for the subnet 2 device behind the router
Remote Subnet 2 Address - Netmask	Remote subnet 2 mask information Default: 255.255.255.0
Remote Subnet 3 Address Type	The network information for subnet 3 IPsec server behind the IPsec gateway. Options are: Subnet Address (default) and Single Address
Remote Subnet 3 Address	The IP address for the subnet 3 device behind the router
Remote Subnet 3 Address - Netmask	Remote subnet 3 mask information Default: 255.255.255.0

IPsec (Standard)

The Standard implementation offers increased security and connectivity, and is the recommended configuration. For more information, see Standard Vs. Legacy IPsec Implementation on page 191.

To configure an IPsec VPN tunnel in Standard mode:

1. In ACEmanager, go to VPN.
2. On the General page, under IPsec Implementation, select Standard.
3. Select your desired Local Termination.

4. Select the VPN you want to configure (1, 2, 3, 4, or 5).
5. In the VPN Type field, select IPsec Tunnel. The screen expands to show the IPsec Tunnel fields.

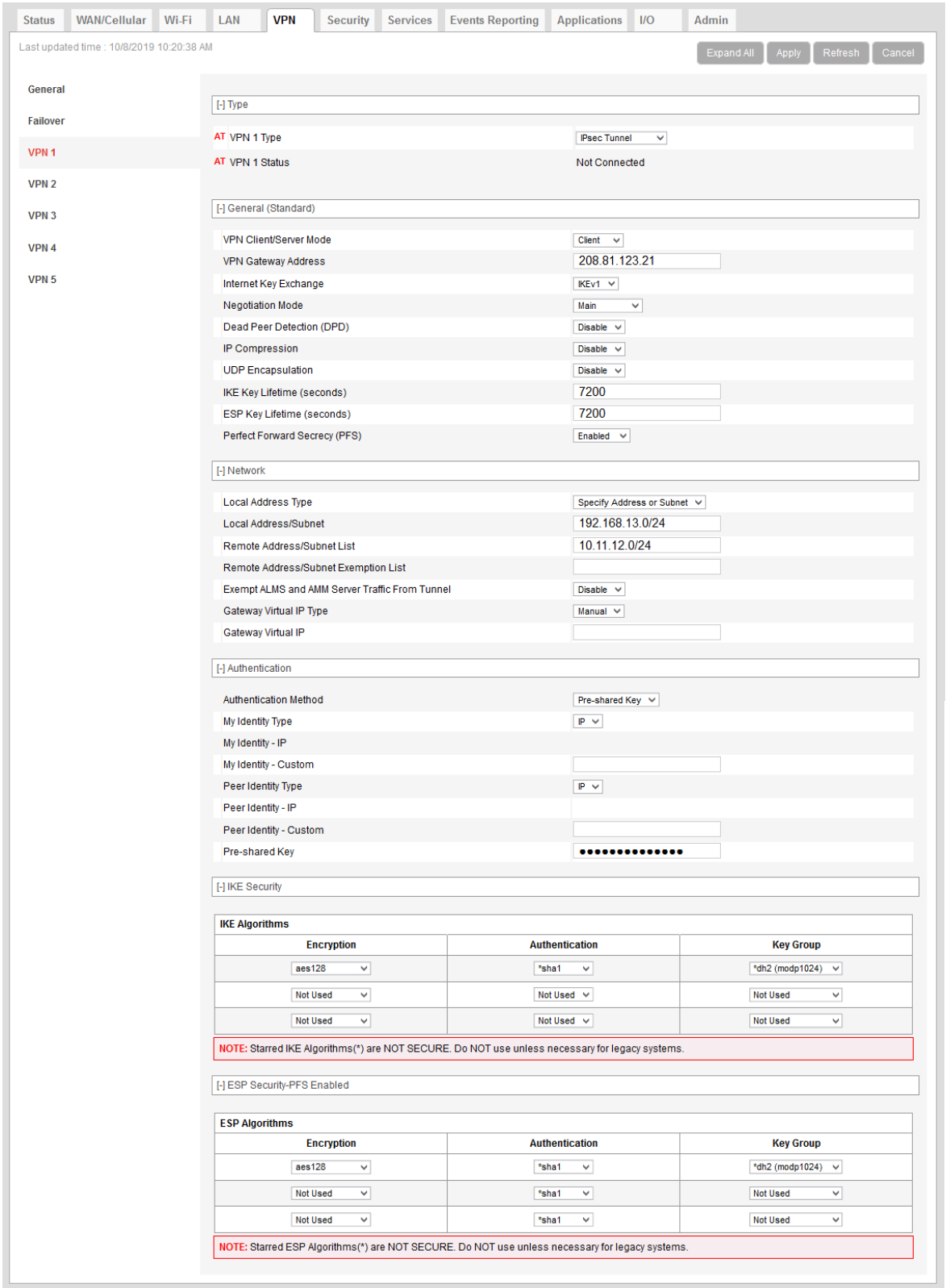


Figure 7-7: ACEmanager: VPN > VPN 1 > IPSec Tunnel (Standard)

6. See the following table for instructions on completing the IPsec Tunnel fields.
7. Once the configuration is complete, click Apply and Reset VPN Tunnels or reboot the AirLink router.
8. Check the VPN Status field to confirm the status of the VPN connection.

Field	Description
Type	
VPN # Type	Use this field to select the type of VPN tunnel. If you configure custom settings, they are saved and the tunnel can be disabled and re-enabled without needing to re-enter the settings. Options are: • Tunnel Disabled (default) • IPsec Tunnel • GRE Tunnel • OpenVPN Tunnel (only available for VPN 1)
VPN # Status	Status of the VPN connection: • Disabled—VPN is disabled (default) • Error Connecting—The VPN failed to connect. This could be because of a mismatch in the configuration between the client and the server, no data connection on the device, etc. • Connected—The VPN is connected and ready to transmit traffic. • Not Connected—The tunnel is enabled and trying to connect. • Error in Gateway—The gateway/peer was an FQDN, and it could not be found; i.e., the IP address could not be found.
General (Standard)	
VPN Client/Server Mode	• Client • Server *Note: Server Mode is not compatible with Host-to-LAN configurations. Do not select Server when IPsec Local Termination is set to Host.* *Note: In Server Mode, the following is not a supported configuration:* • *Negotiation Mode—Aggressive* • *Internet Key Exchange—IKEv1* • *Authentication Method—Pre-Shared Key* *Sierra Wireless recommends setting Negotiation Mode to Main (default) in this case.*

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>VPN Gateway Address</td><td>Available in Client Mode. The IP address or FQDN (Fully Qualified Domain Name) of the server that this VPN client connects to. This address must be open to connections from the AirLink router. The LX40 supports IPv6 addresses for “4-in-6” tunnels, where it is able to pass IPv4 traffic from the local IPv4 subnet to remote IPv4 subnets over the IPv6 network.
The default VPN Gateway IP Addresses are static addresses on Sierra Wireless Servers. They are:
<table><tr><th>VPN</th><th>Gateway IP Address</th></tr><tr><td>1</td><td>208.81.123.21</td></tr><tr><td>2</td><td>208.81.123.22</td></tr><tr><td>3</td><td>208.81.123.26</td></tr><tr><td>4</td><td>208.81.123.23</td></tr><tr><td>5</td><td>208.81.123.24</td></tr></table>
You can use these default IP addresses to confirm that an IPsec connection can be established with your wireless configuration before making any configuration changes, and as an example to model your VPN configuration after.
Note: For VPN Failover to work correctly, VPN server addresses must be able to respond to ICMP echo requests. If the VPN server/firewall device does not respond to ICMP echo requests, then the VPN Failover feature may not fail over and/or revert correctly.</td></tr>
<tr><td>VPN Peer Address</td><td>Available in Server Mode. The IP address or FQDN (Fully Qualified Domain Name) of the client/peer that can connect to this VPN server. This address must be open to connections from the AirLink router.
Note: The default IP Address in this field relates to the VPN Gateway Address setting described above. It can be disregarded when configuring the VPN Peer Address.</td></tr>
<tr><td>Internet Key Exchange</td><td>• IKEv1 (default)
• IKEv2</td></tr>
<tr><td>Negotiation Mode</td><td>Enable Aggressive mode for the VPN. Aggressive mode offers increased performance at the expense of security.
Options are:
• Main (default)
• Aggressive</td></tr>
<tr><td>MOBIKE</td><td>Available when Internet Key Exchange: IKEv2 is selected. MOBIKE allows a VPN tunnel to stay connected, even if the WAN interface used by the tunnel changes. For example, the tunnel stays connected if the WAN interface changes from Ethernet to cellular. Options are:
• Enable (default)
• Disable</td></tr>
</table>

Field	Description
Dead Peer Detection (DPD)	Dead Peer Detection (DPD) Options are: • Disable (default) • Enable When DPD is enabled, the AirLink router checks to see if the server is still present if there has been no traffic for a configured delay. If it does not receive an acknowledgment after several retries, the status of the VPN is set to Not Connected and an attempt is made to restart the tunnel. *Note: Sierra Wireless recommends that you enable DPD. Otherwise the AirLink router has no way of detecting that the connection to the VPN server is still available.*
DPD Delay (seconds)	Use this field to set the DPD delay (in seconds). If there has been no traffic for the period of time set in this field, the AirLink router retries checking with the server, as described in Dead Peer Detection (DPD). Options are: 0 to 3600 (default is 10) Setting this field to 0 disables Dead Peer Detection as described in Dead Peer Detection (DPD). The AirLink router always responds to DPD requests from the server.
DPD Timeout (seconds)	Available for IKEv1 only. Periodic interval for Dead Peer Detection. If there is no communication from the server (including DPD responses) within this interval, the status of the VPN is set to Not Connected and an attempt is made to restart the tunnel.
IP Compression	Enable or disable IP packet compression. When enabled, IP packets are compressed before being encrypted, improving throughput for slow connections. • Disable (default) • Enable *Note: Disable IP Compression if the VPN server (Server Address field) doesn't support compression.*
UDP Encapsulation	Allows you to enable UDP encapsulation in cases where it must be manually enabled if firewall restrictions require it. If either peer is behind a NAT device, UDP encapsulation is automatically enabled. • Enabled—When the VPN server is behind a firewall, firewall configuration is simplified as the firewall only has to allow ports 500 (IKE) and 4500 (IKE and UDP-encapsulated ESP). • Disabled (Default)—When disabled, port 50 must also be allowed for the ESP protocol to pass. *Note: This setting can usually be left at default. Do not use if the gateway is IPv6.*
IKE Key Lifetime (seconds)	Sets the lifetime for the IKE Security Association (SA). After this time expires, a new SA is negotiated, either by re-keying (IKEv2) or re-authentication (IKEv1). Range: 180–86400 (default 7200) *Note: Either end may initiate the negotiation; both ends need not agree.*

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>ESP Key Lifetime (seconds)</td><td>Sets the lifetime for the ESP Security Association (SA). After this time expires, a new SA is negotiated by re-keying.
Range: 180–86400 (default 7200)

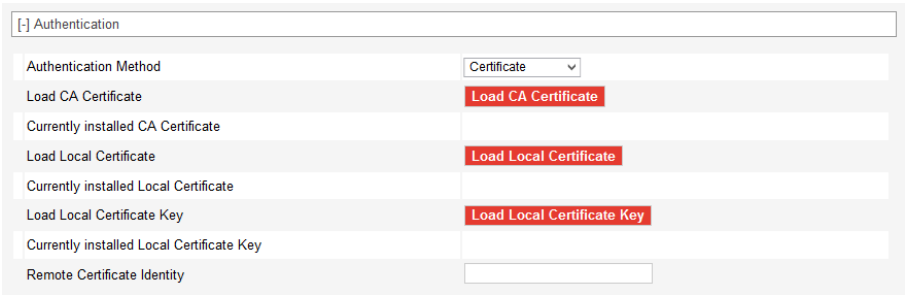
Note: Either end may initiate the negotiation; both ends need not agree.</td></tr>
<tr><td>Perfect Forward Secrecy (PFS)</td><td>Perfect Forward Secrecy (PFS) is enabled by default. Options are:
• Disabled
• Enabled (default)</td></tr>
<tr><td colspan="2">Network</td></tr>
<tr><td>Local Address Type</td><td>The network information of the device. Options are:
• Use the Host Subnet
• Specify Address or Subnet (default)</td></tr>
<tr><td>Local Address/Subnet</td><td>If Specify Address or Subnet is selected, enter the local address or subnet in CIDR notation; for example, 192.168.13.0/24.

Note: More than one local address/subnet is not supported.</td></tr>
<tr><td>Remote Address/ Subnet List</td><td>The IP address or subnet (in CIDR notation) of the device(s) connected to the remote VPN server. These addresses/subnets will be accessible from any hosts connected locally to the router.
Note that you can only have one remote address of 0.0.0.0/0 for all the VPNs.

Note: Enter subnets or addresses as a comma-separated list, ensuring that there are no spaces before or after commas.

Default values are:
<table><tr><th>VPN</th><th>Remote Address</th></tr><tr><td>1</td><td>10.11.12.0/24</td></tr><tr><td>2</td><td>10.11.13.0/24</td></tr><tr><td>3</td><td>10.11.14.0/24</td></tr><tr><td>4</td><td>10.11.15.0/24</td></tr><tr><td>5</td><td>10.11.16.0/24</td></tr></table></td></tr>
<tr><td>Remote Address/ Subnet Exemption List</td><td>Comma-separated list of Remote Addresses or subnets (in CIDR notation) to be exempted.

Note: Enter subnets or addresses as a comma-separated list, ensuring that there are no spaces before or after commas.</td></tr>
</table>

Field	Description
Exempt ALMS and AMM Server Traffic From Tunnel	Selects whether or not to exclude ALMS and AMM server traffic from the tunnel. You may enable this setting if the addresses of the ALMS/AMM servers are within the range of the remote subnet(s), and the remote server is not configured to route this traffic to the ALMS/AMM servers. • Disable (default) • Enable
Gateway Virtual IP Type	Appears when IPsec Local Termination is set to Host. Selects how the virtual IP address is assigned. • Automatic—The LX40 receives the virtual IP address dynamically from the VPN server (default when IKEv2 is used). • Manual—Manually assign the virtual IP address. *Note: You can select Automatic for the Gateway Virtual IP Type only when IKEv2 is used. When IKEv1 is used, Manual is the only option available.*
Gateway Virtual IP	Appears when IPsec Local Termination is set to Host and Gateway Virtual IP Type is Manual. Enter the virtual IP address of the VPN server. Default value is 0.0.0.0. *Note: The default value is not a valid IP address. To create a working VPN tunnel, you must enter an IP address according to your network's design.*
Authentication	
Authentication Method	• Pre-shared Key • Certificate When Pre-shared Key is selected, the Authentication settings appear as in Figure 7-7. When Certificate is selected, the Authentication settings are as shown below. 
Load CA Certificate	Loads the server root CA (Certificate Authority) certificate. When you click the button, a window pops up and enables you to browse and select the file containing the root CA certificate. For more information, see Loading Certificates and Certificate Keys on page 218.
Currently installed CA Certificate	Displays the filename of the most recently uploaded root certificate
Load Local Certificate	Loads the client certificate. For more information, see Loading Certificates and Certificate Keys on page 218. When you click the button, a window pops up and enables you to browse and select the file containing the client certificate.

Field	Description
Currently installed Local Certificate	Displays the filename of the most recently uploaded client certificate.
Load Local Certificate Key	Loads the client certificate key. For more information, see Loading Certificates and Certificate Keys on page 218. When you click the button, a window pops up and enables you to browse and select the file containing the client certificate key.
Currently installed Local Certificate Key	Displays the filename of the most recently uploaded client certificate key
Remote Certificate Identity	Enter the remote certificate identity, or leave this field blank to accept any remote certificate identity.
My Identity Type	Appears when the Authentication Method is Pre-shared Key. Sets the host authentication ID. Options are: • IP (default)—IP address of the active WAN link. This could be the static IP assigned to your SIM. • Custom
My Identity - IP	The WAN IP address assigned by the carrier appears.
My Identity - Custom	Enter your own custom name. *Note: If you are using a FQDN for your device (My Identity Type) either:* • *Set up a Dynamic DNS on the Services > Dynamic DNS tab. (See Dynamic DNS on page 169.) or* • *Use a DNS server as your domain host*
Peer Identity Type	Required in some configurations to identify the peer side of a VPN connection. Options are: • IP (default) • Custom
Peer Identity - IP	Normally, this shows the same address as the router.
Peer Identity - Custom	Enter your own custom name.
Pre-shared Key	This field appears only if the Authentication Method is Pre-shared Key. The pre-shared key (PSK) is used to authenticate the VPN tunnel. • Pre-shared key length: Maximum supported length is 128 characters. • Valid characters are: 1234567890abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ!%-~@#$^* • Invalid characters: ><?&
IKE Security You can define up to three rows in the IKE Algorithms table. Each row is called a proposal. This enables the client and server to negotiate which algorithms to use. Normally, the most secure algorithms would be selected in the first proposal, with the weakest ones in the last proposal. *Note: Algorithms marked with a *, such as *3DES and *MD5, are intended for backwards compatibility and should not be used for new installations.*	

Field	Description
IKE Encryption Algorithm	Determines the type and length of encryption key used to encrypt/decrypt IKE packets. Options are: Not Used, *3DES, AES-128, AES-192, AES-256, and AES-256gcm16 (IKEv2 only)
IKE Authentication Algorithm	Determines the type and length of digest used for authentication. Options are: Not Used, *SHA1, *MD5, SHA512, SHA384, SHA256
IKE Key Group	Use this field to select the DH (Diffie-Hellman) group key length used for authentication. • Options are: Not Used, DH21 (ecp521), DH20 (ecp384), DH19 (ecp256), DH26 (ecp224), DH18 (modp8192), DH17 (modp6144), DH16 (modp4096), DH15 (modp3072), DH14 (modp2048), *DH5 (modp1536), *DH2 (modp1024), *DH1 (modp768)
ESP Security-PFS Enabled You can define up to three rows in the ESP Algorithms table. Each row is called a proposal. This enables the client and server to negotiate which algorithms to use. Normally, the most secure algorithms would be selected in the first proposal, with the weakest ones in the last proposal. *Note: Algorithms marked with a *, such as *3DES, are intended for backwards compatibility and should not be used for new installations.*	
ESP Encryption Algorithm	Determines the type and length of encryption key used to encrypt/decrypt ESP (Encapsulating Security Payload) packets. Options are: Not Used, *3DES, AES-128, AES-192, AES-256, AES-256gcm16, and null (used for testing purposes only—packets are not encrypted)
ESP Authentication Algorithm	Determines the type and length of digest used for authentication. Options are: Not Used, *SHA1, *MD5, SHA512, SHA384, and SHA256
ESP Key Group	Use this field to select the DH (Diffie-Hellman) group key length used for authentication, or to disable Perfect Forward Secrecy (PFS). *Note: This column does not appear when Perfect Forward Secrecy (PFS) is disabled.* The DH group number determines the length of the key used in the key exchange process. Longer keys are more secure, but take longer to compute. Also note that both peers in the VPN exchange must use the same DH group. PFS is enabled by default. It adds additional security because each session uses a unique temporary public/private key pair to generate the shared secret. One key cannot be derived from another. This ensures previous and subsequent encryption keys are secure, even if one key is compromised. • Options are: Not Used, DH21 (ecp521), DH20 (ecp384), DH19 (ecp256), DH26 (ecp224), DH18 (modp8192), DH17 (modp6144), DH16 (modp4096), DH15 (modp3072), DH14 (modp2048), *DH5 (modp1536), *DH2 (modp1024), *DH1 (modp768) and none *Note: Select none to disable PFS for a proposal. This can be useful when multiple proposals are defined. For example, if the first proposal has a valid DH key group number, and the second one has none, if the server supports PFS, the first proposal will be used, but the server will still connect even if the server doesn't support PFS.*

GRE

The AirLink router can act as a Generic Routing Encapsulation (GRE) endpoint, providing a means to encapsulate a wide variety of network layer packets inside IP tunneling packets. With this feature you can reconfigure IP architectures without worrying about connectivity. GRE creates a point-to-point link between routers on an IP network.

Note: Only one GRE tunnel can be configured at one time.

To configure GRE:

1. In ACEmanager, go to VPN.
2. Select the VPN you want to configure (1, 2, 3, 4, or 5).
3. In the VPN Type field, select GRE Tunnel. The screen expands to show the GRE fields.

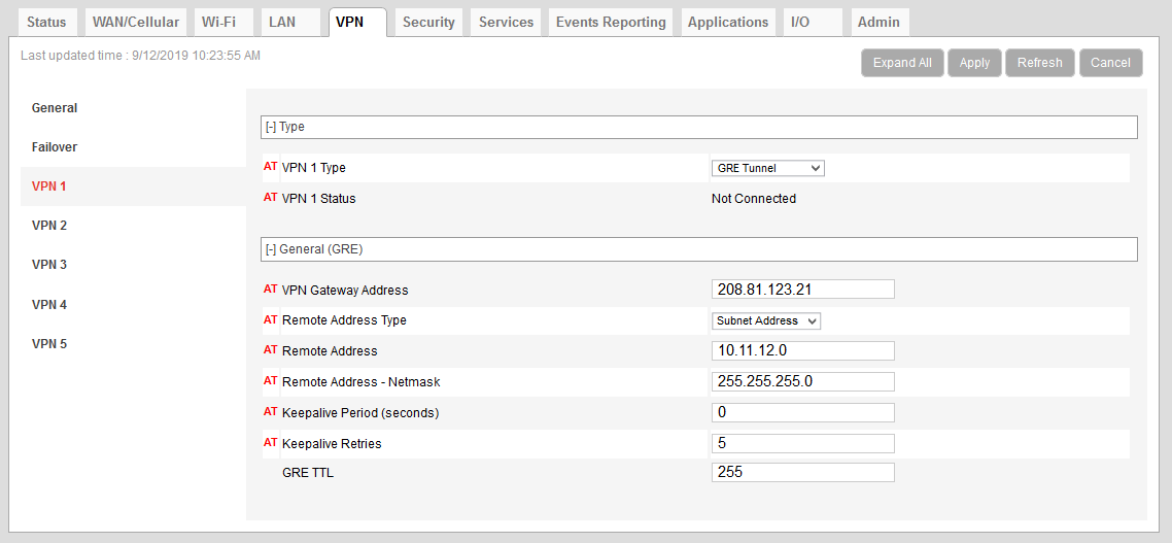


Figure 7-8: ACEmanager: VPN > VPN 1 > GRE Tunnel

4. See the following table for instructions on completing the GRE fields.
5. Once the configuration is complete, click Apply and reboot the AirLink LX40.

Field	Description
Type	
VPN # Type	Options are: Tunnel Disabled or GRE Tunnel. Enabling the GRE Tunnel will expose other options for configuring the tunnel.
VPN # Status	Indicates the status of the GRE tunnel on the device Options are: Disabled, Connected or Not Connected
General (GRE)	
VPN Gateway Address	The IP address of the device that this client connects to. This IP address must be open to connections from the device.

Field	Description
Remote Address Type	The network information of the GRE server behind the GRE gateway
Remote Address	The IP address of the device behind the gateway
Remote Address - Netmask	The subnet network mask of the device behind the GRE gateway *Note: Never use a 16-bit subnet mask: GRE tunnel establishment will fail.*
Keepalive Period (seconds)	The amount of time to wait for a GRE keepalive packet from the VPN server gateway. If at least one packet is received within this time, the GRE tunnel status (VPN # Status) is “Connected”. *Note: The VPN server must have its keepalive functionality enabled.* Options are: 0–65535, 0 default (disabled)
Keepalive Retries	The maximum number of GRE keepalive packet tracking timeouts before the GRE tunnel status (VPN # Status) becomes “Not Connected”. Options are: 0–65535, 5 default
GRE TTL	GRE time to live (TTL) value is the upper bound on the time that a GRE packet can exist in a network. In practice, the TTL field is reduced by one on every router hop. This number is in router hops and not in seconds.

OpenVPN Tunnel

Note: OpenVPN Tunnel configuration is only available on VPN 1.

OpenVPN uses SSL/TLS to facilitate key exchange and supports up to 256-bit encryption. OpenVPN is capable of crossing network address translators (NATs) and firewalls. Peers can authenticate each other using pre-shared keys, certificates, or username and password.

The AirLink router client authenticates the server using a PKI certificate. The server likewise authenticates the client. The Root CA certificate for the server certificate must be loaded on the device.

To configure an OpenVPN tunnel:

1. In ACEmanager, go to VPN.
2. Select the VPN 1.
3. In the VPN Type field, select OpenVPN Tunnel. The screen expands to show the OpenVPN Tunnel fields.

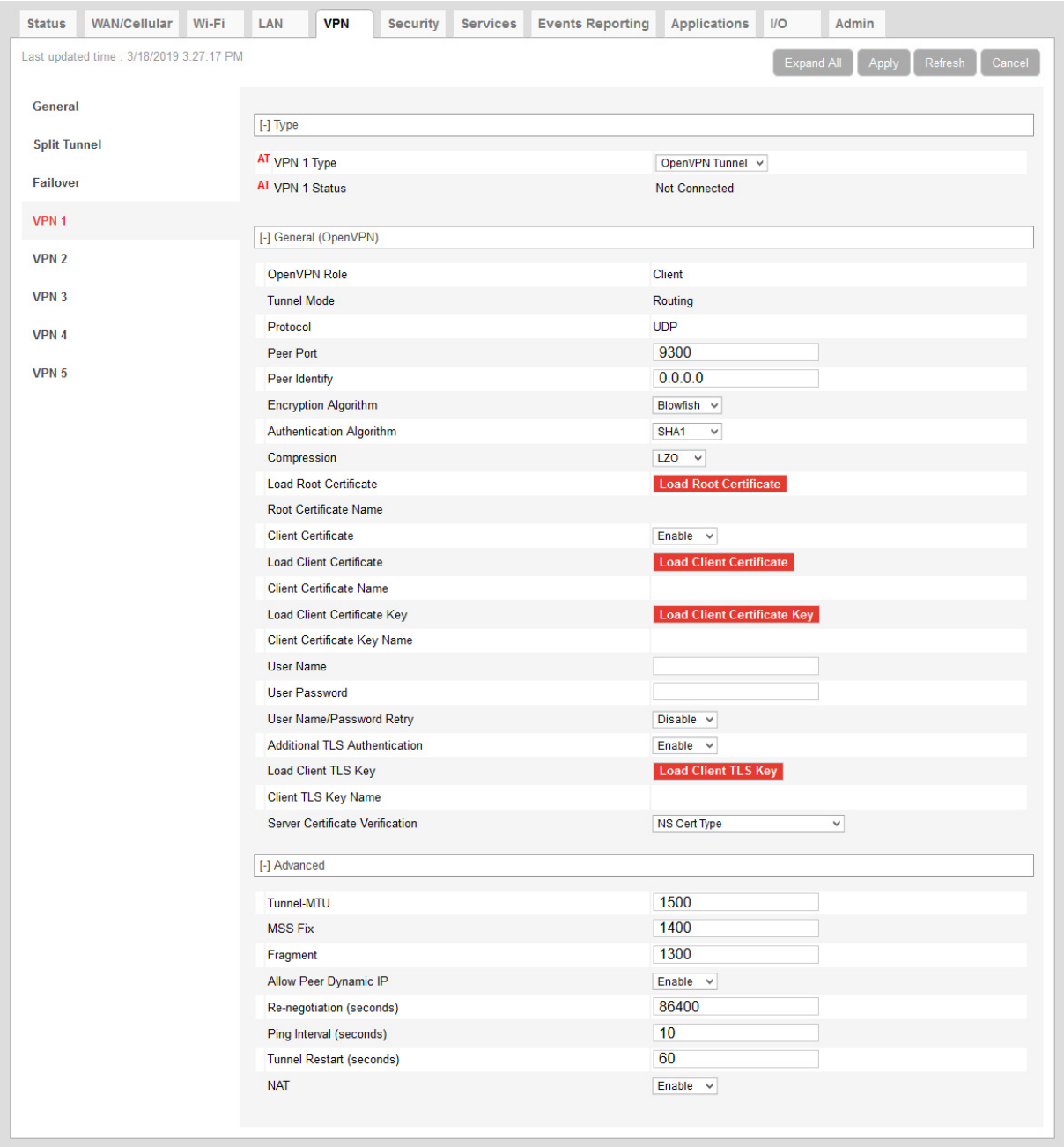


Figure 7-9: ACEmanager: VPN > VPN 1 > OpenVPN Tunnel

4. See the following table for instructions on completing the OpenVPN Tunnel fields.
5. Once the configuration is complete, click Apply and reboot the AirLink router.

Field	Description
General	
VPN 1 Type	Options are: Tunnel Disabled or OpenVPN Tunnel. Enabling the OpenVPN Tunnel will expose other options for configuring the tunnel.

Field	Description
VPN 1 Status	Indicates the status of the OpenVPN tunnel on the device Options are: Disabled, Connected or Not Connected
General (OpenVPN)	
OpenVPN Role	The AirLink router can only be an OpenVPN client. Default: Client
Tunnel Mode	The Tunnel Mode is set to “Routing”.
Protocol	Displays the protocol used for configuration. Only supports UDP
Peer Port	The Peer Port is the UPD port on the peer device.
Peer Identity	Enter the IP address or Fully Qualified Domain Name (FQDN) of the peer device.
Encryption Algorithm	Options are: DES, Blowfish, DES, Cast128, AES-128, and AES-256
Authentication Algorithm	Options are: MD5, SHA-1, and SHA-256
Compression	Options are: LZ0 or NONE
Load Root Certificate	Loads the server root CA (Certificate Authority) certificate. When you click the button, a window pops up and enables you to browse and select the file containing the root CA certificate. For more information, see Loading Certificates and Certificate Keys on page 218.
Root Certificate Name	Displays the name of the most recently uploaded root certificate
Client Certificate	Enables or disables use of a client certificate.
Load Client Certificate	This field appears only if Client Certificate is enabled. Loads the client certificate. When you click the button, a window pops up and enables you to browse and select the file containing the client certificate. For more information, see Loading Certificates and Certificate Keys on page 218.
Client Certificate Number	Displays the number of the most recently uploaded client certificate.
Load Client Certificate Key	This field appears only if Client Certificate is enabled. Loads the client certificate key. When you click the button, a window pops up and enables you to browse and select the file containing the client certificate key. For more information, see Loading Certificates and Certificate Keys on page 218.
Client Certificate Key Name	Displays the name of the most recently uploaded client certificate key
User Name	The user name required for client authentication
User Password	The user password required for client authentication
User Name/Password Retry	Enables or disables retries if there is an authentication error after entering credentials.
Additional TLS Authentication	Enables or disables use of Transport Layer Security (TLS) authentication.

Field	Description
Load Client TLS Key	This field appears only if Additional TLS Authentication is enabled. Loads the client TLS key. When you click the button, a window pops up and enables you to browse and select the file containing the client TLS key. For more information, see Loading Certificates and Certificate Keys on page 218.
Client TLS Key Name	Displays the name of the most recently uploaded client TLS key.
Server Certificate Verification	Selects the method used to verify the server certificate. Options are: • NS Cert Type • Key Usage/Extended Key Usage
Advanced	
Tunnel-MTU	Default: 1500 bytes
MSS Fix	Default: 1400 bytes
Fragment	Default: 1300 bytes
Allow Peer Dynamic IP	Options are: Enable or Disable
Re-negotiation (seconds)	Default: 86400 (24 hours)
Ping Interval (seconds)	Sets the keep-alive sent by the client. Default: 10 seconds
Tunnel Restart (seconds)	Enter the time (in seconds) for a tunnel restart. Default: 60 seconds
NAT	Enables or disables the Mobile Network Operator NAT (note: not a local NAT).

Loading Certificates and Certificate Keys

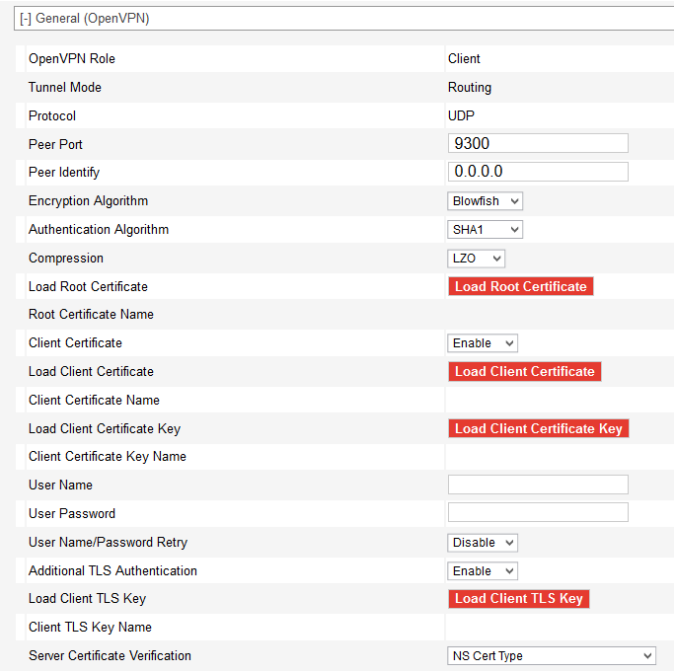
Note: The certificate and certificate key must meet the following conditions:

- *The certificate must be an X.509 certificate*
- *The certificate and the private key must be in .pem format, and they must be in separate files.*
- *There is no limit to the size of the private key, but the larger the key, the more the performance is affected. Sierra Wireless recommends that the key does not exceed 2048 bits.*

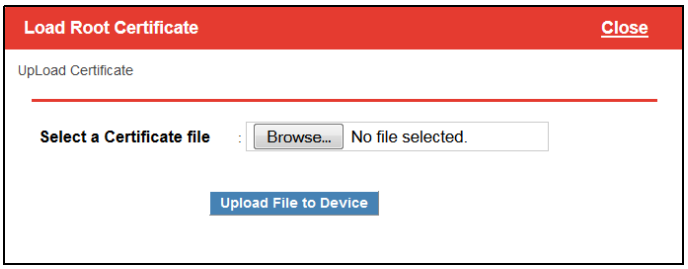
Note: The LX40 supports pre-defined cipher suites using 128-bit cipher algorithms.

To load a certificate or certificate key:

1. Click the button for the type of certificate or key you want to upload.



2. Click Browse... and then select the appropriate file for your device. (Loading a Root Certificate is shown below.)



3. Click Upload File to Device.

8: Security Configuration

The Security tab covers firewall-type functions. These functions include how data is routed or restricted from one side of the device to the other, i.e., from computers or devices connected to the device (LAN) and from computers or devices contacting it from a remote source (WAN). These features are set as rules.

Tip: *For additional security, Sierra Wireless recommends that you change the default password for ACEmanager. See* *Change Password on page 329.*

Solicited vs. Unsolicited

How the device responds to data being routed from one network connection to the other depends on the origin of the data.

- If a computer on the LAN initiates a contact to a WAN location (such as a LAN connected computer accessing an Internet web site), the response to that contact is solicited.
- If, however, a remote computer initiates the contact (such as a computer on the Internet accessing a camera connected to the device), the connection is considered unsolicited.

Port Forwarding

In Port Forwarding, any unsolicited data coming in on a defined Public Port is routed to the corresponding private port and IP of a host connected on the LAN. You can forward a single port or a range of ports.

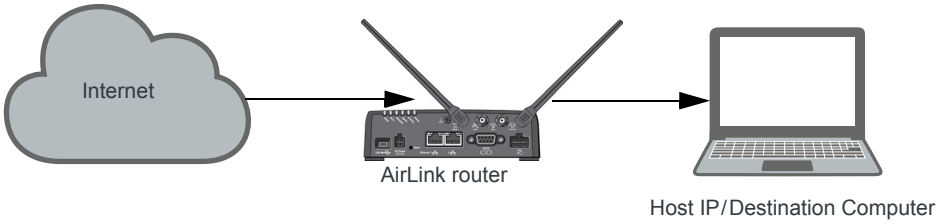


Figure 8-1: Port Forwarding

Note: You can set up a maximum of 48 port forwarding rules, 24 on the Port Forwarding screen and an additional 24 on the Extended Port Forwarding screen.

Single port

To define a port forwarding rule for a single port:

1. In ACEmanager, go to Security > Port Forwarding.
2. In the Port Forwarding field, select Enable.
3. Click “Add More” to display a rule line.

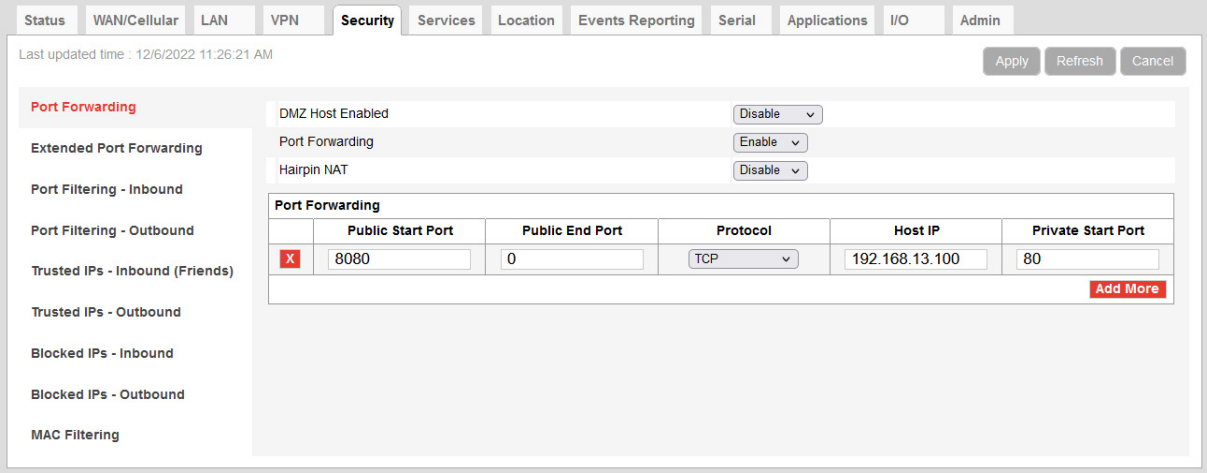


Figure 8-2: ACEmanager: Security > Port Forwarding (Single Port)

4. In the Public Start Port field, enter the desired public network port number. Values between 1 and 65535 are supported, although Sierra Wireless recommends using a value greater than 1024.

   Unsolicited data coming in on this port is forwarded to the port you select in the Private Start Port field.
5. In the Public End Port field, enter 0.
6. Select the desired protocol (see Protocol on page 224):
   - TCP
   - UDP
   - TCP & UDP
7. Enter the IP address of the computer you want to forward data to.
8. In the Private Start Port field, enter the number of the port on the destination computer that you want to forward data to.
9. Click Apply.

   You do not need to reboot immediately, if you have additional changes to make, but port forwarding does not take effect until the device is rebooted.

The Port Forwarding screen allows for 24 port forwarding rules.

10. Optional—If you need additional port forwarding rules, click Extended Port Forwarding on the left menu, and continue adding rules, up to a total over both screens of 48.

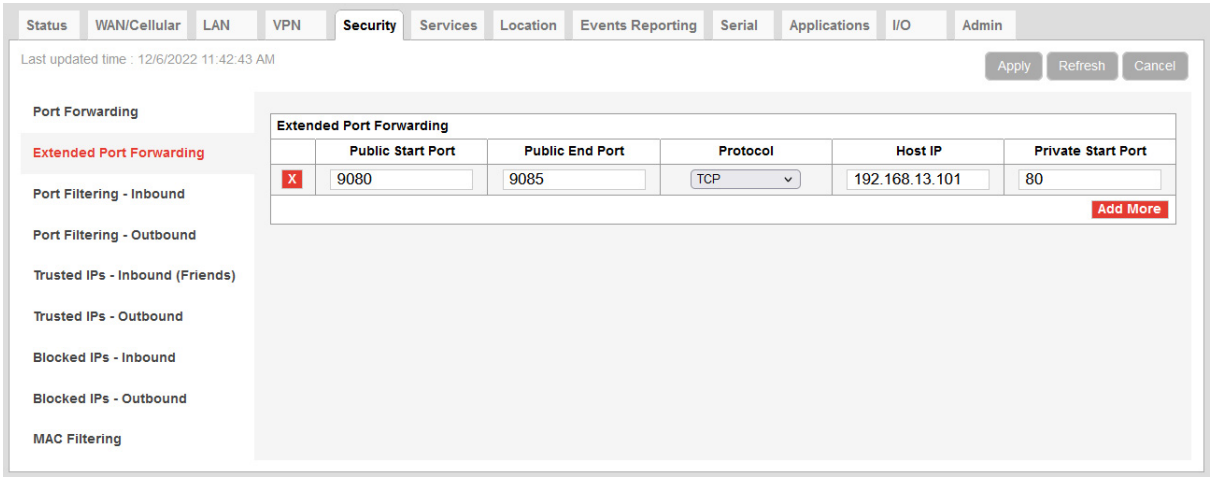


Figure 8-3: ACEmanager: Security > Extended Port Forwarding

11. Reboot.

Range of ports

To define a port forwarding rule for a range of ports:

1. In ACEmanager, go to Security > Port Forwarding.
2. In the Port Forwarding field, select Enable.

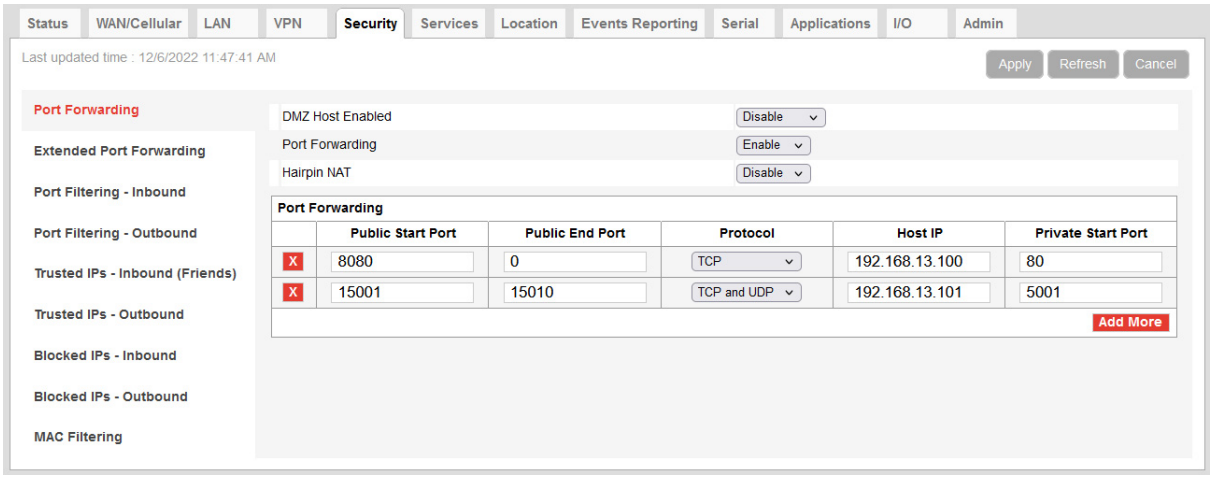


Figure 8-4: ACEmanager: Security > Port Forwarding (Port Range)

3. Set the port range for incoming data:
   a. In the Public Start Port field, enter the desired public network port number. Values between 1 and 65535 are supported, although Sierra Wireless recommends using a value greater than 1024.
   b. In the Public Port End field, enter the last public network port number in the range. The value you enter in the Public Port End field must be greater than the value in the Public Start Port field, or ALEOS rejects the selection.

Unsolicited data coming in on ports in this range are forwarded to a range of ports, starting with the port you select in the Private Start Port field.

4. Select the desired protocol (see Protocol on page 224):
   - TCP
   - UDP
   - TCP & UDP
5. Enter the IP address of the computer you want to forward data to.

   To forward a port to a local ALEOS Service, set the Host IP to 127.0.0.1.
6. In the Private Start Port field, enter the starting port number for the range of ports on the destination computer that you want to forward data to.
7. If you want to add another range, click Add More to display a new rule line.
8. Click Apply.

The Port Forwarding screen allows for 24 port forwarding rules.

9. Optional—If you need additional port forwarding rules, click Extended Port Forwarding on the left menu, and continue adding rules, up to a total over both screens of 48.

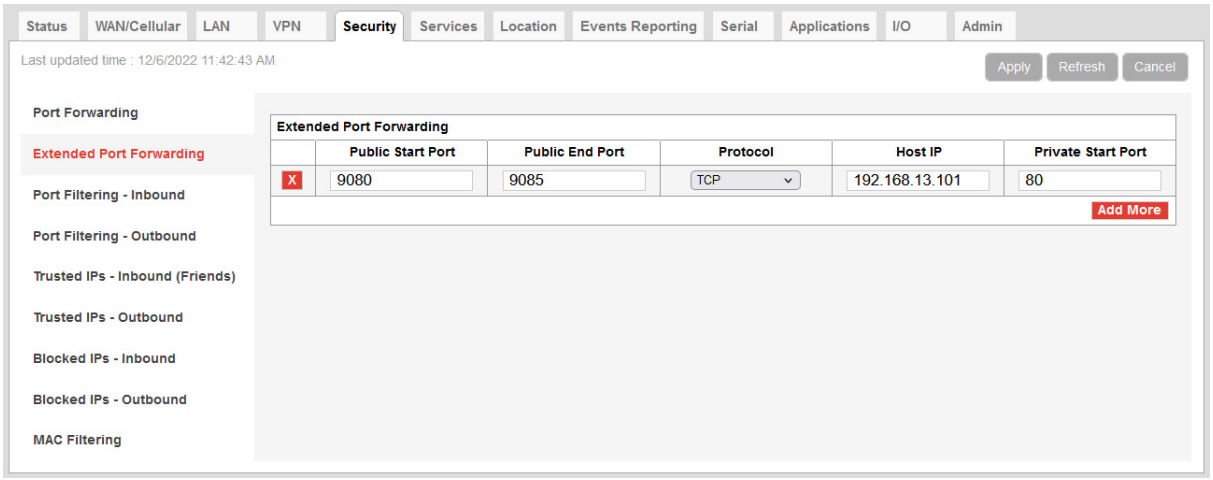


Figure 8-5: ACEmanager: Security > Extended Port Forwarding

10. Reboot.

    You do not need to reboot immediately, if you have additional changes to make, but port forwarding does not take effect until the device is rebooted.

Note: Sierra Wireless recommends that the total number of port forwardings be fewer than 1000 ports, including single port forwarding and port forwarding within a range.

Field	Description
Port Forwarding	Enables port forwarding rules. Options are Enable and Disable (default).
Public Start Port	Port on the public network or starting port on the public network for a range of ports. • Supported values: 1–65535 (Recommended values: greater than 1024)
Public End Port	Ending port for a range of ports on the public network. • For a single port forwarding, this field must be 0. • For a range of ports, this value must be greater than the value in the Public Start Port field.
Protocol	The protocol to be used with the forwarded port: • TCP—Only unsolicited data requests using TCP are forwarded • UDP—Only unsolicited data requests using UDP are forwarded • TCP & UDP—Unsolicited data requests using either TCP or UDP are forwarded
Host IP	IP address of the computer (or device) you want to forward data to.
Private Start Port	Port on the destination computer used as the port for single port forwarding rules, or as the start port for a port forwarding range.

Port Forwarding Example

The following example shows you how to configure a port forward rule for a range of 6 ports on an Ethernet-connected device:

1. In ACEmanager, go to Security > Port Forwarding, and enable Port Forwarding.
2. Click “Add More” to display a rule line.
3. Enter 8080 for the Public Start Port.
4. Enter 8085 for the Public End Port.
5. Select TCP & UDP.
6. Enter 192.168.13.100 as the Host IP.
7. Enter 80 as the Private Start Port.

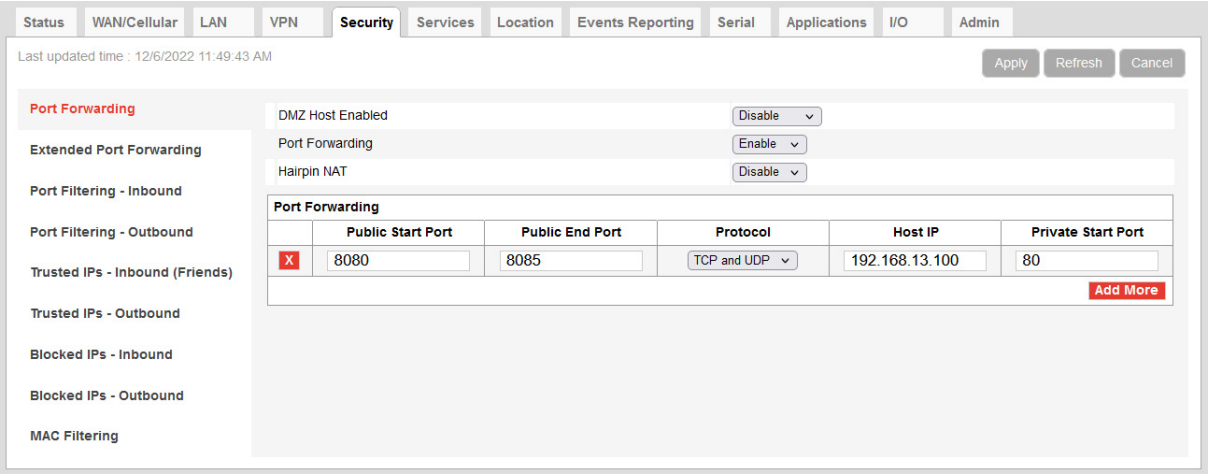


Figure 8-6: ACEmanager: Port Forwarding example

8. Click Apply.
9. Reboot.

   You do not need to reboot immediately, if you have additional changes to make, but port forwarding does not take effect until the device is rebooted.

An unsolicited TCP and UDP data request coming in to the AirLink router on port 8080 is forwarded to the LAN connected device, 192.168.13.100, at port 80. In addition, unsolicited data requests coming in from the Internet on ports 8081, 8082, 8083, 8084, and 8085 are forwarded to ports 81, 82, 83, 84, and 85 respectively.

DMZ

The DMZ is used to direct unsolicited inbound traffic to a specific LAN device such as a computer running a web server or other internal application. The DMZ with public mode is particularly useful for certain services like VPN, NetMeeting, and streaming video where the remote server may require a WAN connection to the LAN device rather than being NATed by the router.

Options for DMZ are Automatic, Manual, and Disable (default is Disable).

Automatic uses the first connected device. If more than one host is available (multiple Ethernet on a switch connected to the device and/or Ethernet with USBnet) and you want to specify the host to use as the DMZ, select Manual and enter the IP address of the desired host.

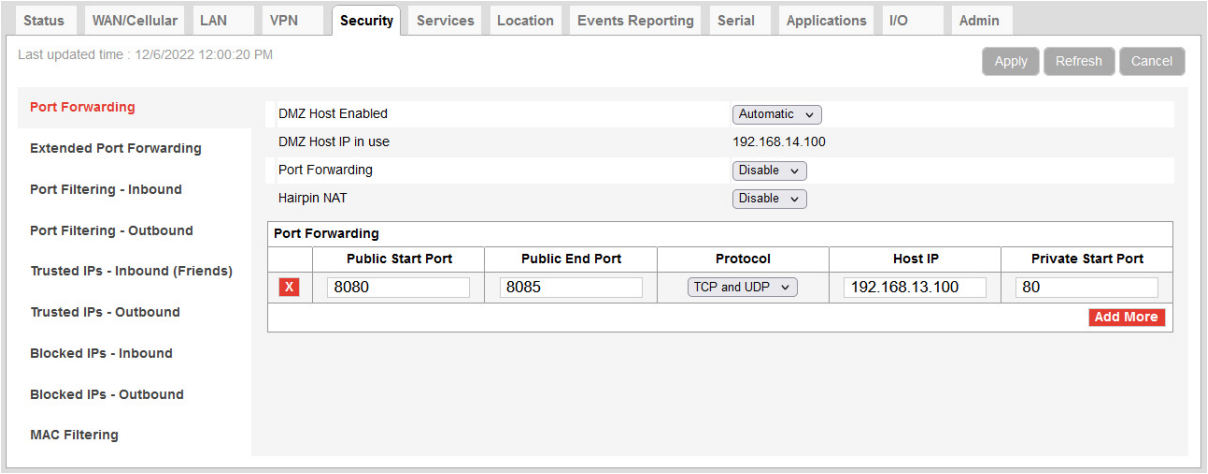


Figure 8-7: ACEmanager: Security > Port Forwarding (DMZ)

Field	Description
DMZ Host Enabled	The AirLink router allows a single client to connect to the Internet through a demilitarized zone (DMZ). Options are: • Automatic—enables the first connected device or the Public Mode interface as the DMZ *Note: In order for IP Passthrough to work, and for inbound packets to be forwarded to the LAN interface or device, DMZ Host Enabled must be set to Automatic.* • Manual—inserts a specific IP address in the DMZ IP field • Disable—no connected device receives unsolicited traffic from the cellular network or Internet (default)
DMZ Host IP	This field only appears if Manual is selected for the DMZ Enabled field. It is the IP address of the private mode host that should be used as the DMZ.
DMZ Host IP in use	IP address of the host to which inbound unsolicited packets are sent When the device passes the Network IP to the configured public host, the DMZ IP in Use displays the public IP.

Example of configuring the DMZ on an Ethernet connected device:

1. In the DMZ Host Enabled field, select Manual.
2. Enter 192.168.13.100 for the DMZ IP.
3. Select Ethernet as the Default Interface.

An unsolicited data request coming in to the AirLink router on any port is forwarded to the LAN device, 192.168.13.100, at the same port.

Note: The DMZ settings are independent of the number of Port Forward entries and can be used with port forwarding to pass anything not forwarded to specific ports.

Hairpin NAT

Hairpin NAT (also known as NAT loopback or NAT reflection) allows devices connected to the router to access the port forwarded device via any interface (WAN or LAN) along with the ports specified in the Port Forwarding configuration.

Any device connected to the following interfaces will have access to hairpin NAT:

- Ethernet (including additional ports from a connected external switch)—The Ethernet port must be configured for LAN
- Wi-Fi—Works for both bridged and unbridged Access Points
- USB—The USB port must be configured for USBNET

Hairpin NAT is disabled by default.

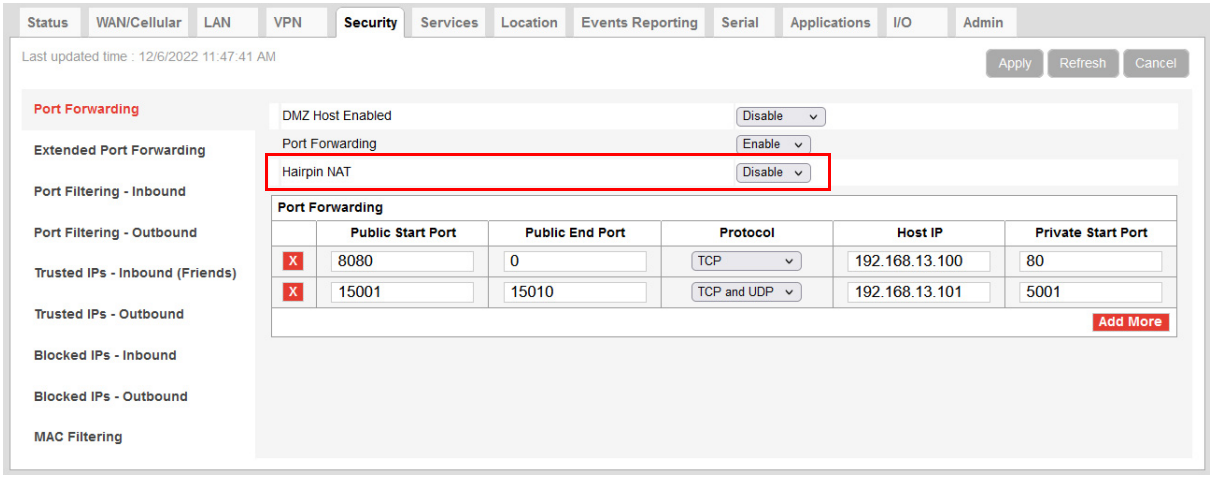


Figure 8-8: ACEmanager: Security > Port Forwarding (Hairpin NAT)

Port Filtering—Inbound

Port Filtering—Inbound restricts unsolicited access to the AirLink router and all LAN-connected devices.

You can enable Port Filtering to either block or allow specified ports. When enabled, all ports not matching the rule are allowed or blocked depending on the mode.

You can configure Port Filtering either on individual ports or for a range of ports. Click Add More for each port filtering rule you want to add.

Note: Inbound restrictions do not apply to responses to outbound data requests. To restrict outbound access, you need to set the applicable outbound filter.

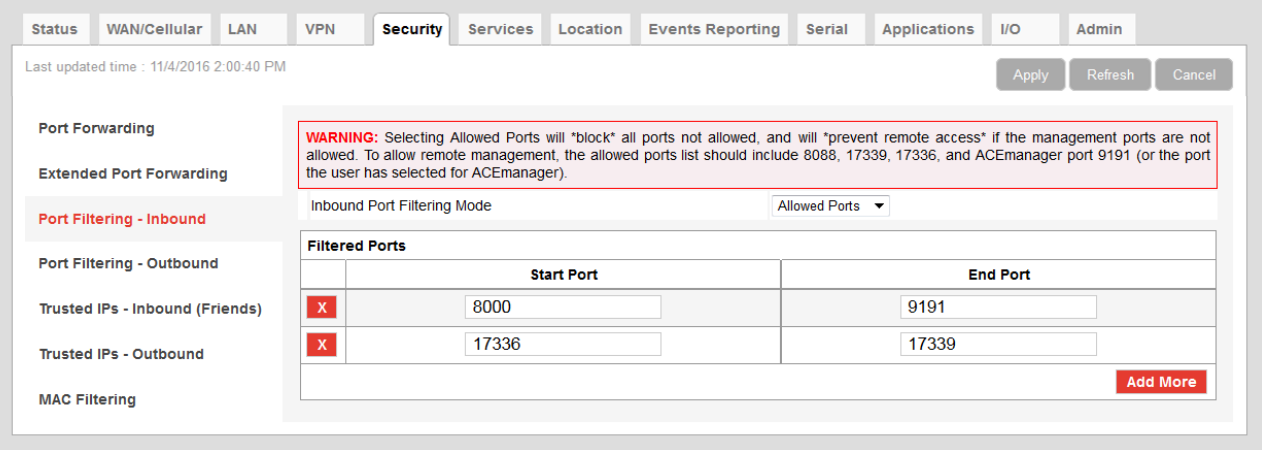


Figure 8-9: ACEmanager: Security > Port Filtering - Inbound

Field	Description
Inbound Port Filtering Mode	Options are: • Disable (default) • Blocked Ports—ports through which traffic is blocked (Shown in Filtered Ports list) • Allowed Ports—ports through which traffic is allowed (Shown in Filtered Ports list)
Filtered Ports	
Start Port	A single port or the first port in a range of ports on the public network (mobile network accessible)
End Port	The end of the range on the public network (mobile network accessible).

Warning: *Selecting Allowed Ports will **block** all ports not allowed, and will **prevent remote access** if the management ports are not allowed. To allow remote management, the allowed ports list should include 8088, 17339, 17336, and ACEmanager port 9191 (or the port you selected for ACEmanager).*

Port Filtering — Outbound

Port Filtering—Outbound restricts LAN access to the external network, i.e., the Internet.

Port Filtering can be enabled to block ports specified or allow specified ports. When enabled, all ports not matching the rule will be allowed or blocked depending on the mode.

Port Filtering can be configured on individual ports or for a range of ports. Click Add More for each port filtering rule you want to add.

Note: Outbound restrictions do not apply to responses to inbound data requests. To restrict inbound access, you need to set the applicable inbound filter.

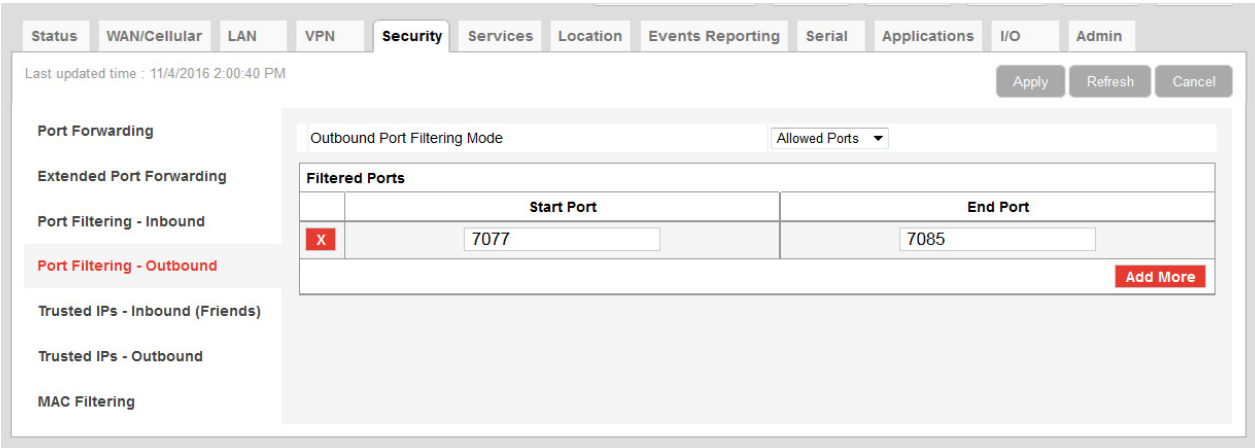


Figure 8-10: ACEmanager: Security > Port Filtering - Outbound

Field	Description
Outbound Port Filtering Mode	Allowed and blocked ports through which traffic is either allowed or blocked (respectively) are listed. Options are: • Disable (default) • Blocked Ports—ports through which traffic is blocked (Shown in Filtered Ports list) • Allowed Ports—ports through which traffic is allowed (Shown in Filtered Ports list) *Note: Outbound IP filter supports up to 9 ports.*
Start Port	The first of a range or a single port on the LAN
End Port	The end of the range on the LAN

Trusted IPs—Inbound (Friends)

Trusted IPs—Inbound restricts access to the AirLink router and all LAN connected devices.

Tip: *Trusted IPs-Inbound was called Friends List in legacy AirLink products.*

When enabled, IP packets with a source address not matching those in the list or range of trusted hosts will be ignored/dropped by the router.

Note: Inbound restrictions do not apply to responses to outbound data requests. To restrict outbound access, you need to set the applicable outbound filter.

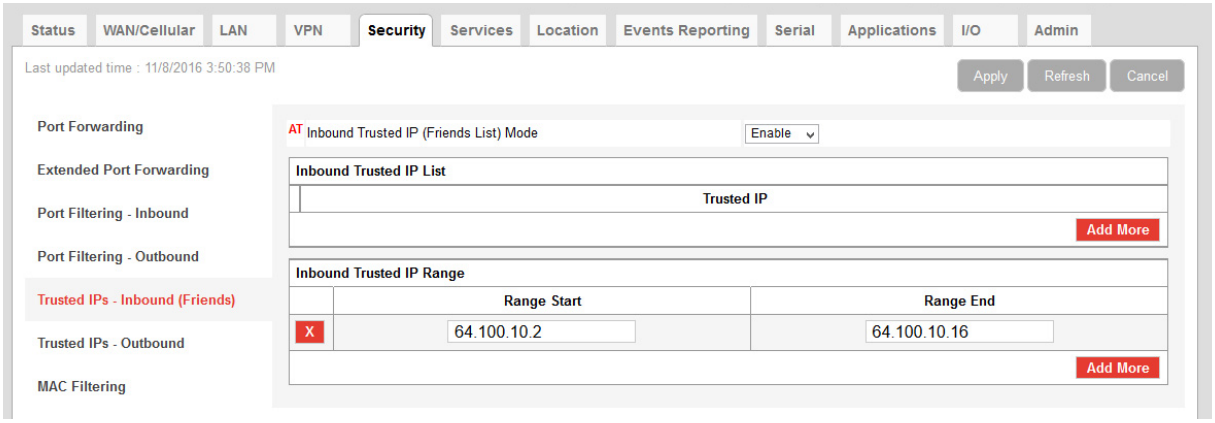


Figure 8-11: ACEmanager: Security > Trusted IPs - Inbound (Friends)

Field	Description
Inbound Trusted IP (Friends List) Mode	Disables or Enables port forwarding rules. Options are Disable (default) or Enable.
Inbound Trusted IP List	Enter a single trusted IP address for example 64.100.100.2. Click Add More to add additional IP addresses to the list.
Inbound Trusted IP Range	Use this section of the page to enter a range of trusted IP addresses.
Range Start	Specify the start and end IP addresses for the trusted IP address range, for example, entering 64.100.10.2 as the Range Start and 64.100.10.15 as the Ranges End would allow 64.100.10.5 but would not allow 64.100.10.16.
Range End	

Trusted IPs—Outbound

Trusted IPs—Outbound restricts LAN access to the external network (Internet).

When enabled, only packets with the destination IP addresses matching those in the list of trusted hosts will be routed from the LAN to the external location.

Note: Outbound restrictions do not apply to responses to inbound data requests. To restrict inbound access, you need to set the applicable inbound filter.

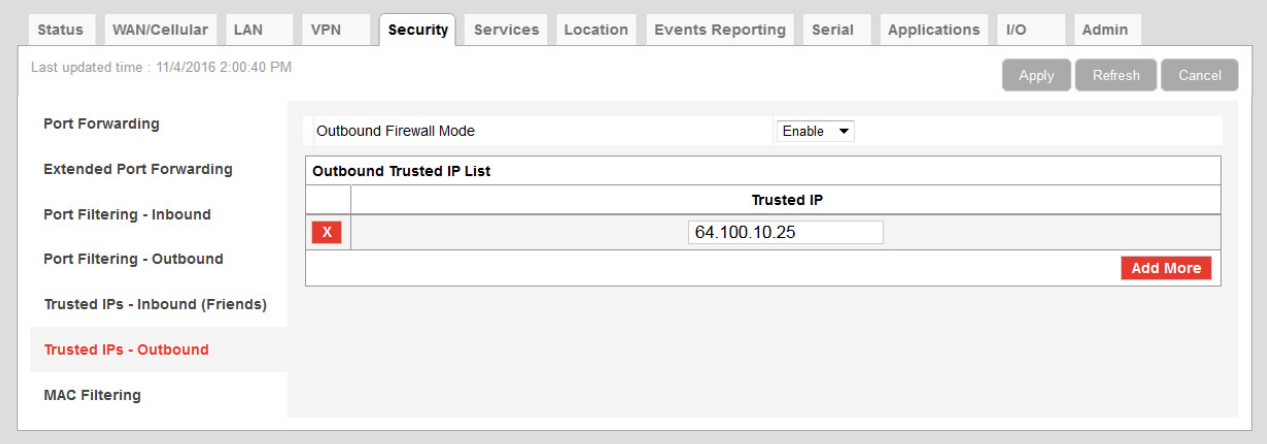


Figure 8-12: ACEmanager: Security > Trusted IPs - Outbound

Field	Description
Outbound Firewall Mode	Disables or enables the Outbound Firewall Options are: • Disable (default)—Allows all outbound traffic • Enable—Only outbound traffic destined for an IP address on the Trusted IP list is allowed. All other outbound traffic is blocked.
Outbound Trusted IP List	Each entry can be configured to allow a single IP address (e.g., 64.100.100.2) Click Add More to add additional IP addresses to the list.

Blocked IPs—Inbound

You can add up to nine IP address ranges to block for inbound traffic. When enabled, these options drop traffic from the listed IP address ranges. To block only a single IP address, enter the same IP address at both the start and end of the range.

Inbound Blocked IPs override access from the Inbound Trusted IP list. If the same IP address is placed in both inbound options, traffic will be blocked from the IP address. For example, when setting Trusted/Blocked Inbound IP addresses, traffic will be blocked to all IP addresses except the included Trusted IPs, and then traffic will be blocked to the included Blocked IP addresses. Please take care to configure both settings to make sure that the device can be accessed from an available IP.

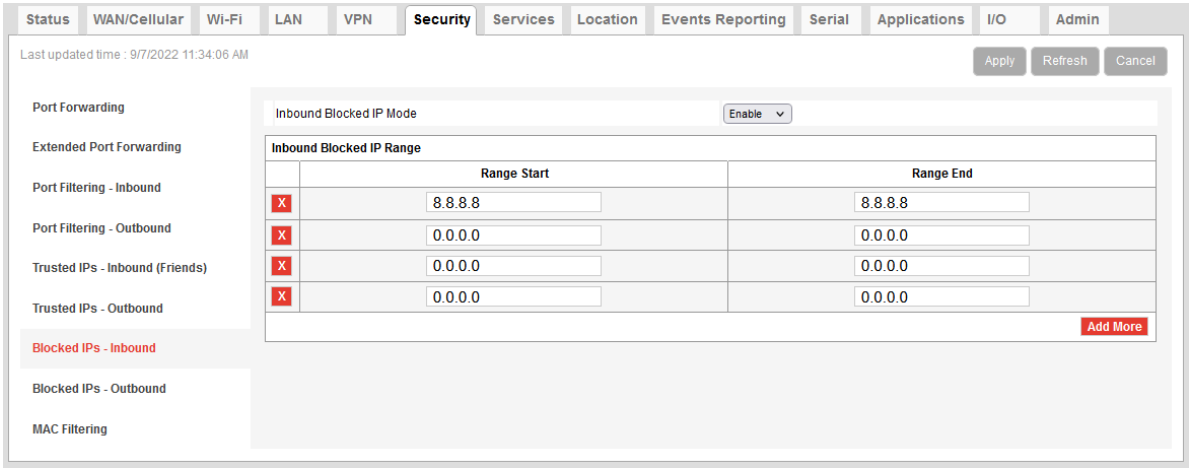


Figure 8-13: ACEmanager: Security > Blocked IPs - Inbound

Field	Description
Inbound Blocked IP Mode	Disables or enables the Inbound Blocked IP feature. Options are: • Disable (default)—Allows all inbound traffic • Enable—Inbound traffic destined for IP addresses in the Inbound Blocked IP Ranges table is blocked.
Inbound Blocked IP Range	Each entry can be configured to block an IP address range. Click Add More to add additional IP address ranges to the list.

Blocked IPs—Outbound

You can add up to nine IP address ranges to block for outbound traffic. When enabled, these options drop traffic to the listed IP address ranges. To block only a single IP address, enter the same IP address at both the start and end of the range.

Outbound Blocked IP addresses override access to the Outbound Trusted IP list. If the same IP address is placed in both outbound options, traffic will be blocked to the IP address. Please take care to configure both settings to make sure that the device can access an available IP address.

As with the Trusted IP list, for outbound, ALEOS filters only LAN/Host traffic (ALEOS traffic is not filtered).

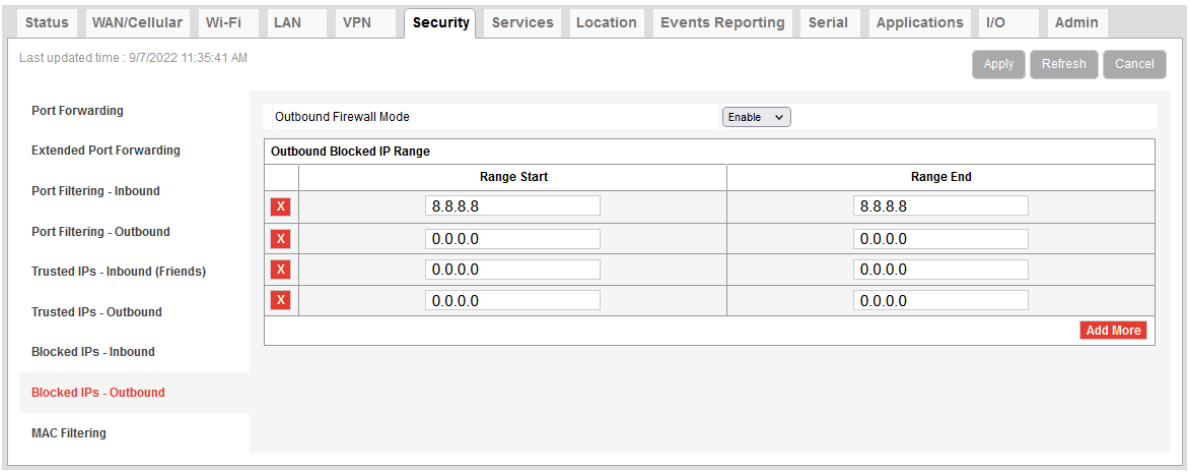


Figure 8-14: ACEmanager: Security > Blocked IPs - Outbound

Field	Description
Outbound Blocked IP Mode	Disables or enables the Outbound Blocked IP feature. Options are: • Disable (default)—Allows all outbound traffic • Enable—Outbound traffic destined for IP addresses in the Outbound Blocked IP Ranges table is blocked.
Outbound Blocked IP Range	Each entry can be configured to block an IP address range. Click Add More to add additional IP address ranges to the list.

MAC Filtering

MAC filtering restricts LAN connection access. You can create a list of up to 20 devices that are allowed a connection based on their MAC address. When MAC filtering is enabled, devices not on the allowed list are explicitly blocked. Hosts directly connected to the device but not in the Allowed list may show an active physical connection, but are blocked from sending traffic of any kind to the device or any other host connected to the device.

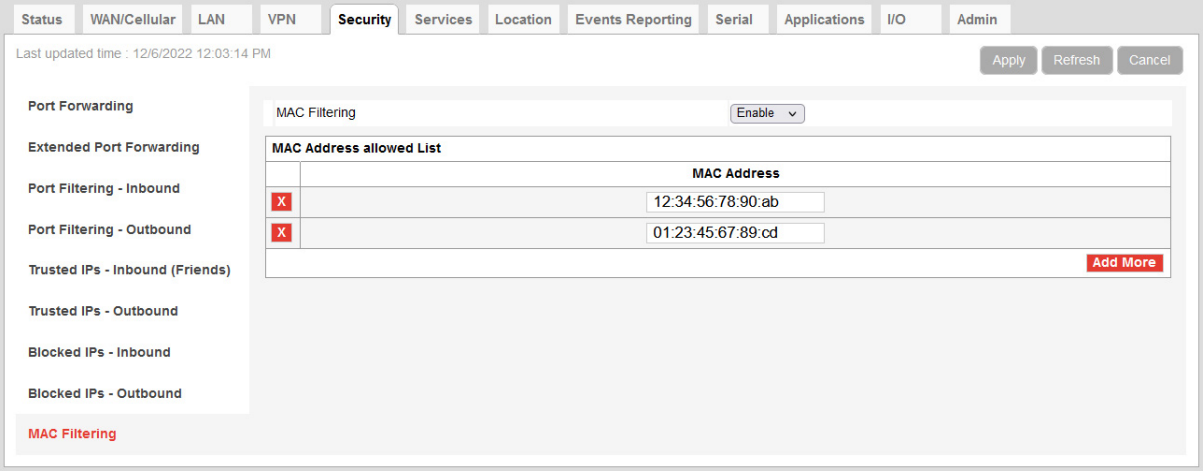


Figure 8-15: ACEmanager: Security > MAC Filtering

Field	Description
MAC Filtering	Enable or disable (default) MAC Filtering
MAC Address allowed List	Allows devices with the MAC Addresses listed to connect to the host and transfer data. Add MAC addresses by clicking on the Add More button. When adding MAC addresses, use a colon between the digit groups, for example 01:23:45:67:89:ab. *Note: After adding all the desired MAC addresses, reboot the device. The MAC Address allowed List takes effect after the device is rebooted.*
MAC Address	This is the MAC Address of the interface adapter on a computer or other device. **Tip:** *You can use the Status > LAN IP/MAC Table page to obtain the MAC addresses of DHCP connected devices.*

9: Services Configuration

The Services tab sections allow the configuration of external services that extend the functionality of the AirLink LX40.

These services include:

- ALMS (AirLink Management Service)
- ACEmanager
- Power Management
- Dynamic DNS
- SMS
- AT (Telnet/SSH)
- Email (SMTP)
- Management (SNMP)
- Time (NTP)
- Authentication
- Device Status Screen

ALMS (AirLink Management Service)

The AirLink® Management Service is a secure cloud-based management solution that makes it easy to deploy, monitor and upgrade any number of routers remotely. For more information, visit sierrawireless.com.

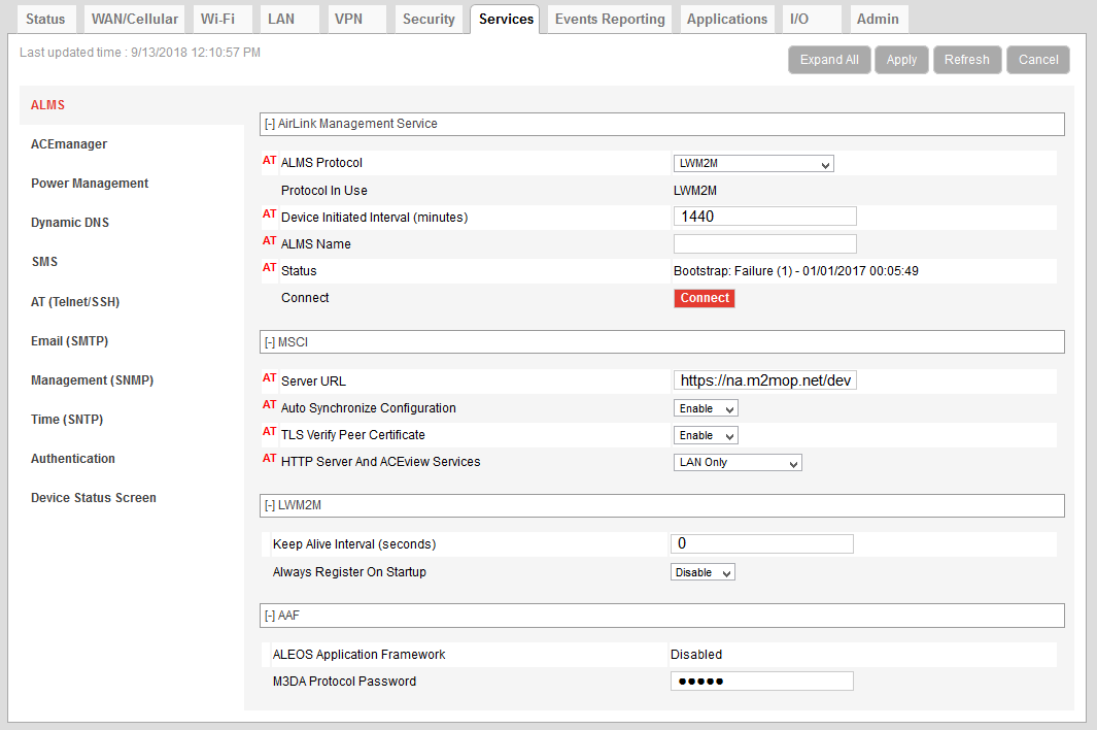
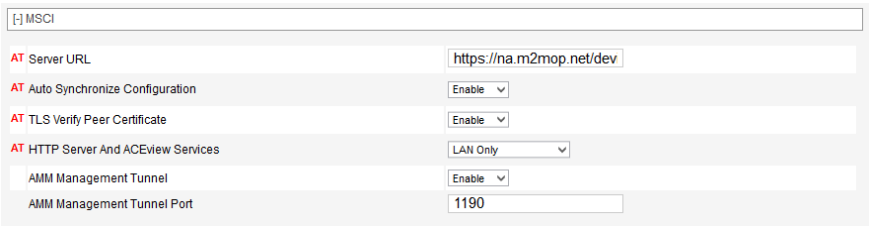


Figure 9-1: ACEmanager: Services > ALMS

Field	Description
AirLink Management Service	
ALMS Protocol	This field is used to select the underlying communication protocol used with ALMS. In most cases, it is best to leave the default settings, but if the router is unable to communicate with ALMS, you may need to change this setting. First check to ensure that the router is registered on ALMS, and if the default is LWM2M, confirm that the network allows UDP traffic. Options are: • LWM2M—Lightweight M2M (default) LWM2M uses DTLS secured communication, with server/router mutual authentication, and uses less bandwidth than MSCI. To use LWM2M, the network must allow UDP traffic. • MSCI—Multi-Protocol Serial Communication Select this setting if you are using a private server that does not support LWM2M, or the network does not allow UDP traffic. (MSCI uses TCP.) • Try LWM2M, Fallback to MSCI After the router is powered on or rebooted, and has a WAN connection, it attempts for two minutes to communicate with ALMS using LWM2M. If it is successful, the field is reset to LWM2M. If it is unsuccessful, the router uses MSCI, and the setting remains as Try LWM2M, Fallback to MSCI. Use this setting if you are unsure whether or not the server being used supports LWM2M.
Protocol in Use	Shows the current ALMS Protocol in use
Device Initiated Interval (minutes)	This field determines how often the AirLink router communicates with ALMS to check for software updates, setting changes, etc. • If the protocol in use is MSCI, the router sends a check-in message, after which all pending jobs on ALMS are carried out. • If the protocol in use is LWM2M, the router sends a registration update, after which all pending jobs on ALMS are carried out. ALMS can also query the AirLink router at a regular interval if settings allow. Refer to AirLink Management Service documentation for more information. Default: 1440 minutes (24 hours).
ALMS Name	Use this field to assign a name of your choice to the AirLink router.This name is used by the ALMS server to identify your device. By default, this field is blank. You can also use an AT command to assign or query the name. See *AVMS_NAME on page 469.

Field	Description
Status	Displays the status of the ALMS connection For MSCI: • Success—Device successfully contacted ALMS during its latest communication. • Disabled—ALMS communications are disabled. (Appears when the AirLink Management Service drop-down menu is set to Disable.) • [ALEOS] Waiting for connectivity—This transitory status appears when the device is in Connect-on-traffic mode and is trying to connect to the network for an ALMS check-in. When the device connects to the network, the ALMS check-in is sent and the status changes to Success or an error message, if there is a problem with the connection. For a list of MSCI error messages, see page 508. For LWM2M: • Bootstrap: In Progress [(n)] - date—Router is contacting the ALMS bootstrap server to get the ALMS server address and corresponding credentials. • Bootstrap: Success [(n)] - date—The ALMS server address and credentials has been provisioned. • Bootstrap: Failure [(n)] - date—Failed to contact the bootstrap server • Registration: In Progress [(n)] - date—Router is contacting the ALMS server to register. • Registration: Success [(n)] - date—Router has successfully registered on the ALMS server. • Registration: Failure [(n)] - date—Router failed to register on the ALMS server. • Registration Update: In Progress [(n)] - date—Router is contacting the ALMS server to refresh its registration. • Registration Update: Success [(n)] - date—Registration has been successfully refreshed. • Registration Update: Failure [(n)] - date—Failed to refresh registration • Authentication: In Progress [(n)] - date—Router is authenticating (ALMS or ALMS bootstrap). • Authentication: Success [(n)] - date—Authentication is complete (ALMS or ALMS bootstrap). • Authentication: Failure [(n)] - date—Router failed to authenticate (ALMS or ALMS bootstrap). • Notify: Sent - date—Router has successfully sent notifications to the ALMS server. • Notify: Failure - date—Router failed to send notifications to the ALMS server. In this case the router retries to send the notifications following an exponential back-off algorithm. • Notify: Rejected - date—The ALMS server has rejected the latest notifications sent by the device. In this case the device renews its registration at the next opportunity: • At the next expected registration update time or • If the registration update is requested using the Connect button. (n): is optional and represents the retry attempt number. n is between 1 and 5 date: is the Greenwich Mean Time of the last status update.
Connect	The Connect button enables you to manually connect an AirLink router to ALMS. This may be useful for troubleshooting the connection between the platform and the remote device and confirming that AAF scripts or jobs created are executing as expected on ALMS.

Field	Description
MSCI	
Server URL	The ALMS server URL address. By default, this is: https://na.m2mop.net/device/msci/com, which encrypts network traffic from ALEOS to ALMS. Using an HTTPS URL enables Transport Layer Security (TLS). When TLS is enabled and the TLS Verify Peer Certificate field is set to Enable, the validity of the server certificate is checked. For more information, see TLS Verify Peer Certificate on page 238. *Note: The URL from earlier ALEOS versions, http://na.m2mop.net/device/msci, is still valid, but does not use TLS.*
Auto Synchronize Configuration	This field allows you to choose when changes to the configuration are propagated to ALMS. • Enable—Changes to the configuration are propagated as soon as possible and do not wait for the next communication period (as configured in the Device Initiated Interval field). This may result in more frequent communication with ALMS. (default) • Disable—Changes to the configuration are propagated to ALMS at the device initiated interval rate.
TLS Verify Peer Certificate	This field has no effect unless an HTTPS URL is used for the Server URL. Using an HTTPS URL (for example, https://na.m2mop.net/device/msci/com) as the server URL enables Transport Layer Security (TLS). When TLS is enabled, use this field to set the TLS certificate validation. • Enable—The validity of the server certificate is checked during the TLS negotiation. (default) If the certificate is not valid, communication with the ALMS server is terminated. For more information, see [HTTP] SSL peer certificate or SSH remote key was not OK on page 509. • Disable—The validity of the server certificate is not checked during the TLS negotiation. The TLS communication proceeds even if the server presents a non-validated certificate.
HTTP Server And ACEview Services	Allows you to activate the: • MSCI server—enables you to configure the router remotely using MSCI over HTTP • ACEview service—enables the router to communicate with the ACEview Windows utility Options are: • Disable—Both services are disabled. • LAN Only—The MSCI HTTP server and ACEview service are only accessible through a LAN connection. (Default) • Both WAN And LAN—The MSCI HTTP server and ACEview service are accessible through both WAN and LAN connections. *Note: In order to use MSCI server-initiated communication from ALMS, HTTP Server And ACEview Services must be set to Both WAN And LAN.*

Field	Description
AMM Management Tunnel	Appears when the ALMS Protocol is set to MSCI. Enables the LX40 to establish an OpenVPN connection to the AMM server. This OpenVPN connection enables remote SSH and remote ACEmanager access from AMM.  Options are: • Disable (default) • Enable *Note: If the AMM Event Reporting (AMMER) AAF application is installed, it will enable this setting by default. Modifying the setting when AMMER is in use can cause AMM connectivity issues.*
AMM Management Tunnel Port	Appears when AMM Management Tunnel is enabled. This field sets the port used for the OpenVPN connection to AMM. Options are: • 1–65535 (default is 1190) *Note: In most cases, you should leave this setting at default. The port number must match the port used for the MSCI OpenVPN management tunnel on the AMM, which is also 1190 by default.*
LWM2M	
Keep Alive Interval (seconds)	Use this field to configure how frequently the router pings ALMS to confirm an IP connection. Options are: • 1–3600 • 0—Disabled (Default)
Always Register on Startup	Use this field to set the router's registration behavior on startup: • Disable—The router performs a registration update. It signals ALMS that it is up and running and refreshes its registration. A registration update consumes far less bandwidth than a registration. (Default) • Enable—The router performs a LWM2M registration on startup. The router declares its capabilities to ALMS and synchronizes its configuration.
AAF	
ALEOS Application Framework	AAF status: Enabled or Disabled. To enable AAF, see ALEOS Application Framework on page 319.

Field	Description
M3DA Protocol Password	M3DA Protocol Password This password must be configured on the AirLink device and on ALMS. The default M3DA password is the default ACEmanager password as shown on the device label. *Note: This password is reset to default when the device is reset to factory defaults using the hardware Reset button, or using the Reset to Factory Default command in ACEmanager (when the Reset Mode is Preserve Only User Password or Reset All). See Reset to Factory Default on page 339 and Reset Configuration on page 340.*
Manual Connection Status	Displays the current manual connection status if AAF is enabled.
Connect	The Connect button enables you to manually connect an AirLink device to ALMS. This may be useful for troubleshooting the connection between the platform and the remote device and confirming that AAF scripts or jobs created are executing as expected on ALMS.

ACEmanager

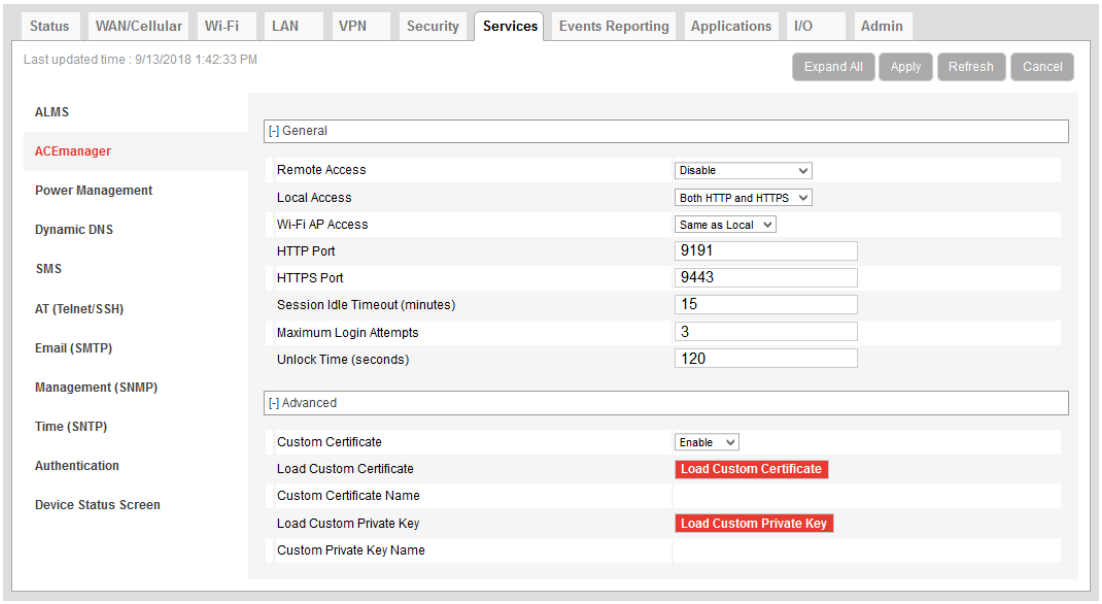


Figure 9-2: ACEmanager: Services > ACEmanager

Field	Description
General	
Remote Access	Configure ACEmanager remote access (over the WAN link) Options are: • Disable (default) • HTTPS Only • Both HTTP and HTTPS
Local Access	Configure ACEmanager local access (Ethernet, USBnet, or Serial/DUN) Options are: • HTTPS Only • Both HTTP and HTTPS (default)
Wi-Fi AP Access	Configure ACEmanager Wi-Fi network access (for clients connected to the router) Options are: • Same as Local (default) • Disabled
HTTP Port	Configure the HTTP port for ACEmanager access. Reboot the device after applying the port change. Default value is 9191.
HTTPS Port	Configure the HTTPS port for ACEmanager access. Reboot the device after applying the port change. Default is 9443.
Session Idle Timeout (minutes)	If ACEmanager is idle for the configured timeout, it automatically logs out and returns you to the Login screen. Options are: • 0–60 (default is 15) If you set the Session Idle Timeout to zero (0), the session remains active until you manually log out.
Maximum Login Attempts	Number of failed login attempts allowed before the user account is temporarily locked Options are: • 0—The account lock-out feature is disabled. • 1–5—Maximum number of failed login attempts before the user account is locked for the length of time specified in the Unlock Time (seconds) field. Default is 3
Unlock Time (seconds)	The length of time (in seconds) that the user account is locked after the maximum number of failed login attempts (configured in Maximum Login Attempts) Options are: • 1–3600 (1 hour) (default is 120 [2 minutes])

Field	Description
Advanced	
Custom Certificate	Enabling this feature allows you to load a custom SSL certificate. (Some restrictions apply; see Note below for details.) Options are: • Enable—Additional fields appear that allow you to load a custom SSL certificate and a custom private key. The ACEmanager web server uses this custom certificate for authentication during HTTPS communication, instead of the default certificate. • Disable—The ACEmanager web server uses the default SSL certificate for authentication during HTTPS communication. (default) *Note: The custom certificate and private key must meet the following conditions:* • *The certificate must be an X.509 certificate* • *The certificate and the private key must be in .pem format, and they must be in separate files.* • *There is no limit to the size of the private key, but the larger the key, the more the performance is affected. Sierra Wireless recommends that the key does not exceed 2048 bits.* *Note: The LX40 supports pre-defined cipher suites using 128-bit cipher algorithms.*
Load Custom Certificate	This field only appears when the Custom Certificate field is set to Enable. To load a custom SSL certificate: 1. Click Load Custom Certificate. 2. Click Browse... and navigate to the SSL certificate file. 3. Click Upload file to device. 4. Once you have uploaded the custom certificate and the custom private key, click Apply and reboot the device.
Custom Certificate Name	This field only appears when the Custom Certificate field is set to Enable. Displays the name of the custom certificate.
Load Custom Private Key	This field only appears when the Custom Certificate field is set to Enable. Allows you to enter a custom private key (Some restrictions apply; see Custom Certificate for details.) To load a custom private key: 1. Click Load Private Key. 2. Click Browse... and navigate to the private key file. 3. Click Upload file to device. 4. Once you have uploaded the custom certificate and the custom private key, click Apply and reboot the device.
Custom Private Key Name	This field only appears when the Custom Certificate field is set to Enable. Displays the name of the private key.

Power Management

The AirLink LX40 gives you a number of options for managing power usage, depending on your application and hardware configuration. For example, you can use the Services > Power Management screen to configure the LX40 to automatically enter standby mode based on the state of the ignition switch, an I/O input, low voltage input to the LX40, or time of day.

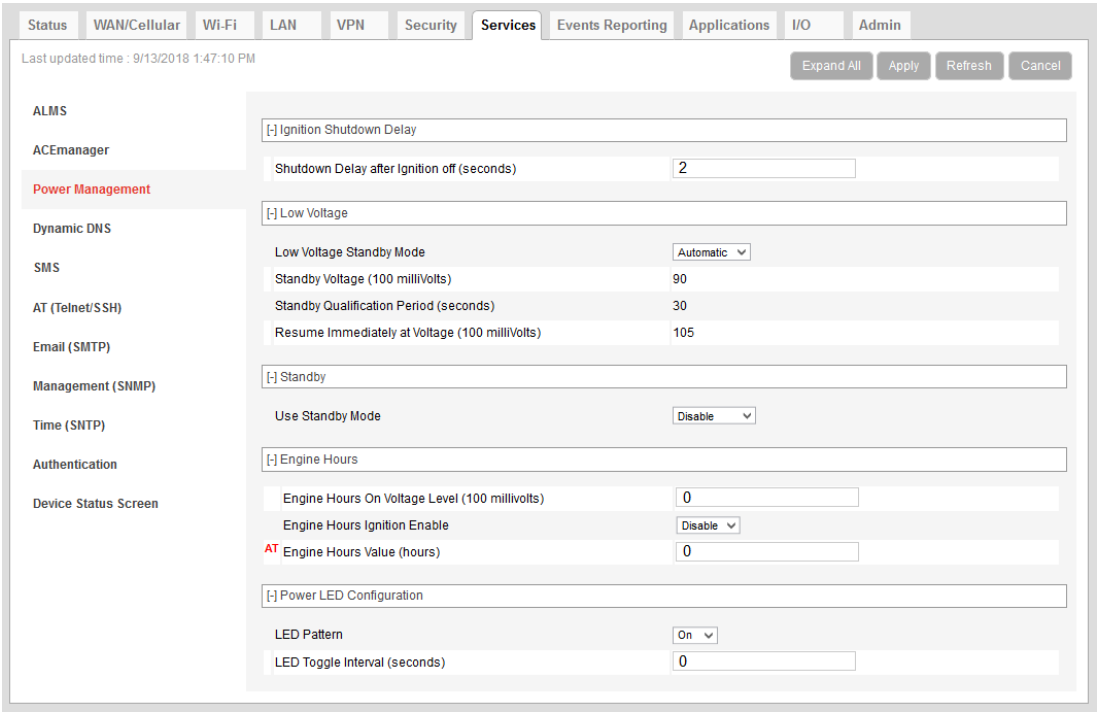


Figure 9-3: ACEmanager: Services > Power Management

Field	Description
Ignition Shutdown Delay	
Shutdown Delay after Ignition off (seconds)	Set the delay (in seconds) between the time the ignition input goes low and the LX40 shuts down. • Range: 2–65535 (18 hours) (default is 2) The timer is reset if the ignition comes on during the delay period.

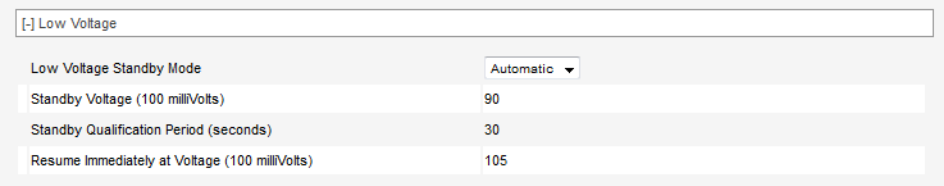
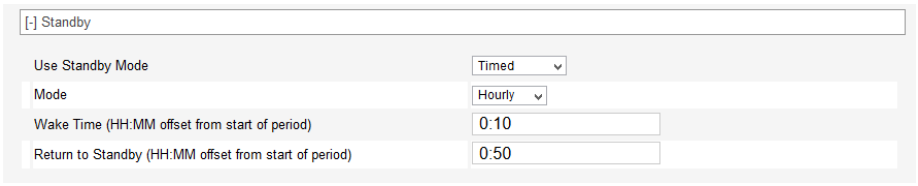
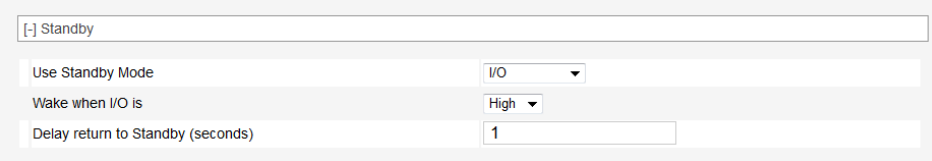
Field	Description
Low Voltage *Note: Changes to the low voltage settings take effect when you click Apply, but the new values are not permanently stored on the router it is rebooted. Also note that, after a change is made, the first reboot may take longer than usual.* *Note: Exercise caution when setting the Low Voltage Standby fields. Before setting the Resume immediately at Voltage field, ensure that you have a power source readily available that can supply the configured voltage. The reset button is not available when the router is in standby mode, so you cannot use it to reset the router to factory default settings. If you have inadvertently set the Resume Voltage too high, follow the instructions in How do I get my LX40 out of Low Voltage Standby mode? to return your router to normal operation.* 	
Low Voltage Standby Mode	Use this field to chose a set of predefined values for low voltage standby mode or to enable the option to configure custom values. • Custom—Allows you to configure the values used for low voltage standby mode. For more information on the configurable fields, see Standby Voltage (100 milliVolts), Standby Qualification Period (seconds), and Resume immediately at Voltage (100 milliVolts). When configuring these fields, the difference between the number in the Standby Voltage field and the number in the Resume immediately at Voltage field must be greater than 5, with the smaller number in the Low Voltage Standby Mode field. For example, if you enter 120 in the Resume immediately at Voltage field, the highest number you can enter in the Low Voltage Standby mode field is 114. • Automatic—The router uses preset values. (default) • Off—The router uses the lowest possible preset values for low voltage standby mode and enters standby mode if the voltage falls below 5.8 V.

Table 9-1: Low Voltage Standby Mode Configurable Ranges and Preset Values

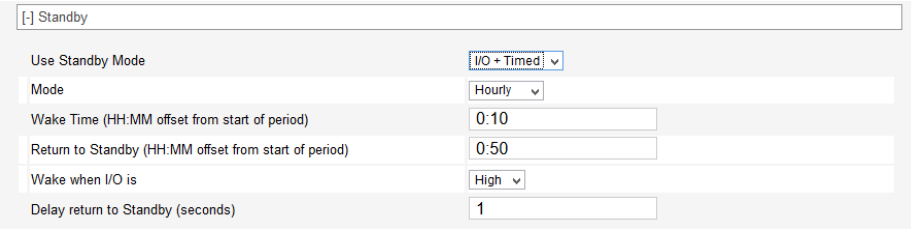
Low Voltage Standby Mode	Standby Voltage (100 milliVolts)	Standby Qualification Period (seconds)	Resume immediately at Voltage (100 milliVolts)
Custom	58–294 (default is 90)	30–3600 (default is 30)	68–300 (default is 105)
Automatic	90	30	105
Off	58	30	68

Field	Description
Standby Voltage (100 milliVolts)	If the incoming voltage to the router is below the value set in this field for the period of time set in the Standby Qualification Period (seconds) field, the router goes into standby mode. This field is read-only if the Low Voltage Standby Mode is set to Automatic or Off. If Low Voltage Standby Mode is set to Custom, the valid range is: • 58–294 hundreds of milliVolts • Default value depends on the setting in the Low Voltage Standby Mode field. See Table 9-1. Enter the value in tenths of Volts. For example, for 11.5 V, enter 115. The difference between the number in the Standby Voltage field and the number in the Resume immediately at Voltage (100 milliVolts) field must be greater than 5, with the smaller number in the Low Voltage Standby Mode field. For example, if you enter 120 in the Resume immediately at Voltage field, the highest number you can enter in the Low Voltage Standby mode field is 114.
Standby Qualification Period (seconds)	Set the time period (in seconds) that the voltage to the router is below the value set in the Standby Voltage (100 milliVolts) field before the router goes into standby mode. This field is read-only if the Low Voltage Standby Mode is set to Automatic or Off. If Low Voltage Standby Mode is set to Custom, the valid range is: • 30–3600 seconds (default is 30)
Resume immediately at Voltage (100 milliVolts)	Set the voltage at which the router exits standby mode and resumes normal operation. This field is read-only if the Low Voltage Standby Mode is set to Automatic or Off. If Low Voltage Standby Mode is set to Custom, the valid range is: • 68–300 hundreds of milliVolts • Default value depends on the setting in the Low Voltage Standby Mode field. See Table 9-1. Enter the value in tenths of Volts. For example, for 12.5 V, enter 125. The difference between the number in the Standby Voltage (100 milliVolts) field and the number in the Resume immediately at Voltage field must be greater than 5, with the smaller number in the Low Voltage Standby Mode field. For example, if you enter 120 in the Resume immediately at Voltage field, the highest number you can enter in the Low Voltage Standby mode field is 114.
Standby	
Use Standby Mode	Select the type of Standby mode you want to configure Options are: • Disable (default) • Timed • I/O • I/O + Timed Changes take effect when you click Apply. No reboot is required. Note: You cannot set this field to I/O or I/O + Timed if the I/O line is already being used by the Relay Output or by the Pull-up for I/O.
Timed 	

Field	Description
Mode	Select the Mode: • Hourly—Wake Time (HH:MM offset from start of period) and Return to Standby (HH:MM offset from start of period) operate on an hourly basis • Daily—Wake Time (HH:MM offset from start of period) and Return to Standby (HH:MM offset from start of period) operate on an daily basis • Custom—Provides the option set a test period to repeat the Wake/Standby cycle
Wake Time (HH:MM offset from start of period)	Set the time (hours:minutes on a 24 hour clock) at which the router wakes up. If you selected Hourly in the Mode field, set the minutes (the hour portion is ignored) and the router wakes up every hour at the configured time. If you selected Daily in the Mode field, the router wakes up every day at the configured time.
Return to Standby (HH:MM offset from start of period)	Set the time (hours:minutes on a 24 hour clock) at which the router goes into standby mode. If you selected Hourly in the Mode field, set the minutes (the hour portion is ignored) and the router goes into standby mode every hour at the configured time. If you selected Daily in the Mode field, the router goes into standby mode every day at the configured time. *Note: There must be at least 5 minutes between the Wake Time (HH:MM offset from start of period) and the Return to Standby time.*
Repeat Period	This field only appears if you select Custom in the Mode field. Use this field to configure how often the Wake Time (HH:MM offset from start of period)/ Return to Standby (HH:MM offset from start of period) cycle is repeated. The options are: • 2 Hours (default) • 3 Hours • 4 Hours • 6 Hours • 8 Hours • 12 Hours
I/O 	
Wake when I/O is	Select the I/O state that causes the router to wake. Options are: • High (default) • Low *Note: If the I/O line is already configured for another purpose, this I/O option is not available.*

Field	Description
Delay return to Standby (seconds)	Select the delay (in seconds) between the I/O state change and the router entering Standby mode. • Range is 1–43200 (12 hours) (default is 1 second)

I/O + Timed

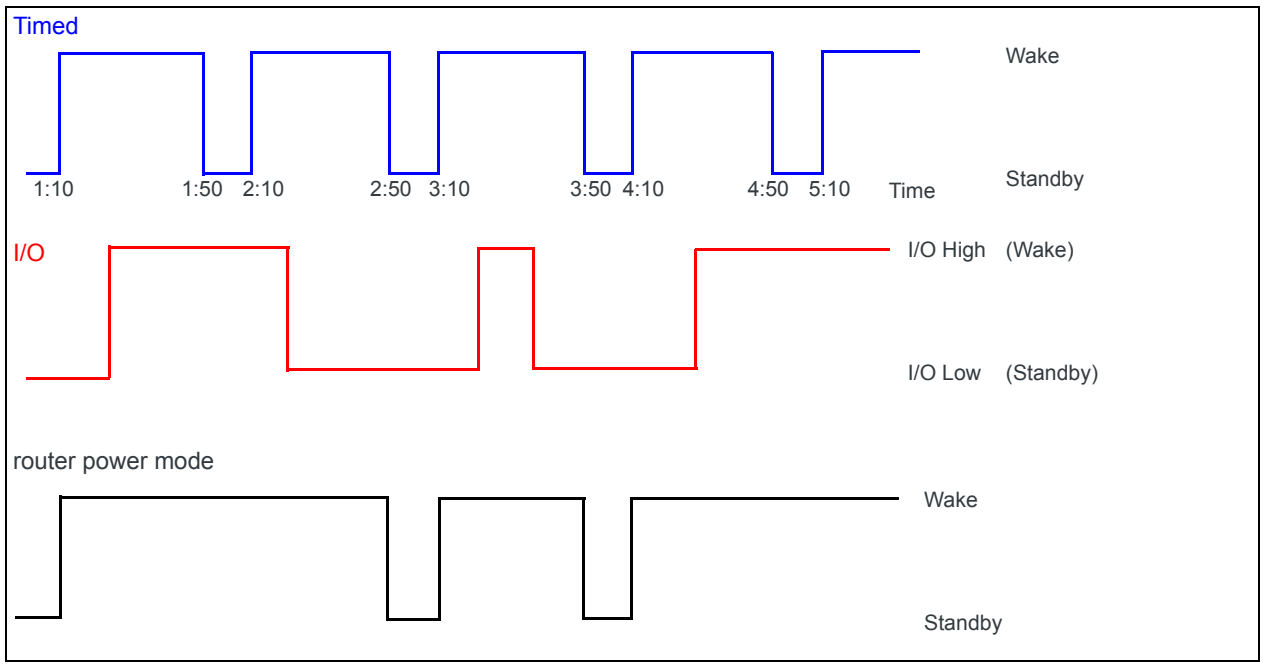


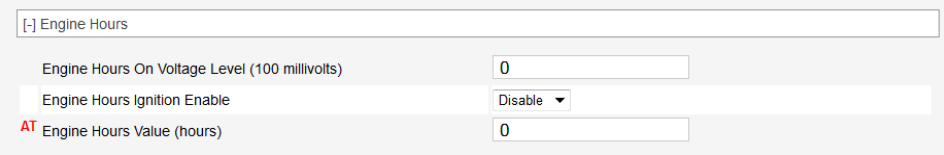
To configure the fields for I/O + Timed, see Timed on page 245 and I/O on page 246.

When both I/O and Timed are configured, the router is in standby mode only when both I/O and Timed conditions for standby mode are met. The router exits standby and returns to the normal operating mode when either the Timed or I/O (or both) conditions for standby are no longer met.

Example: The following example is based on the default settings.

- Timed is set to wake at 10 minutes after the hour and return to standby 50 minutes after the hour.
- I/O is set to wake when the I/O is high.



Field	Description
Engine Hours—ALEOS can start and stop counting engine hours based on: • Voltage on power connector Pin 1 (Power pin) from the vehicle battery (Engine Hours On Voltage Level) • State (High/Low) of power connector Pin 3 (Ignition Sense pin) (Engine Hours Ignition Enable) If you configure both fields, both conditions must be met before the device begins counting engine hours. For more information on the power connector pins, refer to the Hardware Configuration User Guide for your AirLink router. 	
Engine Hours On Voltage Level (100 millivolt)	If you want to use this field to trigger counting engine hours, the AirLink router must be using the vehicle battery as a power source (i.e. Pin 1 [VCC] and Pin 2 [ground] on the AirLink router's power connector are connected to the vehicle battery). Enter the voltage level above which the AirLink router starts counting engine hours. When the voltage from the vehicle battery falls below that value, the device stops counting engine hours. Enter the desired value of the ignition in millivolts. For example, to set the voltage level at 13.0 volts, enter 130. The default value is 0, which means the feature is disabled. Engine hours are not incremented based on the power pin voltage level.
Engine Hours Ignition Enable	If Pin 3 (the ignition sense pin) on the AirLink router's power connector is wired to the vehicle's ignition switch, oil pressure switch, or some other digital input, you can use this field to trigger counting engine hours. The device starts counting engine hours when the voltage on Pin 3 is high and stops counting when the voltage is low (Ground or 0 volts). For more information on the power connector pins, refer to the Hardware User Guide for your AirLink router. Options are: • Disable (default)—Engine hours are not incremented based on changes to Pin 3. • Enable
Engine Hours Value (hours)	Displays an estimate of the number of hours the engine has been running, based on either the input voltage from the vehicle battery or the voltage on the ignition sense pin, depending on which of the two previous fields you configured. For more information on the power connector pins, refer to the Hardware User Guide for your AirLink router. You can also set the engine hours value to an initial value. The default value is 0. The maximum allowed value is 65535. You can also use an AT Command to set this value. For more information, see *ENGHRS on page 470. *Note: You can configure Events Reporting to send reports based on this value. For more information, see Events Reporting Configuration on page 294.*

Field	Description
Power LED Configuration	
LED Pattern	You can configure the Power LED to flash or turn off when the device is in Low Power Mode, which saves power. For more information about LX40 power consumption, see the LX40 Hardware Guide. Options are: • On (default)—During Low Power Mode, the Power LED behaves according to the LED Toggle Interval • Off—LED is off during Low Power Mode
LED Toggle Interval (seconds)	Appears when LED Pattern is set to On. Sets the flashing interval, in seconds, for the Power LED during Low Power Mode. Options are: • 0 (default—LED is always on) to 5 (LED flashes once every 5 seconds).

Dynamic DNS

Dynamic DNS allows an AirLink router's WAN IP address to be published either to a proprietary Sierra Wireless dynamic DNS service called IP Manager, or to a 3rd party DNS service.

Important: *The Sierra Wireless IP Manager dynamic DNS service is intended for limited use in testing or evaluation scenarios. This service is unmonitored and is provided without any service level commitments or uptime expectations. This service may go offline periodically and without notice. This service should not be used in any mission-critical customer application, and Sierra Wireless recommends that customers configure an alternate commercial dynamic DNS service. IP Manager will be deprecated in ALEOS 4.17.0.*

Whether you have one Sierra Wireless AirLink router or multiple devices, it can be difficult to keep track of the current IP addresses especially if the addresses are not static but change every time the devices connect to the mobile network. If you need to connect to a specific router, or the device behind it, it is much easier when you have a domain name (mypage.mydomain.com).

Reasons to Contact or Connect to a Device:

- Requesting a location update from a delivery truck
- Contacting a surveillance camera to download logs or survey a specific area
- Triggering an oil derrick to begin pumping
- Sending text to be displayed by a road sign
- Updating the songs to be played on a juke box
- Updating advertisements to be displayed in a cab
- Remote accessing a computer, a PLC, an RTU, or other system
- Monitoring and troubleshooting the status of the router itself without needing to bring it in or go out to it.

A dynamic IP address is suitable for many Internet activities such as web browsing, looking up data on another computer system, for data only being sent out, or for data only being received after an initial request (also called Mobile Originated). However, if you need to contact the AirLink router directly, a device connected to the AirLink router, or a host system using your AirLink router (also called Mobile Terminated), a dynamic IP will not give you a reliable address to contact (since it may have changed since the last time it was assigned).

Domain names are often only connected to static IP addresses because of the way most domain name (DNS) servers are set-up. Dynamic DNS servers require notification of IP Address changes so they can update their DNS records and link a dynamic IP address to the correct name.

- Dynamic IP addresses are granted only when your AirLink router is connected and can change each time the router reconnects to the network.
- Static IP addresses are granted the same address every time your AirLink router is connected and are not in use when your router is not connected.

Since many mobile network operators, such as wire-based ISPs, do not offer static IP addresses or static address accounts (which can cost a premium as opposed to dynamic accounts), Sierra Wireless AirLink Solutions developed IP Manager. IP Manager works

with a Dynamic DNS server to receive notification from Sierra Wireless AirLink routers to translate the dynamic IP address to a fully qualified domain name. Thus, you can contact your AirLink router directly from the Internet using a domain name.

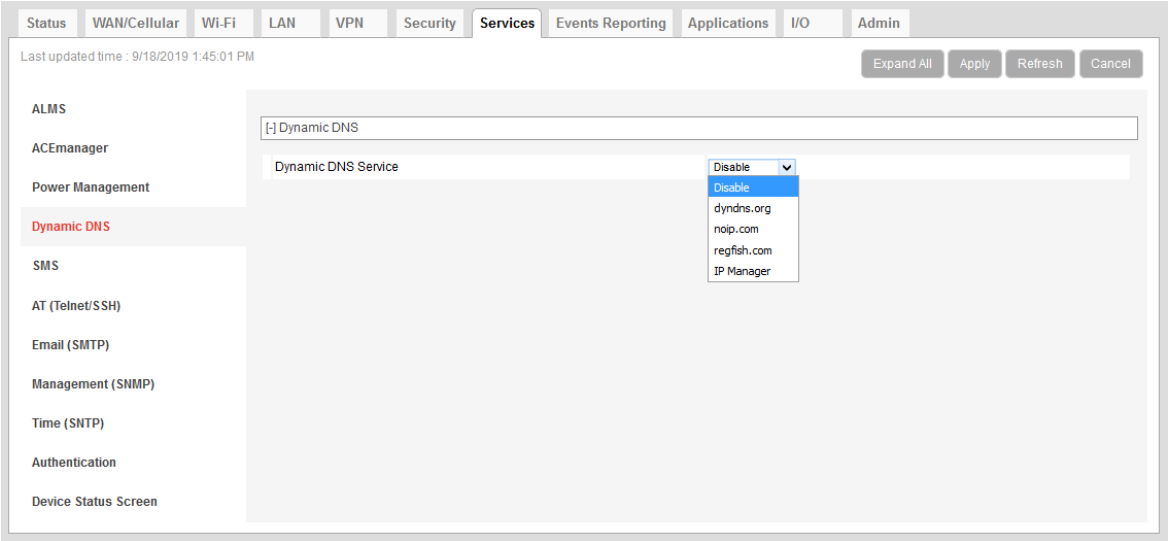


Figure 9-4: ACEmanager: Services > Dynamic DNS

Field	Description
Service	Allows you to select a Dynamic DNS service. Options are: • Disable (default) • dyndns.org • noip.com • regfish.com • IP Manager[a]

a. IP Manager will be deprecated in ALEOS 4.17.0.

Third Party Dynamic DNS Services

Using a third party dynamic DNS service requires an account with Internet access and an account with the third party service.

Note that third party Dynamic DNS services typically update the domain name to point to the source IP in the update packet. If the router has a NATed WAN IP address the domain name points to the network device performing NAT.

Note: Using a Dynamic DNS service does not change the router's Internet accessibility. If the router cannot be accessed remotely using the WAN IP address, it cannot be accessed using the associated FQDN.

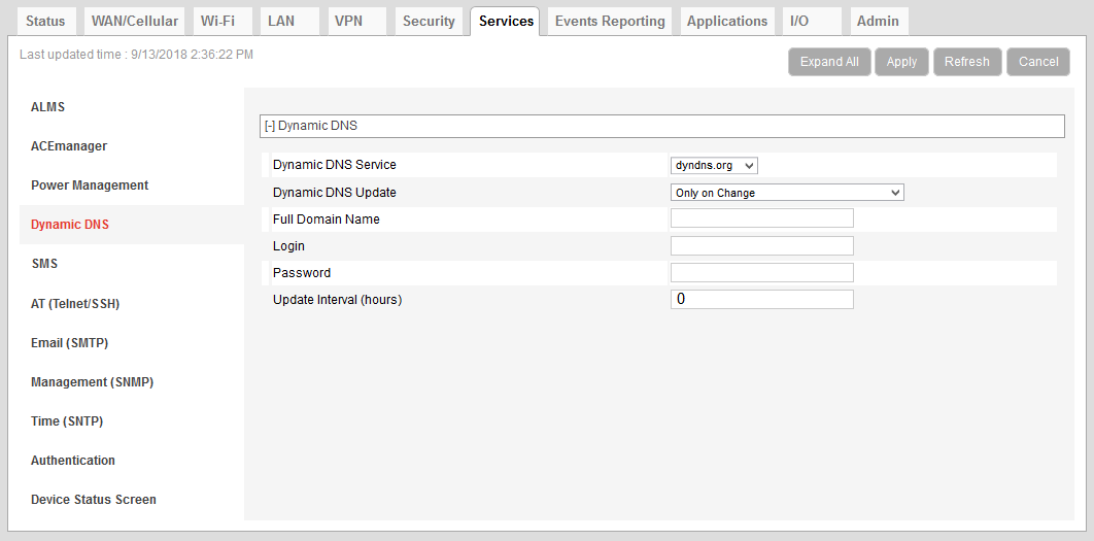


Figure 9-5: ACEmanager: Services > Dynamic DNS (Third Party Service)

The third party service selected from the Service drop-down menu in this example is "dyndns.org." These same fields are displayed for all Service selections other than IP Manager and Disable.

Field	Description
Service	Allows you to select a Dynamic DNS Mobile Network Operator. Options are: • Disable (default) • dyndns.org • noip.com • regfish.com • IP Manager[a]
Dynamic DNS Update	Options are: • Only on Change (default)—Sends an update whenever the IP address changes • Periodically Update (Not recommended)—Sends an update at the interval set in Update Interval (hours). Note that data usage charges may be incurred.
Full Domain Name	The name of a specific AirLink router or device
Login	Shows the login name
Password	Shows the password in encrypted format
Update Interval (hours)	Indicates the time (in hours) between checks for service updates from the selected third party service when Periodically Update is selected.

a. IP Manager will be deprecated in ALEOS 4.17.0.

IP Manager

You can use the Sierra Wireless IP Manager Dynamic DNS service if:

- The service is being used for limited testing or evaluation purposes and is not to be used in production or mission critical environments
- The router has Internet access and uses the Sierra Wireless-hosted IP Manager server (eairlink.com domain)
- The router is on a private network without Internet access and a self-hosted IP Manager server is on the same private network. If you want to self-host an IP Manager server on your private network, contact your authorized Sierra Wireless distributor for more information.

Important: *IP Manager will be deprecated in ALEOS 4.17.0.*

With IP Manager, the router's WAN IP is included in the update packet sent to the IP Manager server, so IP Manager always links the router's WAN IP address to the domain name configured on the router.

Note: Using a Dynamic DNS service does not change the router's remote accessibility. If the router cannot be accessed remotely using the WAN IP address, it cannot be accessed using the associated FQDN.

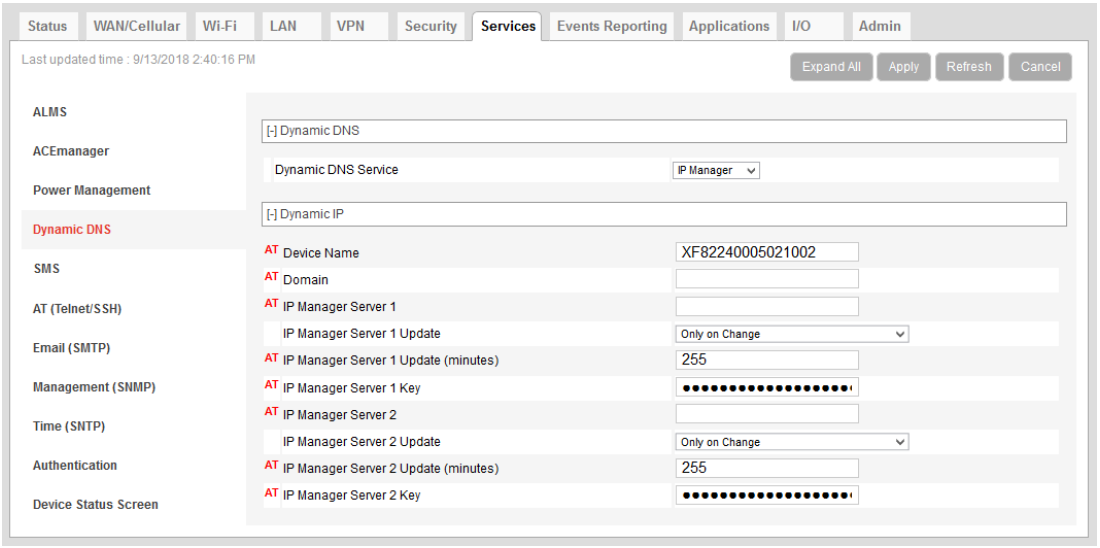


Figure 9-6: ACEmanager: Services > Dynamic DNS > IP Manager

Field	Description
Device Name	The name you want for the device (up to 20 characters) If you want to use the current device phone number as part of the FQDN (for example, 6175551234.eairlink.com) enter #NETPHONE in this field. #NETPHONE is displayed in this field and everywhere else the device name is used, including on the Home > Status page, in SMS messages, in Event reports, as the PPPoE station name, etc. Using #NETPHONE as the device name is recommended if the account phone number may change and you want the device to continue to use the current phone number as part of the FQDN, or if you are creating a template that will be applied to multiple devices. If you are not using #NETPHONE, the Device Name is limited to alpha-numeric characters, plus – (dash). You cannot include other special characters or spaces. To use this feature, you must have IP Manager[a] selected in the Service field.
Domain	The domain name to be used by the device This is the domain name of the server configured for *IPMANAGER1. *Note: As a service, Sierra Wireless maintains IP Manager[a] servers that can be used with any AirLink router. To use one of the free IP Manager servers, enter eairlink.com in this field.*
IP Manager Server 1	The IP address or domain name of the dynamic DNS server that is running IP Manager[a] *Note: To use the Sierra Wireless IP Manager server, enter: edns1.eairlink.com*
IP Manager Server 1 Update	Options are: • Only on Change (default)—Sends an update whenever the IP address changes • Periodically Update (Not recommended)—Sends an update at the interval set in IP Manager Server 1 Update (minutes). Note that data usage charges may be incurred.
IP Manager Server 1 Update (minutes)	How often, in minutes, the address sent to the IP Manager Options are: 5–255
IP Manager Server 1 Key	User-defined password key used instead of the AirLink secret key when using an IP Manager server other than the one provided by Sierra Wireless
IP Manager Server 2	The IP address or domain name of the dynamic DNS server that is running IP Manager. *Note: To use the Sierra Wireless IP Manager server, enter: edns2.eairlink.com*

Field	Description
IP Manager Server 2 Update	Options are: • Only on Change (default)—Sends an update whenever the IP address changes • Periodically Update (Not recommended)—Sends an update at the interval set in IP Manager Server 2 Update (minutes). Note that data usage charges may be incurred.
IP Manager Server 2 Update (minutes)	How often, in minutes, the address sent to the IP Manager Options are: 5–255
IP Manager Server 2 Key	User-defined password key used instead of the AirLink secret key when using an IP Manager server other than the one provided by Sierra Wireless.

a. IP Manager will be deprecated in ALEOS 4.17.0

Tip: *Some PPPoE connections can use a Service Name to differentiate PPPoE devices. Use the device name to set a Station Name for the PPPoE connection.*

Understanding Domain Names

A domain name is a name of a server or device on the Internet associated with an IP address. Similar to how the street address of your house or your phone number are ways to contact you, both the IP address and the domain name can be used to contact a server or device on the Internet. While contacting you at your house address or with your phone number employ different methods, using a domain name instead of the IP address uses the same method, just as a word based name is easier for most people to remember than a string of numbers.

Understanding the parts of a domain name can help to understand how IP Manager[1] works and what you need to be able to configure the device. A fully qualified domain name (FQDN) generally has several parts.

- **Top Level Domain** (TLD): The TLD is the ending suffix for a domain name (.com, .net, .org, etc.)
- **Country Code Top Level Domain** (ccTLD): This suffix is often used after the TLD for most countries except the US (.ca, .uk, .au, etc.)
- **Domain name**: This is the name registered with ICANN (Internet Corporation for Assigned Names and Numbers) or the registry for a the country of the ccTLD (i.e., if a domain is part of the .ca TLD, it would be registered with the Canadian domain registry). A name must be registered before it can be used.
- **Sub-domain or server name**: A domain name can have many sub-domain or server names associated with it. Sub-domains need to be registered with the domain, but do not need to be registered with ICANN or any other registry. It is the responsibility of a domain to keep track of its own subs.

1. IP Manager will be deprecated in ALEOS 4.17.0.

mypage.mydomain.com

- ***.com*** is the TLD
- *mydomain* is the domain (usually noted as mydomain.com since the domain is specific to the TLD)
- *mypage* is the subdomain or server name associated with the device, computer, or device registered with mydomain.com

mypage.mydomain.ca

This would be the same as above, but with the addition of the country code. In this example, the country code (.ca) is for Canada.

Tip: *A URL (Universal Resource Locator) is different from a domain name in that it also provides information on the protocol used by a web browser to contact that address such as* `http://www.sierrawireless.com`. www.sierrawireless.com *is a fully qualified domain name, but adding http://, the protocol identifier, makes the text string a URL.*

Dynamic Names

When an IP address is not expected to change, the DNS server can indicate to all queries that the address can be cached and not looked up for a long period of time. Dynamic DNS servers, conversely, have a short caching period for the domain information to prevent other Internet sites or queries from using the old information. Since the IP address of a device with a dynamic account can change frequently, if the old information was used (e.g., with a DNS server that indicates the address can be cached for a long period of time) when the IP address changed, the domain would no longer point to the new and correct IP address of the device.

If your AirLink router is configured for Dynamic IP when it first connects to the Internet, it sends an IP change notification to the IP Manager[1]. The IP Manager acknowledges the change and updates the Dynamic DNS server. The new IP address is then the address for your device's configured name.

When your device IP address has been updated in IP Manager, it can be contacted by name. If the IP address is needed, use the domain name to determine the IP address.

Note: The fully qualified domain name of your AirLink router will be a subdomain of the domain used by the IP Manager server.

1. IP Manager will be deprecated in ALEOS 4.17.0.

SMS

Note: The LX40 uses the cellular network to send SMS. To use SMS with the LX40, you must have a data subscription from a Mobile Network Operator. Your account may need to have SMS enabled if it is not included with your service.

SMS Overview

AirLink routers can:

- Receive commands via SMS message and send responses, even when the device does not have a full data connection. For example, you can provision a device via SMS without having a data connection (a basic attachment to the cellular network is still required)
- Act as an SMS router for a device connected to a local interface

ACEmanager has four SMS modes. Table 9-2 summarizes the capabilities of each mode.

Table 9-2: SMS Mode Capabilities

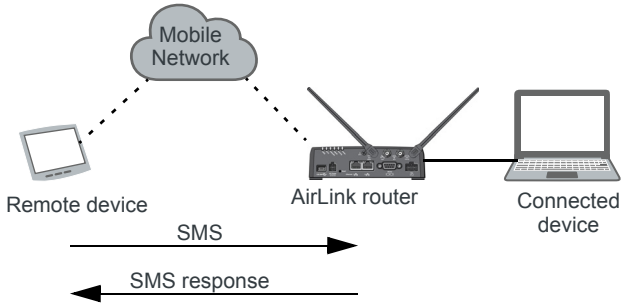
Mode	SMS Command with password	SMS Command without password	SMS router
Password Only	Yes	No	No
Control Only	Yes	Yes*	No
Gateway Only	Yes	No	Yes*
Control & Gateway	Yes	Yes*	Yes*

* Provided either:

- Trusted Phone Number List is disabled.
- Trusted Phone Number List is enabled and the device's phone number is in the Trusted Phone Number List.

For more information on Trusted Phone Number List, see Inbound SMS Messages on page 269.

Sending SMS Commands to an AirLink Router



The format for sending an SMS command varies depending on the mode. See Table 9-3 for details.

Table 9-3: SMS Command Formats

Mode	SMS Command Format
Password Only	PW [Password] [Prefix][Command]
Control Only (from a number on the Trusted Phone Number list)	[Prefix][Command] or PW [Password] [Prefix][Command]
Control Only (from a number not on the Trusted Phone Number list)	PW [Password] [Prefix][Command]
Gateway Only	PW [Password] [Prefix][Command]

Note: Insert a space before and after [Password]; no space between [Prefix] and [Command].

Examples:

[Prefix][Command]

"&&&reset", where:

- &&& is the prefix
  If the ALEOS Command Prefix field in ACEmanager (Services > SMS) is blank, the prefix is not required.
- reset is the command

PW [Password] [Prefix][Command]

"PW 1234 &&&reset", where:

- 1234 is the password
  For more information, see SMS Password Security on page 271.
- &&& is the prefix
  If the ALEOS Command Prefix field in ACEmanager (Services > SMS) is blank, the prefix is not required.
- reset is the command

For information on sending SMS commands and a list of available commands, see page 493.

Note: The maximum length of the ALEOS Command Prefix is 3 characters (alphanumeric or special characters).

SMS Modes

The first step in configuring SMS is to select the SMS mode from the following options:

- Password Only—See page 259.
- Control Only—See page 259.
- Gateway Only—See page 261.
- Control and Gateway—See page 267.
- Outbound Only—See page 267.

For a list of available SMS commands, see page 494. For a list of SMS-related AT commands, see SMS on page 472.

Password Only

In Password Only mode, you can send SMS commands to a device, provided you use the password. Router SMS messaging is not supported in this mode.

Note: In Password Only mode, the password is always required. The Trusted Phone Number List is not available.

To configure Password Only mode:

1. In ACEmanager, go to Services > SMS.

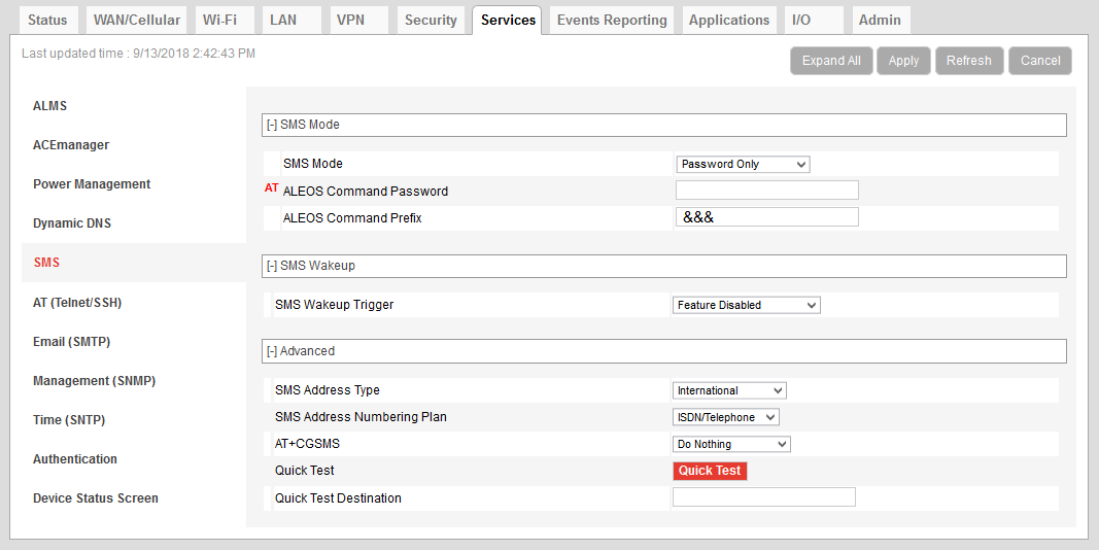


Figure 9-7: ACEmanager: Services > SMS (Password Only)

2. In the SMS Mode field, select Password Only.
3. Enter the desired password in the ALEOS Command Password field or leave the field blank to use the default password.

   The password you enter can be any alphanumeric string between 1 and 255 characters long.

   For more information see SMS Password Security on page 271.
4. If desired, configure Advanced options (see SMS > Advanced on page 273).
5. Click Apply.

For information on the message format, see Sending SMS Commands to an AirLink Router on page 257.

Control Only

In Control Only mode, you can send SMS commands to an AirLink router, but you cannot send non-command (router) SMS messages.

You can send an SMS command without a password if:

- Trusted Phone Number is disabled.
- Trusted Phone Number is enabled and your phone number is on the Trusted Phone Number List.

If Trusted Phone Number is enabled and your number is not on the Trusted Phone Number List, you can still send an SMS command provided you use the password.

Configure ALEOS for Control Only mode

1. In ACEmanager, go to Services > SMS.

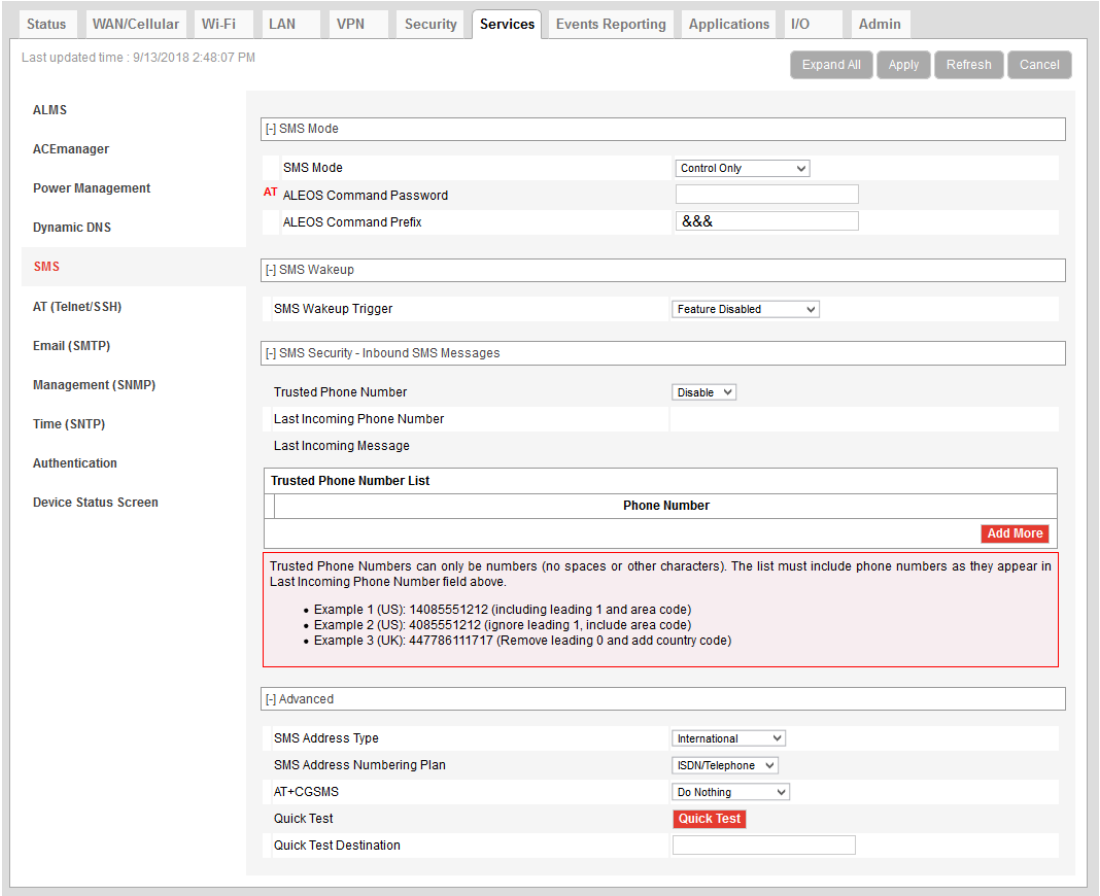


Figure 9-8: ACEmanager: Services > SMS (Control Only)

2. In the SMS Mode field, select Control Only.
3. Enter the desired password in the ALEOS Command Password field or leave the field as is to use the default password.

   The password you enter can be any alphanumeric string between 1 and 255 characters long.

   For more information see SMS Password Security on page 271.

Note: If all the SMS commands you send in Control Only mode are from a trusted number, you do not need to include a password when you send the command.

4. If desired, change the ALEOS Command Prefix or use the default prefix, &&&.

Note: The maximum length of the ALEOS Command Prefix is 3 characters (alphanumeric or special characters). If you leave the ALEOS Command Prefix field blank, no prefix is required when you send the SMS command. The option to omit the prefix is only available in Control Only mode.

5. If desired, configure SMS Security options (see SMS Security on page 269) and Advanced options (see SMS > Advanced on page 273).
6. Click Apply.

For information on the message format, see Sending SMS Commands to an AirLink Router on page 257.

Gateway Only

In Gateway Only mode you can send and receive SMS gateway messages through the AirLink router to a local device. SMS messages received by the AirLink router (inbound) are sent on to the configured local device. Messages sent by the local device to a configured port on the AirLink router are sent out as SMSs (outbound) to a remote destination. Essentially, the AirLink router sends SMS messages between the cellular radio and the connected device.

In Gateway Only mode, you can also send SMS commands provided you include a password. For more information, see Sending SMS Commands to an AirLink Router on page 257.

To configure ALEOS for Gateway Only mode and format a Gateway message:

1. In ACEmanager, go to Services > SMS.

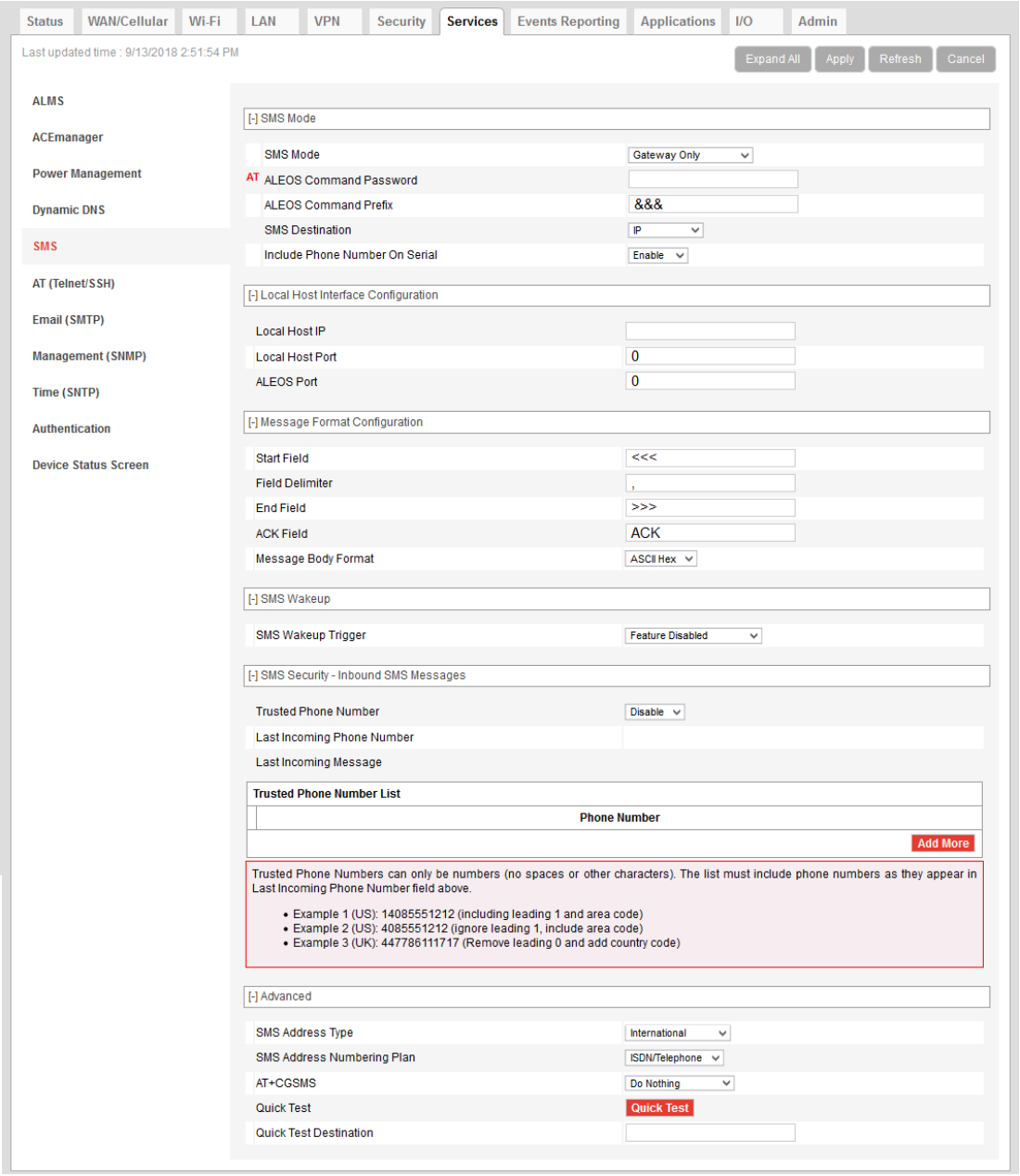


Figure 9-9: ACEmanager: Services > SMS (Gateway Only)

2. In the SMS Mode field, select Gateway Only.
3. Enter the desired password in the ALEOS Command Password field or leave the field blank to use the default password.

   The password you configure can be any alphanumeric string between 1 and 255 characters long.

   For more information see SMS Password Security on page 271.

4. The SMS destination is the local interface where ALEOS forwards an SMS from the mobile network.
   In the SMS destination field, select from the following options:
   - Serial—Messages are forwarded to the Serial port on the destination device.

     If you want to include the phone number as part of the information sent to the serial port, select Yes in the Include Phone Number on Serial field.

     Proceed to step 13.
   - IP—Messages are sent using UDP over IP to a designated LAN or Wi-Fi device. Proceed to step 5.

Local Device Interface Configuration (Applies to inbound [to the local device] gateway messages when IP is the SMS destination and outbound [from the local device])

Inbound

5. Enter the Local Host IP address.

   This is the IP address of the LAN or Wi-Fi device that is used as the destination for all incoming Gateway messages.
6. Enter the Local Host Port.

   This is the UDP port the destination device listens to for incoming messages.

Outbound

7. Enter the ALEOS port.

   This is the UDP port on which the AirLink router listens for outbound Gateway messages sent from any local device.

Message Format Configuration (Only applies if you selected IP in the SMS destination field)

8. In the Start field, enter the start of message delimiter, or use the default (<<<).
9. In the Field Delimiter field, enter the delimiter to be used between fields in the SMS message, or use the default (,).
10. In the End field, enter the end of message delimiter, or use the default (>>>).
11. In the ACK field, enter the desired acknowledgment message, or use the default (ACK). The acknowledgment is sent to the device as a UDP packet on the same port as the device used to send the message.

    ALEOS provides a message acknowledgment for every SMS message when it is passed to the radio. If ALEOS does not send an ACK, wait for 30 seconds, and then retry.

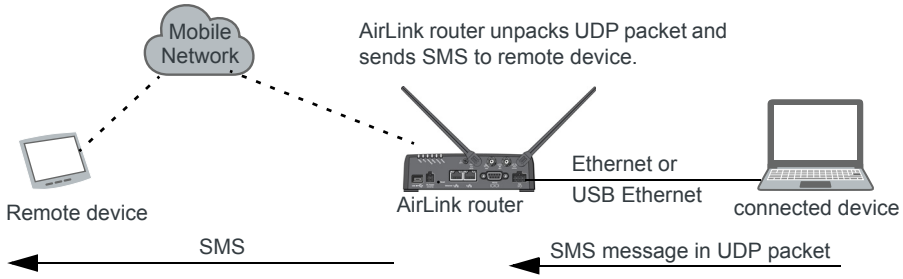
Security

12. If desired, configure SMS Security options (see SMS Security on page 269) and Advanced options (see SMS > Advanced on page 273).
13. Click Apply.

    If you are using IP as the destination and you have changed the IPs or port numbers, reboot the device.

For information on the message format for an SMS Command, see Sending SMS Commands to an AirLink Router on page 257.

Sending a gateway message from a local IP device to a remote destination



The AirLink router acts as a gateway to send SMS messages from an IP connected device using AirLink SMS Protocol. The IP device sends a UDP packet to the AirLink router, which then sends the SMS to its destination.

Note: Outgoing SMS messages are limited to 140 characters.

To use AirLink SMS Protocol to send an SMS message from a connected device:

1. Begin with the start field.
2. Follow with the destination phone number. This number must be in the same format as the phone numbers in the Trusted Phone Number List.

   Note: There is no space between the start number and the destination phone number or between any delimiter and the data fields.

3. Add the field delimiter.
4. Add the data type for the message:

For:	Enter:
ASCII	ASCII
8-bit	8BIT
Unicode	UCS-2
Data types are case sensitive.	

5. Add another field delimiter.
6. Add the number of ASCII characters in your original message (before it is converted to ASCII hex format).
7. Add another field delimiter.
8. Add the message to be sent in ASCII hex format. ASCII is case sensitive. Do not use any punctuation, such as a colon, or characters between hex pairs.
9. Finish with the end field.

Example: You want to send the following message: “Test message” to phone number (510) 555-4200. To use this feature, convert the message to hex:54657374206d657373616765. Then format the message as follows:

<<<15105554200,ASCII,12,54657374206d657373616765>>>

where:

- “<<<” is the start delimiter
- “15105554200” is the phone number
- “,” is the delimiter between fields
- “ASCII” is the data type
- “12” is the number of characters in the original message (before it is converted to ASCII hex format)
- “54657374206d657373616765” is the message itself
- “>>>” is the end delimiter

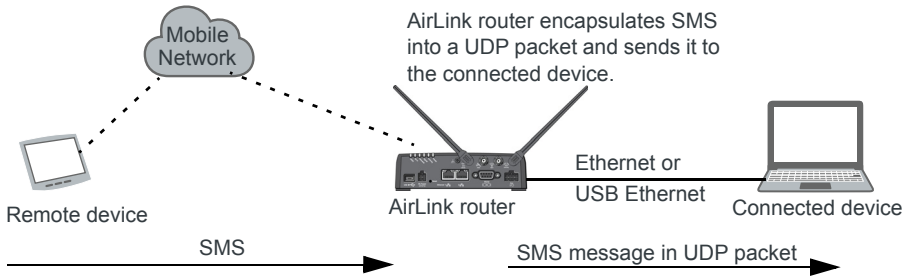
10. Send the UDP packet to the configured ALEOS port.

    After your message is sent, you receive an ACK message in the format ACK Field acknowledgment Code ACK Field. For example, if your message was successfully queued to be sent, you receive the message: ACK0ACK.

If you receive an error message, see SMS on page 507 for details.

*Note: You can also use AT*SMSM2M to send an SMS message to the remote device. For more information, see SMSM2M on page 275.*

Sending a gateway message to the connected device using IP address and port as the SMS destination



Messages from a remote device can be sent to the AirLink router. The AirLink router encapsulates the message in a UDP packet using AirLink SMS Protocol, and sends it to the configured Local Host IP and Local Host Port on the connected device.

Message example:

Example:

1. An SMS is sent from phone number (640) 555-4200 to the device: “Test message”
2. The AirLink router receives the SMS and determines it is a gateway message.
3. The AirLink router converts the message into a UDP packet using the AirLink SMS Protocol and sends it to the configured Local Host IP at Local Host Port. The message as follows:

   <<<16045554200,ASCII,12,54657374206d657373616765>>>

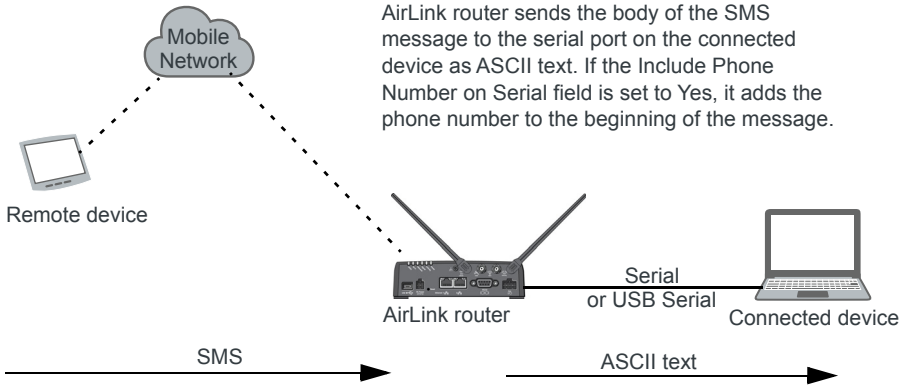
where:

- “<<<” is the start delimiter
- “16045554200” is the phone number
- “,” is the delimiter between fields
- “ASCII” is the message type*
- “12” is the number of characters in the message
- “54657374206d657373616765” is the message itself
- “>>>” is the end delimiter

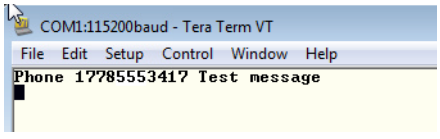
* In this example the message is in ASCII, but it could also be in 8-bit or Unicode format:

For:	Enter:
ASCII	ASCII
8-bit	8BIT
Unicode	UCS-2
Data types are case sensitive.	

Sending a gateway message to the connected device using Serial or USB Serial as the SMS destination



A message can be sent from a remote device to the AirLink router. The AirLink router sends the body of the message in ASCII text to the connected device. If the Include Phone Number on Serial field is set to Yes, the AirLink router prepends the phone number to the message.



Control and Gateway

In Control and Gateway mode you can do both—send commands to the device and send gateway messages to the connected device. When the Trusted Phone Number List is enabled, all SMS messages from trusted devices that do not begin with the password indicator (PW) or the command prefix are sent to the connected device as a gateway message.

For more information, see Trusted Phone Number on page 271.

Configure ALEOS for Control and Gateway mode

1. In ACEmanager, go to Services > SMS.
2. Select Control and Gateway.

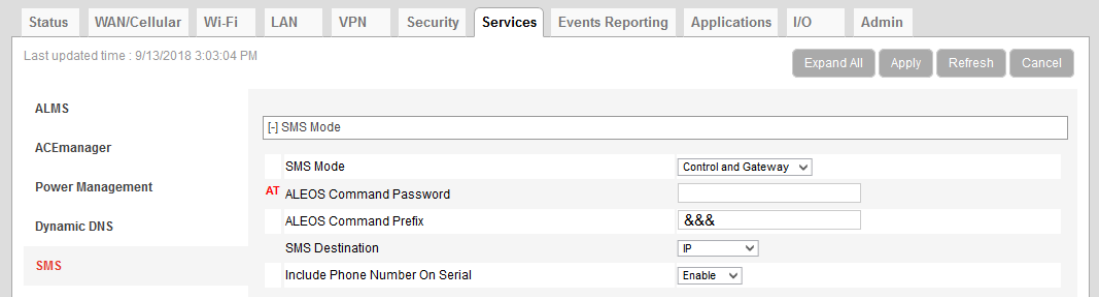


Figure 9-10: ACEmanager: Services > SMS (Control and Gateway)

For more information, see Control Only on page 259 and Gateway Only on page 261.

Outbound Only

Select this mode if you plan to use +CMGD or +CMGL AT commands to manage SMS messages. When you choose this mode, inbound messages are stored on the radio module until another mode is chosen. Note that inbound messages could be lost if the storage becomes full.

Note: MC74xx devices do not support AT+CGML and AT+CGMD commands used for reading and deleting messages for carriers that use CDMA SMS message format.

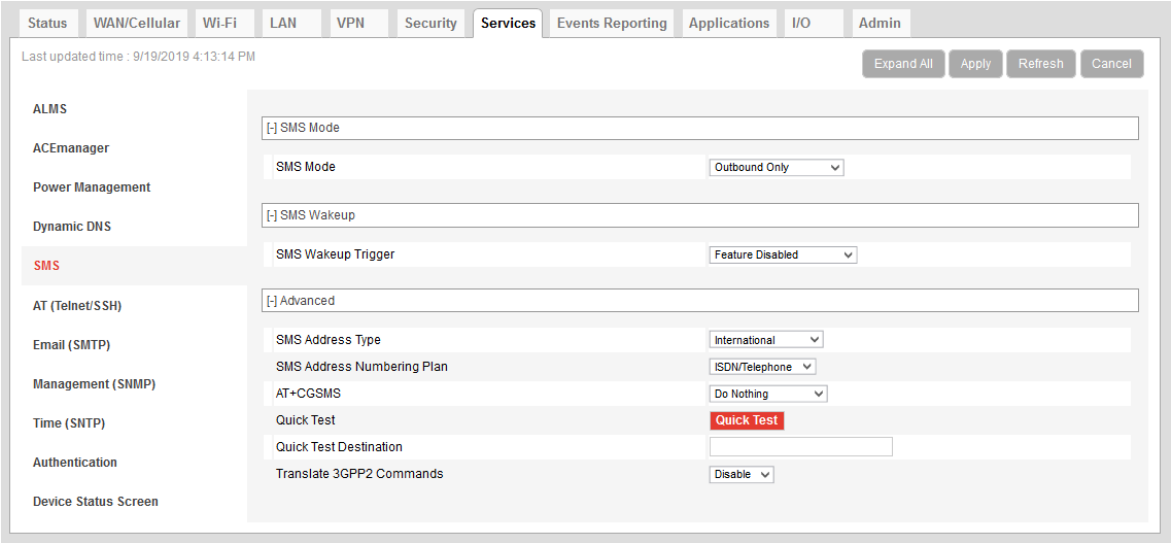


Figure 9-11: ACEmanager: SMS (Outbound Only)

SMS Wakeup

This feature is supported on International AirLink routers on the Vodafone network.

When the AirLink router is in Connect on traffic mode (for details, see Always on connection on page 92), you can configure the AirLink router to also initiate a mobile network data connection on receipt of an SMS. After the connection is established, it remains active until the configured timeout expires. The mobile network data connection closes after the specified timeout period. Outgoing traffic sent after the timer is triggered does not reset the timer.

To configure SMS Wakeup:

1. In ACEmanager go to WAN/Cellular > Advanced and ensure that the Always on connection field is set to Disabled - Connect on traffic.
2. Go to Services > SMS.

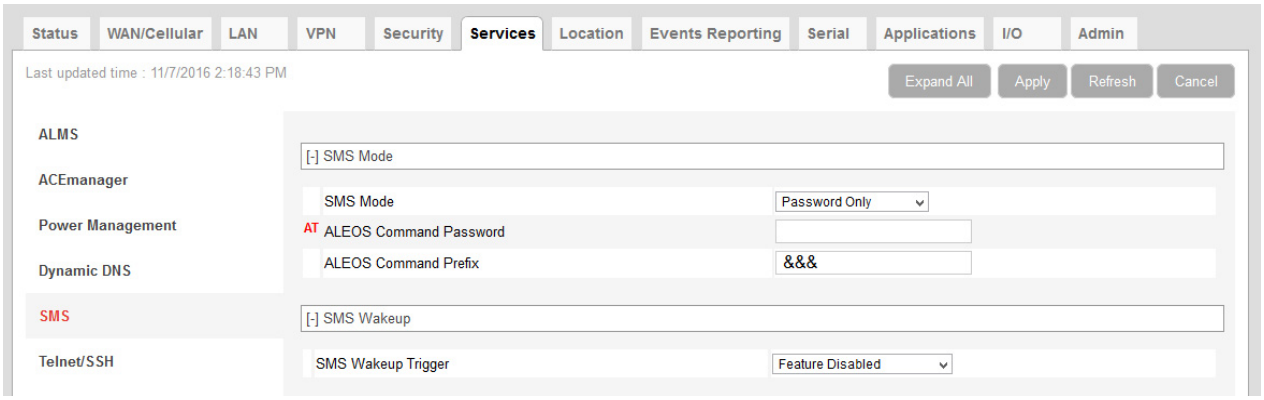


Figure 9-12: ACEmanager: Services > SMS

3. In the SMS Wakeup Trigger field, select the type of SMS that should wake up the device. The options are:
   - Feature Disabled

- Any Class 0 message
- Class 0 Wake Command
- Any SMS message
- Wake Command

Note: "Class 0 Wake Command" and "Wake Command" are SMS commands.

4. Click Apply.
5. In the Connection timeout (minutes) field, enter the number of minutes the mobile network data connection remains active after SMS Wakeup Trigger is received. Accepted values for this field are 2–65535. The default value is 2.

   You can also set the Connection timeout using an AT command. For more information, see *SMSWUPTOUT on page 474.
6. If you selected Class 0 Wake Command or Wake Command in step 3, you can specify the SMS command name in the Wake Command field or use the default value, WAKEUP. Sending this SMS to the device will wake it up. Example: &&&WAKEUP (&&& is the SMS command prefix.)

Figure 9-13: ACEmanager: Services > SMS > SMS Wakeup > Wake Command

7. Click Apply.

SMS Security

Inbound SMS Messages

Incoming SMS messages are received as UDP packets, and forwarded to the local device IP address and port. The UDP packets are in the same format as sent messages.

When Trusted Phone Number security is enabled, incoming messages coming from the phone numbers in the Trusted Phone Number list are the only ones for which commands will be performed (relay, response etc.) or gateway messages forwarded. Incoming messages from all other phone numbers will be ignored. Commands sent to the device with the correct password are always treated as coming from a trusted number.

All non-alphanumeric characters except a space will be replaced by a dot in ACEmanager.

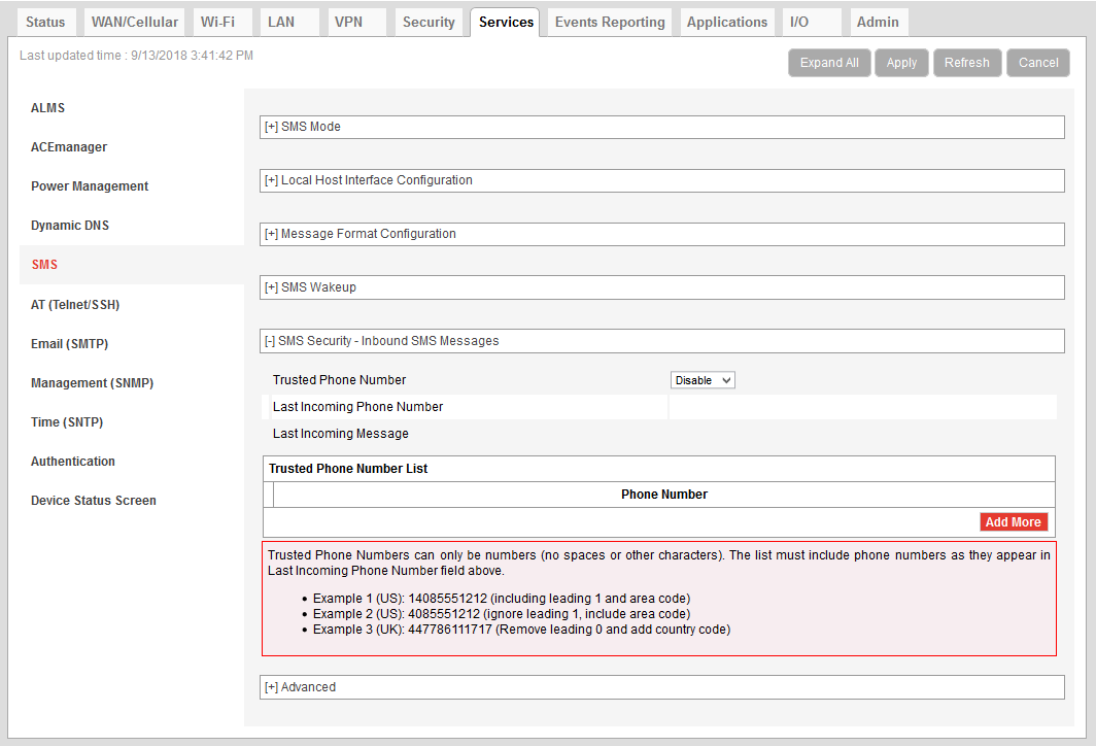


Figure 9-14: ACEmanager: Services > SMS > Security

Field	Description
SMS Security - Inbound SMS Messages	
Trusted Phone Number	Allows you to Enable or Disable a trusted phone number
Last Incoming Phone Number	The last inbound phone number is displayed here. This will only be erased with a reset to defaults.
Last Incoming Message	The last incoming message is the last inbound SMS from the phone number. This will only be erased with a reset to defaults.
Trusted Phone Number List	Trusted phone numbers are listed here

Trusted Phone Number

Follow the instructions below to add a Trusted Phone Number on the SMS page.

1. Send an SMS command to the device, and hit Refresh. If Trusted Phone Number is enabled, and the phone number is not in the Trusted Phone Number List, no action is performed on the message.
2. Once you have the Last Incoming Phone Number that shows up on the SMS window in ACEmanager, note the exact phone number displayed.
3. Click Add More to add the Trusted Phone Number. The Last Phone Number will continue to display. Additions to the Trusted Phone Number become effective immediately. You do not need to reboot the device.

Note: The Trusted Phone number can be up to 15 characters long and must be comprised of numbers only.

Note: Phone Numbers (both trusted and not trusted) will be displayed in the Last Incoming Phone Number field.

4. Enter the Last Incoming Phone Number as the Trusted Phone Number.
5. Click Apply.

Note: Do not enter any extra digits, and use the Last Incoming display as a guide to type the phone number. Use "1" only if it is used in the beginning of the Last Incoming Phone Number.

With Trusted Phone Number enabled, only those SMS messages from Trusted Phone Numbers will receive responses to commands or messages acted on as applicable.

SMS Password Security

The SMS Password feature enables you to use a password to send a command at any time to the device. Even if Trusted Phone Number is enabled, you can send an SMS command from a non-trusted number, provided you include the password.

A default SMS password is generated from the last four characters of the SIM ID (for all SIM-based devices) or you can configure your own SMS password.

Tip: *If you do not know the SIM ID or ESN number you can find it in ACEmanager (Status > WAN/Cellular).*

Note: The SMS password is not the same as the ALEOS password used to access ACEmanager or Telnet/SSH.

To configure the SMS password:

1. Go to Services > SMS > SMS Mode.

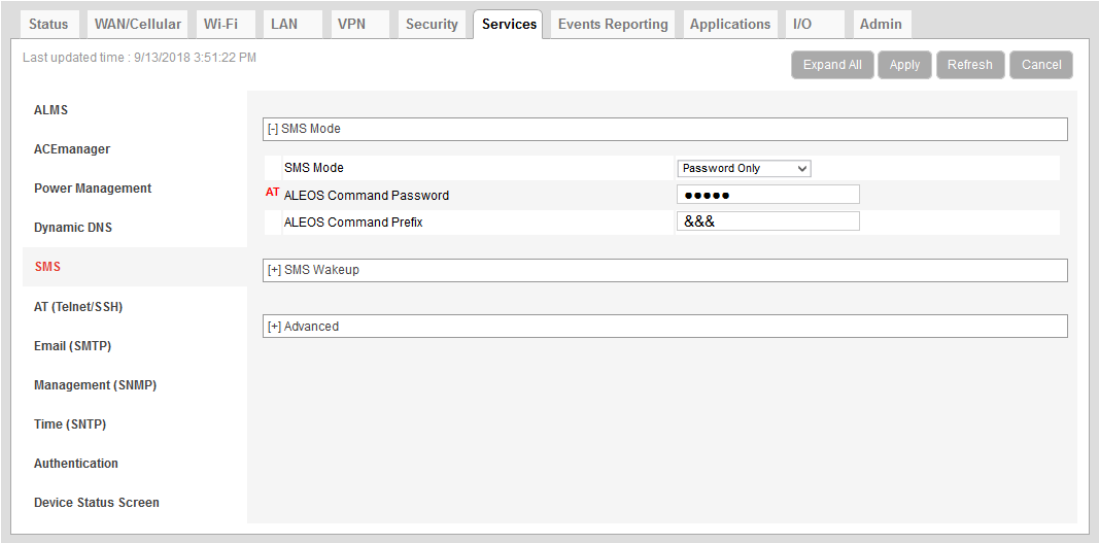


Figure 9-15: ACEmanager: Services > SMS (Password Only Security)

2. Enter the desired SMS password in the ALEOS Command Password field.
   The password can be any alphanumeric string 1 to 255 characters long.
3. Click Apply.

Note:

- *The SMS password is not displayed in plain text in ACEmanager. If you want to query it, use the AT command. See* *SMS_PASSWORD on page 474.*
- *If an SMS command is sent with the wrong SMS password, the device replies with a "Wrong Password" message, and the command is dropped.*

Using the Default SMS Password

You can use the default SMS password (last 4 characters of either the SIM ID number for SIM-based devices, or the ESN for devices without a SIM) with no prior configuration.

Note: The default password:

- *Works with all SMS commands*
- *Is not displayed in ACEmanager (If the ALEOS Command Password field is blank, the default password is used.)*
- *Is overridden by a user-defined password*
- *Changes if the SIM is changed, if no user-defined password is configured*

SMS > Advanced

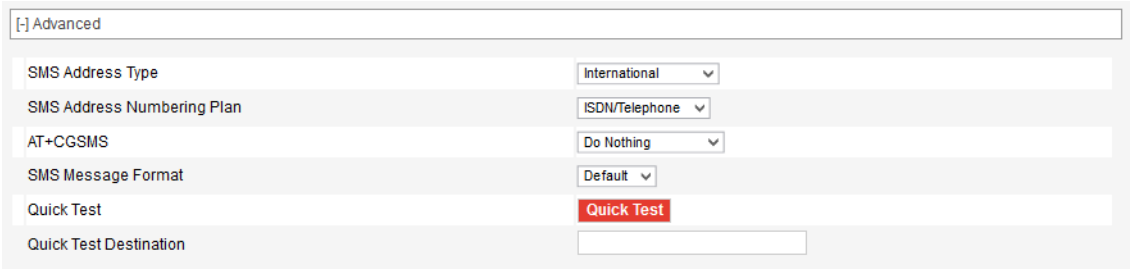


Figure 9-16: ACEmanager: Services > SMS > Advanced

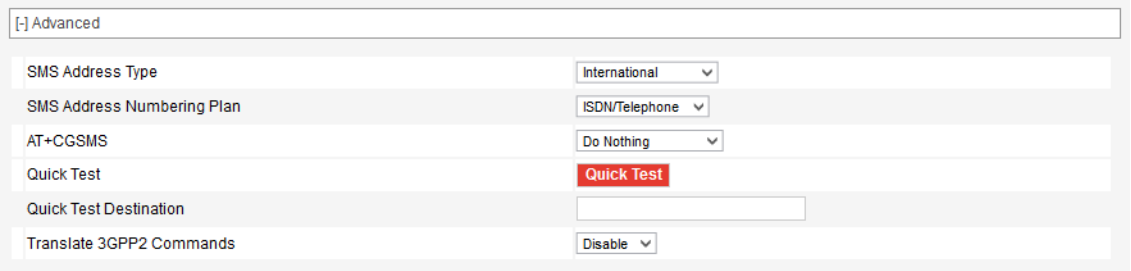


Figure 9-17: ACEmanager: Services > SMS > Advanced (Outbound Only mode)

Field	Description
SMS Address Type	For most networks, use the default setting (International). The address type of the phone number used to send outgoing messages and command responses. Options are: • International (default) • National • Network Specific • Subscriber • Abbreviated
SMS Address Numbering Plan	For most networks, use the default setting (ISDN/Telephone). The address numbering plan of the phone number used to send outgoing messages and command responses. Options are: • Unknown • ISDN/Telephone (default) • Date Numbering • Telex • National • Private • ERMES
AT+CGSMS	Allows you to choose the technology used to send SMS messages. For most networks, use the default setting (Do nothing). Options are: • Do Nothing (default) • Set AT+CGSMS=0—GPRS • Set AT+CGSMS=1—Circuit switched • Set AT+CGSMS=2—GPRS Preferred (Uses circuit switched if GPRS is not available) • Set AT+CGSMS=3—Circuit Switched Preferred (Uses GPRS if circuit switched is not available) *Note: If your router is able to receive SMS messages, but is unable to send them, try changing this field to Set AT+CGSMS=1.* *Note:*
SMS Message Format	This setting appears in all SMS modes except Outbound Only. If the router does not send or receive SMS messages, you may need to select the SMS message format. This situation may arise when an unrecognized SIM prompts the router to use Generic radio module firmware, but service is actually provided by Verizon or AT&T. Options are: • Default (default)—ALEOS uses the message format configured for the carrier's radio module firmware. • 3GPP—ALEOS uses 3GPP message format (compatible with AT&T service). • CDMA—ALEOS uses CDMA/3GPP2 message format (compatible with Verizon).
Quick Test	Allows you to send a test message to the destination entered in the Quick Test Destination field.

Field	Description
Quick Test Destination	Enter the phone number to use for the test message. Click Apply before clicking the Quick Test button. This field is cleared on reboot.
Translate 3GPP2 Commands	This setting appears in Outbound Only mode. In some instances, for MC74xx devices on CDMA networks, the 3GPP AT commands +CMGD and +CMGL must be translated to 3GPP2 in order to work. In such cases, enable this setting. Options are: • Enable • Disable (default)

SMSM2M

SMS messages can be sent from the serial command interface. Enter AT*SMSM2M=”[phone] [message]”. The phone number needs to be in the same format as numbers entered in the Trusted Phone Number List.

The message must not exceed 140 characters. To send several messages back to back, you must wait for the OK before sending the next message.

Command	Description
***SMSM2M** ***SMSM2M_8** ***SMSM2M_u**	*SMSM2M is the command for ASCII text. *SMSM2M_8 is the command for 8-bit data. *SMSM2M_u is the command for unicode. Format: *smsm2m=”[phone][ascii message]” *smsm2m_8=”[phone][hex message]” *smsm2m_u=”[phone][hex message]” • The phone number can only consist of numbers (NO spaces or other characters). The phone number should be as it appears in the Last Incoming Phone Number field. Example 1 (US): 14085551212 (including leading 1 and area code) Example 2 (US): 4085551212 (ignore leading 1, include area code) Example 3 (UK): 447786111717 (remove leading 0 and add country code) Command Examples: *smsm2m=”18005551212 THIS IS A TEST” sends in ASCII. *smsm2m_8="17604053757 544849532049532041205445535 4" sends the message “THIS IS A TEST” as 8-bit data. *smsm2m_u="17604053757 000102030405060708090a0b0c0d0e0f808182838485868788898A8b8c8d8e8f" sends the bytes: 00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d 0e 0f 80 81 82 83 84 85 86 87 88 89 8a 8b 8c 8d 8e 8f *Note: Not all cellular carriers support 8-bit or unicode SMS messages.*

AT (Telnet/SSH)

Use the Telnet or SSH protocol to connect to any AirLink router and send AT commands.

A secure mechanism to connect remote clients is a requirement for many users. In ACEmanager, Secure Shell (SSH) is supported to ensure confidentiality of the information and make the communication less susceptible to snooping and man-in-the-middle attacks. SSH also provides for mutual authentication of the data connection.

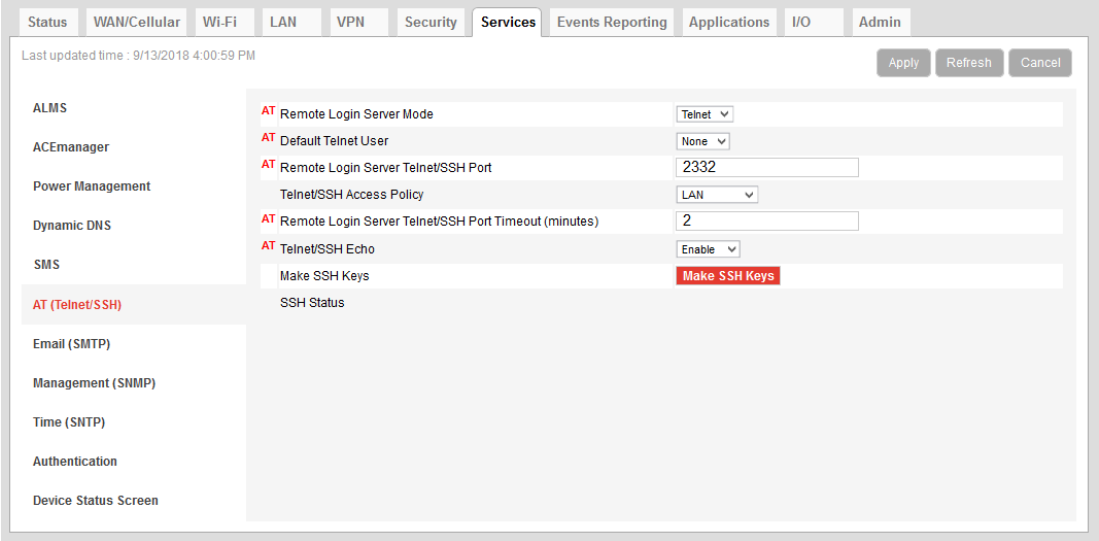


Figure 9-18: ACEmanager: Services > Telnet/SSH

Field	Description
Remote Login Server Mode	Select either Telnet (default) or SSH mode.
Default Telnet User	Select a default Telnet User name Options are: • None—When you log into a Telnet session, you are prompted for a user name and password. • user—When you log into a Telnet session, you are prompted only for a password. Telnet uses the default user name (user). *Note: The default user name is only for Telnet; not SSH.*
Remote Login Server Telnet/SSH Port	Sets or queries the port used for the AT Telnet/SSH server. Default: 2332 **Tip:** *Many networks have the ports below 1024 blocked. We recommend that you use a higher numbered port.*

Field	Description
Telnet/SSH Access Policy	Restricts access to Telnet/SSH Options are: • Disabled • LAN (default) • LAN+WAN • WAN
Remote Login Server Telnet/SSH Port Timeout (mins)	Telnet/SSH port inactivity timeout. Default: 2 (minutes)
Telnet/SSH Echo	Enable (default) or disable AT command echo mode.
Make SSH Keys	Creates keys for SSH session applications
SSH Status	Provides the status of the SSH session

Note: When you are connected to SSH locally, you cannot have OTA SSH connected.

Email (SMTP)

For some functions, the device needs to be able to send email. Since it does not have an embedded email server, you need to specify the settings for a relay server for the device to use.

A reboot is required after configuring the email settings.

Note: The SMTP function will only work with a mail server that will allow relay email from the ALEOS device's Net IP.

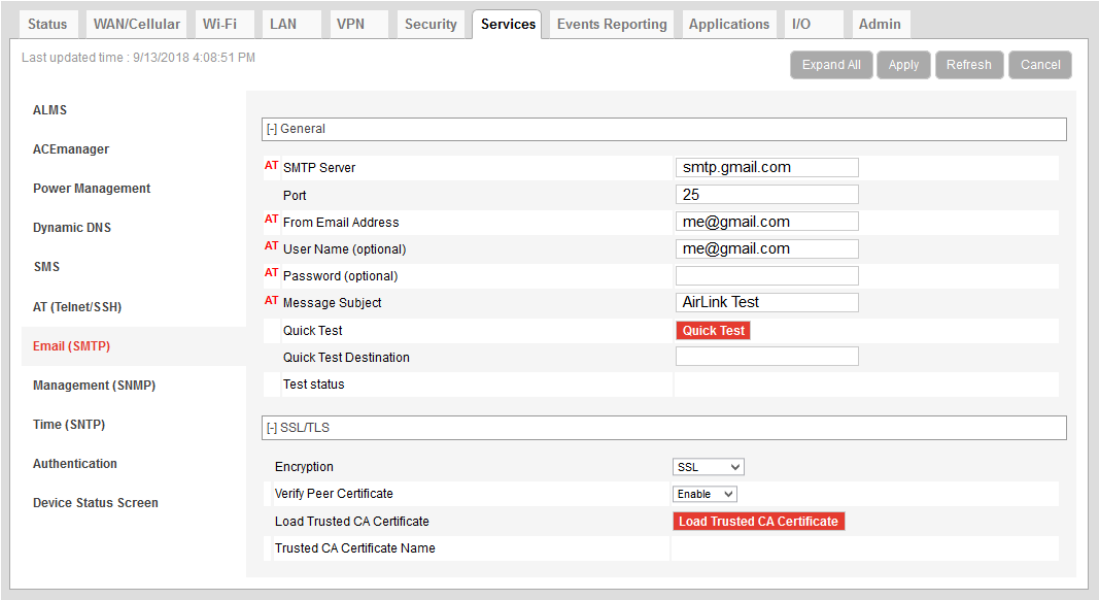
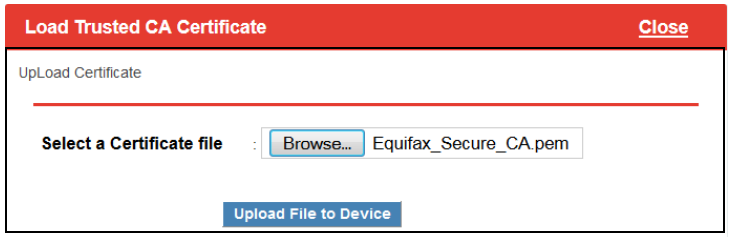


Figure 9-19: ACEmanager: Services > Email (SMTP)

Field	Description
General	
SMTP Server	Specify the IP address or Fully Qualified Domain Name (FQDN) of the SMTP server to use. • d.d.d.d = IP Address • name = domain name (maximum: 40 characters)
Port	Server port (Default is 25.) **Encryption method** / **Default port** SSL / 465 StartTLS / 587
From Email Address	Sets the email address from which the SMTP message is being sent. • email = email address (maximum: 30 characters)
User Name (optional)	Specifies the username to use when authenticating with the server

Field	Description
Password (optional)	Sets the password to use when authenticating the email account (*SMTPFROM) with the server (*SMTPADDR). • pw = password *Note: The email server used for the relay may require a user name or password.*
Message Subject	Allows configuration of the default Subject to use if one is not specified in the message by providing a "Subject: xxx" line as the initial message line. • subject = message subject
Quick Test	After completing the other fields on this screen, click the Quick Test button to send a test email. The status of the test appears in the Test status field.
Quick Test Destination	Enter the email address you want the test email sent to.
Test status	After you press the Quick Test button, the status of the email test appears in this field.
SSL/TLS	
Encryption	Choose the encryption method: • None—No encryption is used (default) • SSL—Use a secure connection directly • StartTLS—Transforms an non-secure connection to a secure one For SSL and StartTLS default ports, see Port on page 278.
Verify Peer Certificate	Choose whether or not to use a peer certificate Disable—No certificate is used (default) Enable—Verifies that the server name used for the connection matches the name and alternative names in the certificate loaded using the Load Trusted CA Certificate field.
Load Trusted CA Certificate	To load a certificate: 1. Click the Load Trusted CA Certificate button. 2. Click browse and navigate to the certificate you want to load.  3. Click Upload File to Device. *Note: Because the starting and expiration dates of the certificate are checked, the date used by the device must be correct. Sierra Wireless strongly recommends that you enable Network Time Protocol (NTP) on the Services > Time (SNTP) tab.*
Trusted CA Certificate Name	The name of the loaded certificate appears in this field.

Management (SNMP)

The Simple Network Management Protocol (SNMP) is designed to allow for remote management and monitoring of a variety of devices from a central location. It is generally used to monitor conditions that may require attention.

The SNMP management system is composed of:

- One or more managers (administrative computers)
- SNMP-compliant devices (such as your AirLink router, a router, a UPS, a web server, a file server, or other computer equipment)
- An agent (data collection software running on the SNMP-compliant devices)
- A Network Management System (NMS) that monitors all the agents on a specific network.

The agent stores information about the device in a Management Information Base (MIB). The manager can send messages to this database to configure and query the status of the device. In addition, the agent running on the device can send traps (unsolicited messages) to the manager on startup, on status change, or when an error condition occurs.

AirLink routers supports configuring SNMPv2 and SNMPv3 as SNMP agents.

Authentication ensures SNMP messages coming from the AirLink router have not been modified and the device cannot be queried by unauthorized users. SNMPv3 uses a User-Based Security Model (USM) to authenticate and, if desired or supported, message encryption. USM uses a user name and password specific to each device.

A reboot is required after configuring SNMP.

SNMPv2

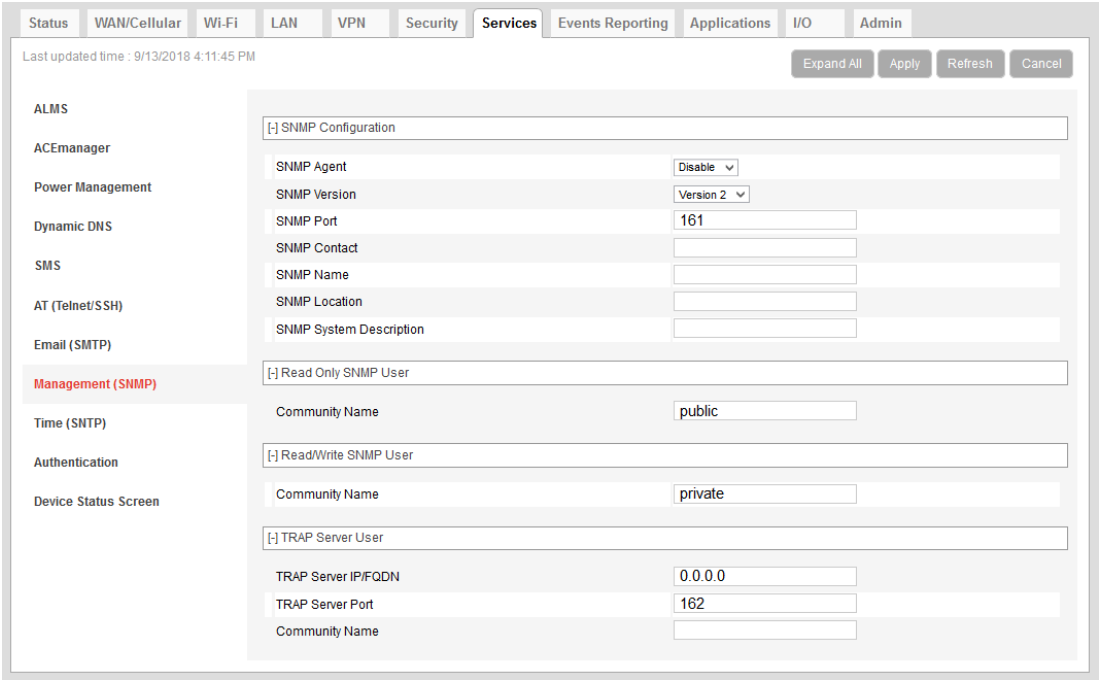


Figure 9-20: ACEmanager: Services > Management (SNMP) (Version 2)

Field	Description
SNMP Configuration	
Enable SNMP	Allows you to enable/disable SNMP Default: Disable
SNMP Version	Allows you to select either SNMP protocol Version 2 (default) or Version 3 communications.
SNMP Port	Controls which port the SNMP Agent listens on: • 1–65535 (default is 161)
SNMP Contact	This is a personal identifier of the contact person you want to address queries to. This is a customer defined field.
SNMP Name	This is the name of the device you want to refer to. This is a customer defined field.
SNMP System Description	Use this field to enter a system description, if desired. The default value, which appears after the SNMP agent is enabled and the router rebooted, is the product name.
Read Only SNMP User	
Community Name	The community name is a text string that acts as a password. It is used to authenticate messages that are sent between the management station and the device. Default is public.
Read/Write SNMP User	
Community Name	The community name is a text string that acts as a password. It is used to authenticate messages that are sent between the management station and the device. Default is private.
TRAP Server User	
TRAP Server IP/FQDN	Identifies the IP address or fully qualified domain name (FQDN) of the trap server that the AirLink router sends SNMP traps to
TRAP Server Port	Identifies the specific port the trap server is on • 1–65535 (default is 162)
Community Name	The community name is a text string that acts as a password. It is used to authenticate messages that are sent between the management station and the device. There is no default value.

SNMPv3

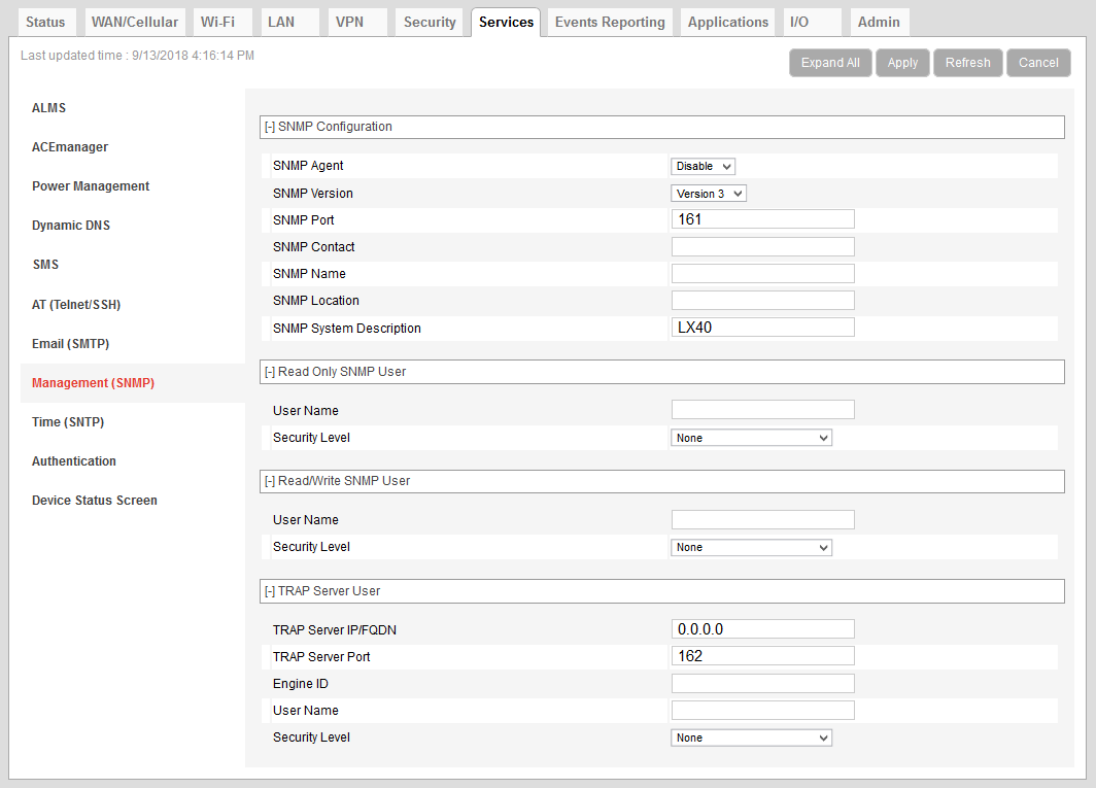


Figure 9-21: ACEmanager: Services > Management (SNTP) (Version 3)

Field	Description
SNMP Configuration	
Enable SNMP	Allows you to enable/disable SNMP Default is Disable.
SNMP Version	Allows you to select either SNMP protocol Version 2 (default) or Version 3 communications.
SNMP Port	Controls which port the SNMP Agent listens on: • 1–65535 (default 161)
SNMP Contact	This is a personal identifier of the contact person you want to address queries to. This is a customer defined field.
SNMP Name	This is the name of the device you want to refer to. This is a customer defined field.
SNMP Location	Location of where your device is stored. This is a customer defined field.
SNMP System Description	Use this field to enter a system description, if desired. The default value, which appears after the SNMP agent is enabled and the router rebooted, is the product name.

Field	Description
Read Only SNMP	
User Name	Allows these SNMP users to view, but not change the network configuration
Security Level	Security types available: None, Authentication Only, and Authentication and Privacy.
Authentication Type	Authentication types available: MD5 or SHA (version SHA-1) *Note: This field is only available when you select either Authentication and Privacy, or Authentication Only in the Security Level field.*
Authentication Key	This key authenticates SNMP requests for SNMPv3. • Minimum length: 8 ASCII characters • Maximum length: 255 ASCII characters Example: My Key_1234 *Note: This field is only available when you select either Authentication and Privacy, or Authentication Only in the Security Level field.*
Privacy Type	Privacy types available: AES (version AES-128) or DES *Note: This field is only available when you select Authentication and Privacy in the Security Level field.*
Privacy Key	This key ensures the confidentiality of SNMP messages via encryption • Minimum length: 8 ASCII characters • Maximum length: 255 ASCII characters Example: My Key_56789 *Note: This field is only available when you select Authentication and Privacy in the Security Level field.*
Read/Write SNMP For a description of the Read/Write SNMP fields, see Read Only SNMP on page 283.	
TRAP Server User	
TRAP Server IP/FQDN	Identifies the IP address or fully qualified domain name (FQDN) of the trap server that the AirLink router sends SNMP traps to
TRAP Server Port	Identifies the specific port the trap server is on • 1–65535 (default is 162)

Field	Description
Engine ID	The Engine ID is a mandatory field that uniquely identifies the SNMPv3 agent in the device to the server. The Engine ID is 5–32 octets long (1 octet is 2 hex characters). That is: • Minimum length: 10 hex characters • Maximum length: 64 hex characters Create the engine ID by entering hex characters only, with no leading 0x. For example, ABCDEF1020
User Name	See User Name on page 283.
Security Level	See Security Level on page 283.
Authentication Type	See Authentication Type on page 283.
Authentication Key	See Authentication Key on page 283.
Privacy Type	See Privacy Type on page 283.
Privacy Key	See Privacy Key on page 284.

Time (NTP)

The device can be configured to synchronize its internal clock with a time server on the Internet using the Network Time Protocol (NTP). If NTP or GPS is not enabled, the LX40 synchronizes with mobile network. If both GPS and NTP are enabled, NTP time will be used.

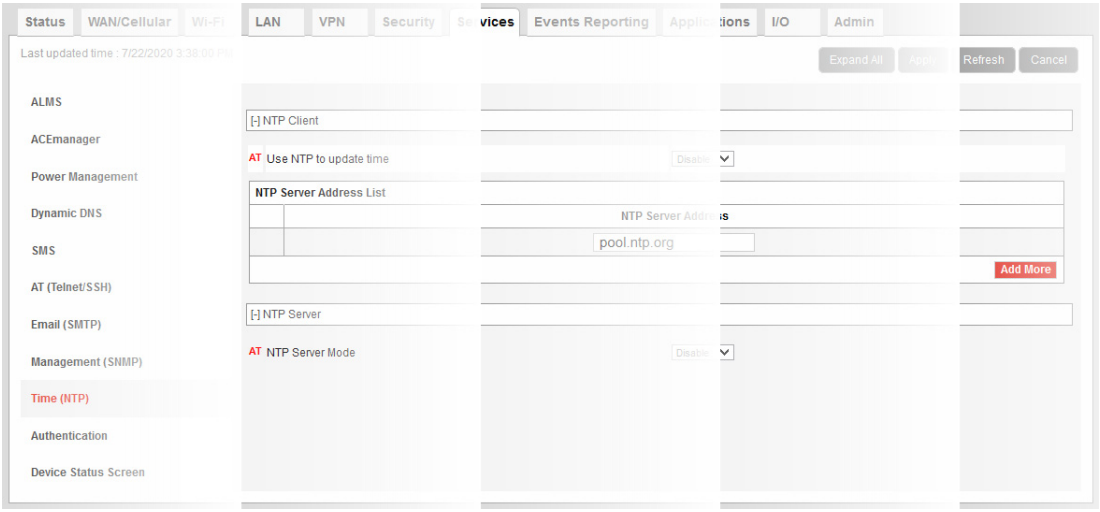


Figure 9-22: ACEmanager: Services > Time (NTP)

Field	Description
NTP Client	
Use NTP to update time	Enables daily NTP update of the system time. Default: Disable
NTP Server Address List	NTP Server IP address, or fully qualified domain name, to use if *NTP=1. If blank, time.nist.gov is used. • d.d.d.d=IP address • name=domain name Click Add More to add another NTP Server Address. You can add up to two additional NTP Servers. The additional NTP servers will provide backup if the primary server connection fails.
NTP Server	
NTP Server Mode	Enables the LX40 to act as an NTP server bound on port 123. If the NTP Client is not enabled, time from the cellular network or GPS will be used. Default: Disable

Authentication

ALEOS supports ACEmanager login using secure LDAP, RADIUS, and TACACS+ authentication schemes. This enables enterprise IT managers to centrally manage access to AirLink routers and produce an audit trail showing which users logged into specific devices and when.

Note the following:

- You can configure any or all of these schemes at the same time. When more than one scheme is configured, the authentication is successful if at least one of the schemes authenticates the user.
- Successful authentication can take time. For example, if you have all three authentication schemes enabled, ALEOS first attempts to reach the LDAP server. If it is unable to reach the LDAP server in the configured timeout period, it abandons the attempt and tries to reach the RADIUS server. If that server is unreachable after the timeout period, it then tries to reach the TACACS+ server. If none of the servers are reachable in the configured timeout periods, ALEOS falls back to ACEmanager user name and password authentication.
- LDAP, RADIUS, and TACACS+ provide authentication (checks the user's credentials) but do not check authorization (account expiration date, user rights, etc.) All users authenticated using the LDAP, RADIUS, and TACACS+ servers have administrative rights (i.e. a user account) and can modify the AirLink router settings. Ensure that LDAP, RADIUS, and TACACS+ users are authorized to modify device settings.
- LDAP, RADIUS, and TACACS+ are supported for ACEmanager logins, but are not supported by other AirLink router services such as Telnet, SSH, PPPoE, etc.

For instructions on configuring these authentication schemes, see:

- LDAP Authentication on page 286
- RADIUS Authentication on page 289
- TACACS+ Authentication on page 290

LDAP Authentication

Lightweight Directory Access Protocol (LDAP) is a network protocol for accessing and manipulating information stored in a directory. It is suitable for using with information that must be easily available and accessible, and does not change frequently. AirLink routers support LDAP version 3.

To configure LDAP:

1. Go to Services > Authentication.
2. In the LDAP Client field, select Enable.

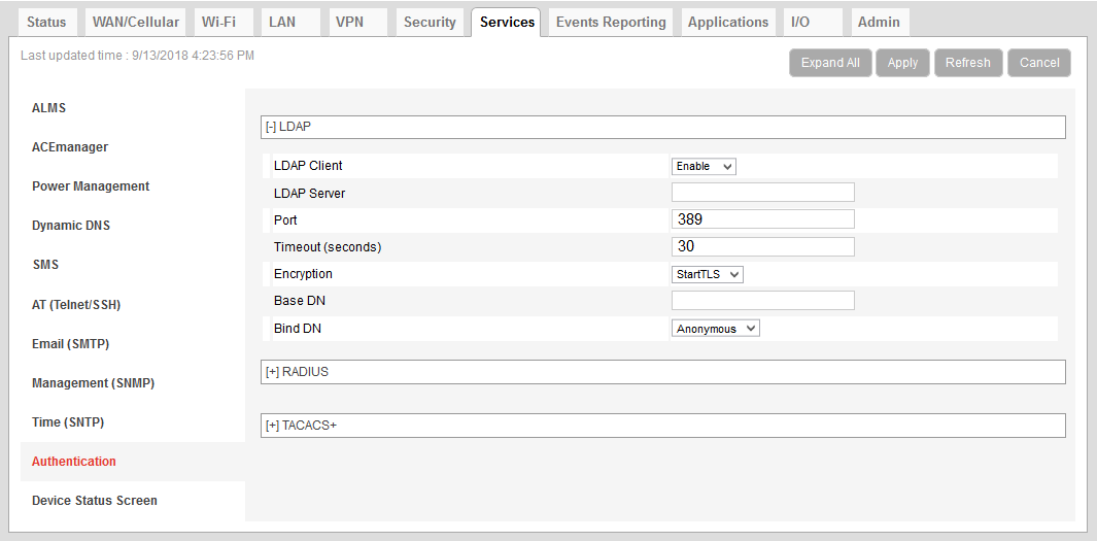


Figure 9-23: ACEmanager: Services > Authentication > LDAP

3. Enter:
   - The LDAP server IP address or resolvable domain name
   - The Port number (default is TCP port 389)
4. Ensure that the LDAP server IP address/port is reachable not only from outside the company, but also from inside the mobile network your router is on.

   You can use a utility such as netcat to test this. If netcat is available try:
   nc -z <IP> <port>; echo $?
   0 means success; 1 means failure.
5. Configure the other fields as described in the following table.

Field	Description
Timeout (seconds)	The time limit for the server to respond • 1–60 seconds (default is 30) *Note: If the server does not respond during the timeout (no route to host, server down, network too slow etc.), the authentication fails and the next enabled authentication mechanism checks the credentials.*
Encryption	Select the encryption type Options are: • None • SSL—Secure Sockets Layer protocol—Non-standard legacy (pre-LDAPv3) encryption type • StartTLS—Secure mechanism integrated into the LDAPv3 protocol (default)
Base DN	The Base DN is the path in the LDAP tree to the list of users (example shown is dc=sierrawireless,dc=com). This is where the LDAP protocol searches for a matching user to authenticate.

Field	Description
Bind DN	Choose how the LDAP search is done Options are: • Anonymous—A password is not required to perform requests in the database (default) • Explicit—A password is required to perform requests in the database
Bind DN User	This field only appears if you selected Explicit in the Bind DN field The full path of the user authorized to perform requests in the LDAP database (example shown is cn=admin,dc=sierrawireless,dc=com)
Bind on Password	This field only appears if you selected Explicit in the Bind DN field Password associated with the Bind DN user

6. Click Apply.

RADIUS Authentication

Remote Authentication Dial In User Service (RADIUS) uses UDP and checks authentication credentials, using a shared key.

To configure RADIUS:

1. Go to Services > Authentication.
2. In the RADIUS Client field, select Enable.

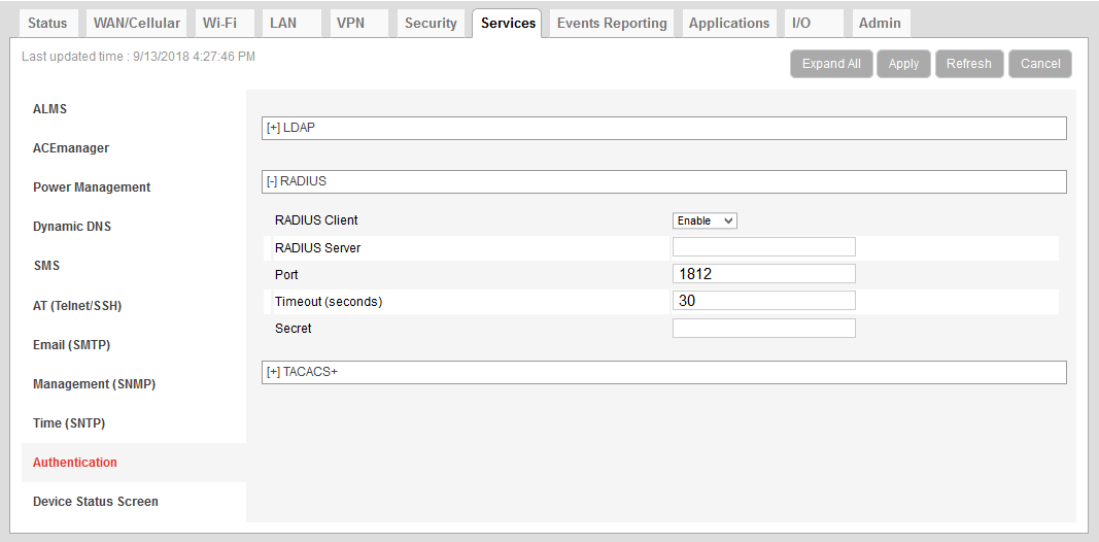


Figure 9-24: ACEmanager: Services > Authentication > RADIUS

3. Configure the other fields as described in the following table.

Field	Description
RADIUS Server	RADIUS server IP address or resolvable domain name
Port	By default, RADIUS uses UDP port 1812
Timeout (seconds)	The time limit for the server to respond • 1–60 seconds (default is 30) *Note: If the server does not respond during the timeout (no route to host, server down, network too slow etc.), the authentication fails and the next enabled authentication mechanism checks the credentials.*
Secret	Shared secret for configured server

4. Click Apply.

TACACS+ Authentication

Terminal Access Controller Access-Control System Plus (TACACS+) uses TCP protocol and encrypts the entire packet, except the header.

To configure TACACS+:

1. Go to Services > Authentication.
2. In the TACACS+ Client field, select Enable.

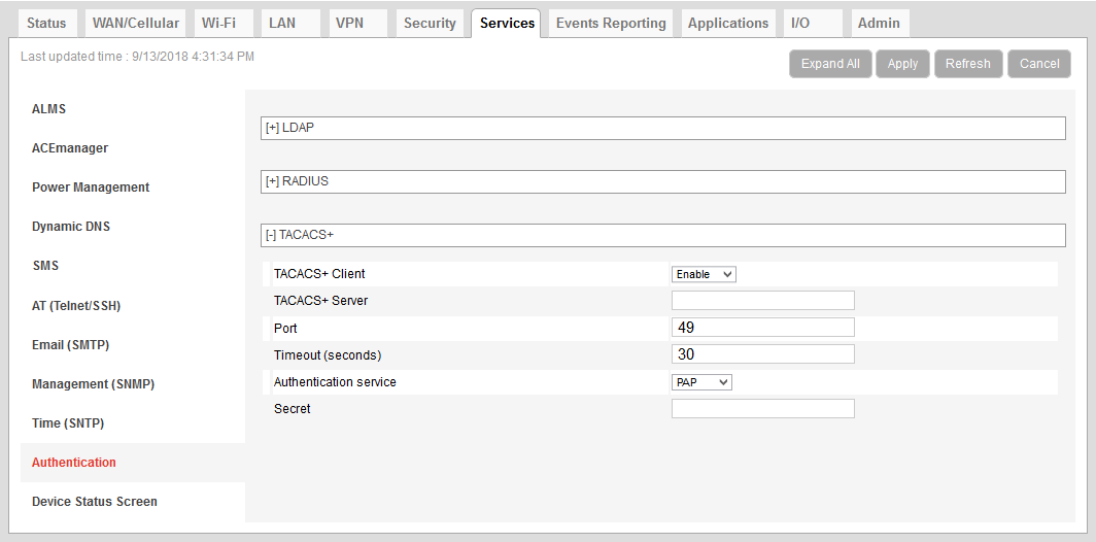


Figure 9-25: ACEmanager: Services > Authentication > TACACS+

3. Enter:
   - The TACACS+ server IP address or resolvable domain name
   - The Port number (default is TCP port 49)
4. Ensure that the TACACS+ server IP address/port is reachable not only from outside the company, but also from inside the mobile network your router is on.

   You can use a utility such as netcat to test this. If netcat is available try:
   nc -z <IP> <port>; echo $?
   0 means success; 1 means failure.

5. Configure the other fields as described in the following table.

Field	Description
Timeout (seconds)	The time limit for the server to respond • 1–60 seconds (default is 30) *Note: If the server does not respond during the timeout (no route to host, server down, network too slow etc.), the authentication fails and the next enabled authentication mechanism checks the credentials.*
Authentication service	The type of bind used for authentication Options are: • PAP—Password Authentication Protocol (default) • CHAP—Challenge Handshake Authentication Protocol The stronger of the two protocols. Recommended, provided it is supported by all the client devices. • Login—User name and password
Secret	Shared secret for configured server

6. Click Apply.

Device Status Screen

The Device Status Screen feature allows you to add Network, Template and Other (input voltage and temperature) status parameters to the ACEmanager Login screen. Once enabled, subsequent log ins to ACEmanager display whatever status parameters have been previously checked on the Device Status Screen.

Under Services > Device Status Screen, you can also configure the Login screen to display up to 10 lines of additional text (for a legal disclaimer, for example). See Legal Disclaimer on page 293.

Status Screen

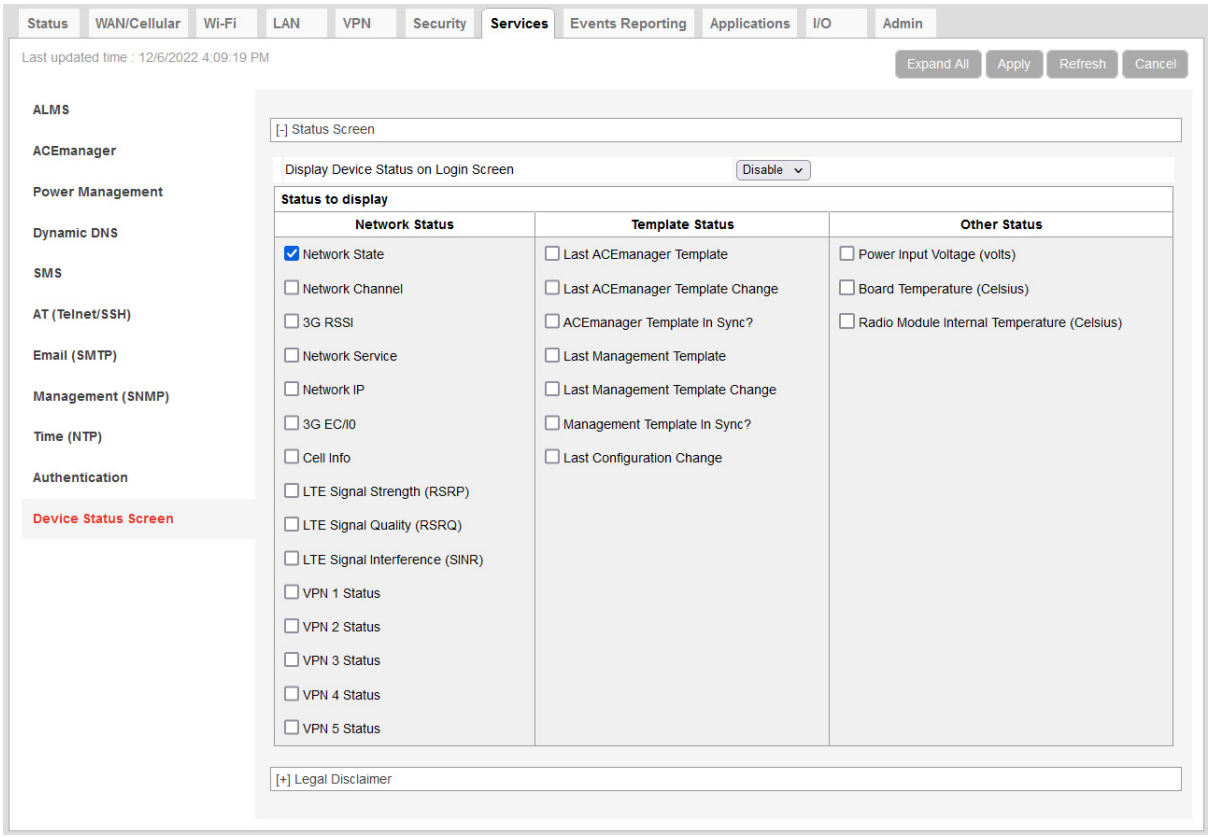


Figure 9-26: ACEmanager: Services > Device Status Screen

Field	Description
Enable Device Status on Login Screen	Enables device status parameters on the Login screen Options are: Disable (default) or Enable
Status to display	Select the network, template and other status parameters to display on the Login screen

Legal Disclaimer

In the Legal Disclaimer fields, you can enter up to 10 lines of text (maximum of approximately 200 characters per line) for displaying terms and conditions or other information on the ACEmanager Login screen.

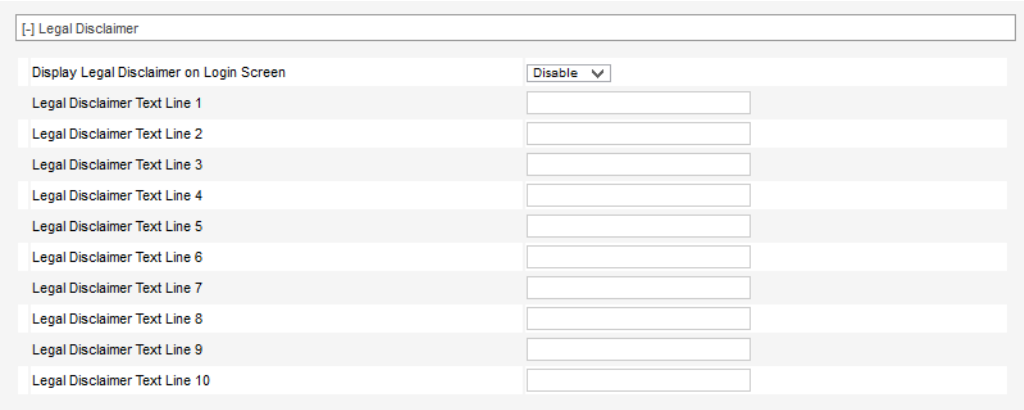


Figure 9-27: ACEmanager: Services > Device Status Screen > Legal Disclaimer

Field	Description
Display Legal Disclaimer on Login Screen	Enables the Login screen to display the text entered in the fields below. Options are: Disable (default) or Enable
Legal Disclaimer Text Line 1 - 10	Enter up to approximately 200 characters per line. *Note: The Login screen itself does not display up to 200 characters per line. The Login screen uses a proportional font, and the resulting line lengths can vary between roughly 40 to 60 characters, including spaces. See the example in Figure 9-28.*

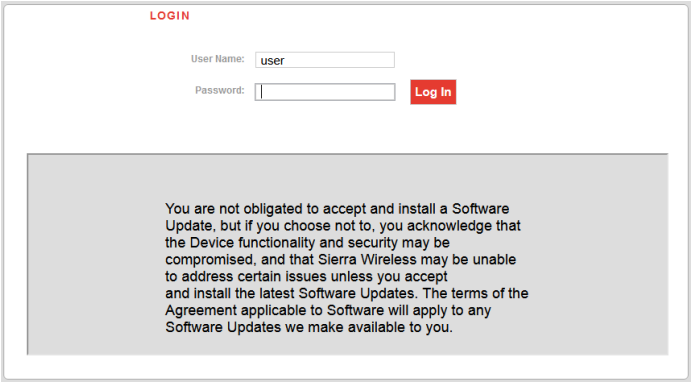


Figure 9-28: Legal Disclaimer text example

10: Events Reporting Configuration

Introduction

You can configure the AirLink LX40 to generate reports or initiate actions based on specified events. Events can either be generated internally, such as a change in location fix status or a signal quality indicator crossing a specified threshold, or by external devices attached to the analog or digital inputs.

Events that can trigger reports or actions include:

- A switch on connected equipment opens or closes (digital input)
- A pulse accumulation crosses a configured threshold
- An analog meter on connected equipment crosses a configured threshold (Analog input is reported in volts or transformed to meaningful units.)
- Changes to location information such as a location fix obtained or lost, changes in vehicle speed or heading, engine hours threshold crossed
- Changes to network status such as signal strength, network state, and network service
- The router's power supply (in volts) crosses a configured threshold
- The AirLink router board or radio temperature crosses a configured threshold
- A configured threshold for daily or monthly data usage is crossed

Depending on the type of report, reports can be sent to a local or remote report server, or an email address, or by SMS to a cell phone.

The occurrence of a configured event can also turn on or off a relay link.

Figure 10-1 summarizes how Event reporting works.

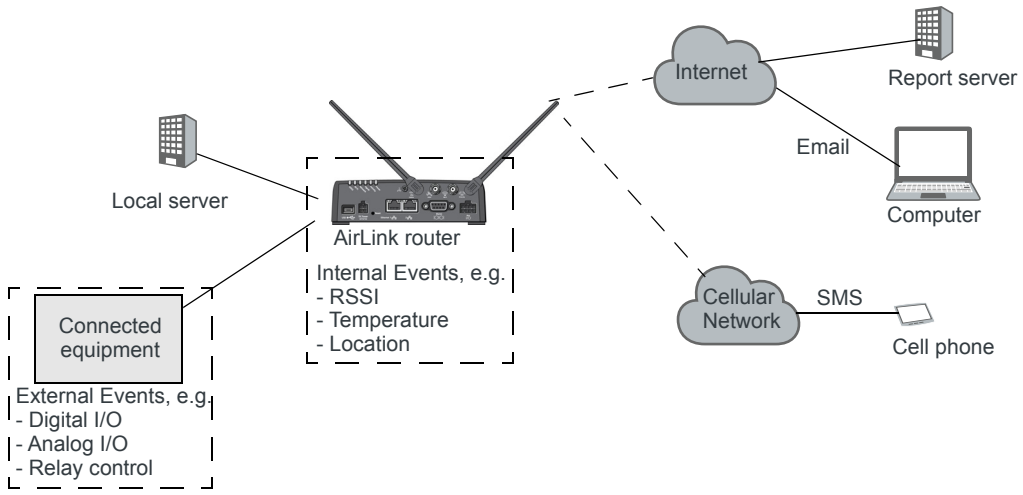


Figure 10-1: Events Reporting

Events/Actions are not one-shot activities. After an Action is performed, the Event is still active and will trigger an Action the next time the state change or threshold crossing occurs.

A single Event may activate one or more Actions. For example, if RSSI is below threshold, you can send an email (Action 1) and send an SMS message (Action 2).

A single Action may be activated by one or more Events. For example, if either the network state changes to Network Ready or the RSSI crosses a configured threshold, the same Action is performed.

Configuring Events Reporting

Before you begin

If you plan to use either of the following, configure that feature in ACEmanager before configuring Events Reporting:

- Email (Email (SMTP) on page 278)
- SNMP Trap (Management (SNMP) on page 280)

Configuring Events Reporting

When configuring Events Reporting, first configure the Action (that is, how you want to be notified when the Event occurs). Then configure the Event you want reported, and finally, link the Event to the Action.

Note: All Events Reporting configuration changes take effect after a short delay (about one minute). No reboot of the AirLink router is necessary.

Configuring the Action

Note: You can define a maximum of 5 Actions.

If an Action requires an IP connection, the following source ports are used. These are not configurable.

Actions (in the order configured)	Source port
Action 1	17348
Action 2	17349
Action 3	17351
Action 4	17352
Action 5	17353

Click the appropriate link for instructions on configuring the desired Action. Once the Action is configured, proceed to Event Types on page 307.

- Email
- SMS
- Relay Link
- SNMP TRAP
- Events Protocol Reports
  - Type, Length, Value

  - Binary
  - CSV- ASCII
  - XML
- Turn Off Services

Email

Note: Sending an email report is limited to SMTP servers that are open and do not require a secure login.

To configure ALEOS to send an email report:

1. Ensure that email is configured on the Services > Email (SMTP) screen. (See *Email (SMTP)* on page 278.)
2. On the Events Reporting tab, select Actions from the menu on the left.
3. Enter the desired Action Name.
4. From the drop-down menu in the Action Type field, select Email.

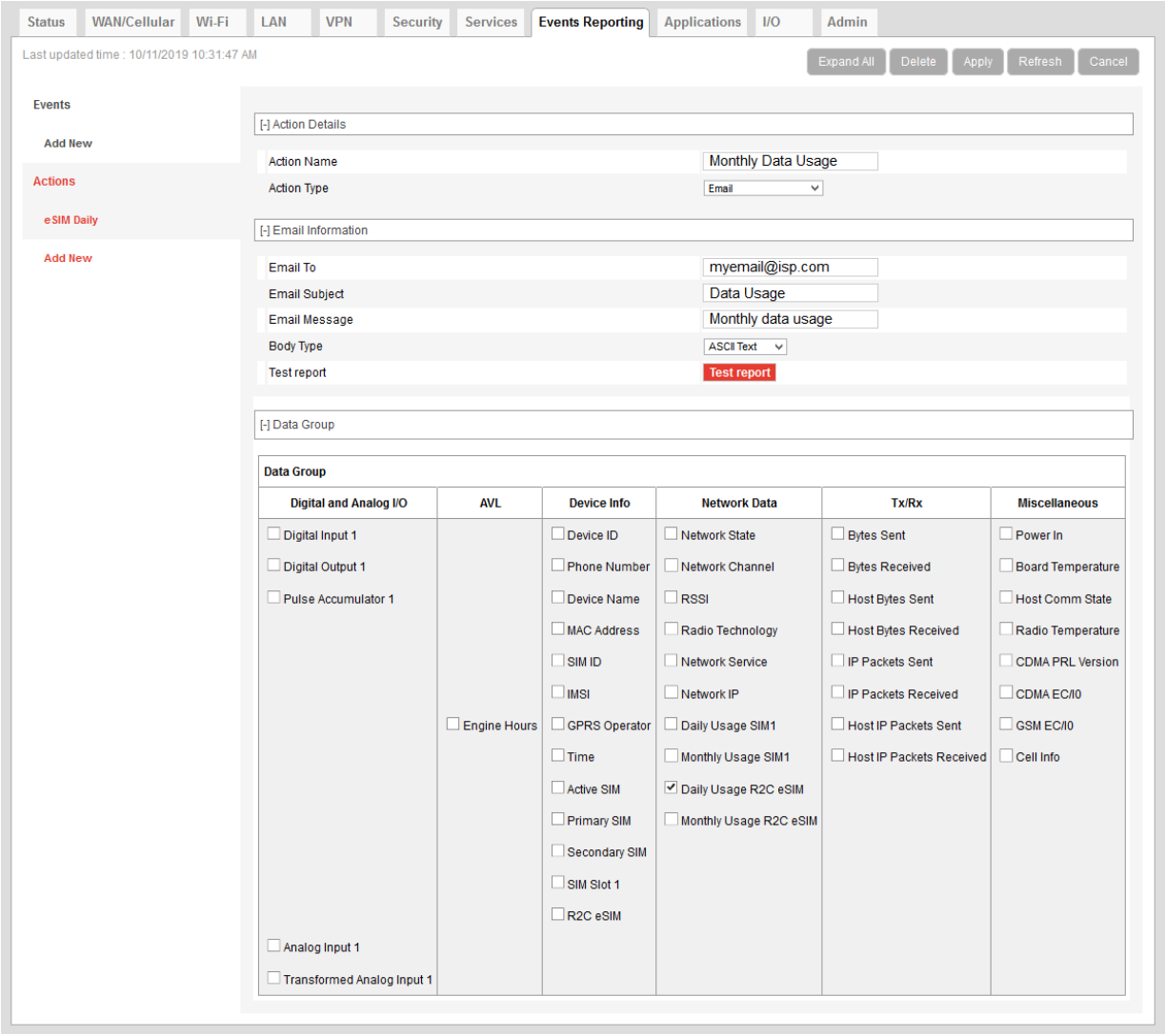


Figure 10-2: ACEmanager: Events Reporting > Actions > Action Type > Email

5. Complete the Email Information section with the recipient's email address, the subject line, and the desired message.
6. In the Body Type field, select the desired format for the Data Group information included in the report.
7. In the Data Group section, select the data to be included in the email report. For more information on the options, see Report Data Group on page 304.
8. Click Apply.

   The name you assigned to the Action appears under Actions. You can click on this any time to modify the settings.
9. Optional—If desired, after you have updated all the fields and clicked the Apply button, wait about 1 minute, and then click the Test report button to send a test email to verify that the destination and format are correct.

10. Click Events on the menu on the left and follow the instructions on Event Types on page 307 to configure the Event you want associated with this Action and to link the Action to the Event.

SMS

Note: You can only send SMS from your AirLink router if your cellular account allows SMS. You may need to have SMS added to the account. SMS from data accounts is blocked on some mobile networks. Outgoing SMS messages are limited to 140 characters. If the selected data exceeds 140 characters, the message is truncated.

To configure ALEOS to send an SMS message:

1. On the Events Reporting tab, select Actions from the menu on the left.
2. Enter the desired Action Name.
3. From the drop-down menu in the Action Type field, select SMS.

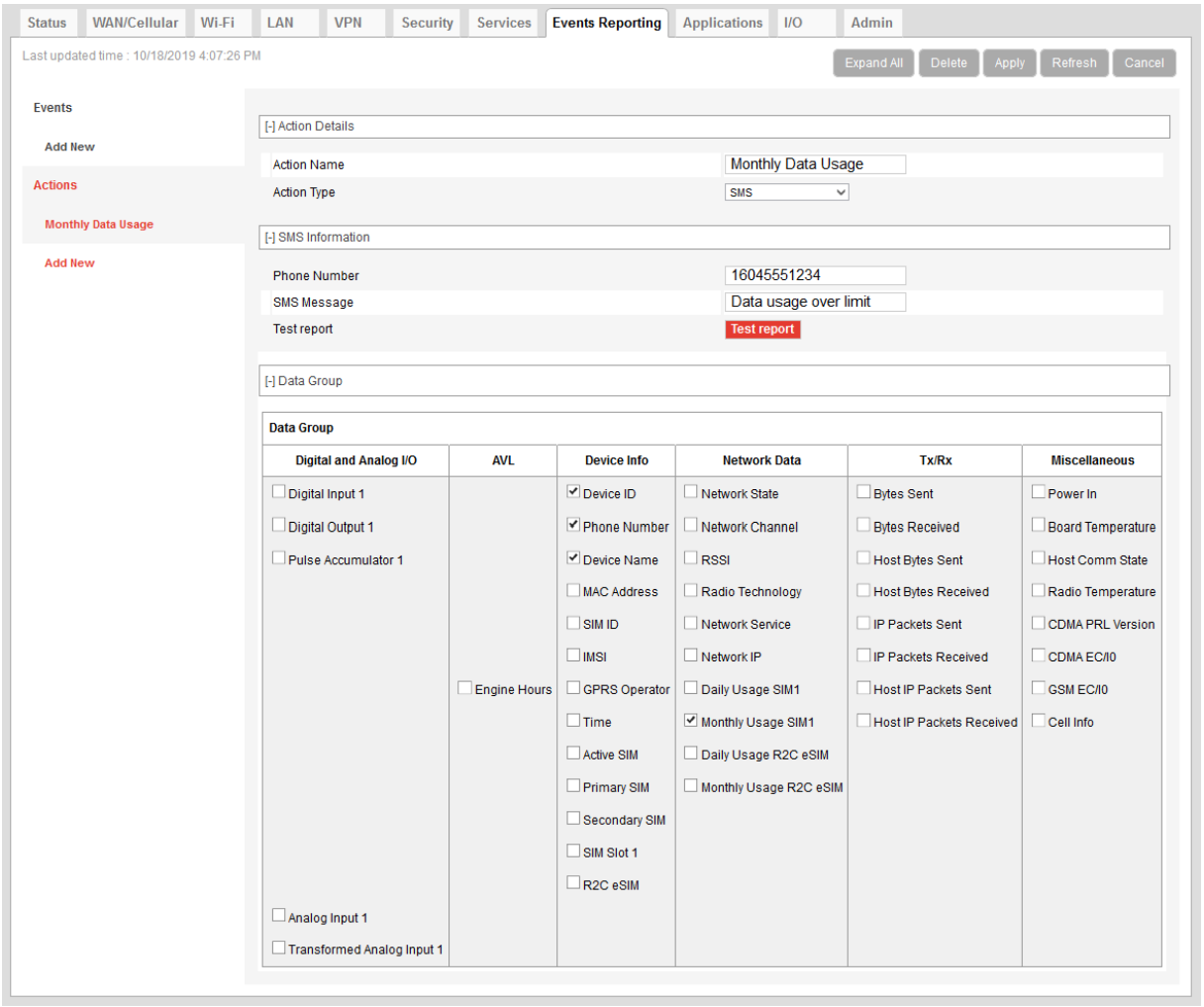
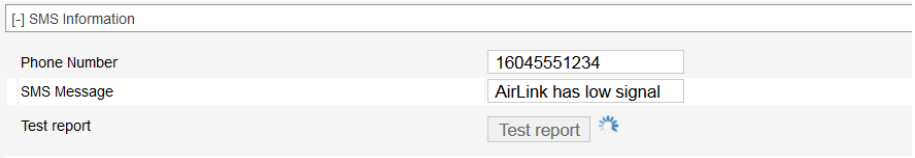


Figure 10-3: ACEmanager: Events Reporting > Actions > Action Type > SMS

4. Complete the SMS Information section with the recipient's phone number and the desired message to be included with the information from the Data Groups. The combined message and Data Group information cannot exceed 140 characters.
   - You can enter multiple phone numbers as a comma-separated list with no spaces. The length of the phone number string (the phone numbers and commas) must be under 256 characters. For example, 1234567890,1234567890,1234567890,1234567890,1234567890
5. In the Data Group section, select any data you would like to be included in the SMS. For more information on the options, see Report Data Group on page 304.
6. Click Apply.

   The name you assigned to the Action appears under Actions. You can click on this any time to modify the settings.
7. Optional—If desired, after you have updated all the fields and clicked the Apply button, wait until the progress circle disappears (about 30 seconds), and then click the Test report button to send a test SMS.



8. Click Events on the menu on the left and follow the instructions on Event Types on page 307 to configure the Event you want associated with this Action and to link the Action to the Event.

Relay Link

When an event occurs, you can signal or control connected devices using the router's relay outputs. The power connector has one relay.

Note: The relays are capable of switching small loads. If you need to switch a larger load, such as to open a door lock, connect the AirLink router's relay to an externally powered switch.

To configure ALEOS to turn a relay link on or off:

1. On the Events Reporting tab, select Actions from the menu on the left.
2. Enter the desired Action Name.
3. From the drop-down menu in the Action Type field, select Relay Link.

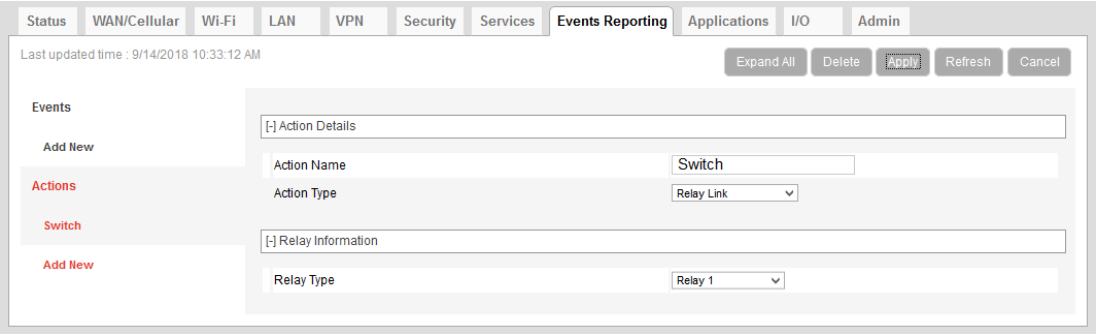


Figure 10-4: ACEmanager: Events Reporting > Actions > Action Type > Relay Link

4. In the Relay Type drop-down menu, select the desired Action:
   - Relay 1—Open
   - Relay 1, Inverted—Close
5. Click Apply.

   The name you assigned to the Action appears under Actions. You can click on this anytime to modify the settings.
6. Click Events on the menu on the left and follow the instructions on Event Types on page 307 to configure the Event you want associated with this Action and to link the Action to the Event.

SNMP TRAP

To configure ALEOS to send an SNMP TRAP notification:

1. Ensure that SNMP is configured on the Services > Management (SNMP) page. See Management (SNMP) on page 280.
2. On the Events Reporting tab, select Actions from the menu on the left.
3. Enter the desired Action Name.
4. From the drop-down menu in the Action Type field, select SNMP TRAP.

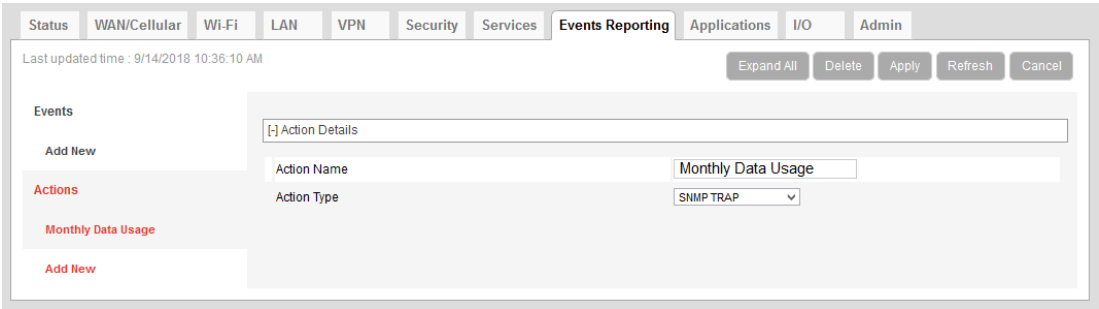


Figure 10-5: ACEmanager: Event Reporting > Actions > Action Type > SNMP TRAP

5. Click Apply.

   The name you assigned to the Action appears under Actions. You can click on this any time to modify the settings.
6. Click Events on the menu on the left and follow the instructions on Event Types on page 307 to configure the Event you want associated with this Action and to link the Action to the Event.

If you have more than one event or action configured, the trap indicates which Event triggered which Action.

Events Protocol Reports

Sierra Wireless' Events Reporting protocol allows for messages to be sent to the report server in four formats:

- **1 — Type, Length, Value** (TLV)—The TLV message consists of the MSCI ID as the type, the length of the data, and the actual data.
- **2 — Binary**—A binary condensed form of the TLV message
- **3 — CSV-ASCII**—An ASCII condensed and comma-delimited form of the TLV message
- **4 — XML**—An XML form of the data

Tip: *Because of its flexibility and robustness, the TLV message type is recommended for most reports using the Events Protocol. The Binary and ASCII forms do not contain a "type field" which can result in misinterpretation of data. Since the TLV and XML forms always include the type as well as the data, an unintentional type can be identified much easier.*

To configure an Events protocol report:

1. On the Events Reporting tab, select Actions from the menu on the left.
2. Enter the desired Action Name.
3. From the drop-down menu in the Action Type field, select the desired Events protocol report format.

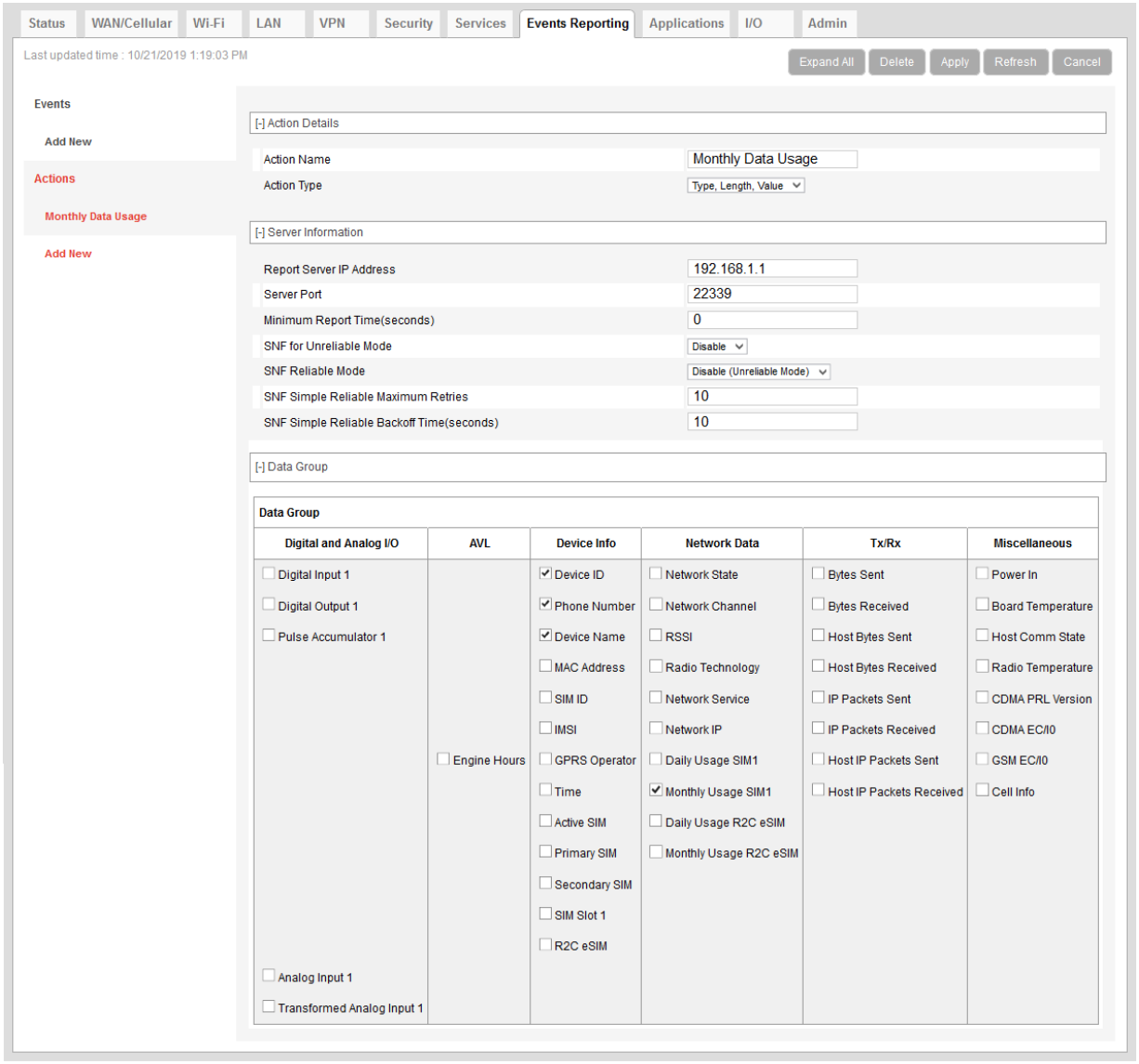


Figure 10-6: ACEmanager: Events Reporting > Actions > Action Type > Type, Length, Value

4. Enter the server information and if desired, the store and forward parameters.
5. In the Data Group section, select any data you would like to be included in the report. For more information on the options, see Report Data Group on page 304.
6. Click Apply.

   The name you assigned to the Action appears under Actions. You can click on this at any time to modify the settings.
7. Click Events on the menu on the left and follow the instructions on Event Types on page 307 to configure the Event you want associated with this Action and to link the Action to the Event.

Turn Off Services

This setting limits services and is primarily used in conjunction with monitoring data usage. For example, you could set the AirLink router to limit network service when data usage exceeds a configured threshold. For more information, see Data Usage on page 311.

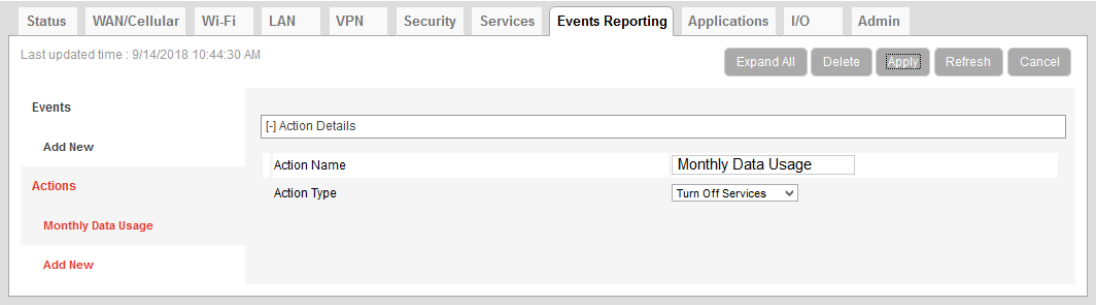


Figure 10-7: ACEmanager: Events Reporting > Actions > Action Type > Turn Off Services

Turn Off Services does not turn off all network use. Reports are still sent and over-the-air access to the device is allowed. You can still access the AirLink router locally, but Ethernet, USBnet, and Wi-Fi host access to the mobile network is blocked.

After Turn Off Services is triggered, serial communication that originates from the router continues to be sent out over the WAN port. This includes PAD and MODBUS data.

Serial communication that originates from a dial-up networking host is blocked by Turn Off Services. This includes PPP and SLIP data.

Report Data Group

For email, SMS, and Events Protocol (TLV, Binary, CSV-ASCII, and XML) messages, you can select the data you want to be included in the report. Check the box corresponding to the data displayed. By default, all the boxes are clear.

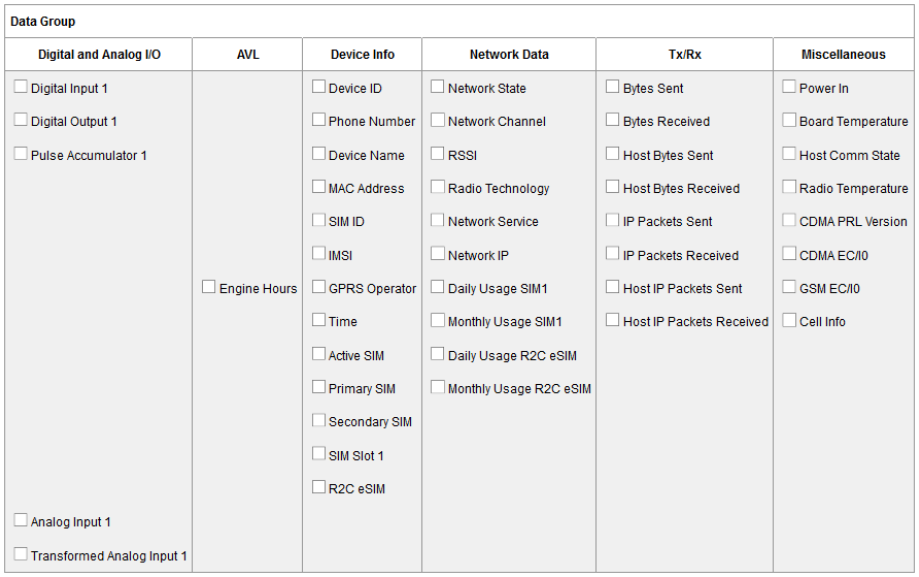


Figure 10-8: ACEmanager: Events Reporting > Actions > Data Group

The reports attributes are:

- Digital and Analog I/O

  Options are to include:
  - Digital Input 1—The status of the digital input
  - Digital Output 1—The status of the digital output
  - Pulse Accumulator 1—The pulse count for the digital input
  - Analog Input 1—The status of the analog input (reported in volts)
  - Transformed Analog Input 1—The status of the analog input (reported in units configured in ACEmanager I/O > Configuration—see Configuration on page 325)
- AVL
  - Engine Hours—The number of hours the engine has been on, based on either Power In or Ignition Sense
- Device Info

  Options are to include:
  - Device ID—The device ID (serial number) for the AirLink router
  - Phone Number—The phone number of the AirLink router
  - Device Name—The name of the AirLink router
  - MAC Address—The MAC Address of the Ethernet port of the AirLink router
  - SIM ID—The SIM ID of the AirLink router
  - IMSI—The IMSI of the SIM installed in the AirLink router
  - GPRS Operator—The wireless Mobile Network Operator the SIM card is associated with
  - Time—The time the AirLink router is active

  - Primary SIM—The SIM card slot that contains the Primary SIM card (the primary one is used for network connections if two SIM cards are installed)
  - Secondary SIM—The SIM card slot that contains the Secondary SIM card (the Secondary one is used for network connections if two SIM cards are installed)
  - SIM Slot 1—Whether or not a SIM card is present in SIM slot 1 (when R2C eSIM is available)
  - R2C eSIM—Whether or not a Ready to Connect eSIM is present
- Network Data

  Options are to include:
  - Network State—The network state for the AirLink router
  - Network Channel—The network channel to which the AirLink router is connected
  - RSSI—The signal strength for the AirLink router
  - Radio Technology—Type of service being used by the device (e.g. HSPA, LTE)
  - Network Service—The network service for the AirLink router
  - Network IP—The IP address given by the mobile network
  - Daily Usage— The daily usage of the SIM card (Units as configured on the Applications > Data Usage screen)
  - Monthly Usage— The monthly usage of the SIM card (Units as configured on the Applications > Data Usage screen)
  - Daily Usage SIM 1—The daily usage of the SIM card in slot 1, if R2C eSIM is available (Units as configured on the Applications > Data Usage screen)
  - Daily Usage R2C eSIM—The daily usage of the Ready to Connect eSIM, if available (Units as configured on the Applications > Data Usage screen)
  - Monthly Usage SIM 1—The monthly usage of the SIM card in slot 1, if R2C eSIM is available (Units as configured on the Applications > Data Usage screen)
  - Monthly Usage R2C eSIM—The monthly usage of the R2C eSIM card, if available (Units as configured on the Applications > Data Usage screen)
- Tx/Rx

  The Network Traffic in this group relates to the mobile network and the network between the AirLink router and any directly connected device(s). Options are to include:
  - Bytes Sent—The number of bytes sent on the mobile network since last reset
  - Bytes Received—The number of bytes received from the mobile network since last reset
  - Host Bytes Sent—The number of bytes sent from the network between the AirLink router and the connected device(s) since last reset
  - Host Bytes Received—The number of bytes received from the network between the AirLink router and the connected device(s) since last reset
  - IP Packets Sent—The number of IP packets sent on the mobile network since last reset
  - IP Packets Received—The number of IP packets received from the mobile network since last reset
  - Host IP Packets Sent—The number of IP packets sent from the network between the AirLink router and the connected device(s) since last reset
  - Host IP Packets Received—The number of IP packets received from the network between the AirLink router and the connected device(s) since last reset
- Misc Data

  Options are to include:

- Power In—The voltage level of the power coming in to the AirLink router at the time of the report
- Board Temperature—The temperature of the internal hardware of the AirLink router at the time of the report
- Host Comm State—The signal level between the AirLink router and the connected device(s)
- Radio Temperature—The temperature of the internal radio module
- CDMA PRL Version—PRL version used by the AirLink router
- CDMA EC/IO—The quality of the signal from the cellular CDMA network
- GSM EC/IO—The quality of the signal from the cellular GSM network
- Cell Info—The mobile network cell information for the AirLink router

Event Types

Note: You can define a maximum of 5 Events.

To define an Event:

1. On the Event Reporting tab, select Events > Add New from the menu on the left.

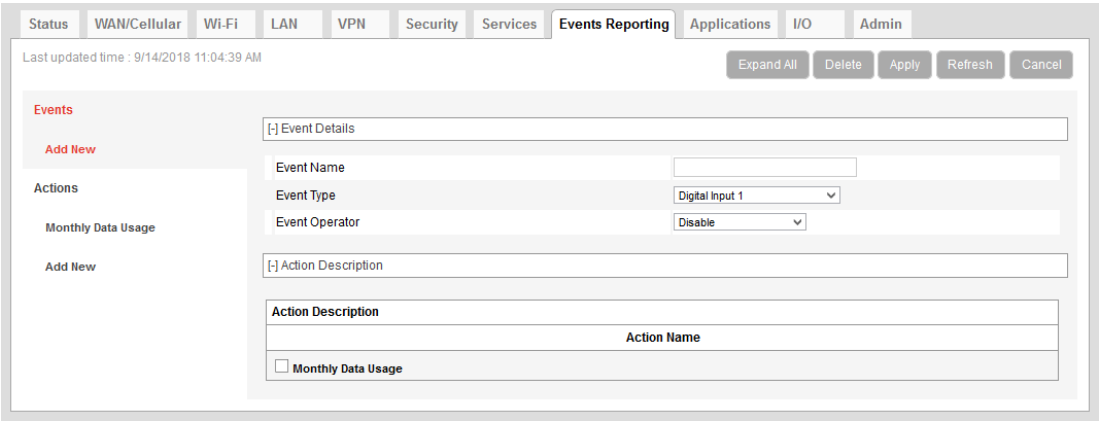


Figure 10-9: ACEmanager: Events Reporting > Events > Add New

2. Enter the desired name for the Event.
3. Select the Event type from the drop-down menu.
4. Select the Event Operator and the Value to Compare. The options available depend on the Event type you choose. See Table 10-1 on page 308 for a list of options for each Event type.
5. All the configured Actions appear at the bottom of the screen. Select the check box beside the Action you want to associate this Event with.
6. Click Apply.

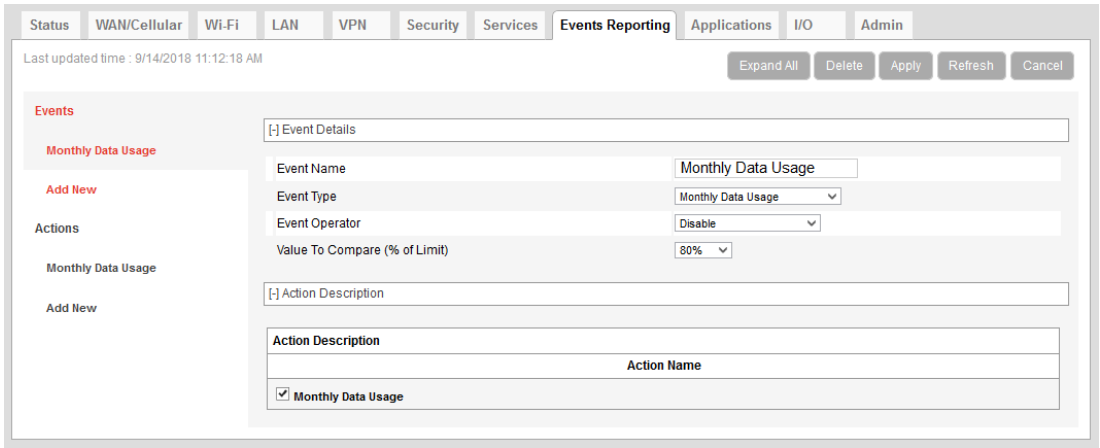


Figure 10-10: ACEmanager: Events Reporting > Events

Table 10-1: Event Types

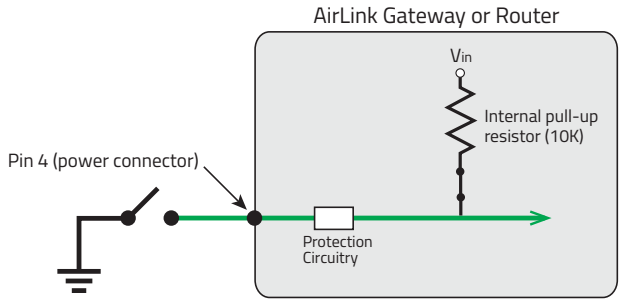
Event Name	Event Type	Event Operator Options	Values to Compare
Digital Inputs			
Digital Input See Figure 10-11 for switch configuration	State Change	• Disable • When Switch Closed (I/O high-to-low falling edge) • When Switch Opened (I/O low-to-high rising edge) • On any change	N/A
		 *Figure 10-11: Digital input switch configuration*	
Pulse Accumulator	Threshold Crossing	• Disable • When Changed By	• Pulse Accumulator Delta • Starting Trigger Value
Analog Input (volts)	Threshold Crossing	• Disable • When Above Threshold • When Below Threshold • When Cross Threshold	Value To Compare (Threshold (volts))
Transformed Analog	Threshold Crossing	• Disable • When Above Threshold • When Below Threshold • When Cross Threshold	Value To Compare (Units configured on the I/O screen) See Transformed Analog on page 327.
AVL			
Engine Hours	Threshold Crossing	• Disable • When Changed By	Value To Compare (Engine Hours)
Network			
RSSI	Threshold Crossing	• Disable • When Above Threshold • When Below Threshold • When Cross Threshold	Value To Compare (Signal Power (-dBm))

Table 10-1: Event Types

Network State	State Change	• Disable • When Cellular is Ready (Triggered when a cellular connection is established) • When Wi-Fi is Ready (Triggered when a Wi-Fi connection is established) • When either is Ready (Triggered when the router establishes either a cellular or Wi-Fi connection or when it switches between a cellular or Wi-Fi connection) Note: the last two options require a LX40 that supports Wi-Fi.	N/A
Network Service	State Change	• Disable • On Service • On No Service • On Change	Value To Compare (Network Service): • Roaming • 2G Service • Rev A or HSUPA • Any Data Service
Other Report Types			
Periodic Reports	Threshold Crossing (Time)	• Disable • Periodically	Value To Compare: Report Period (secs) *Note: The minimum interval between periodic reports is 3 seconds. Setting an interval less than 3 seconds results in only one report being sent.*
Power In	Threshold Crossing	• Disable • When Above Threshold • When Below Threshold • When Cross Threshold	Value To Compare (Power In Threshold (volts))
Board Temperature	Threshold Crossing	• Disable • When Above Threshold • When Below Threshold • When Cross Threshold	Value To Compare (Temperature Threshold (°C))
Radio Temperature	Threshold Crossing	• Disable • When Above Threshold • When Below Threshold • When Cross Threshold	Value To Compare (Temperature Threshold (°C))

Table 10-1: Event Types

Data Usage			
Note: Depending on your AirLink router model, you can choose whether the Event is for the SIM card in slot 1, slot 2 or Ready to Connect eSIM.			
Daily Data Usage	Threshold Crossing	• Disable • When Above Threshold	Value To Compare (% of Limit)
Monthly Data Usage	Threshold Crossing	• Disable • When Above Threshold	Value To Compare (% of Limit)
Note: You can only configure one Event with either a Daily Data Usage or Monthly Data Usage trigger. If you configure more than one, for example, a trigger when the Daily Data Usage reaches a certain percentage and a trigger when the Monthly Data Usage reaches a certain percentage, only the last threshold configured is used. *ALEOS Data Usage is approximate and should not be compared with data usage recorded by the Mobile Network Operator. SIERRA WIRELESS IS NOT RESPONSIBLE FOR DATA OVERAGES.*			

11: Applications Configuration

The Applications tab consists of a Data Usage section, a Garmin application, and an ALEOS Application Framework section.

Data Usage

Note: Before configuring Data Usage, ensure that the AirLink router receives date and time information from the mobile network, or from GNSS in the case of a router using Location technology. You can also use the ACEmanager SNTP client to receive time from an SNTP server. (See Time (NTP) on page 285.) If necessary, contact your Mobile Network Operator to confirm that the mobile network provides date and time information to connected devices.

The Data Usage feature on the Applications tab in conjunction with Events Reporting provides you with a way to actively monitor cellular data usage.

Once data usage is configured, you can use event reporting to:

- Actively monitor the cellular data usage by configuring monthly and/or daily usage level thresholds that result in notifications being sent to you (e.g. email, SMS, or SNMP Trap) when the threshold is reached.
- Limit mobile network communication until the end of the billing period when the data limit is reached by blocking connected LAN devices from using the mobile network. Traffic sent to and from the AirLink router is not blocked. Over-the-air access to ACEmanager and the Telnet/SSH AT interface is still available.

Note: You can configure Events Reporting to notify you when the threshold set in Data Usage is reached, but ALEOS does not block further access to the mobile network unless you also create a second action to Turn Off Services.

Note: ALEOS Data Usage is approximate and should not be compared with data usage recorded by the Mobile Network Operator.
Sierra Wireless is NOT responsible for data overages.

Step 1—Configure Data Usage

1. In ACEmanager, go to Applications > Data Usage.
2. In the Usage Monitoring field, select Enable.
3. In the side menu, select the SIM slot you want to configure: Data Usage Slot 1 or Data Usage R2C eSIM (if available).

Note: If R2C eSIM is available, an additional Data Usage page appears.

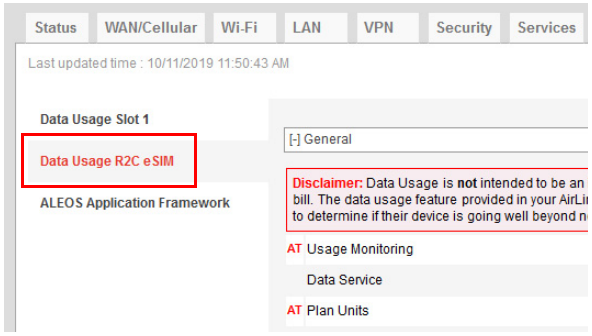


Figure 11-1: Applications > Data Usage (R2C eSIM available)

Data usage monitors the slot. If you change the SIM card in the slot being monitored, the data usage tracked is the accumulative data usage for all SIM cards placed in that slot.

4. Enter the desired values in the Daily or Monthly Limit fields (in GB or MB), and the day of the month that the billing cycle starts. For more details, see the table starting on page 313.
5. Click Apply.

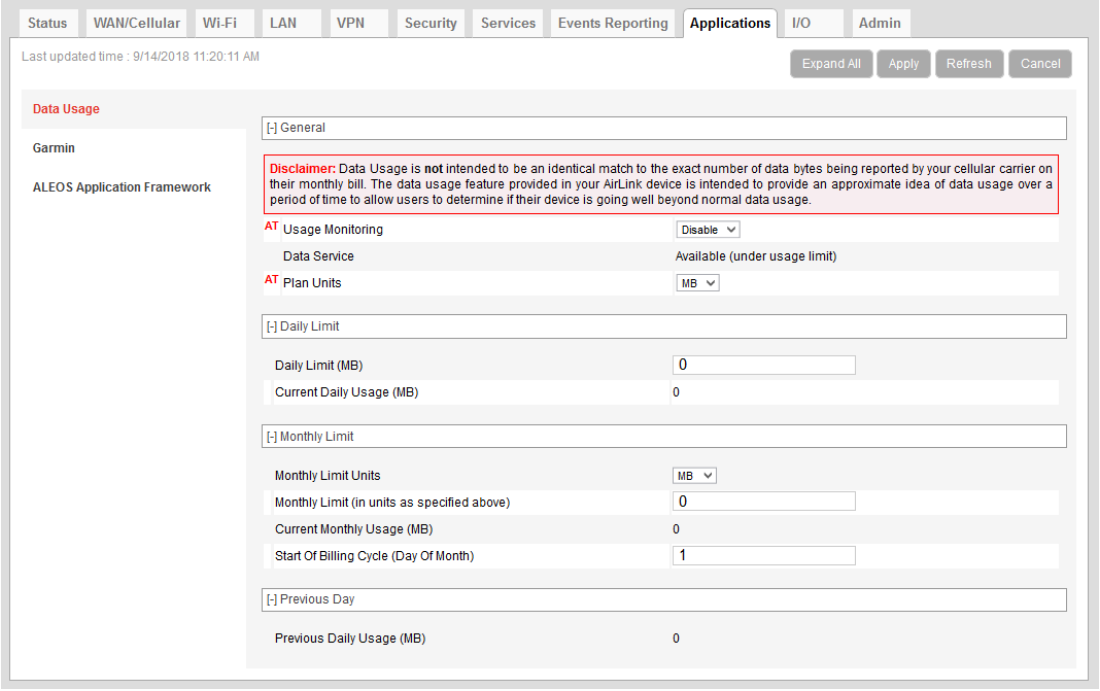


Figure 11-2: ACEmanager: Applications > Data Usage

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td colspan="2">General</td></tr>
<tr><td>Usage Monitoring</td><td>Use this field to enable or disable data usage monitoring. Options are:
Disable (default)
Enable</td></tr>
<tr><td>Data Service</td><td>This field is intended for use in conjunction with Events Reporting, specifically a Data Usage Event with Turn Off Services as the configured action. For more information and instructions on configuring the appropriate Event Reporting settings, see Stopping Service when the Event Reporting Threshold is Reached on page 318.
<table>
<tr><th>Data Usage</th><th>Turn Off Services Events Reporting action configured</th><th>Data Service displays....</th></tr>
<tr><td>Over threshold configured in Events Reporting</td><td>No</td><td>Available (under usage limit)</td></tr>
<tr><td>Under threshold configured in Events Reporting</td><td>Yes</td><td>Available (under usage limit)</td></tr>
<tr><td>Over threshold configured in Events Reporting</td><td>Yes</td><td>Blocked (usage limit exceeded)</td></tr>
</table>
Warning: This field shows the status of the data usage, but mobile network access is not actually stopped when this field reads “Blocked (usage limit exceeded” unless you have also configured Event Reporting to Turn Off Services when the threshold is reached. See Stopping Service when the Event Reporting Threshold is Reached on page 318.</td></tr>
<tr><td>Plan Units</td><td>Select the units used for your data plan. The options are:
MB—Megabytes (default)
KB—Kilobytes
Note: When you change the units in this field, the units for values in the Daily Limit and Monthly Limit fields are not converted and must be updated manually.</td></tr>
</table>

Field	Description
Daily Limit	
Daily Limit (MB)	This is the user-specified daily (24 hour) data usage limit (in MB or KB, depending on the value in the Plan Units field). You can specify data usage limits on a daily basis. A limit is essentially a threshold that can trigger the software to take a user-specified action if the usage goes above the threshold. See Events Reporting Configuration on page 294. *Note: The Daily Limit value MUST be expressed as an integer (i.e., a whole number) and NOT as a fraction (e.g., "3.5").* *Note: Daily usage is cleared at midnight, UTC.* **Caution:** *Data usage limits are approximate and based on reporting conditions in ALEOS. Data usage may run over the amount set in this field before the action specified for the threshold trigger takes effect.* **Tip:** *ALEOS reads the data usage every 3 to 5 minutes. If you are using an application that requires high data usage, you can set an alert to warn you when data usage reaches a safe limit that takes into account the amount of data expected over the 3 to 5 minutes between data usage readings. For information on how to set an alert or other action, see Events Reporting Configuration on page 294.*
Current Daily Usage (MB)	Displays the current daily data usage (in MB or KB, depending on the option selected in the Plan Units field) *Note: Data usage includes data sent and data received.*

Field	Description
Monthly Limit	
Monthly Limit Units	Select the units used for your monthly data plan. This option does not appear if KB is selected for Plan Units. The options are: • MB—Megabytes (default) • GB—Gigabytes
Monthly Limit	This is the user-specified monthly data usage limit (in KB, MB or GB, depending on the option selected in the Plan Units and Monthly Limit Units field). Data usage accumulates on a monthly basis and on the date you specified (the “rolling month”). Data usage accumulates during the month until the end of the next billing period, at which point the data usage totals are reset. *Note: The Monthly Limit value MUST be expressed as an integer (i.e., a whole number) and NOT as a fraction (e.g., “3.5”)* *Note: Monthly usage is cleared at midnight, UTC on the last day of the billing cycle.* **Caution:** *Data usage limits are approximate and based on reporting conditions in ALEOS. Data usage may run over the amount set in this field before the action specified for the threshold trigger takes effect.*
Current Monthly Usage	Displays the current monthly data usage (in MB or KB, depending on the value configured in Plan Units on page 313.) *Note: Data usage includes data sent and data received.*
Start of Billing Cycle (Day of Month)	Enter the desired start of the billing cycle. For example, 3 (Day 3 of every month) Changing the value in this field resets the Current Monthly Usage field to zero.
Previous Day	
Previous Daily Usage	Shows the data usage for the previous day (in MB or KB, depending on the value configured in Plan Units on page 313.) *Note: Data usage includes data sent and data received.*

Step 2—Configure Event Reporting

1. In ACEmanager, go to Events Reporting > Actions.

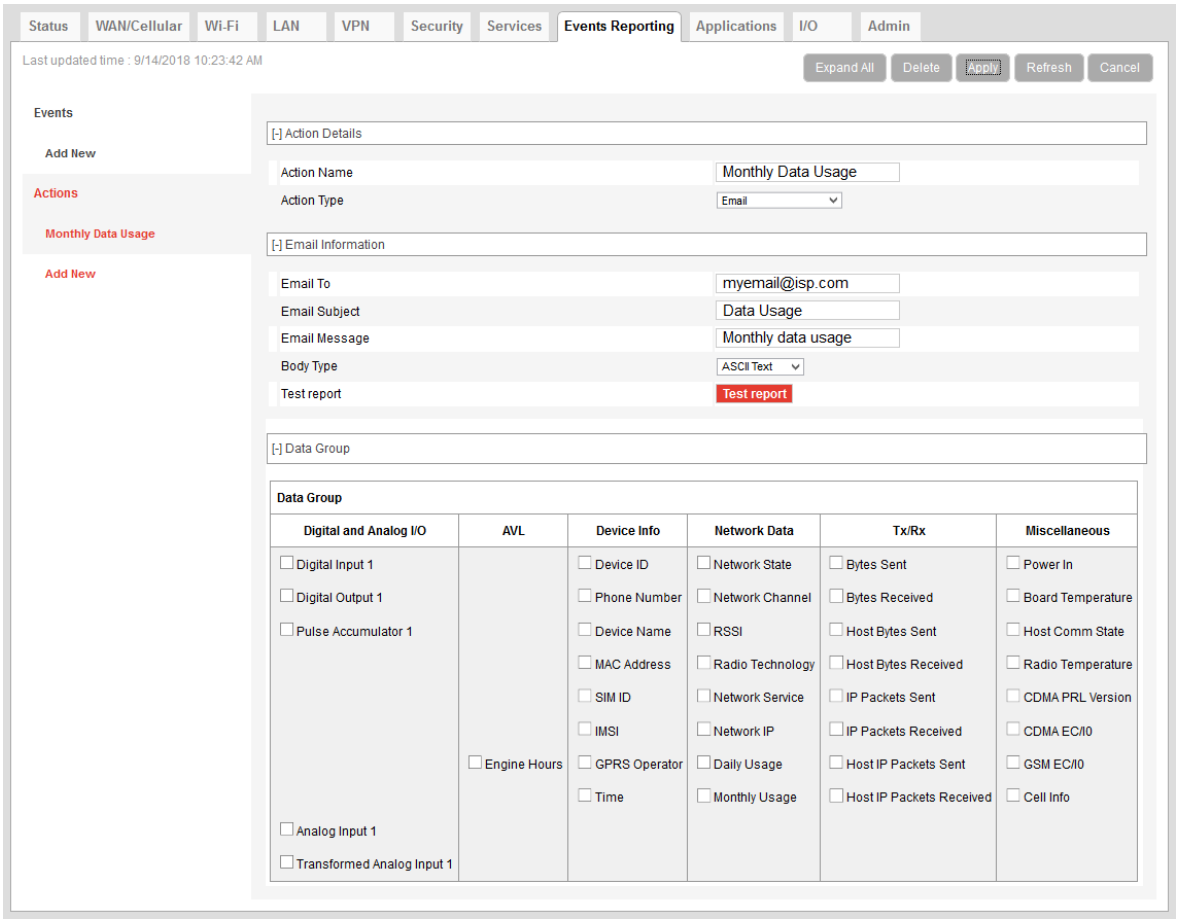


Figure 11-3: ACEmanager: Events Reporting > Actions

2. Select the desired Action to be performed when the Event is triggered, such as SNMP Trap or Email, and enter the appropriate information in the related fields. For detailed instructions, see Configuring Events Reporting on page 295.
3. Some reports give you the option to include additional information. If applicable, select the check box(es) in the Data Group section of the screen to indicate the information to be included in the report.

Note: You can have more than one Action for a single Event, but you can only have one Daily Usage and one Monthly Usage Event.

4. Click Apply.
5. Go to Events Reporting > Events and configure a data usage threshold.

   The threshold is specified as a percentage of the monthly or daily limit. For example, if you have a monthly limit of 5 GB, and the threshold is set at 80%, then threshold is

reached at 4 GB of data. For detailed instructions, see Configuring Events Reporting on page 295.

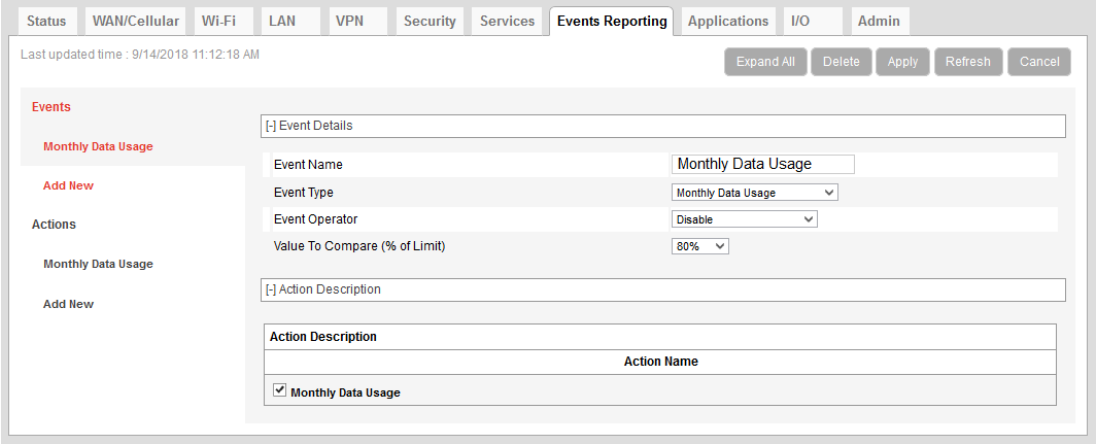


Figure 11-4: ACEmanager: Events Reporting > Events

6. At the bottom of the screen, select the check box beside the Action you want to associate the Event with.
7. Click Apply.

Stopping Service when the Event Reporting Threshold is Reached

When you are approaching the data plan limit, you may want to turn off cellular communication to any LAN connected user devices until the next billing cycle starts.

To turn off services on the data plan when the limit is reached:

1. In ACEmanager, go to Events Reporting and select Actions Add New on the left menu.
2. Enter the desired name for the action.
3. In the Action Type field, select Turn Off Services.

   When triggered, this action prevents cellular communication to all LAN connected devices. Traffic sent from the AirLink router is not blocked. Over-the-air access to ACEmanager and the Telnet/SSH AT interface is still available.

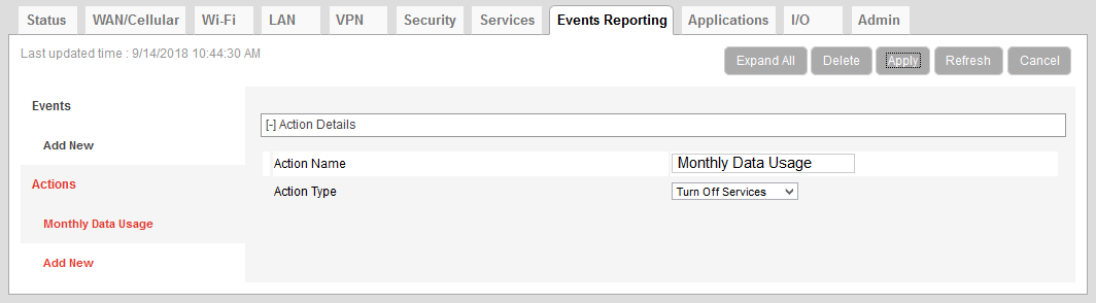


Figure 11-5: ACEmanager: Events Reporting

4. Click Apply.
5. Select Events on the left menu.
6. Enter the desired Event Name.
7. In the Event Type field, select either Daily Data Usage or Monthly Data Usage.
8. In the Event Operator field, select When Above Threshold.
9. Set the desired Value to Compare (% of limit).
10. At the bottom of the screen, select the check box beside the Action you want to associate the Event with.

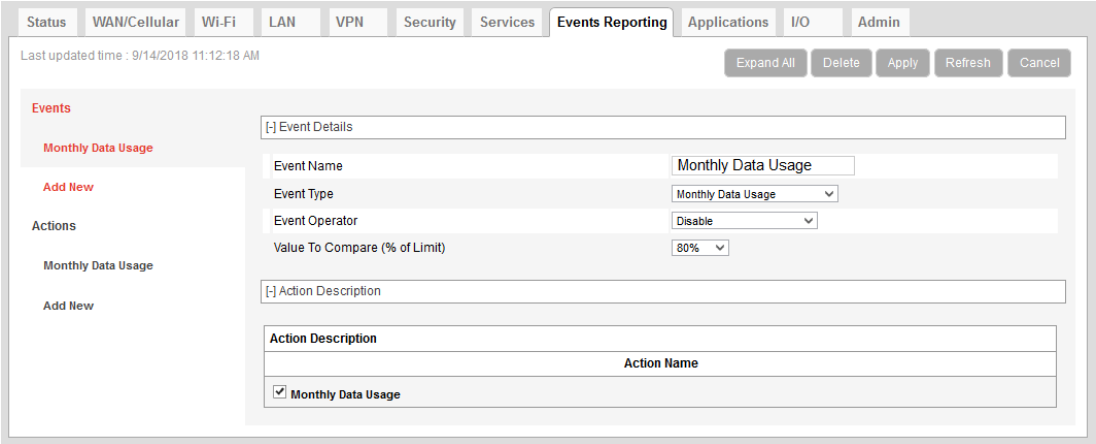


Figure 11-6: ACEmanager: Events Reporting > Events

11. Click Apply.

Note: When the configured threshold is crossed, all traffic between connected devices and the cellular network is blocked. This helps to reduce data usage, but it does not completely stop it. Traffic to and from the AirLink router is not blocked, and over-the-air access to ACEmanager and the Telnet/SSH AT interface is still available.
Setting the "Turn Off Services" threshold at a level below 100% of the data plan helps to reduce data usage before the data plan limits are exceeded.

ALEOS Application Framework

ALEOS Application Framework (AAF) allows you to develop your own applications to run inside an AirLink router and leverage the ALEOS Application Platform (source.sierrawireless.com/resources/airlink/aleos_af/aleos_af_home/) or a customer-developed server platform.

Sierra Wireless routers come without an AAF user password. Before using AAF, select a password and go to Admin > Change Password to enter it. See AAF User Password on page 330. The AAF Development Studio (DevStudio) application uses this password to communicate with the router.

Once the AAF user password is set up, embedded and server application developers can start using AAF by accessing the ALEOS Application Platform (source.sierrawireless.com/resources/airlink/aleos_af/aleos_af_home/).

You may want to reserve the serial port for an AAF application. To do so, select Enable in Applications > ALEOS Application Framework > Serial Port Reserved.

It is not necessary to reserve the serial port before activating AAF.

Reserving the serial port is mandatory only if the AAF application will be using the serial port.

Note: When you reserve the serial port for AAF, it cannot be used for any other serial-related ALEOS features.

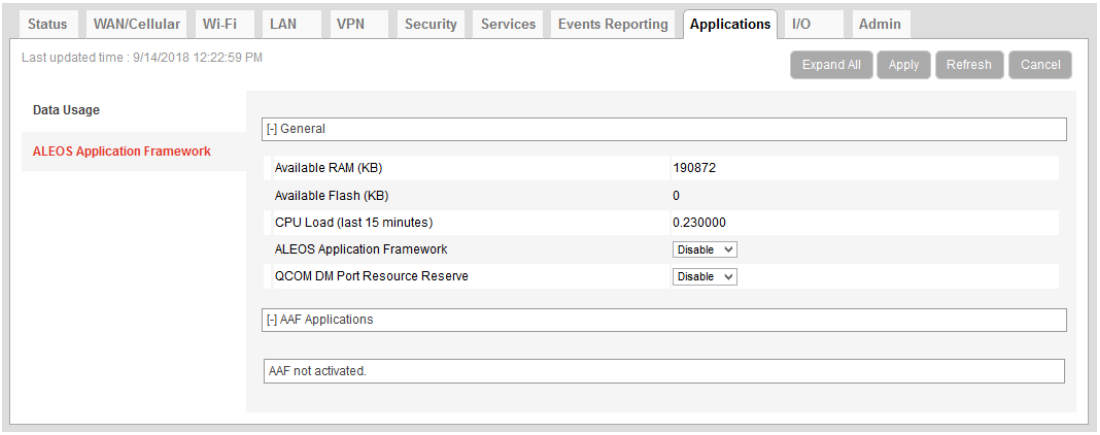


Figure 11-7: ACEmanager: Applications >ALEOS Application Framework (no applications installed)

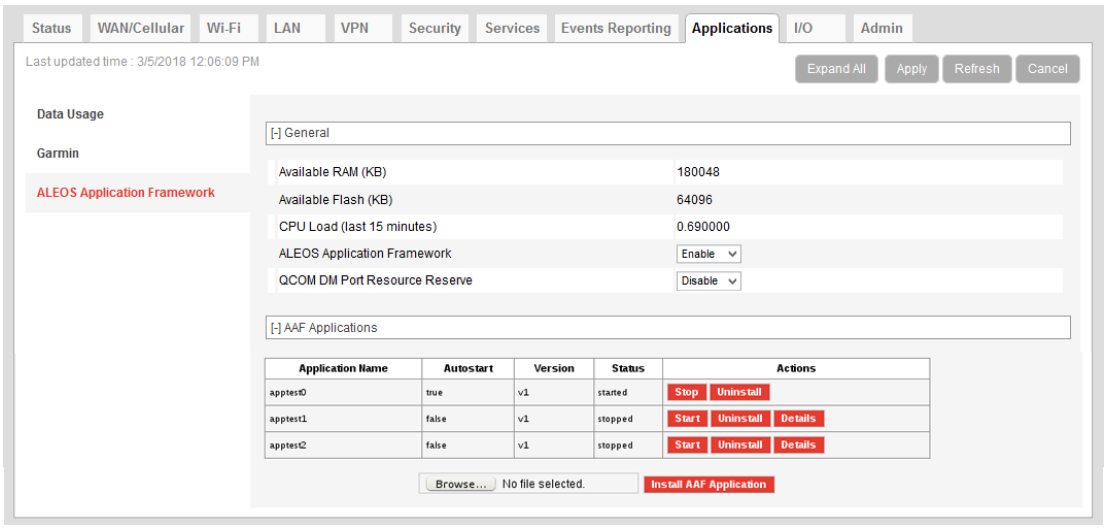


Figure 11-8: ACEmanager: Applications > ALEOS Application Framework (applications installed)

Field	Description
General	
Available RAM (KB)	Available RAM in kilobytes (1000 bytes), updated every 30 seconds
Available Flash (KB)	Available Flash on the user partition in kilobytes (1024 bytes), updated every 30 seconds
CPU Load (Last 15 minutes)	CPU load, averaged over the last 15 minutes and updated every 30 seconds The CPU load relates to how many applications are attempting to execute in parallel over the 15-minute period. If the load is greater than 1, some applications are waiting for CPU capacity to become available and may be delayed in launching.
ALEOS Application Framework	Enable or disable (default) the ALEOS Application Framework (ALEOS AF). If enabled, ALEOS AF starts at boot time. When the Reset to Factory default button on the Admin > Advanced page is pressed, ALEOS AF is disabled.
QCOM DM Port Resource Reserve	Reserves the QCOM DM port for ALEOS AF applications. Options are: Enable (Reserve access for ALEOS AF) or Disable (Reserve access for ALEOS). Default: Disable

Field	Description
AAF Applications	
Application Name **Autostart** **Version** **Status** **Actions**	If there are no AAF applications enabled and started, one of the following messages is displayed: • "AAF not activated"—AAF is not enabled • "AAF not started"—AAF is not yet started • "No AAF Application installed" When AAF is enabled and started, you can install an application. To install an application: 1. Click Browse... and navigate to the application you want to install. 2. Click the Install AAF Application button. For installed applications, the table shows the: • Application name • Autostart—true or false • Version • Status—started or stopped Use the Stop/Start, Uninstall, and Details buttons to manage your applications. For more information on the Details button, refer to *AAF—Customizing UI Elements* on source.sierrawireless.com.

12: I/O Configuration

The I/O tab in ACEmanager applies to all Sierra Wireless AirLink routers that feature I/O ports.

You can use the input/outputs on AirLink routers to generate reports based on a threshold being crossed, a switch being opened or closed, or the number of times a switch has changed state.

Use the Events Reporting screen to configure reports. (See Events Reporting Configuration on page 294.) Use the I/O screen to view the current state of the analog and digital inputs, to turn the relays on and off, and to configure the units you want used in the reports based on analog inputs.

RS485 Configuration on page 374The AirLink LX40 has one pin (Pin 4 on the power connector) that can be configured as a digital input/output, relay output, or analog input.

More information

For more information, refer to the Hardware User Guide for the AirLink LX40.

Analog inputs

Analog inputs monitor a voltage range in small increments. This allows you to monitor equipment that reports status as an analog voltage. Examples include:

- Power supply voltage
- Temperature, weight, volume, flow represented as voltage
- An incremental gauge with a voltage output
- Vehicle battery voltage

The raw data for the changes being monitored is in volts, but you can use the I/O Configuration screen in ACEmanager to convert voltage to the desired units of measurement. See Transformed Analog on page 327.

Digital inputs

Digital inputs monitor contact closures on a switch. This allows you to monitor changes such as:

- When a door or latch is open or closed
- When a container is full or empty
- When a switch or valve is opened or closed
- The level of fuel in a vehicle (connected to an on/off sensor)
- When the trunk of a vehicle is opened or closed

You can use Events Reporting to generate reports and actions based on the digital input values.

Volts	Interpreted as
≤ 1.0	Digital 0
≥ 2.7	Digital 1

For more information on setting up reports, see Events Reporting Configuration on page 294.

Relay outputs

You can use relay outputs to trigger an intermediary switch and change the state of equipment.

Current State

The Current State screen allows you to view the current values (as of the last refresh) of analog and digital inputs, pulse counts for digital inputs, and raw and transformed values for analog inputs. You can also use this screen to change the current values for Relay outputs. This change occurs immediately without a reboot.

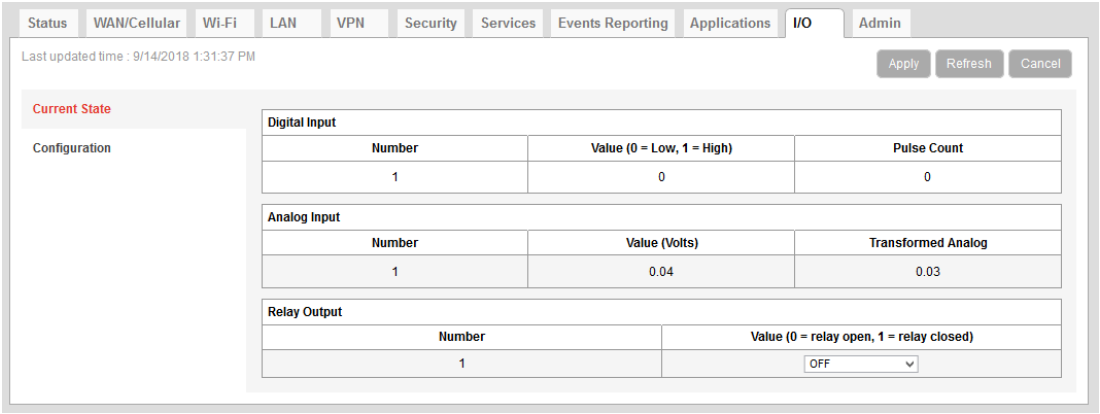


Figure 12-1: ACEmanager: I/O > Current State

Table 12-1: I/O: Current State

Command	Description
Digital Input	
Number	Displays the number of digital inputs. The corresponding hardware pins are: **Digital Input** / **Corresponding hardware pin** 1 / Pin 4 on Power connector
Value	Displays the current value for the digital input: • 0 —Low • 1 —High You can also use an AT command to read these values. See *DIGITALIN[n]? on page 484.

Table 12-1: I/O: Current State

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>Pulse Count</td><td>The pulse count increments when the input value changes from high to low.

Note: To reset the pulse count to zero, reset the device to the factory defaults.</td></tr>
<tr><td colspan="2">Analog Input</td></tr>
<tr><td>Number</td><td>Displays the number of analog inputs. The corresponding hardware pins are:

<table><tr><th>Analog Input</th><th>Corresponding hardware pin</th></tr><tr><td>1</td><td>Pin 4 on Power connector</td></tr></table></td></tr>
<tr><td>Value (Volts)</td><td>Shows the current state of the analog input
The analog inputs report the voltage in volts. Range is 0–30 volts.
You can also use an AT command to read these values. See *ANALOGIN[n]? on page 484.</td></tr>
<tr><td>Transformed Analog</td><td>The analog input expressed in the configured units. See Transformed Analog on page 327.</td></tr>
<tr><td>Relay Output</td><td>Controls the internal current sink that you can use to drive a relay or for other use purposes where a switchable low side current sink is required. For more details refer to the hardware user guide.</td></tr>
<tr><td>Number</td><td>Displays the number of relay outputs. The corresponding hardware pins are:

<table><tr><th>Relay Output</th><th>Corresponding hardware pin</th></tr><tr><td>1</td><td>Pin 4 on Power connector</td></tr></table></td></tr>
<tr><td>Value</td><td>Options are:
• OFF (default)—Relay open.
• Drive Active Low—Relay closed.
Note: You cannot set this field to Drive Action Low if the I/O line is already being used for Standby mode.
You can also use an AT command (see *RELAYOUT1 on page 485), an SMS command (see [prefix]relay x y on page 494), or a RAP command (refer to the Remote Application Protocol User Guide) to configure this field.

Note: Changes to this field go into effect immediately. No reboot of the AirLink router is necessary.</td></tr>
</table>

Pulse Count

Pulse Count details:

- Pulses are counted on falling edge (high to low).
- Repeated pulses cannot be counted when the device is powered off, or being reset. However, a single change in state while the device is powered off or being reset is counted properly.
- To reset the pulse count to zero, reset the device to the factory defaults.

Configuration

This screen allows you to configure the initial relay settings and to transform units of measurement for the analog inputs from volts to a more appropriate unit, if applicable. Generated reports use the transformed value configured on this screen.

For more information, refer to the Hardware Configuration User Guide for your AirLink router.

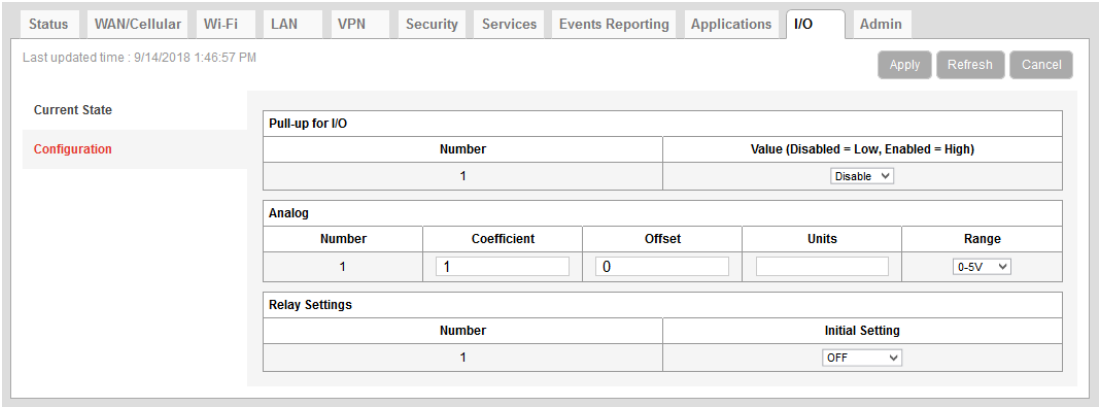


Figure 12-2: ACEmanager: I/O > Configuration

Field	Description
Pull-up for I/O	
Number	Displays the number of pull-ups. The corresponding hardware pins are: **Pull-up** / **Corresponding hardware pin** 1 / Pin 4 on Power connector

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td>Value</td><td>Controls the internal pull-up resistor on the I/O line. Options are:
• Disable—The pull-up is disabled. (Default)
• Enable—The pull-up is enabled.
The pull-up voltage is based on V_{in}. For details, refer to the Hardware User Guide.
Note: You cannot enable the Pull-up for I/O if the I/O line is already being used for Standby mode.

Note: During bootup, the I/O settings remain in their default state: the internal pull-up resistor is disabled, and output current sink switch is open. After bootup, any custom I/O settings are applied. This may take approximately 30 seconds after the router is restarted or powered on.</td></tr>
<tr><td colspan="2">Analog</td></tr>
<tr><td>Number</td><td>Displays the number of analog inputs. The corresponding hardware pins are:
<table><tr><th>Analog Input</th><th>Corresponding hardware pin</th></tr><tr><td>1</td><td>Pin 4 on Power connector</td></tr></table></td></tr>
<tr><td>Coefficient</td><td>This value may be found in the user guide for the equipment you want to monitor, or you can calculate it from information in the user guide. If this information is not available in the documentation that came with the equipment you want to monitor, contact the manufacturer.
For an example of how to calculate the coefficient, see Transformed Analog on page 327.</td></tr>
<tr><td>Offset</td><td>The offset (difference) between 0 volts and the equivalent value for the desired unit of measurement</td></tr>
<tr><td>Units</td><td>The unit of measurement used in event reporting for the parameter being monitored by the analog input
For example: degrees Celsius, degrees Fahrenheit, liters, mm, etc.</td></tr>
<tr><td>Range</td><td>Selects the range of voltage to be monitored on each analog input. For low input voltages, 0–5 V provides better accuracy.
Options are:
• 0–5V (Default)
• 0–10V</td></tr>
</table>

<table>
<tr><th>Field</th><th>Description</th></tr>
<tr><td colspan="2">Relay Settings</td></tr>
<tr><td>Number</td><td>Displays the number of relay outputs. The corresponding hardware pins are:<table><tr><th>Relay Output</th><th>Corresponding hardware pin</th></tr><tr><td>1</td><td>Pin 4 on Power connector</td></tr></table></td></tr>
<tr><td>Initial Setting</td><td>The initial setting for the current sink when the AirLink router is powered on
Options are:
ON
OFF (default)
Last Value (The value remains the same as it was before the AirLink router was powered down).
When you change this field, the corresponding digital input value on this screen reflects the change after a screen refresh.</td></tr>
</table>

Transformed Analog

The raw analog data is displayed in volts. However, that is not always the most convenient unit of measurement to view the data. The I/O Configuration screen enables you to transform the voltage readings to a more convenient unit of measurement, for example degrees Celsius or Fahrenheit for temperature, liters for volume, etc.

Step 1—Coefficient and Offset

Before you configure ACEmanager, you need to locate or calculate the coefficient and the offset values.

Consult the user documentation for the equipment you want to monitor. It should provide you with the coefficient to convert volts to the appropriate unit of measurement and the offset value (the difference between the equivalent value for 0 volts and 0), or provide information on equivalent values for voltage readings from which you can calculate the coefficient and offset. (If this information is not available in the user documentation, contact the manufacturer.)

For example, if the equipment monitors temperature, and has a scale from 0 volts to 10 volts, the equipment specifications should provide information similar to the following:

0 V is equivalent to –20°C

10 V is equivalent to 100°C

This is expressed algebraically as follows:

$$a \times 0V + b = -20C$$

$$a \times 10V + b = 100C$$

where:

a = coefficient

b = offset

For this example, you can calculate a as follows:

$$(a \times 10V + b) - (a \times 0V + b) = 100C - (-20)$$

$$a \times 10V = 120V$$

$$a = 12$$

To calculate b, substitute a into the first equation above:

$$12 \times 0V + b = -20$$

$$b = -20$$

Step 2—Configure ACEmanager

For each of the analog inputs you want to configure:

1. In ACEmanager, go to I/O > Configuration.
2. Enter the values for the coefficient and offset. (In this example, the coefficient is 12 and the offset is –20.)
3. Enter the desired unit of measurement. (In this example, the unit of measurement is C, for degrees Celsius).

ACEmanager shows the value of the transformed analog input as temperature in C.

Note: A reboot is required after configuring the transformed analog values.

13: Admin

Change Password

For system security reasons, ensure that you change the default password of the LX40.

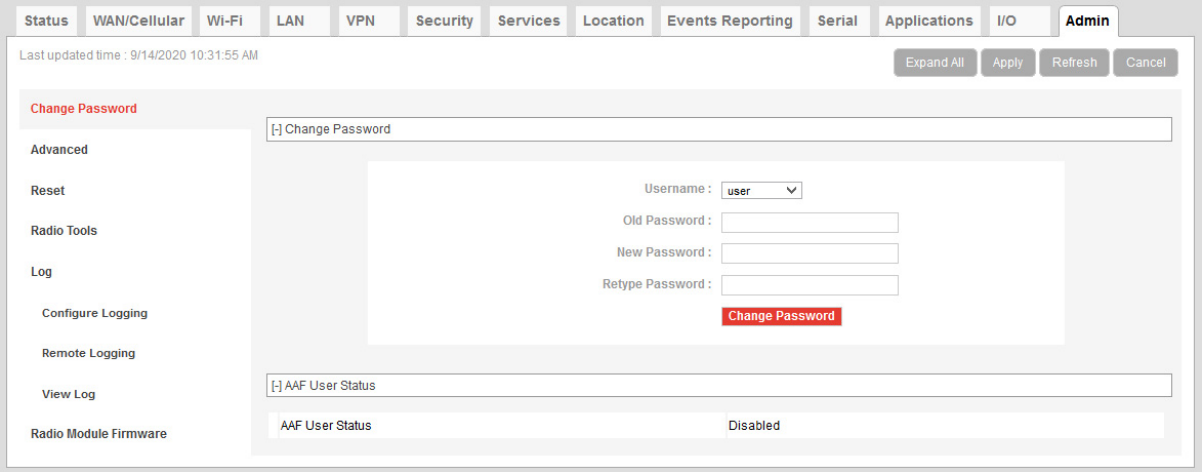


Figure 13-1: ACEmanager: Admin > Change Password

To change the default password:

1. Select the User Name associated with the password you want to change: user or sconsole.

   (To create an AAF user password, see AAF User Password on page 330.)
2. Enter the old password.
3. Enter the new password twice.

   The new password must be 8 to 32 characters long and can contain a mixture of letters, numbers, and/or special characters. The password is case sensitive.

Note: If the password is lost, the only way to recover access to the AirLink router is to press the hardware Reset button to reset all device settings to factory default. After resetting to factory defaults, the user password will be reset to the default password. If the router supports unique default passwords, the default password will be printed on the device label. Note that using the Reset button also resets the M3DA password to the default password.

To reset all settings to factory default, press the hardware Reset button for between 7 and 20 seconds (release the button when the Power LED flashes red).

If the Reset button has been disabled (using the Reset Button Configuration field on the Admin > Advanced screen) prior to the password being lost, the only way to recover access to the AirLink router is through AirLink Management Services, for which an account is required.

4. Click Change Password.

If you want to confirm that the password has been changed, log out and then log in with the new password.

AAF User Password

An AAF user password is required if you want to use ALEOS Application Framework (AAF) to develop your own applications to run inside an AirLink router. This password is used when installing an AAF application from DevStudio onto the router.

To enter an AAF user password:

1. In ACEmanager, go to Admin > Change Password.
2. From the User Name drop-down menu, select AAF user.

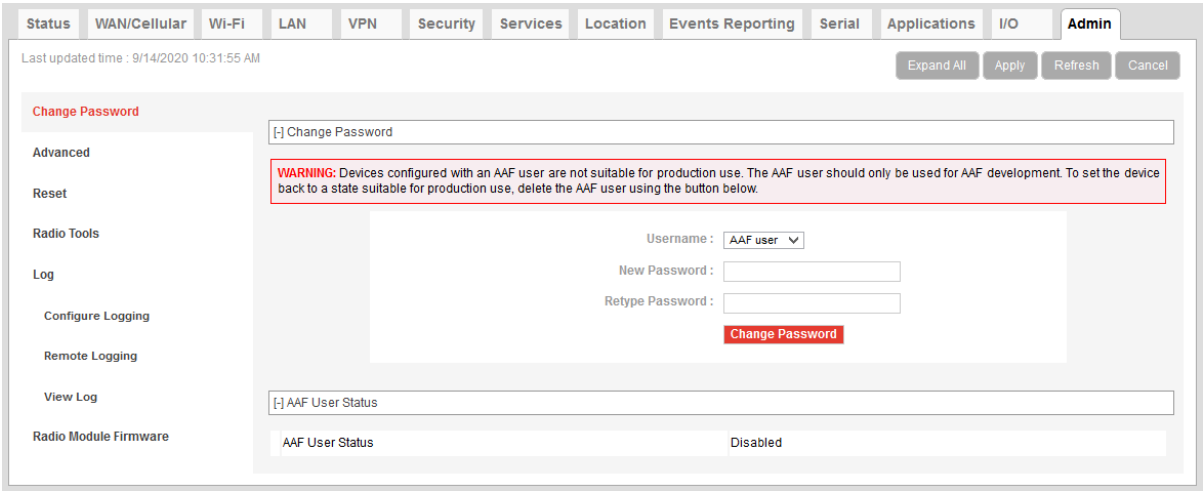


Figure 13-2: ACEmanager > Change Password (AAF user)

3. Enter the new password twice and click Change Password.

   The password can be 4 to 100 characters long and can contain a mixture of letters, numbers, and/or special characters. The password is case sensitive.
4. Reboot the router.

For more information on using ALEOS Application Framework, see page 319.

Advanced

The Advanced screen presents features that should be rarely changed and will affect the operation of the device.

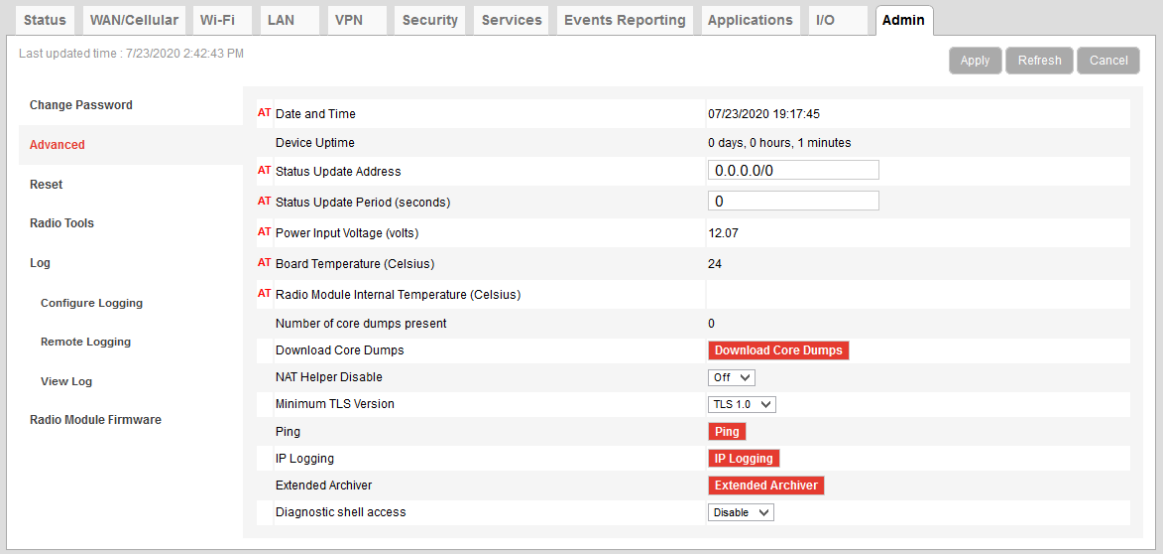
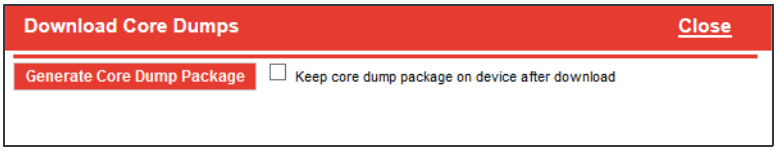
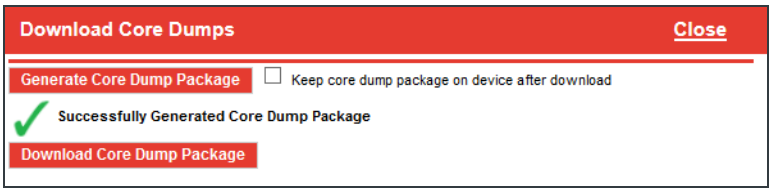
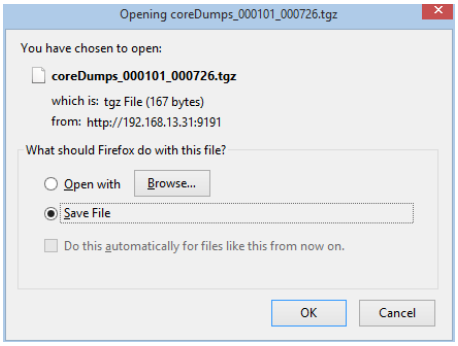
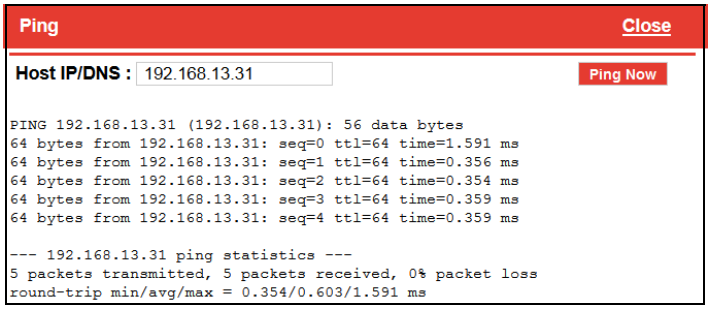
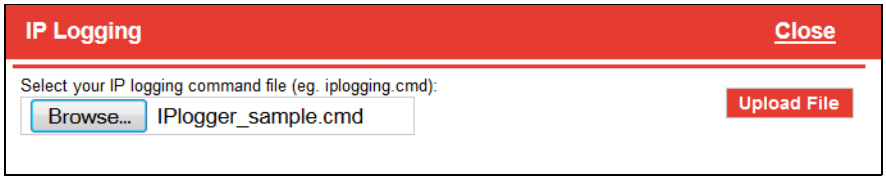


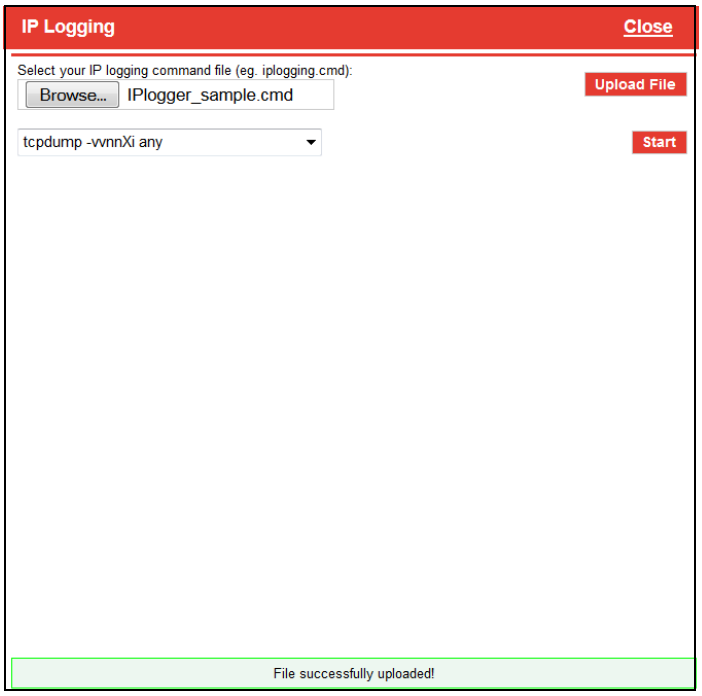
Figure 13-3: ACEmanager: Admin > Advanced

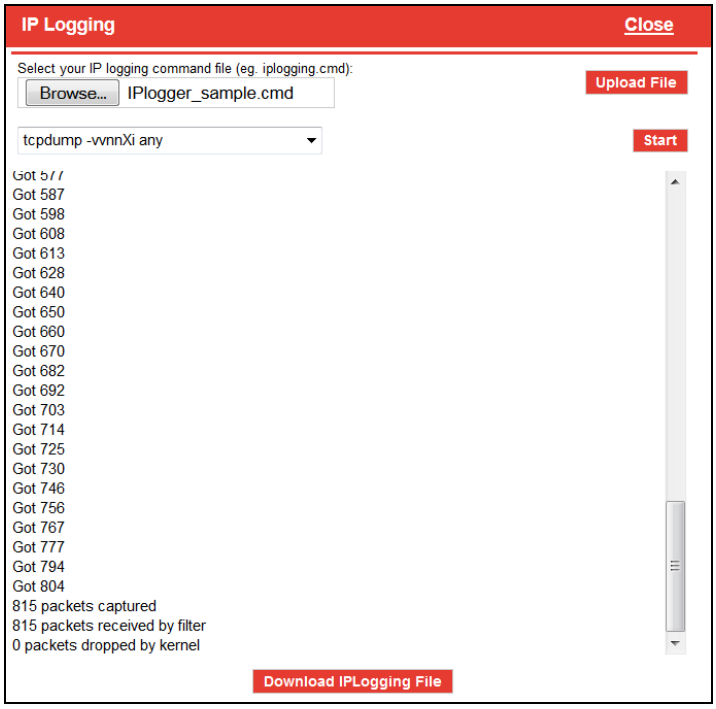
Field	Description
General	
Date and Time	Queries the internal clock. The date and time are always specified in 24-hour notation (UTC). • mm/dd/yyyy=date in month/day/year notation • hh:mm:ss=time in 24-hour notation
Device Uptime	Length of time since the router was last rebooted (in days, hours and minutes)
Status Update Address	Enter the device Name/Port. Name is the domain name or IP address, and Port is the port of the device where the device status updates (in XML format) will be sent. This report can be sent to a LAN connected device (e.g., 192.168.13.100/1122) or a remote location (e.g., newb.eairlink.com/17000).
Status Update Period (seconds)	The time interval (in seconds) when a status update should be sent
Power Input Voltage (volts)	Displays the power input voltage in volts. If the input voltage ground is connected to the AirLink router case (without serial connection), this value reads .3 V (approx.) less; if ground is connected (with serial connection), the value reads .3 V (approx.) more.
Board Temperature (Celsius)	Displays the board temperature in degrees (Celsius)
Radio Module Internal Temperature (Celsius)	Displays the temperature of the internal radio module in degrees (Celsius).

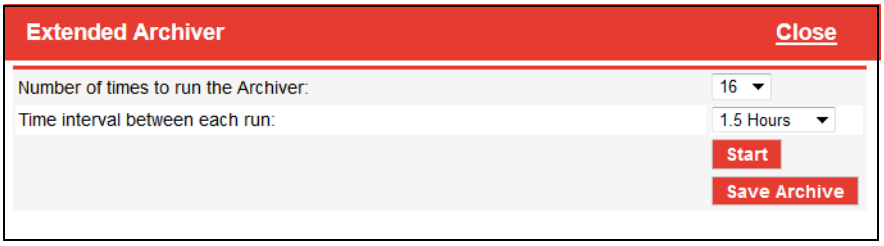
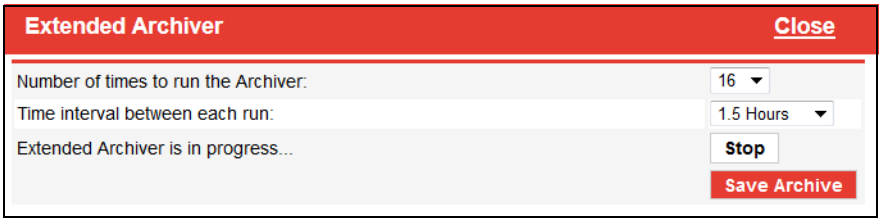
Field	Description
Number of core dumps present	Shows the number of core dumps stored on the system A core dump is produced if a software component on the router crashes, leading to a restart of the component or reboot of the system.
Download Core Dumps	As part of the troubleshooting process, you may be asked to download the core dumps and send them to Sierra Wireless or your distributor. If asked to do so: 1. Click the Download Core Dumps button. The following window appears.  2. If you are instructed to do so by Sierra Wireless Tech Support, select the check box beside “Keep core dump package on device after download”. Otherwise, leave the check box unselected. 3. Click Generate Core Dump Package.  4. Once you see the message that the Core Dump Package has been successfully generated, click Download Core Dump Package, select Save File and click OK.  5. Navigate to where you want to save the file.

Field	Description
NAT Helper Disable	The NAT helper functions are used to parse traffic on well-known protocols/port combinations. In most cases, leave the default setting. However, if you are running a protocol on one of the well-known port that is not normally associated with that port, traffic may not be parsed properly, or may be dropped completely. In that case, use this field to disable the NAT helper functions. The NAT helper functions are used to enable IP services that create temporary TCP or UDP ports. For example, FTP (TCP 21), SIP (UDP 5060) and SNMP (UDP 161). If you are running non-standard protocols on these ports, you may need to disable the NAT helper functions in order for the firewall to operate The NAT helper functions are used to enable IP services that create temporary TCP or UDP ports. For example, FTP (TCP 21), SIP (UDP 5060) and SNMP (UDP 161). If you are running non-standard protocols on ports that use the NAT helper functions, you may need to disable the NAT helper functions in order for the firewall to operate. Options are: • Off—NAT helper functions are operational (default) • On—NAT helper functions are disabled.
Minimum TLS Version	Sets the minimum TLS version that can be used for secure connections. When set to TLS 1.3, for example, connection attempts using a lower version will be blocked. **Important:** *Support for the insecure ciphers TLS 1.0 and TLS 1.1 has been removed in ALEOS 4.16.0. Note that some older equipment may still use these ciphers and AirLink devices running ALEOS 4.16.0 or later will no longer be able to communicate with any equipment using these insecure ciphers.* By default (when set to TLS 1.2) the LX40 will make outbound connection attempts using the most secure layer (TLS 1.3) and fall back to other layers if the remote host does not support it. Options are: • TLS 1.2 (default) • TLS 1.3
Ping	Use this button to confirm that a connected device is responding. 1. Click Ping. 2. In the pop-up window, enter the device IP address or DNS name and click Ping Now. 

Field	Description
IP Logging	IP Logging is used to troubleshoot issues such as: • Problems with the LAN or WAN connection to an AirLink router • Uncertainty about where a packet is coming from • Issues with port forwarding not working properly IP Logging enables you to log network traffic and save it in a form that can be analyzed by Sierra Wireless engineers. Before using IP Logging, contact your authorized AirLink reseller or Sierra Wireless representative to discuss the issue you are observing and obtain a .cmd file to capture the appropriate related IP traffic. When you receive the file, save it to your computer's hard drive. To use IP logging: 1. Obtain a command (.cmd) file from Sierra Wireless. 2. In ACEmanager, go to Admin > Advanced and click IP Logging. 3. In the pop-up window, click Browse and navigate to the command file you received from Sierra Wireless. 4. Click Open. The file name appears in the field beside the Browse... button.  5. Click Upload File.

Field	Description
IP Logging (continued)	6. Once you see a message at the bottom of the window saying that the file has been successfully uploaded, select a command from the drop-down menu, as advised by your support contact.  7. Click the Start button. *Note: If you are running more than one command, run each command sequentially and save the results before selecting the next command to run. Running a new command or re-running the same command wipes out the results from the previous run.* When the logging is complete, the log shows the number of packets captured, received, and dropped. *Note: If the log shows only "Got 0", no logs were captured. Contact Sierra Wireless.*

Field	Description
IP Logging (continued)	 8. Once the logging is compete, click the Download IP Logging File button at the bottom of the screen, save the tarred gzip file (file extension .tgz) to your computer, and email it to your support contact.

Field	Description
Extended Archiver	Extended Archiver is a troubleshooting tool that enables you to collect logs covering an extended period of time. Before using it, contact your authorized AirLink reseller or Sierra Wireless representative to discuss the problem. To start the process: 1. Click Extended Archiver. 2. Select the following options, as advised by Sierra Wireless: • The number of times to run the archiver (1–25; default is 16) • The interval between runs (30 minutes, 1 hour, 1.5 hours, 2 hours, 2.5 hours, 3 hours, 3.5 hours, 4 hours, 4.5 hours, 5 hours, 5.5 hours, 6 hours, or 6.5 hours; default is 1.5 hours)  3. Click Start. The Extended Archiver saves the current set of logs. It waits for the configured interval and then collects another set of logs, which are saved to the same file. This process continues for the number of times the Archiver is configured to run. At any time, you can click Save Archive. The logs collected to that point are saved and the process continues.  4. Once the process is complete, click Save Archive, save the tarred gzip file (file extension .tgz) to your computer, and email it to your support contact. **Stopping and Restarting the Extended Archiver** After you click the Start button, it changes to Stop. To stop the process: 1. Click Save Archive if you want to save the logs already collected. 2. Click Stop. Logs not already saved will be lost. If desired, you can change the settings and restart the process. *Note: The Extended Archiver settings and the collected logs persist over reboots. Once the reboot is complete, the process resumes.*
Diagnostic shell access	When enabled, this field allows Sierra Wireless Tech Support personnel to locally access the diagnostic shell on your router. It should be left at the default setting unless Sierra Wireless TechSupport asks you to change it.

Reset

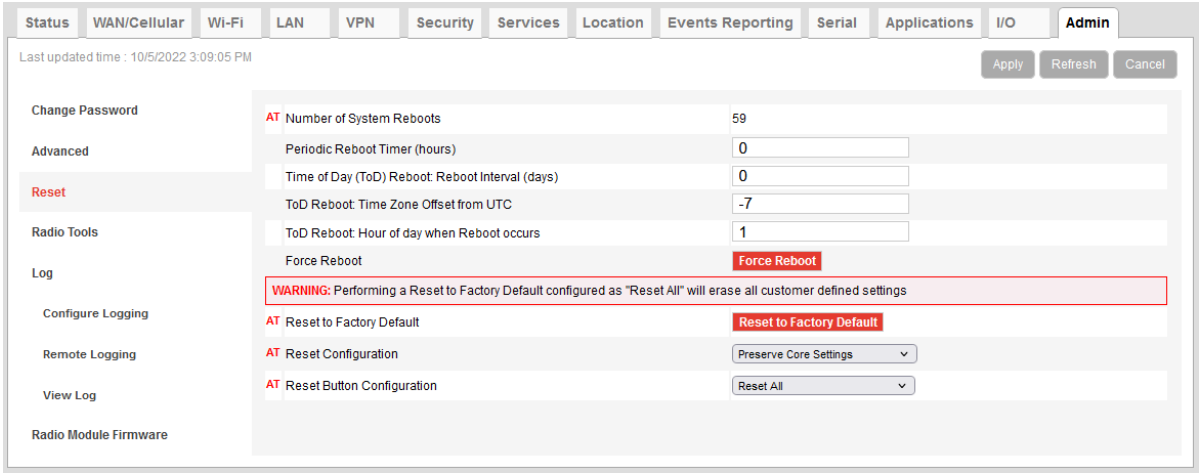
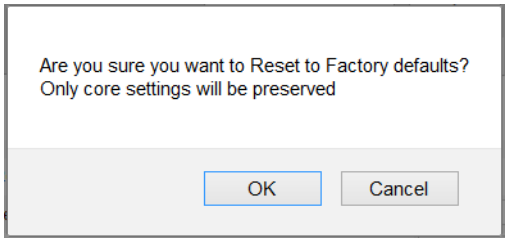


Figure 13-4: ACEmanager > Admin > Reset

Field	Description
Number of System Reboots	Count of the number of system reboots over the life of the device or since the last device reboot
Periodic Reboot Timer (hours)	Reboots the router after the specified number of hours. 0 = Disabled
Time of Day (ToD) Reboot: Reboot Interval (days)	Number of days between reboots 0 = Disabled Example: If this field is set to 3, the router reboots every third day.
ToD Reboot: Time Zone Offset from UTC	Time zone adjustment (Offset in easterly direction from UTC Time) Possible values are -12...12 Example: Pacific Standard Time would be -7
ToD Reboot: Hour of day when Reboot occurs	The local hour of the day when the reboot occurs Possible values are 0–23 Example: 4 is 4:00 am
Force Reboot	Click to force the LX40 to reboot when other means (such as the Reboot button on the Toolbar) are not successful. Force Reboot can be used by Sierra Wireless as a means to recover a router during advanced investigations.

Field	Description
Reset to Factory Default	Resets the LX40 and its settings according to the Reset Configuration (see Reset Configuration on page 340. After clicking Reset to Factory Default, a confirmation message indicates which settings are affected as part of the reset.  *Note: After resetting the device to full factory defaults (the Reset Configuration is set to Reset All or Preserve Only User Password), if you are using a management service like ALMS or AMM, Sierra Wireless recommends synchronizing the device again via the management service. The re-synchronization enables the management tunnel to re-establish itself.*

Field	Description
Reset Configuration	The Reset Configuration lets you select how the ACEmanager Reset to Factory Default button behaves. The different options determine the types of settings that are reset and the types of settings that are preserved after the LX40 resets. Options are: • Reset All—All settings, including network settings and passwords, are returned to the factory default values on Reset to Factory Default. After clicking Reset to Factory Default, a confirmation message appears. After confirming that you want to continue, a warning appears, notifying you that passwords will be reset. • Preserve Only User Password—All settings except the ACEmanager (user) password are returned to the factory default values on Reset to Factory Default. • Preserve Core Settings—(default) Setting the Reset Configuration to Preserve Core Settings preserves some predetermined settings that enable the LX40 to stay online after a Reset to Factory Default. The following network settings are preserved: • User Password • M3DA Protocol Password • Network User ID (SIM 1 and R2C eSIM) • Network Password (SIM 1 and R2C eSIM) • Set Carrier (Operator) Selection • Network Authentication Mode (SIM 1 and R2C eSIM) • APN Type (SIM 1 and R2C eSIM) • Select from the List (APN value) (SIM 1 and R2C eSIM) • User Entered APN (APN value) (SIM 1 and R2C eSIM) • Backup Network Authentication Mode (SIM 1 and R2C eSIM) • Backup Network User ID (SIM 1 and R2C eSIM) • Backup Network Password (SIM 1 and R2C eSIM) • SIM Card PIN code (SIM 1 and R2C eSIM) • Primary SIM slot • Allow R2C eSIM Usage • Setting for Band Profile • Status of the last PIN lock/unlock attempt (SIM 1 and R2C eSIM) • Service Domain Preference • LTE Wideband Operation • LTE Cat-M1 Operation • LTE NB-IOT Operation • Reset Button Configuration • Preserve AAF Apps • Reset template name • ALMS Enabled/Disabled status • ALMS Name (Device name in ALMS) • ALMS Device Initiated Interval • ALMS MSCI Server URL • ALMS MSCI Auto Synchro • ALMS SSL Verify Peer • ALMS LWM2M Keep Alive Interval • ALMS LWM2M Register On Startup • HTTP Server and ACEview Services • Reset Configuration • Network Operator Switching Enabled/Disabled • Default radio module firmware carrier • ACEmanager Remote Access • SMS Mode • SMS Prefix • SMS Password • Enabled Trusted Phone • Trusted Phone List • Every trusted phone number in the list • Low Voltage Standby Mode • Standby Qualification Period (seconds) • Standby Voltage (100 milliVolts) • Resume Immediately at Voltage (100 milliVolts) • Ethernet Mode • Ethernet WAN Mode • Static WAN IP • Static WAN Netmask • Static WAN Gateway • Static WAN DNS1 • Static WAN DNS2 AMM Management Tunnel Enabled • AMM Management Tunnel Remote Port • AMM Management Tunnel Username • AMM Management Tunnel Password

Field	Description
Reset Configuration (continued)	• Reset to Custom Configuration—Allows you to reset the device to a custom configuration file, with the option to preserve AAF Apps. For more information, see Reset to Custom Configuration on page 341.
Reset Button Configuration	Configures the functionality of the hardware Reset button. When not set to Disabled, pressing the hardware Reset button for 7–20 seconds reboots the LX40 and resets it according to the selected Reset button configuration. (When resetting the device to its reset configuration, release the Reset button when the power LED flashes red.) • Disabled—Pressing the hardware Reset button reboots the LX40, but does **not** reset any of its settings. • Reset All—All settings, including network settings and passwords, are returned to the factory default values. • Preserve Core Settings—(default) Setting the Reset Button Configuration to Preserve Core Settings preserves some predetermined settings that enable the LX40 to stay online after a Reset to Factory Default (for a list of settings, see Reset Configuration on page 340). • Reset to Custom Configuration—Allows you to reset the device to a custom configuration, with the option to preserve AAF Apps. For more information, see Reset to Custom Configuration on page 341. *Note: This field only affects the **hardware** Reset button on the device. You can always use the "Reset to Factory Default" button in ACEmanager to reset the device.* *Note: If this field is set to "Reset All" and the default login password is subsequently lost, the only way to regain access to the AirLink router is through AirLink Management Service (account required).*

Reset to Custom Configuration

The Reset Configuration and Reset Button Configuration settings have an option for Reset to Custom Configuration. The Reset to Custom Configuration option allows you to use the Reset to Factory Default button (either in ACEmanager or using the hardware Reset button) to reset the LX40 to a reset configuration stored on the device. The reset configuration can be either a template (see Saving a Custom Configuration as a Template on page 20) or a database backup uploaded to the device or generated by the device and saved as the reset configuration.

Setting the Reset Configuration and Reset Button Configuration to Preserve Core Settings preserves some predetermined settings that enable the LX40 to stay online after a reset to factory default. Setting the Reset Configuration to Reset to Custom Configuration allows the full configuration of a working router to be preserved.

The additional settings for configuring the Custom Reset settings are shown in Figure 13-5.

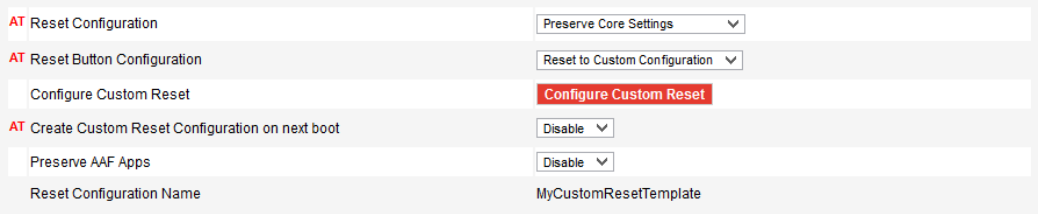


Figure 13-5: Custom Reset Configuration settings

The additional settings are:

- Configure Custom Reset—Click this button to add a custom reset configuration file to the non-volatile memory of the LX40 (see the procedure below).
- Create Custom Reset Configuration on next boot—Enable the LX40 to back up its configuration the next time it reboots. This creates a “restore point” that the LX40 uses for Reset to Factory Default when the Reset Configuration is set to Reset to Custom Configuration.

  Note: Sierra Wireless recommends using this method, as it is the easiest way to create a reset configuration.

- Preserve AAF Apps—Set to Enable to preserve AAF applications on the LX40 during a reset to custom configuration.

Note: Because user passwords are not stored in device configuration files, user passwords are reset to default after resetting the LX40 to a custom configuration. Please ensure you change the default passwords afterwards.

The Reset Configuration Name (shown as a status field in Figure 13-5) appears after you have uploaded a custom reset configuration file.

To upload a custom reset configuration file:

1. Click Configure Custom Reset.

   The Reset Configuration screen appears.

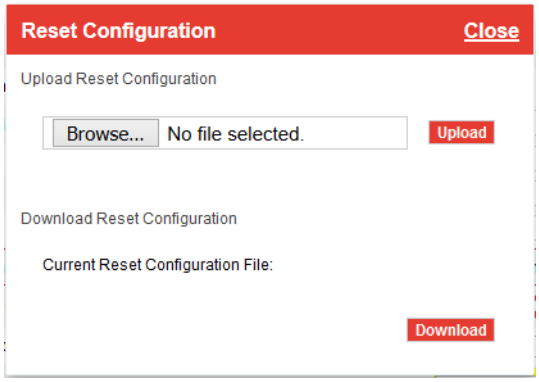


Figure 13-6: Reset Configuration screen

2. Click Browse... to locate your file, and then click Open. The file can either be a template or custom reset configuration backup file.
3. Click Upload.

The custom reset configuration file uploads to your device and the file name appears on the Reset Configuration screen and the Reset Configuration Name field shown in Figure 13-5.

Radio Tools

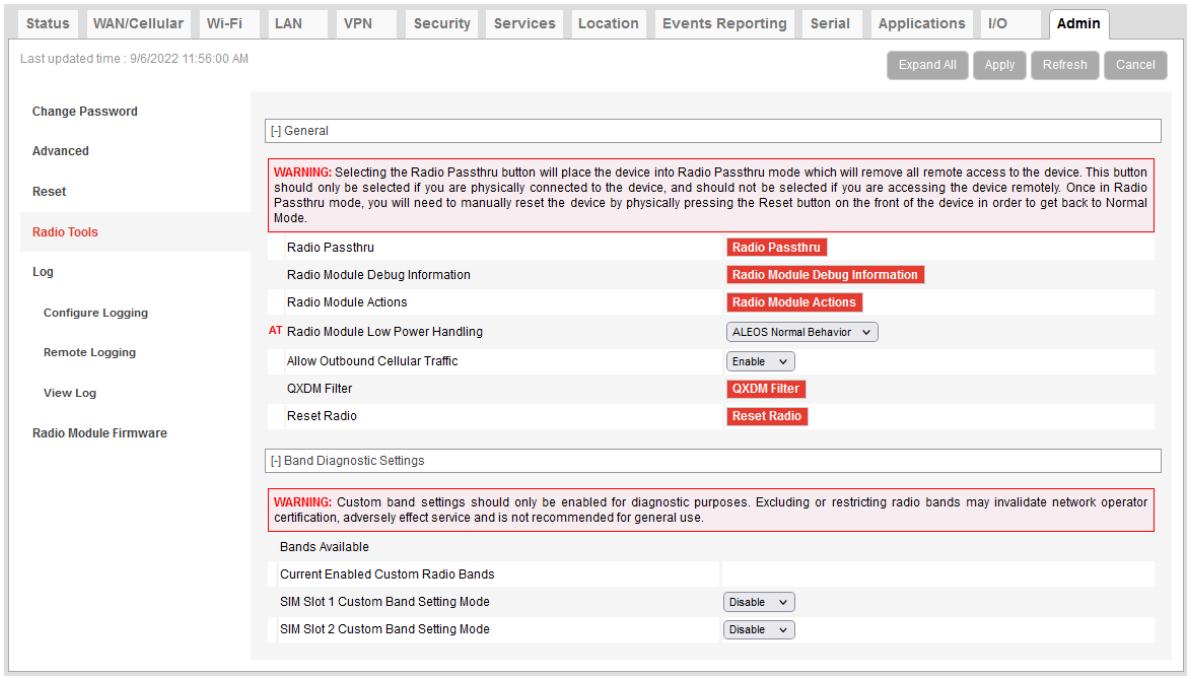
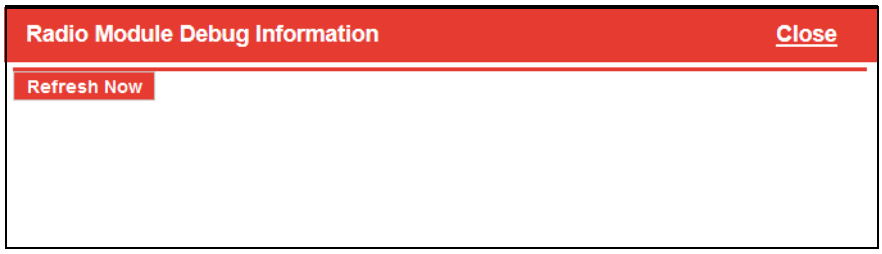
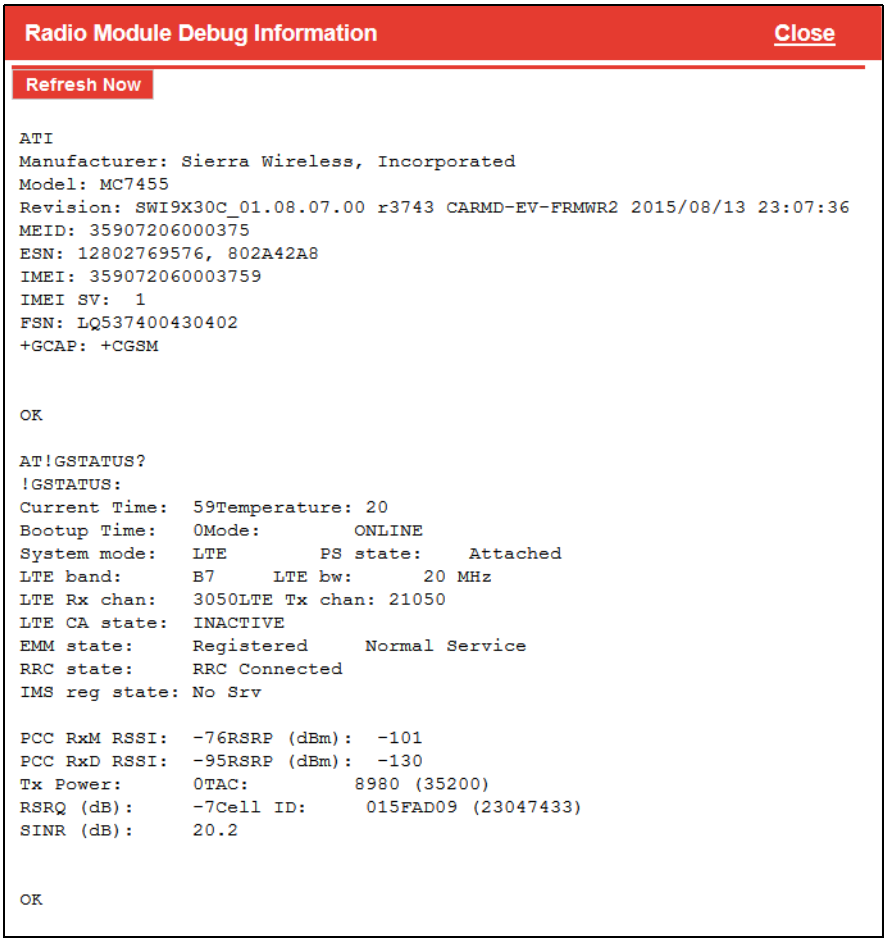
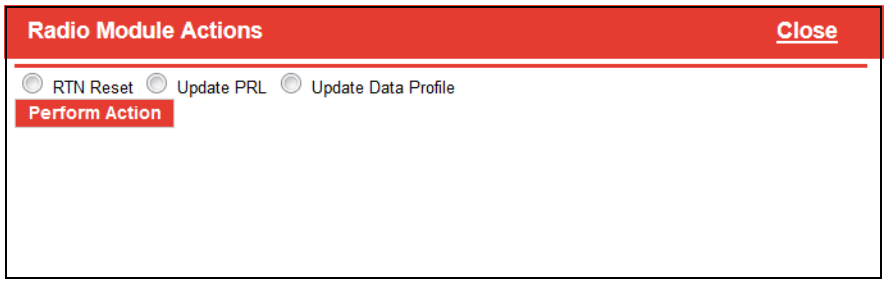


Figure 13-7: ACEmanager > Advanced > Radio Tools

Field	Description
General	
Radio Passthru	See Radio Passthru on page 346.

Field	Description
Radio Module Debug Information	For radio module debug information: 1. Click the Radio Module Debug Information button.The following screen appears:  2. Click Refresh Now. 

Field	Description
Radio Module Actions	This feature only applies to radio modules running on the Sprint Network. Use this button only if advised to do so by Sprint representative. 1. Click the Radio Module Actions button.  2. Select the desired option: • RTN Reset—Resets the radio module to pre-activated state • Update PRL—Updates the Preferred Roaming List • Update Data Profile—Updates the data profile 3. Click Perform Action.
Radio Module Low Power Handling	Controls how ALEOS handles device operation when the radio module is in Low Power mode. This feature is intended for testing and diagnostic purposes, not as part of normal device operation. Options are: • ALEOS Normal Behavior (default) • ALEOS does nothing
Allow Outbound Cellular Traffic	Enables or disables outgoing traffic on the cellular interface. This feature is intended for testing and diagnostic purposes, not as part of normal device operation. Options are: • Enable (default) • Disable
QXDM Filter	Click to upload a custom QXDM filter file (with the extension .sqf). QXDM filters define which logs to keep when performing a capture in the radio module. In the QXDM Filter window, you can also delete an existing QXDM filter by clicking Delete Existing Filter (only one dynamic filter can be loaded on the router at a time).
Reset Radio	Click to force reboot of the radio. A radio reboot may be necessary when performing diagnostic procedures.

Field	Description
Band Diagnostic Settings **Warning:** *These settings are intended for diagnostic purposes and should only be modified under the guidance of Sierra Wireless or your service provider. Excluding or restricting radio bands may invalidate network operator certification, adversely affect service and is not recommended for general use.* The Diagnostic Settings allow you to select which bands to use, either by excluding certain bands, or by restricting the LX40 to using the bands you specify.	
Bands Available	Available radio bands based on the selected Setting for Band. See WAN/Cellular > Cellular > General > Band Setting on page 89 and Setting for Band on page 504.
Current Enabled Custom Radio Bands	This status field displays the custom band settings for the active SIM card. • Not Enabled—Custom band setting mode is disabled. • All bands excluding bands [x, y]—Bands affected when the mode is set to Exclude. • Bands restricted to [x, y]—Bands affected when the mode is set to Restrict.
Custom Band Setting Mode	Select the type of custom band settings. Options are: • Disable (default) • Exclude—Exclude specified bands from operating. After selecting Exclude, an Exclude Bands field appears, in which you can enter a comma-separated list of bands. • Restrict—Limit the LX40 to using specified bands. After selecting Restrict, a Restrict Bands field appears, in which you can enter a comma-separated list of bands.
SIM Slot 1 Custom Band Setting Mode	Select the type of custom band settings for SIM slot 1 (when R2C eSIM is available). Options are: • Disable (default) • Exclude—Exclude specified bands from operating. After selecting Exclude, an Exclude Bands field appears, in which you can enter a comma-separated list of bands. • Restrict—Limit the LX40 to using specified bands. After selecting Restrict, a Restrict Bands field appears, in which you can enter a comma-separated list of bands.
R2C eSIM Custom Band Setting Mode	Select the type of custom band settings for the R2C eSIM (if enabled). Options are: • Disable (default) • Exclude—Exclude specified bands from operating. After selecting Exclude, an Exclude Bands field appears, in which you can enter a comma-separated list of bands. • Restrict—Limit the LX40 to using specified bands. After selecting Restrict, a Restrict Bands field appears, in which you can enter a comma-separated list of bands.

Radio Passthru

Radio Passthru allows a direct connection, using USB, to the internal radio. Normal cellular radio operation is suspended while Radio Passthru is enabled.

Radio Passthru is generally used only in certain troubleshooting scenarios.

The hardware bypass remains in effect until the router is rebooted.

Note: Because Radio Passthru is not USB/net or USB/serial, a different set of drivers is required to connect to the radio installed inside an AirLink router. Additionally, while it is possible to send AT commands to the radio using a terminal connection, there are software applications designed to communicate with the radio directly. If you need to use Radio Passthru, contact your Sierra Wireless AirLink representative to obtain the needed drivers and/or software application.

To start and end a Radio Passthru session:

1. Connect your computer to the router through the router USB port.
2. Ensure the Network Watchdog and Cellular Watchdog are disabled to prevent the router rebooting while in Radio Passthru mode. See Network Watchdog on page 74 and Cellular Watchdog on page 89.
3. Reboot the router.
4. On the Admin > Radio Tools page, click Radio Passthru.
5. To finish the Radio Passthru session, reboot the router.

Log

The Log file is a system log of the AirLink LX40.

The Logging configuration screen enables you to configure log verbosity and display filtering. The View Log screen enables you to view and save logs. The logs are in plain text.

You can configure logging for every major router function, as well as for activity on the following interfaces:

- USB Serial (only available when configured to use AT mode for USB Serial. See USB Device Mode and USB Serial Mode on page 170.)
- Wi-Fi (only available for Wi-Fi models)

Configure Logs

To configure what you want to include in the logs:

1. In ACEmanager, go to Admin > Log.

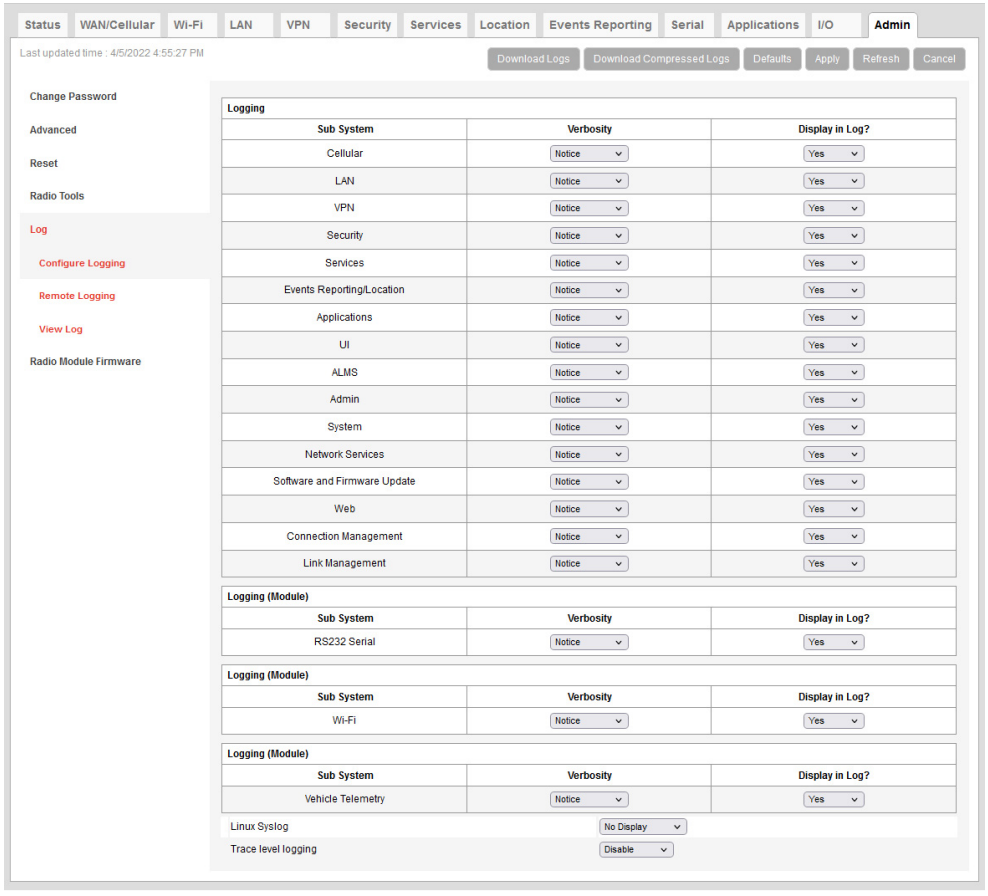


Figure 13-8: ACEmanager: Admin > Log > Configure Logging

2. For each subsystem listed:
   a. Select whether or not to display it in the log.

Separate filters, based on subsystem and severity, are applied when the messages are generated and when the messages are displayed. The following severity levels are supported for filtering in the drop-down lists for verbosity:

- Error
- Warning
- Notice (default)
- Info (information)
- Debug

b. Select the verbosity level.

Note: Some log messages are only displayed if you display Linux Syslog. For example, If you are debugging a VPN or LAN setup, the relevant information is only displayed in the Linux Syslog.

3. Optional: To display Linux Syslog in the View Logs screen:

a. Ensure that Display is selected in the drop-down menu beside Linux Syslog.

Note: At any point, you can click the buttons on the upper right portion of the screen to:

- *Download logs to your computer*
- *Download a compressed version of the logs to your computer*
- *Refresh the screen*
- *Cancel the selected settings*
- *Return the screen to the Default settings.*

4. Click Apply.

5. If you have changed any of the verbosity levels or the Linux syslog setting:

a. Reboot the AirLink router.

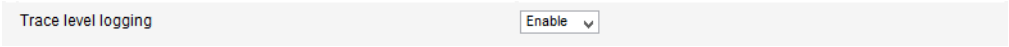
b. Log into ACEmanager, go to Admin > Log.

Trace Level Logging

Use this option only if you are specifically asked to do so by Sierra Wireless or an authorized distributor.

To enable trace level logging:

1. In the Trace level logging field at the bottom of the page, select Enable.



2. Click Apply.

3. On the left menu, click View Log.

Remote Logging

Remote logging enables you to send logs to a remote server.

To configure remote logging[1]:

1. In ACEmanager, go to Admin and from the menu on the left, select Remote Logging.
2. In the Remote Syslog field, select Enable.

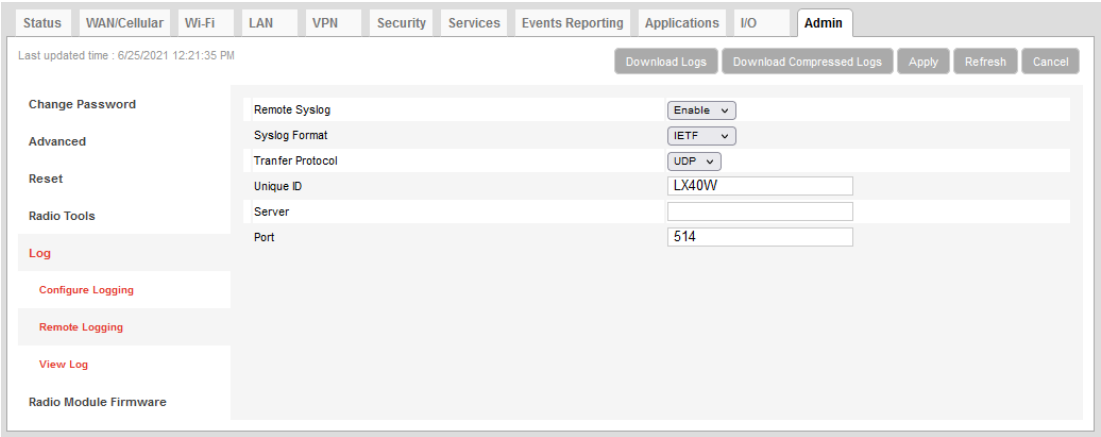
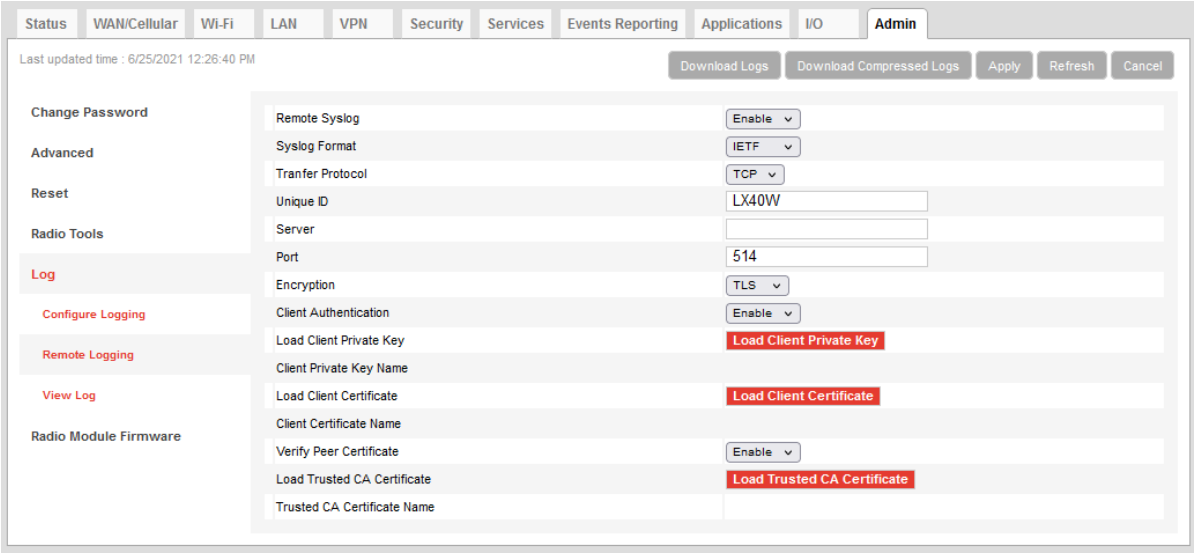


Figure 13-9: ACEmanager: Admin > Remote Logging (enabled)

3. In the Syslog Format field, select either:
   - IETF (default)
   - BSD
4. In the Transfer Protocol field, select either:
   - UDP (default)
   - TCP

   If you select TCP, you'll be given encryption options.
5. In the Unique ID field, enter a name or identifier that will be included in syslog messages. By default, this is the AirLink device name.
6. In the Server field, enter the IP address of the remote server you want the logs to go to.
7. In the Port field, enter the server port number. Default is 514.
8. If you select TCP in the Transfer Protocol field, you'll be given the option to enable TLS Encryption and then to enable Client Authentication and/or Verify Peer Certificate.

1. You can also use an AT command to configure remote logging.
See *REMOTELOG on page 491.



9. Click the appropriate red button to:

- Load a Client Private Key.
- Load a Client Certificate.
- Load a server Trusted CA Certificate.

Once it is uploaded the file name appears on the screen.

Note: When enabled, this functionality persists over a reboot/power cycle.

View Logs

To view the logs:

1. Select View Logs from the menu on the left side of the page.

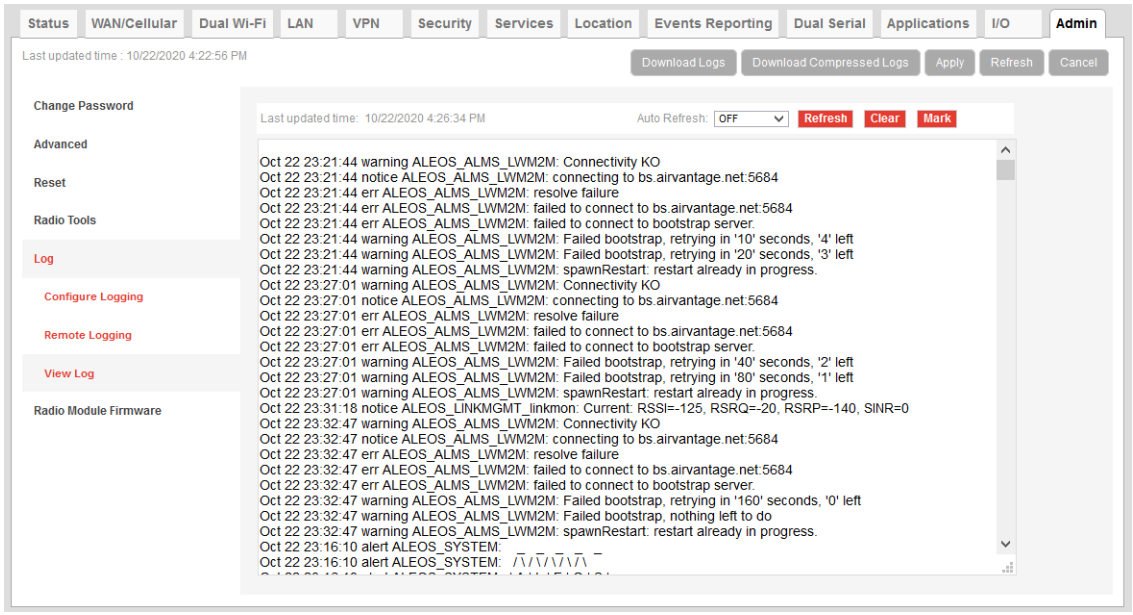


Figure 13-10: ACEmanager: Admin > Log, View Log (AirLink RV55 shown)

Note: VPN info and debug information uses the term racoon (rather than VPN).

Note: If you toggle the "Display in Log?" field, clear and refresh the View Log page. (You do not need to reboot the device.)

Tip: *Use View Log for troubleshooting purposes (e.g., when setting up the IPsec configuration). The Log page allows you to establish the tunnel connection and monitor the results directly. To change the intervals at which the log is displayed, you can change the settings in Auto Refresh.*

Actions on the View Log screen include:

- Auto Refresh—The drop-down menu allows you to set up an automatic log page refresh, and the interval between refreshes: 30 secs, 1 minute, or 2 minutes.
- Refresh button—Clears the screen, reloads the log file, and display the point in the log file you were viewing immediately prior to clicking Refresh. Any new log information is added to the bottom of the log.
- Clear button—Clears the screen
- Mark button—Marks the start of a section in the device log and is typically used for troubleshooting
- Download Logs button—downloads the logs to your computer
- The Download Compressed Logs button—downloads a compressed version of the logs.

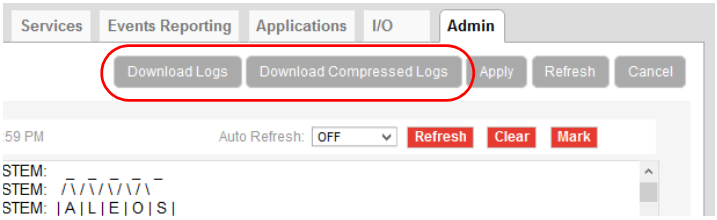


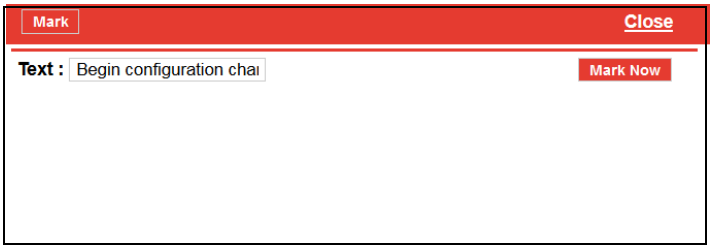
Figure 13-11: Download Logs buttons

Note: The logs you obtain using the Download Logs or the Download Compressed Logs buttons always include the Linux Syslog. The Linux Syslog setting on the Configure Logs page does not affect the contents of the downloaded logs.

If asked to do so:

1. Click the Mark button and enter the text you want to appear in the log file.

   Alphanumeric characters, spaces, periods, commas, dashes, colons and semi-colons are allowed.



2. Click Mark Now.
3. Click Refresh.

   The mark appears at the end of the log.

Radio Module Firmware

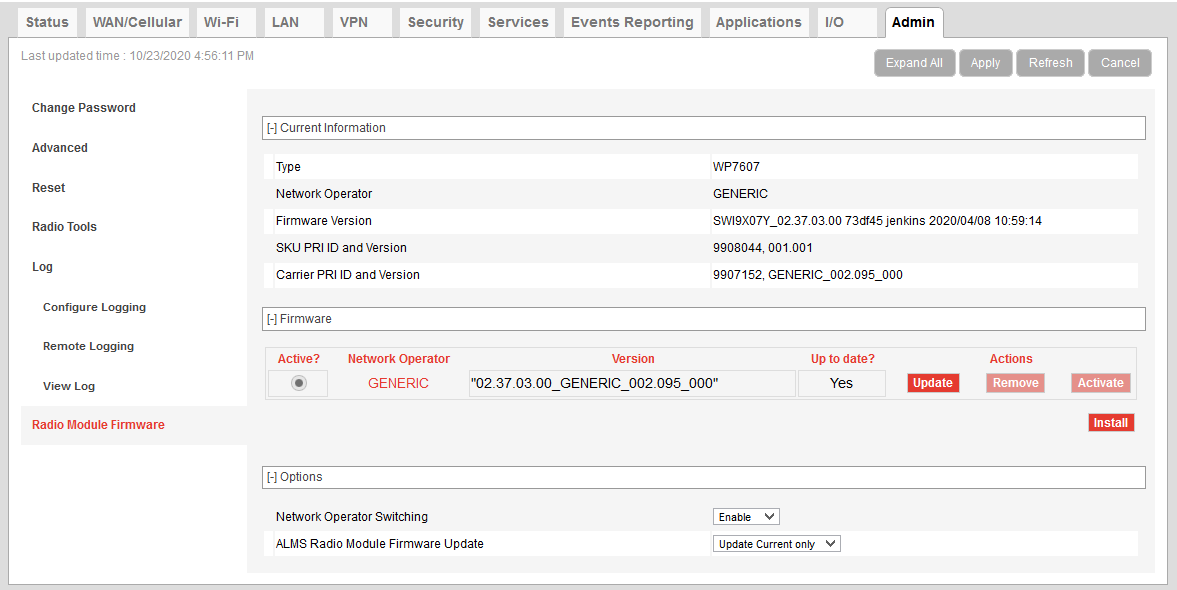


Figure 13-12: ACEmanager: Admin > Radio Module Firmware

AirLink routers come preloaded with multiple versions of radio module firmware (For details, see Table 13-1). When the LX40 is powered on, it checks the stored radio module firmware versions and automatically loads the appropriate version for the installed SIM card onto the radio module.

This feature, which is intended for North American products, makes it easy to provision the router for a particular mobile network. To provision the LX40:

1. Obtain an account and SIM card for the mobile network you want to run the LX40 on.
2. Insert the SIM card into the SIM card slot. (For instructions on installing the SIM card, refer to the LX40 Hardware User Guide.)
3. Power on the LX40. It chooses the appropriate radio module firmware to use for the installed SIM card, provided it is stored on the LX40.

The following table indicates the pre-installed radio module firmware, based on the SKU:

Table 13-1: AirLink LX40 Pre-installed Radio Module Firmware based on SKU

SKU	Verizon Wireless	AT&T	Generic	Sierra	Telstra
North America WP7610	✔	✔	✔	✔	
North America WP7603		✔	✔	✔	
Verizon	✔				
Global LTE-M/NB-IOT	✔	✔	✔	✔	

Table 13-1: AirLink LX40 Pre-installed Radio Module Firmware based on SKU

SKU	Verizon Wireless	AT&T	Generic	Sierra	Telstra
EMEA WP7607			✔	✔	
AU & NZ			✔	✔	✔

If the appropriate firmware is not stored on the router, you can download it from source.sierrawireless.com and install it on the router. You can also:

- Check which version of radio module firmware is currently active
- Remove radio module firmware from the router
- Update the radio module firmware stored on the router
- Override the automatic function and manually select the radio module firmware to be used

Note: You can store a maximum of four radio module firmware versions on the router.

Note: If you select Preserve Cellular Authentication Settings in the Reset Configuration field before rebooting the router, the configuration and the stored radio module firmware are preserved when you reset the router to the factory default settings.

To manage radio module firmware:

1. In ACEmanager, go to Admin > Radio Module Firmware.

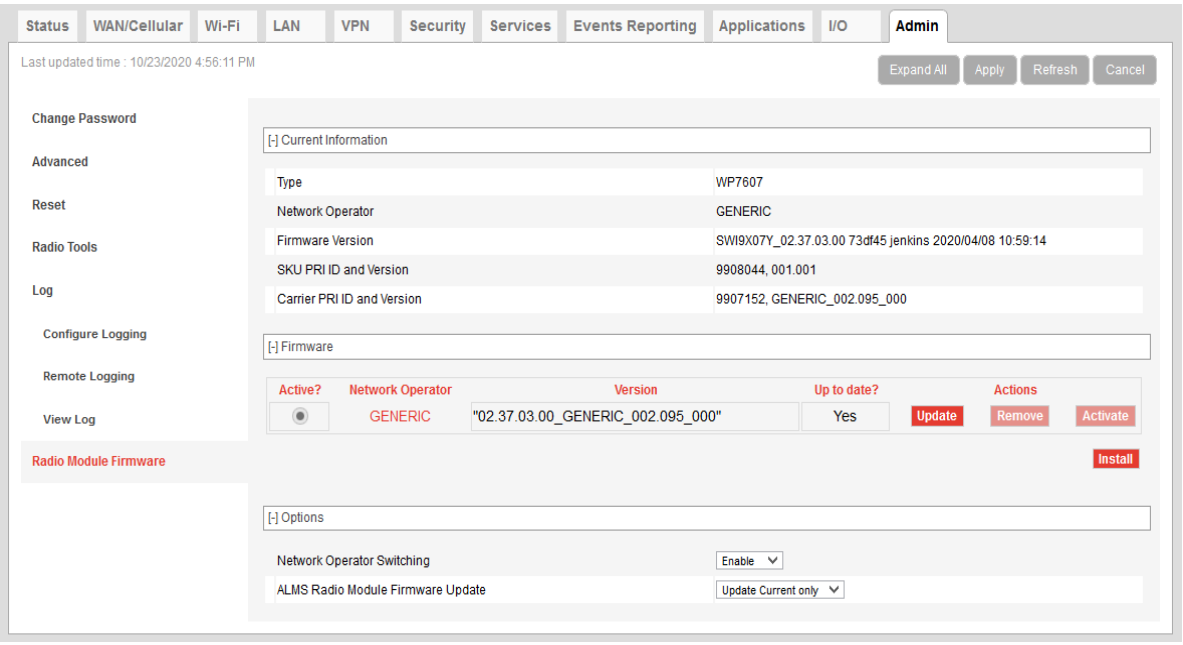
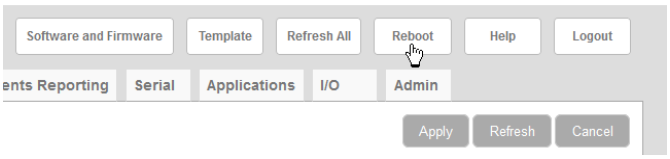


Figure 13-13: ACEmanager: Admin > Radio Module Firmware

2. Use the information in the following table to install, update, or remove radio module firmware.

Field	Description
Current Information	
Type	Shows the router's radio module
Network Operator	Shows the network operator associated with the radio module firmware
Firmware Version	Shows the firmware version for the radio module firmware in use
SKU PRI ID and Version	Shows the device Product Release Instructions ID number and hardware version. This ID specifies which radio modules the device supports, among other hardware parameters.
Carrier PRI ID and Version	Shows the Carrier Product Release Instructions ID number and version. This ID determines the bands available for use by the carrier, among other radio module parameters.
Radio String	Shows the radio module flash memory code
Firmware	
Active?	Indicates whether or not the radio module firmware is currently in use
Network Operator	Indicates the Mobile Network Operator associated with the radio module firmware
Version	Indicates the version number of the radio module firmware
Up to date?	Indicates if the firmware in use matches the ALEOS-referenced radio module firmware
Actions	Action buttons beside each radio module firmware listed, enable you to: • Update—Click to update the radio module firmware for that RMID. Updating the active radio module firmware updates the version in storage and also updates the firmware on the radio module at the next reboot. To reboot, click the Activate button or the reboot button on the top right side of the screen.  • Remove—Click to remove that radio module firmware from the router storage Note: The firmware cannot be removed if it is the active firmware. • Activate—Click to select a radio module firmware to be the active firmware for the router. This option is only available if Network Operator Switching is set to Disable. See Manually Selecting the Radio Module Firmware. A reboot is only required if the router is in Radio Passthru mode. (See page 346.) You can also: • Install—Click to add an additional radio module firmware image to the router storage. When the maximum number of radio module firmware versions are stored on the router, the Install button is not available. To free up space to add another version, first remove one of the firmware versions on the router.

Field	Description
Network Operator Switching	Enable or disable Network Operator Switching • Enable—When the router powers on or reboots, it automatically selects and uses the appropriate radio module firmware for the installed SIM card, if it is stored on the router. (default) • Disable—The router does not automatically select the appropriate radio module firmware when it is powered on or rebooted. You can manually select the firmware to use. See Manually Selecting the Radio Module Firmware.
ALMS Radio Module Firmware Update	Enables you to choose which radio module firmware ALMS will update when you update ALEOS: • Update Current Only—Only the radio module firmware in use is updated, if required (default) • Update All—All the radio module firmware stored on the router is updated, if required • Custom Update—Allows you to select one of three options for each currently supported Network Operator radio module firmware. See Radio Module Firmware Management.

Manually Selecting the Radio Module Firmware

To manually select the radio module firmware to use:

1. In ACEmanager, go to Admin > Radio Module Firmware.

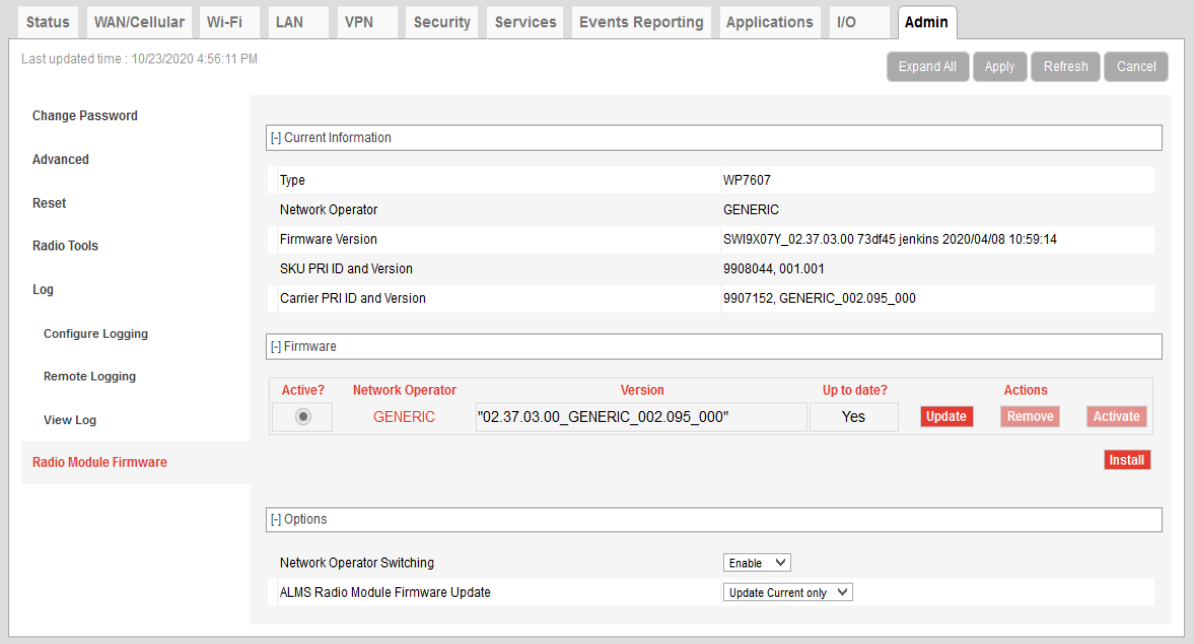


Figure 13-14: ACEmanager: Admin > Radio Module Firmware

2. Under Options > Network Operator Switching, select Disable.
3. Under Firmware, click Activate beside the firmware you want the router to use.
4. Click Apply.
5. Click Reboot or press and release the reset button on the router.

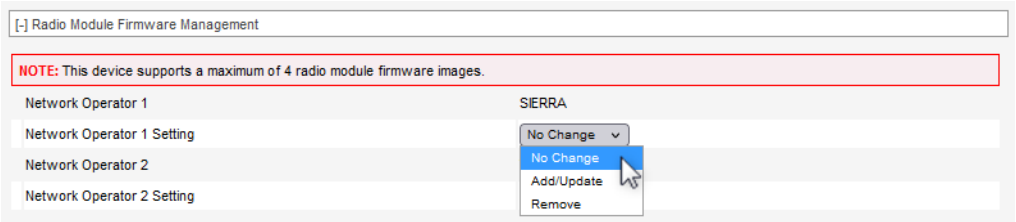
Radio Module Firmware Management

The Radio Module Firmware Management settings appear when Custom Update is selected for ALMS Radio Module Firmware Update.

You can select one of three options for each currently supported Network Operator radio module firmware for the installed version of ALEOS.

- No Change—No action is executed for the selected radio module firmware during the ALMS upgrade
- Add/Update—The radio module firmware for the associated network operator is added or upgraded to the same version associated with the ALMS upgrade
- Remove—The radio module firmware for the associated operator is removed from ALEOS during an ALMS upgrade.

Note: If the currently active radio firmware image is selected to be removed, the ALMS upgrade will fail. For example, if the LX40 is currently running GENERIC radio module firmware image and its Network Operating Setting is Remove, the ALMS upgrade will result in an error and no upgrade will be performed.



A: SNMP: Simple Network Management Protocol

Management Information Base (MIB)

ALEOS includes a Management Information Base (MIB) that contains information specific to the AirLink LX40. Reports based on this database are sent in a form designed to be parsed by the NMS. The data is hierarchical with entries addressed through object identifiers.

The MIB complies with:

- RFC 1213 and MIB-II
- RFC 2665 — Ethernet-Like Interface Types
- RFC 2863 — The Interfaces Group MIB

SNMP Traps

SNMP traps are alerts that can be sent from the managed device to the Network Management System when an event happens. Your AirLink LX40 is capable of sending traps when the network connection becomes available.

To send SNMP traps:

1. In ACEmanager, go to Services > Management (SNMP).
2. Configure the fields under Trap Server User. (For more information, see Management (SNMP) on page 280.)
3. Go to Events Reporting > Actions.
4. In the Action Type field select SNMP trap. (For more information, see SNMP TRAP on page 300.)
5. Go Events Reporting > Events and configure monitoring for the event type that will trigger the SNMP trap. For example, the event type could be RSSI, thresholds, network state, hardware temperature, etc.

Sierra Wireless MIB

This section shows the contents of the Sierra Wireless MIB file. When this file is loaded onto a remote SNMP client, you can query the Sierra Wireless specific objects listed in this file.

For a text copy of this MIB file, go to source.sierrawireless.com, and select your AirLink LX40.

```
SIERRA-MIB DEFINITIONS ::= BEGIN

IMPORTS
    OBJECT-TYPE, NOTIFICATION-TYPE, MODULE-IDENTITY, IpAddress,
    Integer32, Opaque, enterprises, Counter32, Unsigned32
        FROM SNMPv2-SMI

    TEXTUAL-CONVENTION, DisplayString, TruthValue
FROM SNMPv2-TC;

sierrawireless MODULE-IDENTITY
    LAST-UPDATED "201202290000Z"
    ORGANIZATION "Sierra Wireless Inc"
    CONTACT-INFO
"Sierra Wirelss Inc
        "

    DESCRIPTION
""
    REVISION "201202290000Z"

    DESCRIPTION
"This file defines the private Sierra MIB extensions."

    ::= { enterprises 20542 }

sharks OBJECT IDENTIFIER ::= { sierrawireless  9}

-- MIB versions

mibversion1 OBJECT IDENTIFIER ::= { sharks  1}

--  GUI Tabs for Sharks

statustab OBJECT IDENTIFIER ::= { mibversion1  1}
```

```
cellulartab OBJECT IDENTIFIER ::= { mibversion1  2}
lantab OBJECT IDENTIFIER ::= { mibversion1  3}
vpntab OBJECT IDENTIFIER ::= { mibversion1 4}
securitytab OBJECT IDENTIFIER ::= { mibversion1  5}
servicestab OBJECT IDENTIFIER ::= { mibversion1  6}
gpstab OBJECT IDENTIFIER ::= { mibversion1  7}
eventsreportingtab OBJECT IDENTIFIER ::= { mibversion1  8}
serialtab OBJECT IDENTIFIER ::= { mibversion1  9}
iotab OBJECT IDENTIFIER ::= { mibversion1  10}
admintab OBJECT IDENTIFIER ::= { mibversion1  11}
snmpconfig OBJECT IDENTIFIER ::= { mibversion1  12}

--  status elements

home   OBJECT IDENTIFIER ::= { statustab  1}
cellular OBJECT IDENTIFIER ::= { statustab  2}
lan  OBJECT IDENTIFIER ::= { statustab  3}
vpn     OBJECT IDENTIFIER ::= { statustab  4}
security     OBJECT IDENTIFIER ::= { statustab  5}
services     OBJECT IDENTIFIER ::= { statustab  6}
gps     OBJECT IDENTIFIER ::= { statustab  7}
serial     OBJECT IDENTIFIER ::= { statustab  8}
about     OBJECT IDENTIFIER ::= { statustab  9}

-- io elements
currentstate OBJECT IDENTIFIER ::= { iotab  1}
configuration OBJECT IDENTIFIER ::= { iotab  2}


--  home status elements

phoneNumber OBJECT-TYPE
SYNTAX DisplayString (SIZE (10))
MAX-ACCESS read-only
STATUS current
```

```
    DESCRIPTION ""
::= { home 17 }

ipAddress OBJECT-TYPE
SYNTAX IpAddress
MAX-ACCESS read-only
STATUS current
   DESCRIPTION ""
::= { home 301 }

networkState OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
   DESCRIPTION ""
::= { home 259 }

rssi OBJECT-TYPE
SYNTAX INTEGER(-125..-50)
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { home 261 }

gprsnetworkOperator OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { home 770 }

cdmanetworkOperator OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
```

```
    DESCRIPTION ""
::= { home 644 }

gprsECIO OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
 DESCRIPTION ""
::= { home 772 }

cdmaECIO OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
  DESCRIPTION ""
::= { home 643 }

powerIn OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { home 266 }

boardTemprature OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { home 267 }

networkServiceType OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
```

```
    DESCRIPTION ""
::= { home 264}

aleosSWVer OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { home 4 }

netChannel OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { home 260 }

cellularBytesSent OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { home 283 }

cellularBytesRecvd OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { home 284 }


deviceName OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
```

```
STATUS current
    DESCRIPTION ""
::= { home 1154 }

--  cellular status elements

wanIP OBJECT-TYPE
SYNTAX IpAddress
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 301 }

electronicID OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 10 }

iccid OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 771 }

cellid OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 773 }

lac OBJECT-TYPE
```

```
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 774 }

imsi OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 785 }

keepAliveIpAddress OBJECT-TYPE
SYNTAX IpAddress
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 1105 }

keepAlivePingTime OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 1104 }

dnsServer1 OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 1082 }

dnsServer2 OBJECT-TYPE
```

```
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 1083 }

cellBand OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 2056 }

apn OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 2151 }

wanUseTime OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 5046 }

rscp OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 10249 }

errorRate OBJECT-TYPE
```

```
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 263 }

bytesSent OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 283 }

bytesRecvd OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 284 }

packetsSent OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 281 }

packetsRecvd OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 282 }

prlVersion OBJECT-TYPE
```

```
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 642 }

prlUpdateStatus OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 646 }

sid OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 648 }

nid OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 649 }

pnOffset OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 650 }

baseClass OBJECT-TYPE
```

```
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 651 }

rsrq OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 10209 }

rsrp OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 10210 }

sinr OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { cellular 10211 }

--  LAN status elements

usbMode OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { lan 1130 }
```

```
vrrpEnabled OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
   DESCRIPTION ""
::= { lan 9001 }

lanpacketsSent OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { lan 279 }

lanpacketsRecvd OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { lan 280 }

wifipacketsSent OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { lan 10405 }

wifipacketsRecvd OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
```

```
::= { lan 10406 }

wifiBridgeEnabled OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { lan 10401 }

wifiSecurityType OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { lan 4509 }

wifiAPStatus OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { lan 4506 }

wifiSSID OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { lan 4507 }

wifiChannel OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
```

```
::= { lan 4508 }

--  VPN status elements


incomingOOB OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { vpn 3177 }

outgoingOOB OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { vpn 3178 }

outgoingHostOOB OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { vpn 3179 }


vpn1Status OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { vpn 3176 }

vpn2Status OBJECT-TYPE
```

```
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { vpn 3205 }

vpn3Status OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { vpn 3231 }

vpn4Status OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { vpn 3257 }

vpn5Status OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { vpn 3283 }

--  Security status elements

dmz OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { security 5113 }
```

```
portForwarding OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { security 5112 }

portFilteringIn OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { security 3505 }

portFilteringOut OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { security 3506 }

trustedHosts OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { security 1062 }

macFiltering OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { security 3509 }
```

```
badPasswdCount OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { security 385 }

ipRejectCount OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { security 386 }

ipRejectLog OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { security 387 }

--  Services status elements

aceNet OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { services 5026 }

aceManager OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
```

```
    DESCRIPTION ""
::= { services 1149 }

dynamicDnsService OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { services 5011 }

fullDomainName OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { services 5007 }

--  GPS status elements

gpsFix OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
   DESCRIPTION ""
::= { gps 900 }

satelliteCount OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { gps 901 }

latitude OBJECT-TYPE
SYNTAX DisplayString
```

```
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { gps 902 }

longitude OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { gps 903 }

heading OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { gps 904 }

speed OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { gps 905 }

engineHours OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { gps 906 }

--  Serial status elements
```

```
serialPortMode OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { serial 1043 }

tcpAutoAnswer OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { serial 1048 }

udpAutoAnswer OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { serial 1054 }

serialPacketsSent OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { serial 273 }

serialPacketsRecvd OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { serial 274 }
--  About status elements
```

```
deviceModel OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { about 7 }


radioModelType OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { about 9 }

radioFirmwareVersion OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { about 8 }

deviceID OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { about 25 }

macAddress OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
```

```
::= { about 66 }

aleosSWVersion OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { about 4 }

deviceHwConfiguration OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { about 5 }

msciVersion OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-only
STATUS current
    DESCRIPTION ""
::= { about 3 }

-- Read Write values

snmpenable OBJECT-TYPE
SYNTAX INTEGER {
           disabled(0),
           enabled(1)}
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig 10040 }

snmpversion OBJECT-TYPE
```

```
SYNTAX INTEGER {
          snmpv2c(2),
          snmpv3(3)}
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10041 }

snmpport OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10042 }

snmpContact OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  2730 }

snmpName OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  2731 }

snmpLocation OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  2732 }
```

```
rocommunity OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10063 }

rouser OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10045 }

rosecuritylvl OBJECT-TYPE
SYNTAX INTEGER {
           noauthnopriv(0),
           authnopriv(1),
           authpriv(2)}
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10046 }

roauthtype OBJECT-TYPE
SYNTAX INTEGER {
           md5(0),
           sha(1) }
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10047 }

roauthkey OBJECT-TYPE
```

```
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10048 }

roprivtype OBJECT-TYPE
SYNTAX INTEGER {
           aes(0),
           des(1) }
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10049 }

roprivkey OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10050 }


rwcommunity OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10064 }

rwuser OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
```

```
::= { snmpconfig  10051 }

rwsecuritylvl OBJECT-TYPE
SYNTAX INTEGER {
          noauthnopriv(0),
          authnopriv(1),
          authpriv(2)}
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10052 }

rwauthtype OBJECT-TYPE
SYNTAX INTEGER {
          md5(0),
          sha(1) }
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10053 }

rwauthkey OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10054 }


rwprivtype OBJECT-TYPE
SYNTAX INTEGER {
          aes(0),
          des(1) }
MAX-ACCESS read-write
STATUS current
```

```
    DESCRIPTION ""
::= { snmpconfig  10055 }

rwprivkey OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10056 }


trapipAddress OBJECT-TYPE
SYNTAX IpAddress
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig 1166 }

trapport OBJECT-TYPE
SYNTAX INTEGER
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10043 }

engineid OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10044 }

trapcommunity OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
```

```
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10065 }

trapuser OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10057 }

trapsecuritylvl OBJECT-TYPE
SYNTAX INTEGER {
           noauthnopriv(0),
           authnopriv(1),
           authpriv(2)}
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10058 }

trapauthtype OBJECT-TYPE
SYNTAX INTEGER {
           md5(0),
           sha(1) }
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10059 }

trapauthkey OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
```

```
::= { snmpconfig  10060 }


trapprivtype OBJECT-TYPE
SYNTAX INTEGER {
          aes(0),
          des(1) }
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10061 }

trapprivkey OBJECT-TYPE
SYNTAX DisplayString
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  10062 }


rebootmodem OBJECT-TYPE
SYNTAX INTEGER {
          nop(0),
          reboot(1) }
MAX-ACCESS read-write
STATUS current
    DESCRIPTION ""
::= { snmpconfig  65001 }

digitalInput1 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Input 1 MSCIID 851"
    ::= { currentstate 851 }
```

```
digitalInput2 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Input 2 MSCIID 852"
    ::= { currentstate 852 }

digitalInput3 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Input 3 MSCIID 853"
    ::= { currentstate 853 }

digitalInput4 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Input 4 MSCIID 854"
    ::= { currentstate 854 }

digitalInput5 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Input 5 MSCIID 867"
    ::= { currentstate 867 }

digitalInput6 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Input 6 MSCIID 868"
    ::= { currentstate 868 }

digitalOutput1 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Output 1 MSCIID 859"
    ::= { currentstate 859 }
```

```
digitalOutput2 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Output 2 MSCIID 860"
    ::= { currentstate 860 }

digitalOutput3 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Output 3 MSCIID 863"
    ::= { currentstate 863 }

digitalOutput4 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Output 4 MSCIID 864"
    ::= { currentstate 864 }

digitalOutput5 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Output 5 MSCIID 865"
    ::= { currentstate 865 }

digitalOutput6 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Output 6 MSCIID 866"
    ::= { currentstate 866 }

digitalConfig1 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Configuration 1 MSCIID 861"
```

```
    ::= { configuration 861 }

digitalConfig2 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Configuration 2 MSCIID 862"
    ::= { configuration 862 }

digitalConfig3 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Configuration 3 MSCIID 869"
    ::= { configuration 869 }

digitalConfig4 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Configuration 4 MSCIID 870"
    ::= { configuration 870 }

digitalConfig5 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Configuration 5 MSCIID 871"
    ::= { configuration 871 }

digitalConfig6 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Digital Configuration 6 MSCIID 872"
    ::= { configuration 872 }


pulseAccumulator1 OBJECT-TYPE
    SYNTAX DisplayString
```

```
    STATUS      current
    DESCRIPTION "Pulse Accumulator 1 MSCIID 4002"
    ::= { currentstate 4002 }

pulseAccumulator2 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Pulse Accumulator 2 MSCIID 4003"
    ::= { currentstate 4003 }

pulseAccumulator3 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Pulse Accumulator 3 MSCIID 4004"
    ::= { currentstate 4004 }

pulseAccumulator4 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Pulse Accumulator 4 MSCIID 4005"
    ::= { currentstate 4005 }

pulseAccumulator5 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Pulse Accumulator 5 MSCIID 4006"
    ::= { currentstate 4006 }

pulseAccumulator6 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Pulse Accumulator 6 MSCIID 4007"
    ::= { currentstate 4007 }

analogInput1 OBJECT-TYPE
```

```
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Analog  Input 1 MSCIID 855"
    ::= { currentstate 855 }


analogInput2 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Analog  Input 2 MSCIID 856"
    ::= { currentstate 856 }

analogInput3 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Analog  Input 3 MSCIID 857"
    ::= { currentstate 857 }

analogInput4 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Analog  Input 4 MSCIID 858"
    ::= { currentstate 858 }

analogInput5 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Analog  Input 5 MSCIID 873"
    ::= { currentstate 873 }

analogInput6 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Analog  Input 6 MSCIID 874"
    ::= { currentstate 874 }
```

```
analogInput7 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Analog  Input 7 MSCIID 875"
    ::= { currentstate 875 }

analogInput8 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Analog  Input 8 MSCIID 876"
    ::= { currentstate 876 }

coefficientAnalogInput1 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Coefficient Analog  Input 1 MSCIID 4011"
    ::= { currentstate 4011 }

coefficientAnalogInput2 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Coefficient Analog  Input 2 MSCIID 4012"
    ::= { currentstate 4012 }

coefficientAnalogInput3 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Coefficient Analog  Input 3 MSCIID 4013"
    ::= { currentstate 4013 }

coefficientAnalogInput4 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Coefficient Analog  Input 4 MSCIID 4014"
```

```
    ::= { currentstate 4014 }

coefficientAnalogInput5 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Coefficient Analog  Input 5 MSCIID 4015"
    ::= { currentstate 4015 }

coefficientAnalogInput6 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Coefficient Analog  Input 6 MSCIID 4016"
    ::= { currentstate 4016 }

coefficientAnalogInput7 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Coefficient Analog  Input 7 MSCIID 4017"
    ::= { currentstate 4017 }

coefficientAnalogInput8 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Coefficient Analog  Input 8 MSCIID 4018"
    ::= { currentstate 4018 }

offsetAnalogInput1 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Offset Analog  Input 1 MSCIID 4021"
    ::= { currentstate 4021 }

offsetAnalogInput2 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
```

```
    DESCRIPTION "Offset Analog  Input 2 MSCIID 4022"
   ::= { currentstate 4022 }

offsetAnalogInput3 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Offset Analog  Input 3 MSCIID 4023"
    ::= { currentstate 4023 }

offsetAnalogInput4 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Offset Analog  Input 4 MSCIID 4024"
    ::= { currentstate 4024 }

offsetAnalogInput5 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Offset Analog  Input 5 MSCIID 4025"
    ::= { currentstate 4025 }

offsetAnalogInput6 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Offset Analog  Input 6 MSCIID 4026"
    ::= { currentstate 4026 }

offsetAnalogInput7 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Offset Analog  Input 7 MSCIID 4027"
    ::= { currentstate 4027 }

offsetAnalogInput8 OBJECT-TYPE
    SYNTAX DisplayString
```

```
        STATUS      current
        DESCRIPTION "Offset Analog  Input 8 MSCIID 4028"
        ::= { currentstate 4028 }

    unitsAnalogInput1 OBJECT-TYPE
        SYNTAX DisplayString
        STATUS      current
        DESCRIPTION "Units Analog  Input 1 MSCIID 4031"
        ::= { currentstate 4031 }

    unitsAnalogInput2 OBJECT-TYPE
        SYNTAX DisplayString
        STATUS      current
        DESCRIPTION "Units Analog  Input 2 MSCIID 4032"
        ::= { currentstate 4032 }

    unitsAnalogInput3 OBJECT-TYPE
        SYNTAX DisplayString
        STATUS      current
        DESCRIPTION "Units Analog  Input 3 MSCIID 4033"
        ::= { currentstate 4033 }

    unitsAnalogInput4 OBJECT-TYPE
        SYNTAX DisplayString
        STATUS      current
        DESCRIPTION "Units Analog  Input 4 MSCIID 4034"
        ::= { currentstate 4034 }

    unitsAnalogInput5 OBJECT-TYPE
        SYNTAX DisplayString
        STATUS      current
        DESCRIPTION "Units Analog  Input 5 MSCIID 4035"
        ::= { currentstate 4035 }

    unitsAnalogInput6 OBJECT-TYPE
```

```
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Units Analog  Input 6 MSCIID 4036"
    ::= { currentstate 4036 }

unitsAnalogInput7 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Units Analog  Input 7 MSCIID 4037"
    ::= { currentstate 4037 }

unitsAnalogInput8 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Units Analog  Input 8 MSCIID 4038"
    ::= { currentstate 4038 }

scaledAnalogInput1 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Scaled Analog  Input 1 MSCIID 4041"
    ::= { currentstate 4041 }

scaledAnalogInput2 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Scaled Analog  Input 2 MSCIID 4042"
    ::= { currentstate 4042 }

scaledAnalogInput3 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Scaled Analog  Input 3 MSCIID 4043"
    ::= { currentstate 4043 }
```

```
scaledAnalogInput4 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Scaled Analog  Input 4 MSCIID 4044"
    ::= { currentstate 4044 }

scaledAnalogInput5 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Scaled Analog  Input 5 MSCIID 4045"
    ::= { currentstate 4045 }

scaledAnalogInput6 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Scaled Analog  Input 6 MSCIID 4046"
    ::= { currentstate 4046 }

scaledAnalogInput7 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Scaled Analog  Input 7 MSCIID 4047"
    ::= { currentstate 4047 }

scaledAnalogInput8 OBJECT-TYPE
    SYNTAX DisplayString
    STATUS      current
    DESCRIPTION "Scaled Analog  Input 8 MSCIID 4048"
    ::= { currentstate 4048 }




--  Notifications starting at 1000
```

```
modemNotifications OBJECT IDENTIFIER ::= { mibversion1  1000 }


value OBJECT-TYPE
    SYNTAX       DisplayString
    MAX-ACCESS  accessible-for-notify
    STATUS      current
    DESCRIPTION "value of MSCIID that triggered this event"
    ::= { modemNotifications 500 }

gpsFixNotification NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "GPS Fix MSCIID 900"
::= { modemNotifications 17 }

vehicleSpeed NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "Vehicle Speed MSCIID 905"
::= { modemNotifications 18 }

engineHoursNotification NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "Engine Hours MSCIID 906"
::= { modemNotifications 19 }

headingChange NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
```

```
        "Heading Change MSCIID 904"
::= { modemNotifications 20 }

rssiNotification NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "RSSI MSCIID 261"
::= { modemNotifications 21 }

networkStateNotification NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "Network State MSCIID 259"
::= { modemNotifications 22 }

networkService NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "Network Service 264"
::= { modemNotifications 23 }

networkErrorRate NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "Network Error Rate MSCIID 263"
::= { modemNotifications 24 }

periodicReports NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
```

```
        "Periodic Reports MSCIID 270"
::= { modemNotifications 25 }

powerInNotification NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "Power In  MSCIID 266"
::= { modemNotifications 26 }

boardTemp NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "Board Temperature MSCIID 267"
::= { modemNotifications 27 }

cdmaTemp NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "CDMA Temperature MSCIID 641"
::= { modemNotifications 28 }


dailyDataUsage NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
    DESCRIPTION
        "Daily Data Usage MSCIID 25001"
::= { modemNotifications 29 }

monthlyDataUsage NOTIFICATION-TYPE
    OBJECTS     { value }
    STATUS      current
```

```
    DESCRIPTION
        "Monthly Data Usage MSCIID 25002"
::= { modemNotifications 30 }

END
```

B: AT Commands

AT Command Set Summary

Note: If you are writing software to parse AT command responses, Sierra Wireless recommends that you design the software to be independent of the amount of whitespace. Whitespace is defined as ASCII space, tab, carriage return and linefeed characters and may appear in any combination, not necessarily containing all of the above.

Note: When using AT commands to change passwords or passphrases, the special character comma ',' cannot be used in the new password or passphrase.

Using a terminal connection (Telnet) or SSH protocol, you can send AT commands to configure the device, command it to do something, or query a setting.

- AT commands must always be terminated by a carriage return <CR> (ASCII character 0x0D), i.e., pressing Enter on the keyboard. Some may also include a new line or line feed <LF>.
- If **E=1** (Echo On), the AT command (including the terminating <carriage return>) is displayed (output) before any responses.
- Two settings affect the format of AT command output: V (Verbose) and Q (Quiet).
- If Q=1 (Quiet On), no result codes are output whatsoever, so there is no response generated by a (non-query) command.
- If Q=0 (Quiet Off), result codes are output. The format of this output is then affected by the Verbose setting.

  If Quiet mode is off, the result code is affected as follows:

  For V=1 (Verbose mode), the textual result code is surrounded by a carriage return and new line. Any AT query response is also surrounded by a carriage return and new line.

  For V=0 (Terse mode), a numeric result code is output with a single trailing carriage return (no new line is output), while any AT query response is followed by a carriage return and new line (there is no preceding output).
- For example, possible output to the AT command "AT" with carriage return (assuming quiet mode is not on) is:

  carriage return—if V=0

  carriage return and new line OK another carriage return and new line—if V=1

Note: AT commands work for the port on which they are executed. For example, if the user types ATE1 and then AT&W using a USB/serial port connection, it sets the USB/serial port to Echo On, but not the telnet connection or the RS232 serial port.

If you need to change the port for Telnet (for example, you have the default port blocked on your firewall), the option is on the Services > Telnet/SSH tab. The default Telnet port is 2332. You can also change the Telnet timeout; if the connection is idle, default timeout is 2 minutes. This is the internal Telnet on the device to pass AT commands and not TCP PAD.

AT commands are shown in upper case, but they are not case sensitive.

This appendix organizes the commands into functional groups to allow you to more quickly locate a desired command when you know the operation but not the command. Commands under each topic are listed alphabetically.

Note: Some of the configuration commands listed here are only available as AT commands.

Reference Tables

Result codes are not shown in the command tables unless special conditions apply. Generally the result code OK is returned when the command has been executed. ERROR may be returned if parameters are out of range, and is returned if the command is not recognized or is not permitted in the current state or condition of the AirLink LX40.

Note: Unless otherwise stated, all commands are accessible locally and remotely.

AT command topics in this appendix:

- Device Updates on page 407
- Status on page 409
- WAN/Cellular on page 425
- LAN on page 442
- VPN on page 462
- Security on page 468
- Services on page 469
- Standard (Hayes) commands on page 479
- I/O on page 484
- Applications on page 485
- Admin on page 489

Device Updates

Table B-1: Device Update AT Commands

Command	Description
***FWRMUPDATE**	This AT command updates the ALEOS software remotely. The ALEOS software file must be on an ftp server. The command parameters are: AT*FWRMUPDATE= <FTP Server IP>,<FTP Server username>,<FTP Server password>,<ALEOS filename> Example: AT*FWRMUPDATE=192.168.17.111,MyUserName,v3yieo,GX_4.3.4.001v0.bin Error message: • Firmware update failed: could not get file from FTP server—Firmware file does not exist; check that the file name was spelled correctly
I4	Query the Recovery version installed on the LX40 Example: ATI4? returns 2.0 - 31934
***RMSTORE**	This AT command remotely loads the radio module firmware file using ftp, verifies and then copies the file in the radio module firmware store location. The radio module firmware file must be on an FTP server, and the file name must have the suffix .iso The command parameters are: AT*RMSTORE=<FTP server hostname or IP>,<user>,<password>,<filepath> Where: • <FTP server hostname or IP> is the resolvable hostname or IP address of the FTP server • <user> is the user name used to access the FTP server • <password> is the password used to access the FTP server • <filepath> is the full path to the file on the FTP server. Example: AT*RMSTORE=192.168.17.111,MyUserName,password,MC7354_VZW004_55581.iso To query the list of files in storage: AT*RMSTORE? Example: AT*RMSTORE? MC7354_ATT004_55580.iso MC7354_SPT004_55581.iso MC7354_VZW004_55581.iso OK

Table B-1: Device Update AT Commands

Command	Description
***RMFWSWITCH**	This AT command switches the current radio module firmware to the radio module firmware specified by the AT command. The radio module firmware file must be stored on the LX40. For more information, see Radio Module Firmware on page 354. The command parameters are: AT*RMFWSWITCH=<Network Operator> Where: • <Network Operator> is the network operator associated with the radio module firmware to which you want to switch. For example, att, generic, etc. (case insensitive). Example: AT*RMFWSWITCH=att

***TPLUPDATE**	This AT command updates the template (configuration file) remotely.
	The template file must be accessible on an FTP server.
	The command parameters are:
	AT*TPLUPDATE=<Server_IP>,<USER_NAME>,<PASSWORD>,<FILE_NAME>
	where:
	• SERVER_IP is the IP address of the FTP server.
	• USER_NAME is the user name used to access the FTP server.
	• PASSWORD is the password used to access the FTP server.
	• FILE_NAME is the name of the template file on the FTP server that you want to apply to the AirLink LX40. The template file must be stored on the FTP User_Name home, not in a sub-folder.
	Example:
	AT*TPLUPDATE=192.168.17.111,MyUserName,MyPassword,NewTemplate.xml
	When the template is successfully applied, the message displayed is:
	`Template applied successfully`
	`OK`
	Note: Configure the FTP server:
	• *As passive mode (not active mode)*
	• *To listen to port 21*

Status

General status commands are listed in Table B-2. For AT commands related to each status page in ACEmanager, see:

- Status > Home AT Commands
- Status > Cellular AT Commands
- Status > Ethernet AT Commands
- Status > Wi-Fi AT Commands
- Status > Security AT Commands
- Status > Services AT Commands
- Status > Applications AT Commands
- Status > About AT Commands

Table B-2: General Status AT Commands

Command	Description
***BAND?**	Query the current radio module band. .
+ECIO?	Query the signal quality.
***ESIMICCID?**	Query the ICCID of the R2C eSIM (if present).
***ETHSTATE?**	Query the connection state (speed and duplex) of the Ethernet port. • AT*ETHSTATE? or AT*ETHSTATE?1—Returns the speed and duplex state of the main Ethernet port (e.g. 100Mb/s Full Duplex)
***HOSTCOMMLVL?**	Query the serial host signal level. Response example: DCD:LOW; DTR:LOW; DSR:HIGH; CTS:HIGH; RTS:LOW
+HWTEMP?	Query the internal temperature of the radio module (in degrees Celsius).
***LISTIP?**	Query the IP/MAC address information for connected LAN devices. This AT command retrieves the information available on the IP/MAC table on the Status > LAN screen. AT*LISTIP? The response lists the IP address, the MAC address, and the status. Fields are separated by semi-colons. Example: `192.168.14.100;0e:c6:ff:b2:61:8f;active`
***NETSERVICE_RAW?**	Query the numeric value for the network service type. • 8—2G (GPRS) • 10—2G roaming • 16—3G (HSPA, HSPA+, UMTS) • 18—3G roaming • 64—4G

Table B-2: General Status AT Commands

Command	Description
***NETSTATE_RAW?**	Query the network state of the current WAN connection. AT*NETSTATE_RAW? returns: • 5—Network Ready (The LX40 is connected to the WAN network and ready to send data.) • 29—Network Ready - Wi-Fi (The LX40 is connected to a Wi-Fi network in client mode.) • 34—Network Ready - Ethernet (The LX40 is connected to an Ethernet WAN network.) • 35—Network Ready - eSIM Not Activated (A legacy status indicating the R2C eSIM has not been activated, as reported by AirVantage.) • 36—Network Ready - eSIM Activation State Unknown • 37—Network Ready - eSIM Suspended • 38—Network Ready - eSIM Terminated • 39—Network Ready - eSIM Not Activated (The R2C eSIM is in Inventory, as reported by AirVantage.) • 0—Network Link Down (The network link is not available.) • 7—No Service (There is no mobile network detected.)
***USBNETSTATE?**	Query the status of the USB connection. AT*USBNETSTATE? returns: • None—There are no USB connections to the AirLink LX40. • 8 MB/s Half Duplex—There is a USB connection to the device.

Status > Home

Table B-3: Status > Home AT Commands

Command	Description
General	
***NETSTATE?**	Query the network state of the current WAN connection. AT*NETSTATE? returns: • Network Ready—The LX40 is connected to the WAN network and ready to send data. • Network Ready - Wi-Fi—The LX40 is connected to a Wi-Fi network in client mode. • Network Ready - Ethernet—The LX40 is connected to an Ethernet WAN network. • Network Ready - Ethernet (Auto DHCP)—The LX40 has an Auto DHCP WAN Ethernet connection. • Network Ready - eSIM Activation State Unknown—The activation state is unknown. For more information, see Network State on page 36. • Network Ready - eSIM Not Activated—A legacy status indicating the R2C eSIM has not been activated, as reported by AirVantage. See also *NETSTATE_RAW?. • Network Ready - eSIM Activation State Unknown • Network Ready - eSIM Suspended • Network Ready - eSIM Terminated • Network Ready - eSIM Not Activated—The R2C eSIM is in Inventory, as reported by AirVantage. • Network Link Down — The network link is not available. • No Service—There is no mobile network detected.
***NETIP?**	Query the current WAN IP address of the device reported by the internal module (generally obtained from your Mobile Network Operator). If you have an Internet-routable IP address, you can use this address to contact devices from the Internet. If your device on a private mobile network, you can use this address to contact the device from another host on the same WAN network. If required, use AT*NETALLOWZEROIP to allow displaying an IP address ending in a zero. *Note: If there is no current network IP address, 0.0.0.0 is returned.*
***NETIPV6?**	Query the current IPv6 network IP address of the device reported by the internal module (generally obtained from your Mobile Network Operator). If you have an Internet-routable IP address, you can use this address to contact devices from the Internet. If your device is on a private mobile network, you can use this address to contact the device from another host on the same WAN network. *Note: If there is no current network IPv6 address, "::" (two colons) is returned.*
***NETIPV6PREFIXLEN?**	Query the length of the network IPv6 prefix. AT*NETIPV6PREFIXLEN? If there is no IPv6 connection, 0 is returned.
***MODEMNAME**	Query the device serial number. AT*MODEMNAME?

Table B-3: Status > Home AT Commands

Command	Description
Advanced (DNS)	
***DNS1?** ***DNS2?**	Query or set the primary DNS (*DNS1) and secondary (*DNS2) IP addresses. AT*DNS1? to query DNS1 AT*DNS2? to query DNS2 AT*DNS1=d.d.d.d to set DNS1 AT*DNS2=d.d.d.d to set DNS2 • d.d.d.d=IP address
***DNS1V6?** ***DNS2V6?**	Query the primary DNS (*DNS1V6) and secondary (*DNS2V6) IPv6 addresses. AT*DNS1V6? to query DNS1 IPv6 AT*DNS2V6? to query DNS2 IPv6

Status > Cellular

Table B-4: Status > Cellular AT Commands

Command	Description
General	
***NETPHONE?**	Query the device's cellular phone number, if applicable or obtainable.
***NETCONNTYPE?**	Query the current IP address type. AT*NETCONNTYPE? • 0—None • 1—IPv4 • 3—IPv4 and IPv6 Gateway *Note: To set the IP address type preference, see *NETIPPREF on page 432.*
***INTSTATE?1**	Query the WAN connection status for a particular interface. The Cellular Interface is interface 1. AT*INSTATE?1 Returns the WAN connection status: • Connected • Not Connected • No Service If no interface is specified, the command queries the cellular network.

Table B-4: Status > Cellular AT Commands

Command	Description
***INTSTATE_RAW?1**	Query the condition of each WAN interface (i.e. the reason for the WAN state returned by *INTSTATE?1). The Cellular interface is interface 1 AT*INTSTATE_RAW?1 The values returned depend on the interface being queried. If no interface is specified, the command queries the cellular network. AT*INTSTATE_RAW?1 returns: • 100—Disconnected • 101—Connecting • 102—Data connection failed. Waiting for retry • 103—Not Connected - Radio Connect off • 104—Not Connected - Waiting for Activity • 105—No SIM or Unexpected SIM Status • 106—SIM Locked, but bad SIM PIN • 107—SIM PIN Incorrect, 5 Attempts Left • 108—SIM PIN Incorrect, 4 Attempts Left • 109—SIM PIN Incorrect, 3 Attempts Left • 110—SIM PIN Incorrect, 2 Attempts Left • 111—SIM PIN Incorrect, 1 Attempt Left • 112—SIM PIN Incorrect, 0 Attempts Left • 113—SIM Blocked, Bad unlock code • 114—SIM Locked: 10 PUK Attempts Left • 115—SIM Locked: 9 PUK Attempts Left • 116—SIM Locked: 8 PUK Attempts Left • 117—SIM Locked: 7 PUK Attempts Left • 118—SIM Locked: 6 PUK Attempts Left • 119—SIM Locked: 5 PUK Attempts Left • 120—SIM Locked: 4 PUK Attempts Left • 121—SIM Locked: 3 PUK Attempts Left • 122—SIM Locked: 2 PUK Attempts Left • 123—SIM Locked: 1 PUK Attempt Left • 124—SIM Blocked, unblock code incorrect • 125—IP Acquired
***NETOP?**	Query the Mobile Network Operator of the active connection. If you are roaming, the roaming operator is returned, if the home operator allows this.
***NETRSSI?**	Query the current RSSI (Receive Signal Strength Indicator) for non-LTE cellular connections, as a negative dBm value.
***LTERSRQ?**	LTE only. Query the LTE signal quality (in dB). For more information, see LTE Signal Quality (RSRQ) on page 43.
***LTERSRP?**	LTE only. Query the LTE signal strength (in dBm). For more information, see LTE Signal Quality (RSRQ) on page 43.
+ICCID?	HSPA and LTE only. Query the SIM ID.

Table B-4: Status > Cellular AT Commands

Command	Description
***NBSIMPRESENT?**	Query the number of SIM cards installed in the router. AT*NBSIMPRESENT? to query Example: AT*NBSIMPRESENT? <number of SIM cards present> OK Response: • 1—One SIM card installed • 2—Two SIM cards installed • 3—Two SIM cards installed, and R2C eSIM present
***PRIMARYSIM**	Query or set which SIM slot contains the primary SIM card. If multiple SIM cards are installed, the Primary SIM card is used for network connections. *PRIMARYSIM? to query *PRIMARYSIM=<slot number> to set • <slot number>=1—Primary SIM card is in slot 1 (upper slot) • <slot number>=2—Primary SIM card is in slot 2 (lower slot) • <slot number>=3—Primary SIM card is R2C eSIM Examples: AT*PRIMARYSIM? <slot number> OK AT*PRIMARYSIM=<slot number> OK The change takes effect after a reboot.
***SECONDARYSIM**	Query or set which SIM slot contains the secondary SIM card. If multiple SIM cards are installed, the secondary SIM card is the second choice to use for network connections. *SECONDARYSIM? to query *SECONDARYSIM=<slot number> to set • <slot number>=1—Secondary SIM card is in slot 1 (upper slot) • <slot number>=2—Secondary SIM card is in slot 2 (lower slot) • <slot number>=3—Secondary SIM card is R2C eSIM Examples: AT*SECONDARYSIM? <slot number> OK AT*SECONDARYSIM=<slot number> OK The change takes effect after a reboot.

Table B-4: Status > Cellular AT Commands

Command	Description
***ACTIVESIM?**	Query the Active SIM card, i.e., which SIM card is currently being used for the data connection. AT*ACTIVESIM? to query • 1—The SIM card in slot 1 (upper slot) is the Active SIM. • 2—The SIM card in slot 2 (lower slot) is the Active SIM. • 3—The R2C eSIM is the Active SIM.
***NETSERV?**	Query the current connection type (e.g., LTE, HSPA+, etc.).
Monitor	
***IPPINGSEC**	Query or set the ping monitor test interval (in seconds) for an interface. AT*IPPINGSEC?<interface> to query the ping monitor test interval • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*IPPINGSEC=<interface>,n to set the ping monitor test interval for an interface • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • n=1–15300 seconds If no interface is specified, the command applies to the cellular network.
***MONITORTYPE**	Query or set the monitor type that is enabled on each interface. AT*MONITORTYPE?<interface> to query • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*MONITORTYPE=<interface>,n to set • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • n=0—Disable • n=1—Enable If no interface is specified, the command applies to the cellular network.

Table B-4: Status > Cellular AT Commands

Command	Description
***IPPINGADDR**	Query or set the ping monitor IP address or FQDN for an interface when the ping monitor test interval (*IPPINGSEC) is set. AT*IPPINGADDR?<interface> to query • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*IPPINGADDR=<interface>,d.d.d.d or n to set • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • d.d.d.d=IP address • n=domain name If no interface is specified, the command applies to the cellular network. *Note: AT*IPPINGSEC must to be set to a value other than 0 to enable pinging.*
***WANUPTIME?**	Query the time in minutes from which the cellular IP is obtained from the mobile network. AT*WANUPTIME?
Advanced	
+CIMI?	HSPA and LTE only. Query the IMSI.
***SRVPLMN?**	Query the PLMN of the currently attached network. AT*SRVPLMN?
***CELLINFO?**	Query cellular connection information.
***CELLINFO2?**	Query in depth cell information.
***NETCHAN?**	Query the current mobile network channel.

Status > Ethernet

Table B-5: Status > Ethernet AT Commands

Command	Description
Ethernet LAN	
***USBDEVICE**	Query or set the startup mode for the USB port. AT*USBDEVICE? to query AT*USBDEVICE=n to set • n=0—USB Serial • n=1—USBNET • n=2—Disabled

Table B-5: Status > Ethernet AT Commands

Command	Description
Ethernet WAN	
***INTSTATE?3**	Query the WAN connection status for a particular interface. The Ethernet Interface is interface 3. AT*INSTATE?3 Returns the WAN connection status: • Connected • Not Connected • No Service If no interface is specified, the command queries the cellular network.
***INTSTATE_RAW?3**	Query the condition of each WAN interface (i.e. the reason for the WAN state returned by *INTSTATE?3). The Ethernet interface is interface 3. AT*INTSTATE_RAW?3 AT*INTSTATE_RAW?3 returns: • 200—Ethernet disconnected • 201—IP acquired • 202—Ethernet not configured for WAN
Monitor	
***IPPINGSEC**	Query or set the ping monitor test interval (in seconds) for an interface. AT*IPPINGSEC?<interface> to query the ping monitor test interval • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*IPPINGSEC=<interface>,n to set the ping monitor test interval for an interface • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • n=1–15300 seconds If no interface is specified, the command applies to the cellular network.
***MONITORTYPE**	Query or set the monitor type that is enabled on each interface. AT*MONITORTYPE?<interface> to query • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*MONITORTYPE=<interface>,n to set • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • n=0—Disable • n=1—Enable If no interface is specified, the command applies to the cellular network.

Table B-5: Status > Ethernet AT Commands

Command	Description
***IPPINGADDR**	Query or set the ping monitor IP address or FQDN for an interface when the ping monitor test interval (*IPPINGSEC) is set. AT*IPPINGADDR?<interface> to query • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*IPPINGADDR=<interface>,d.d.d.d or n to set • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • d.d.d.d=IP address • n=domain name If no interface is specified, the command applies to the cellular network. *Note: AT*IPPINGSEC must to be set to a value other than 0 to enable pinging.*
***WANUPTIME?**	Query the time in minutes from which the cellular IP is obtained from the mobile network. AT*WANUPTIME?

Status > Wi-Fi

Most of the Wi-Fi AT commands are formatted to take two extra parameters after the value parameter that is being set. The first extra parameter is the Wi-Fi card, while the second parameter will be either the SSID (Access Point) or Remote AP (Client). If no extra parameters are provided, the AT command will be queried/set on Wi-Fi Card A and SSID/Remote AP 1. **Either 0 or 2 extra parameters must be provided.**

- Values for Wi-Fi Card are A/a and B/b (B/b applies to the RV55 only).
- Values for SSID are 1 to 4 (SSIDs 2 to 4 apply to the MP70 only).
- Values for Remote AP are 1 to 10.

For example:

- To query an AT command that depends on SSID, enter **AT*WIFIAP_SSIDNAME?,A,3** (where A is the Wi-Fi card and 3 is the SSID).
- To set an AT command that depends on SSID, enter **AT*WIFIAP_SSIDNAME=MyNetwork,b,1** (where b is the Wi-Fi card and 1 is the SSID).
- To query an AT command that depends on the Remote AP: **AT*WIFI_24GPREF?,A,5** (where A is the Wi-Fi card and 5 is the Remote AP).
- To set an AT command that depends on the Remote AP: **AT*WIFI_5GCHANNELS=1,3,11,B,10** (where 1,3,11 are the channels, B is the Wi-Fi card and 10 is the Remote AP).

Table B-6: Status > Wi-Fi AT Commands

Command	Description
Wi-Fi Status	
***WIFI_MODE**	Query or set the WI-Fi Mode. AT*WIFIMODE? to query AT*WIFIMODE=n to set • n=0—Disabled • n=1—AP (Access Point) • n=2—Client For more information, see Global DNS on page 176.
Access Point (LAN)	
***WIFIAP_SSIDNAME**	Query or set the SSID name AT*WIFIAP_SSIDNAME? to query AT*WIFIAP_SSIDNAME=n to set • n=ASCII SSID string Examples: AT*WIFIAP_SSIDNAME?,a,1 (Query on Wi-Fi A, SSID 1) AT*WIFIAP_SSIDNAME=MyNetwork,A,1 (Set to “MyNetwork” on Wi-Fi A, SSID 1)
***WIFIAP_SECTYPE**	Query or set the Wi-Fi Access Point Security Encryption type. AT*WIFIAP_SECTYPE? to query AT*WIFIAP_SECTYPE=n to set • n=0—Openn=1—WEP • n=2—WPA Personal • n=3—WPA2 Personal • n=4—WPA2 Enterprise *Note: WEP is not a recommended Wi-Fi Security protocol because of its vulnerabilities and because only alphanumeric characters can be used for the passphrase. Use WPA/WPA2 instead.* Examples: AT*WIFIAP_SECTYPE?,a,1 (Query on Wi-Fi A, SSID 1) AT*WIFIAP_SECTYPE=3,A,1 (Set to WPA2 Personal on Wi-Fi A, SSID 1)
***WIFIAP_CLIENTS**	Query the number of clients connected to the access point. AT*WIFIAP_CLIENTS? to query AT*WIFIAP_CLIENTS?,a,1 (Query on Wi-Fi A, SSID 1)

Table B-6: Status > Wi-Fi AT Commands

Command	Description
***WIFIAP_EN**	Query or set the Wi-Fi Access Point mode AT*WIFIAP_EN? to query AT*WIFIAP_EN=n to set • n=2—b/g Enabled • n=3—b/g/n 2.4 GHz enabled • n=4—n/ac 5 GHz enabled Examples: AT*WIFIAP_EN?,A,1 (Query on Wi-Fi A, SSID 1) AT*WIFIAP_EN= 4,B,1 (Set to “n/ac 5 GHz” on Wi-Fi B, SSID 1)
***WIFIAP_ENCURRENT**	Query the current access point mode AT*WIFIAP_ENCURRENT?,A,1 (Query on Wi-Fi A, SSID 1)
***WIFIAP_LOCALFREQ**	Query the Access Point frequency (GHz) AT*WIFIAP_LOCALFREQ? to query AT*WIFIAP_LOCALFREQ?,B,1 (Query on Wi-Fi B)
***WIFIAP_CHANNEL**	Query the Access Point channel in use AT*WIFIAP_CHANNEL? to query AT*WIFIAP_CHANNEL?B,1 (Query on Wi-Fi B)
***WIFIAP_MAC**	Query the MAC address of the Wi-Fi Access Point AT*WIFIAP_MAC?,B,1 (Query on Wi-Fi B, SSID 1) *Note: Wi-Fi Client uses a different MAC address.*
***DHCPMODEWIFI**	Query or set the DHCP mode for an SSID. AT*DHCPMODEWIFI? to query AT*DHCPMODEWIFI=n to set • n=0—Server • n=1—Relay Examples: AT*DHCPMODEWIFI?,A,1 (Query on Wi-Fi A, SSID 1) AT*DHCPMODEWIFI=1,A,1 (Set Relay mode on Wi-Fi A, SSID 1)
***WIFIAP_BRIDGED**	Query or set the Bridge Wi-Fi Access Point to Ethernet feature. AT*WIFIAP_BRIDGED? to query AT*WIFIAP_BRIDGED=n to set • n=0—Disable • n=1—Enable AT*WIFIAP_BRIDGED?,A,2 (Query on Wi-Fi A, SSID 2) AT*WIFIAP_BRIDGED=1,b,1 (Set to enabled on Wi-Fi B, SSID 1)

Table B-6: Status > Wi-Fi AT Commands

Command	Description
Client (WAN)	
***INTSTATE?2**	Query the WAN connection status for the Wi-Fi interface. AT*INTSTATE?2 Returns the WAN connection status: • Connected • Not Connected • No Service If no interface is specified, the command queries the cellular network.
***INTSTATE_RAW?2**	In Client Mode, query the condition of the Wi-Fi interface (i.e. the reason for the WAN state returned by *INTSTATE?2). AT*INTSTATE_RAW?2 The values returned depend on the interface being queried. If no interface is specified, the command queries the cellular network. AT*INTSTATE_RAW?2 returns: • 0—Wi-Fi disconnected • 1—Wi-Fi associating • 2—Wi-Fi associated • 3—Wi-Fi connecting • 4—IP acquired
***WIFI_E2ECONNECT**	Query the Wi-Fi end to end connection AT*WIFI_E2ECONNECT?
***WIFI_AVAILABLENET**	Query the available SSIDs AT*WIFI_AVAILABLENET?
***WIFI_ENCRYPTTYPE**	Query the encryption type AT*WIFI_ENCRYPTTYPE?
***WIFI_REMOTEAPMAC**	Query the remote AP MAC address AT*WIFI_REMOTEAPMAC?
***WIFI_REMOTEAPFREQ**	Query the remote AP frequency (GHz) AT*WIFI_REMOTEAPFREQ?
***WIFI_IP**	Query the Wi-Fi IP address AT*WIFI_IP?
***WIFI_RSSIMONITOR**	Query or set the Wi-Fi level RSSI Monitor AT*WIFI_RSSIMONITOR? to query AT*WIFI_RSSIMONITOR=n to set • 0—Disable • 1—Enable
***WIFI_RSSI**	Query the Wi-Fi RSSI level AT*WIFI_RSSI?
***WIFI_CLIENTMAC**	Query the Wi-Fi client MAC address AT*WIFI_CLIENTMAC?

Table B-6: Status > Wi-Fi AT Commands

Command	Description
***WIFI_REMOTEAPMODE**	Query the remote access point mode AT*WIFI_REMOTEAPMODE?
***WIFI_CHANNEL**	Query the current/last used channel. AT*WIFI_CHANNEL?
Statistics (Access Point)	
***WIFIAP_PKTTRANSMIT**	Query sent packets for an access point (SSID n) AT*WIFIAP_PKTTRANSMIT?,a,n (Query on Wi-Fi A, SSID n)
***WIFIAP_PKTRECEIVE**	Query received packets for an access point (SSID n) AT*WIFIAP_PKTRECEIVE?,a,n (Query on Wi-Fi A, SSID n)
Statistics (Client)	
***WIFI_PKTTRANSMIT**	Query sent packets for a client AT*WIFI_PKTTRANSMIT?
***WIFI_PKTRECEIVE**	Query received packets for a client AT*WIFI_PKTRECEIVE?
Monitor (Client)	
***IPPINGSEC**	Query or set the ping monitor test interval (in seconds) for an interface AT*IPPINGSEC?<interface> to query the ping monitor test interval • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*IPPINGSEC=<interface>,n to set the ping monitor test interval for an interface • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • n=1–15300 seconds If no interface is specified, the command applies to the cellular network.
***MONITORTYPE**	Query or set the monitor type that is enabled on each interface. AT*MONITORTYPE?<interface> to query • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*MONITORTYPE=<interface>,n to set • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • n=0—Disable • n=1—Enable If no interface is specified, the command applies to the cellular network.

Table B-6: Status > Wi-Fi AT Commands

Command	Description
***IPPINGADDR**	Query or set the ping monitor IP address or FQDN for an interface when the ping monitor test interval (*IPPINGSEC) is set. AT*IPPINGADDR?<interface> to query • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*IPPINGADDR=<interface>,d.d.d.d or n to set • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • d.d.d.d=IP address • n=domain name If no interface is specified, the command applies to the cellular network. *Note: AT*IPPINGSEC must to be set to a value other than 0 to enable pinging.*
***WIFI_PINGTIMEOUT**	Query or set the time between pings AT*WIFI_PINGTIMEOUT? to query AT*WIFI_PINGTIMEOUT=n to set • n=1 to 20 seconds (default is 20)
***WANUPTIME?**	Query the time in minutes from which the cellular IP is obtained from the mobile network. AT*WANUPTIME?

Status > Security

Table B-7: Status > Security AT Commands

Command	Description
FM	Query or set the Inbound Trusted IP mode (Friends List)—Only allow specified IPs to access the device. ATFM? to query the setting ATFM=n to set • n=0—Disable Trusted IP mode • n=1—Enable Trusted IP mode—Only packets from IP addresses in the Trusted IP list are allowed. Packets from other IP addresses are ignored.

Status > Services

Table B-8: Status > Services AT Commands

Command	Description
***SNTP**	Query or set daily SNTP updates of the system time. AT*SNTP? to query AT*SNTP=n to set • n=0—Off • n=1—On

Status > Applications

Table B-9: Status > Applications AT Commands

Command	Description
***GARMINSTATUS?**	Query Garmin device attachment status.

Status > About

Table B-10: Status > About AT Commands

Command	Description
***SERIALNUM?**	Query the serial number used by ALMS to identify the device.
***DEVICEID?**	When the device is configured to use the device ID with Location reports, this command displays the 64-bit device ID created from the ESN/IMEI or phone, preceded by the hex delimiter (0x). For example: at*deviceid? 0x010112DE140B5A32 *Note: If the device is not configured to use the device ID with Location reports, the command returns "NOT SET".*
***ETHMAC?**	Query the MAC address of the Ethernet port. • AT*ETHMAC? or AT*ETHMAC?1—Returns the MAC address of the main Ethernet port
I[n]	Query device information. • n omitted—device model • n=0—device model • n=1—ALEOS software version, hardware revision, boot version • n=2—Radio module firmware version • n=3—Radio module's unique ID (ESN, IMIEI, or EID) • n-4—Query the Recovery version installed on the LX40

WAN/Cellular

A reboot is required before the WAN/Cellular AT Commands described in the following table take effect.

For a complete alphabetical list of WAN/Cellular AT Commands, see Table B-12. The following table provides a summary of SIM-card-related AT Commands for routers with more than one SIM card slot. Click the AT Command for a detailed description.

Table B-11: Summary of SIM Card AT Commands

Command	What it does
*NBSIMPRESENT?	Queries the number of SIMs present
*SIM1PRESENT?	Queries whether or not there is a SIM card in slot 1
*ESIMPRESENT?	Queries whether or not there is an R2C eSIM card enabled
*ALLOWESIM	Queries or sets whether the LX40 is allowed to use the Ready to Connect eSIM for network connections.
*PRIMARYSIM	Queries or sets which slot contains the Primary SIM card
*SECONDARYSIM	Queries or sets which slot contains the Secondary SIM card
*ACTIVESIM?	Queries which slot contains the Active SIM
*SWITCHSIM	Switches the Active SIM to the one in the Target SIM slot
*TARGETSIM	For manual SIM switching, queries or sets the SIM slot that will become the Active SIM
*NETPW	Queries or sets the network password for the Active SIM
*NETPWSIM1	Queries or sets the network password for the SIM card in slot 1
*NETPWESIM	Queries or sets the network password for the R2C eSIM
*NETUID	Queries or sets the network user ID for the Active SIM
*NETUIDSIM1	Queries or sets the network user ID for the SIM card in slot 1
*NETUIDESIM	Queries or sets the network user ID for the R2C eSIM
*NETAPN	Queries or sets the user-entered APN for the Active SIM
*SIM1NETAPN	Queries or sets the user-entered APN for the SIM card in slot 1
*ESIMNETAPN	Queries or sets the user-entered APN for the R2C eSIM
*SIMPINENABLE	Queries, enables, or disables the ALEOS SIM PIN feature for the Active SIM. When enabled, ALEOS automatically enters the SIM PIN requested by the SIM card when the router starts up.
*SIM1PINENABLE	Queries, enables, or disables the ALEOS SIM PIN feature for the SIM card in slot 1. When enabled, ALEOS automatically enters the SIM PIN requested by the SIM card when the router starts up.
*SIMPIN	Sets the SIM PIN that ALEOS automatically enters for the Active SIM if the ALEOS SIM PIN feature is enabled. This should match the SIM PIN set on the SIM card, either by the mobile network operator or by using *CHGSIMPIN.

Table B-11: Summary of SIM Card AT Commands

Command	What it does
*SIM1PIN	Sets the SIM PIN that ALEOS automatically enters for the SIM card in slot 1 if the ALEOS SIM PIN feature is enabled. This should match the SIM PIN set on the SIM card, either by the mobile network operator or by using *CHGSIMPIN.
*ENASIMPIN	Queries, enables, or disables the PIN lock on the Active SIM card.
*CHGSIMPIN	Changes the PIN on the Active SIM card if the PIN lock is enabled

Table B-12: WAN/Cellular AT Commands

Command	Description
***ACTIVESIM?**	Query the Active SIM card, i.e., which SIM card is currently being used for the data connection. AT*ACTIVESIM? to query • 1—The SIM card in slot 1 (upper slot) is the Active SIM. • 2—The SIM card in slot 2 (lower slot) is the Active SIM. • 3—The R2C eSIM is the Active SIM.
***BANDMODE**	Query or set the Bandwidth Throttle mode. AT*BANDMODE? to query AT*BANDMODE=n to set • n=0—Disable • n=1—Enable
***CHGSIMPIN**	This command changes the SIM PIN on the Active SIM card. To change the SIM PIN ALEOS requests as part of the ALEOS SIM PIN feature, see *SIMPIN on page 438. AT*CHGSIMPIN=<Old PIN>,<NewPIN> Note: To enable or disable the SIM PIN lock, see *ENASIMPIN on page 429. For more information, see SIM PIN on page 99.
***CIOTWBEN**	WP7702-equipped devices only. Query or set LTE Wideband Operation. AT*CIOTWBEN? to query AT*CIOTWBEN=n to set • n=0—Disable • n=1—Enable
***CIOTM1EN**	WP7702-equipped devices only. Query or set LTE Cat-M1 Operation. AT*CIOTM1EN? to query AT*CIOTM1EN=n to set • n=0—Disable • n=1—Enable

Table B-12: WAN/Cellular AT Commands

Command	Description
***CIOTNBEN**	WP7702-equipped devices only. Query or set LTE NB-IoT Operation. AT*CIOTNBEN? to query AT*CIOTNBEN=n to set • n=0—Disable • n=1—Enable

***CLIENT_PPP_AUTH**	Query or set the Force Network Authentication mode.
	AT*CLIENT_PPP_AUTH? to query
	AT*CLIENT_PPP_AUTH=n to set
	• n=0—None
	• n=1—PAP
	• n=2—CHAP
	Examples:
	`*ATCLIENT_PPP_AUTH?`
	`1`
	
	`OK`
	`*ATCLIENT_PPP_AUTH=2`
	`OK`

***CLIENT_PPP_AUTHESIM**	Query or set the Force Network Authentication mode for the R2C eSIM (if available).
	AT*CLIENT_PPP_AUTHESIM? to query
	AT*CLIENT_PPP_AUTHESIM=n to set
	• n=0—None
	• n=1—PAP
	• n=2—CHAP
	Examples:
	`*ATCLIENT_PPP_AUTHESIM?`
	`1`
	
	`OK`
	`*ATCLIENT_PPP_AUTHESIM=0`
	`OK`

Table B-12: WAN/Cellular AT Commands

Command	Description
+COPS	HSPA only. Query or set the network operator and the connection mode. AT+COPS? to query AT+COPS=? to retrieve a list of operators available to the radio AT+COPS=MODE[,FORMAT[,OPER]] to set MODE • MODE=0—Automatic (default) • MODE=1—Manual • MODE=4—Manual/Automatic; if manual failed, it defaults to automatic FORMAT • FORMAT=0—Alphanumeric (“Name”) • FORMAT=2—Numeric OPER • OPER= the operator numeric code Example, AT+COPS=1,2,302610 Manual mode, numeric format, operator code 302610 *Note: On some mobile networks, explicit use of +COPS allows you to select the roaming Mobile Network Operator to use.*
***DOWNBAND**	Query or set the maximum downlink bandwidth. AT*DOWNBAND? to query AT*DOWNBAND=n to set • n = 0—Bandwidth Throttle is disabled for downlink traffic • n=1–512000—Maximum downlink bandwidth in Kilobits per second (Kbps). This is the long-term bandwidth limit. Default value is 25600.
***DOWNBURST**	Query or set the maximum size for bursts of downlink traffic. AT*DOWNBURST? to query AT*DOWNBURST=n to set • n=64–512000—Maximum size for bursts of downlink traffic in Kilobits (Kb). This allows the LX40 to handle temporary bursts of traffic without dropping packets. When the actual downlink traffic is less than the value configured in *DOWNBAND, ALEOS collects credits that can be used for bursty traffic. The value configured here is the maximum amount of credit that can be collected. Default value is 51200. *Note: Sierra Wireless recommends that the Maximum Downlink Burst Size be set at 2× the value configured in the *DOWNBAND field. If the Maximum Downlink Burst Size is set at more than 60× the value configured in the *DOWNBAND field, the bandwidth throttle feature is disabled for downlink traffic.*
***DOWNBYTES?**	Query the number of downlink bytes received. AT*DOWNBYTES? The value is updated every 30 seconds, and is reset to zero on LX40 reboot or reset to factory default settings.

Table B-12: WAN/Cellular AT Commands

Command	Description
***DOWNDROPPED?**	Query the number of downlink packets dropped because the limit set in *DOWNBAND and *DOWNBURST have been exceeded. AT*DOWNDROPPED? The value is updated every 30 seconds, and is reset to zero on LX40 reboot or reset to factory default settings.
***DOWNPACKETS?**	Query the number of downlink packets received. AT*DOWNPACKETS? The value is updated every 30 seconds, and is reset to zero on LX40 reboot or reset to factory default settings.
***EDRXEN**	WP7702-equipped devices only. Query or set the Extended Discontinuous Reception (extended sleep mode or eDRX) setting. AT*EDRXEN? to query AT*EDRXEN=n to set • n=0—Disable • n=1—Enable
***ENASIMPIN**	Query, enables or disables the SIM PIN lock on the Active SIM card, When enabled, the SIM card requests this PIN when the LX40 boots up. (If the ALEOS SIM PIN feature is also enabled, the PIN will be entered automatically. This is useful if the LX40 is at a location where no one is available to enter the PIN. For more information see Enable the SIM PIN on page 100 and *SIMPINENABLE on page 439.) AT*ENASIMPIN? to query • 0—SIM PIN is not required at boot. • 1—SIM PIN Is required at boot. AT*ENASIMPIN=<lock>,<PIN> to set, where: • <lock> = 0—SIM PIN is not required at boot. • <lock> = 1—SIM PIN Is required at boot. • <PIN> = The current PIN
***ETHWAN_IPMODE**	Query or set the Ethernet WAN IP mode AT*ETHWAN_IPMODE? to query AT*ETHWAN_IPMODE=n to set • 0—Dynamic • 1—Static
***ETHWAN_STATICDNS1** ***ETHWAN_STATICDNS2**	Query or set the static IP address for the primary or secondary Ethernet WAN DNS server AT*ETHWAN_STATICDNS1? to query the IP address for the primary DNS server AT*ETHWAN_STATICDNS2? to query the IP address for the secondary DNS server AT*ETHWAN_STATICDNS1=n.n.n.n to set the IP address for the primary DNS server AT*ETHWAN_STATICDNS2=n.n.n.n to set the IP address for the secondary DNS server Example: AT*ETHWAN_STATICDNS1=208.67.222.222

Table B-12: WAN/Cellular AT Commands

Command	Description
***ETHWAN_STATICGTWY**	Query or set the static IP address for the Ethernet WAN gateway AT*ETHWAN_STATICGTWY? to query AT*ETHWAN_STATICGTWY=n.n.n.n to set Example: AT*ETHWAN_STATICGTWY=208.81.123.254
***ETHWAN_STATICIP**	Query or set the static IP address for the AirLink LX40 AT*ETHWAN_STATICIP? to query AT*ETHWAN_STATICIP=n.n.n.n to set Example: AT*ETHWAN_STATICIP=208.81.123.34
***ETHWAN_STATICMASK**	Query or set the subnet mask for the AirLink LX40 static IP address AT*ETHWAN_STATICMASK? to query AT*ETHWAN_STATICMASK=n.n.n.n to set Example: AT*ETHWAN_STATICMASK=255.255.255.0
***IPPINGSEC**	Query or set the ping monitor test interval (in seconds) for an interface. AT*IPPINGSEC?<interface> to query the ping monitor test interval • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*IPPINGSEC=<interface>,n to set the ping monitor test interval for an interface • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • n=1–15300 seconds If no interface is specified, the command applies to the cellular network.
***IPPINGADDR**	Query or set the ping monitor IP address or FQDN for an interface when the ping monitor test interval (*IPPINGSEC) is set. AT*IPPINGADDR?<interface> to query • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*IPPINGADDR=<interface>,d.d.d.d or n to set • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • d.d.d.d=IP address • n=domain name If no interface is specified, the command applies to the cellular network. *Note: AT*IPPINGSEC must to be set to a value other than 0 to enable pinging.*

Table B-12: WAN/Cellular AT Commands

Command	Description
***MONITORTYPE**	Query or set the monitor type that is enabled on each interface. AT*MONITORTYPE?<interface> to query • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network AT*MONITORTYPE=<interface>,n to set • interface=1—Cellular network • interface=2—Wi-Fi network • interface=3—Ethernet WAN network • n=0—Disable • n=1—Enable If no interface is specified, the command applies to the cellular network.
***MSNOSERVICETOUT**	Query or set the time in minute before switching to the inactive SIM card if there is no longer service on the current SIM card. AT*MSNOSERVICETOUT? to query AT*MSNOSERVICETOUT=<n> to set • <n>=10–255 • <n>=0—feature is disabled (default)
***MSSECONDARYTOUT**	Query or set the time in minute before switching to the primary SIM card if the router is connected to the network using the secondary SIM card. AT*MSSECONDARYTOUT? to query AT*MSSECONDARYTOUT=<n> to set • <n>=10–255 • <n>=0—feature is disabled (default)
***MSROAMINGTOUT**	Query or set the time in minute before switching to the inactive SIM card if active SIM card is roaming. AT*MSROAMINGTOUT? to query AT*MSROAMINGTOUT=<n> to set • <n>=10–255 • <n>=0—feature is disabled (default)
***MSSCANTOUT**	Query or set the time in minute before switching to the inactive SIM if the router is unable to connect to the network. AT*MSSCANTOUT? to query AT*MSSCANTOUT=<n> to set • <n>=10–255 • <n>=0—feature is disabled (default)

Table B-12: WAN/Cellular AT Commands

Command	Description

***NBSIMPRESENT?**	Query the number of SIM cards installed in the router.
	AT*NBSIMPRESENT? to query
	Example:
	`AT*NBSIMPRESENT?`
	`<number of SIM cards present>`
	
	`OK`
	Response:
	• 1—One SIM card installed
	• 2—Two SIM cards installed
	• 3—Two SIM cards installed, and R2C eSIM present

***NETALLOWZEROIP**	Query or set allowing the device to get an IP address from the mobile network that has the last octet as 0 (zero). AT*NETALLOWZEROIP? to query AT*NETALLOWZEROIP=n to set • n=0—Do not allow • n=1—Allow Allows the device to use a WAN IP address that ends in zero (e.g. 192.168.1.0).

***NETAPN**	Query or set the user entered APN.
	AT*NETAPN? to query
	AT*NETAPN=<apn> to set (up to 80 characters)
	Examples:
	`AT*NETAPN?`
	`<apn>`
	
	`OK`
	`AT*NETAPN=<apn>`
	`OK`
	When you set this command, the APN type is automatically set to User Entry so that the APN you enter with this AT command is used on reboot.

***NETIPPREF**	Query or set the IP Address Preference. *Note: To use IPv6, it must be supported by your Mobile Network Operators and your account (SIM and APN).* AT*NETIPPREF? to query AT*NETIPPREF=n to set • n=0—IPv4 • n=1—IPv4 and IPv6 Gateway *To determine the current network IP type, see *NETCONNTYPE? on page 412.*

Table B-12: WAN/Cellular AT Commands

Command	Description

***NETPW**	Query or set the mobile network account password.
	AT*NETPW? to query
	AT*NETPW=<password> to set (up to 128 characters)
	*Note: AT*NETPW? returns asterisks (****) for privacy.*
	Examples:
	`ATNETPW?`
	`*******`
	
	`OK`
	`AT*NETPW=<password>`
	`OK`

***NETPWSIM1**	Query or set the mobile network account password for the SIM card in Slot 1 (upper slot).
	AT*NETPWSIM1? to query
	AT*NETPWSIM1=<password> to set (up to 128 characters)
	*Note: AT*NETPWSIM1? returns asterisks (****) for privacy.*
	Examples:
	`ATNETPWSIM1?`
	`*******`
	
	`OK`
	`AT*NETPWSIM1=<password>`
	`OK`

***NETPWESIM**	Query or set the mobile network account password for the R2C eSIM (if available).
	AT*NETPWESIM? to query
	AT*NETPWESIM=<password> to set (up to 128 characters)
	*Note: AT*NETPW? returns asterisks (****) for privacy.*
	Examples:
	`ATNETPWESIM?`
	`*******`
	
	`OK`
	`AT*NETPWESIM=<password>`
	`OK`

Table B-12: WAN/Cellular AT Commands

Command	Description
***NETUID**	Query or set the mobile network account user ID, if required. AT*NETUID? to query • AT*NETUID=<uid>(up to 128 characters) AT*NETUID? <uid> OK AT*NETUID=<uid> OK
***NETUIDSIM1**	Query or set the mobile network account user ID for the SIM card in Slot 1 (upper slot). AT*NETUIDSIM1? to query AT*NETUIDSIM1=<uid> (up to 128 characters) Examples: AT*NETUIDSIM1? <uid> OK AT*NETUIDSIM1=<uid> OK
***NETUIDESIM**	Query or set the mobile network account user ID for the R2C eSIM (if available). AT*NETUIDESIM? to query AT*NETUIDESIM=<uid> (up to 128 characters) Examples: AT*NETUIDESIM? <uid> OK AT*NETUIDESIM=<uid> OK

Table B-12: WAN/Cellular AT Commands

Command	Description
***NWDOGTIME**	Query or set the interval that the network connection watchdog waits for a cellular or W-Fi WAN connection. If no connection is established within this interval, the device resets. AT*NWDOGTIME? to query AT*NWDOGTIME=n to set Accepted values: • n=0—Disable • n=5—5 Minutes • n=10—10 Minutes • n=15—15 Minutes • n=30—30 Minutes • n=45—45 Minutes • n=60—1 Hour • n=120—2 Hours (default) • n=180—3 Hours • n=240—4 Hours *Note: This AT Command replaces AT*NETWDOG.*
PING	Sends 5 PING to a single address. Returns OK if there is a response: ERROR if there is no response. ATPING[ip address or FQDN] *Note: Do not use an equal sign (=) when issuing the command.* Example: ATPINGsierrawireless.com

***PRIMARYSIM**	Query or set which SIM slot contains the primary SIM card. If multiple SIM cards are installed, the Primary SIM card is used for network connections.
	*PRIMARYSIM? to query
	*PRIMARYSIM=<slot number> to set
	• <slot number>=1—Primary SIM card is in slot 1 (upper slot)
	• <slot number>=2—Primary SIM card is in slot 2 (lower slot)
	• <slot number>=3—Primary SIM card is R2C eSIM
	Examples:
	`AT*PRIMARYSIM?`
	`<slot number>`
	
	`OK`
	`AT*PRIMARYSIM=<slot number>`
	`OK`
	The change takes effect after a reboot.

Table B-12: WAN/Cellular AT Commands

Command	Description

***SECONDARYSIM**	Query or set which SIM slot contains the secondary SIM card. If multiple SIM cards are installed, the secondary SIM card is the second choice to use for network connections.
	*SECONDARYSIM? to query
	*SECONDARYSIM=<slot number> to set
	• <slot number>=1—Secondary SIM card is in slot 1 (upper slot)
	• <slot number>=2—Secondary SIM card is in slot 2 (lower slot)
	• <slot number>=3—Secondary SIM card is R2C eSIM
	Examples:
	`AT*SECONDARYSIM?`
	`<slot number>`
	
	`OK`
	`AT*SECONDARYSIM=<slot number>`
	`OK`
	The change takes effect after a reboot.

***RADIO_CONNECT**	This AT Command applies only to International devices on the Vodafone network.
	Query or set the wireless connection setting.
	AT*RADIO_CONNECT? to query
	AT*RADIO_CONNECT=n to set
	• n=0—Disables data traffic. The only way to change this mode is to issue a radio_connect=1 or radio_connect=2 AT command.
	• n=1—Enables Always on connection.
	• n=2—Disables Always on connection. The device listens for outgoing traffic and establishes a mobile network data connection for a specified time:
	  • When there is outgoing traffic
	  or
	  • When it receives a Wakeup SMS, provided Wakeup SMS is configured.
	  (Use *TRAFWUPTOUT on page 440 to set the timeout period.)
	
	Note: This command is not persistent over device resets.
	
	Note: You can only send this command locally over a serial, serial USB, or local telnet/SSH connection.

***RADIO_CONNECT_ STARTUP**	This AT Command applies only to International devices on the Vodafone network. You can query this command remotely or locally, but it can only be set locally. This command is the same as *RADIO_CONNECT, except • The change does not take effect until the next reboot. • The setting is persistent over subsequent reboots.

Table B-12: WAN/Cellular AT Commands

Command	Description
***RXDIVERSITY** *(3G Only)*	Query or set the RX Diversity setting. Rx Diversity allows you to use two antennas to provide a more reliable connection. If you are not using a diversity antenna, Rx Diversity should be disabled. AT*RXDIVERSITY? to query AT*RXDIVERSITY=n to set • n=0—Disable • n=1—Enable *Note: Two antennas are required when connecting to an LTE network.* *Note: This AT Command is not available for all AirLink* LX40*s.*

***SIM1NETAPN**	Query or set the override APN for the SIM card in SIM slot 1.
	*SIM1NETAPN? to query
	*SIM1NETAPN=<apn> to set the APN (up to 80 characters)
	Examples:
	`AT*SIM1NETAPN?`
	`<apn>`
	
	`OK`
	`AT*SIM1NETAPN=<apn>`
	`OK`
	Note: When you set this command, the APN type is automatically set to Override APN so that the APN you enter with this AT command is used on reboot.

***ESIMNETAPN**	Query or set the override APN for the R2C eSIM (if available).
	*ESIMNETAPN? to query
	*ESIMNETAPN=<apn> to set the APN (up to 80 characters)
	Examples:
	`AT*ESIMNETAPN?`
	`<apn>`
	
	`OK`
	`AT*ESIMNETAPN=<apn>`
	`OK`
	Note: When you set this command, the APN type is automatically set to Override APN so that the APN you enter with this AT command is used on reboot.

Table B-12: WAN/Cellular AT Commands

Command	Description
***NETBLANKAPN**	Query or set the Blank APN setting. Enabling blank APN allows the LX40 to connect to a network using a blank APN. AT*NETBLANKAPN? to query AT*NETBLANKAPN=n to set • n=0—Disable • n=1—Enable
***SIM1NETBLANKAPN**	Query or set the Blank APN setting for SIM slot 1. Enabling blank APN allows the LX40 to connect to a network using a blank APN. AT*SIM1NETBLANKAPN? to query AT*SIM1NETBLANKAPN=n to set • n=0—Disable • n=1—Enable
***ESIMNETBLANKAPN**	Query or set the Blank APN setting for R2C eSIM (if available). Enabling blank APN allows the LX40 to connect to a network using a blank APN. AT*ESIMNETBLANKAPN? to query AT*ESIMNETBLANKAPN=n to set • n=0—Disable • n=1—Enable

***SIMPIN**	Sets the SIM PIN that ALEOS automatically entered if the ALEOS SIM PIN feature is enabled. This should match the SIM PIN set on the SIM card by the mobile network operator.
	AT*SIMPIN=<pin> to enter the SIM pin
	Example:
	`AT*SIMPIN=<pin>`
	`OK`

***SIM1PIN**	Sets the SIM PIN that ALEOS automatically entered for the SIM in slot 1 if the ALEOS SIM PIN feature is enabled (and if R2C eSIM is available). This should match the SIM PIN set on the Active SIM card, either by the mobile network operator or by using *CHGSIMPIN. See *CHGSIMPIN on page 426.
	*SIM1PIN=<pin> to enter the SIM PIN
	Example:
	`AT*SIM1PIN=<pin>`
	`OK`

Table B-12: WAN/Cellular AT Commands

Command	Description

***SIMPINENABLE**	Query, enable, or disable the ALEOS SIM PIN feature. When enabled, ALEOS automatically enters the SIM PIN requested by the SIM card on boot up. This is useful if the LX40 is at a location where no one is available to enter the PIN.
	AT*SIMPINENABLE? to query
	AT*SIMPINENABLE=<setting> to set
	• <setting>=0—Don't change
	• <setting>=1—Enable (SIM pin required on startup)
	• <setting>=2—Disable
	`AT*SIMPINENABLE?`
	`<setting>`
	
	`OK`
	`AT*SIMPINENABLE=<setting>`
	`OK`
	
	To enable or disable the SIM PIN lock on the SIM card, see *ENASIMPIN on page 429.

***SIM1PINENABLE**	Query, enable, or disable the ALEOS SIM PIN feature for the SIM card in SIM slot 1 (upper slot). When enabled, ALEOS automatically enters the SIM PIN requested by the SIM card on boot up. This is useful if the router is at a location where no one is available to enter the PIN.
	AT*SIM1PINENABLE? to query
	AT*SIM1PINENABLE=<setting> to set
	• <setting>=0—Don't change
	• <setting>=1—Enable (SIM pin required on startup)
	• <setting>=2—Disable
	`AT*SIM1PINENABLE?`
	`<setting>`
	
	`OK`
	`AT*SIM1PINENABLE=<setting>`
	`OK`

***SIM1PRESENT?**	Query whether or not there is a SIM card installed in SIM slot 1.
	AT*SIM1PRESENT? to query
	• 0—No SIM card in slot 1
	• 1—SIM card present in slot 1
	Examples:
	`AT*SIM1PRESENT?`
	`<Slot 1 SIM status>`
	
	`OK`

Table B-12: WAN/Cellular AT Commands

Command	Description

***ESIMPRESENT?**	Query whether or not there is an R2C eSIM present.
	AT*ESIMPRESENT? to query
	• 0—No R2C eSIM present
	• 1—R2C eSIM present
	Examples:
	`AT*ESIMPRESENT?`
	`<R2C eSIM status>`
	
	`OK`

***ALLOWESIM**	Query or set whether the LX40 is allowed to use the Ready to Connect eSIM for network connections (if supported). AT*ALLOWESIM? to query • 0—R2C eSIM disabled • 1—R2C eSIM enabled AT*ALLOWESIM=n to set • n=0—Disable R2C eSIM (default) • n=1—Enable R2C eSIM
***TARGETSIM**	Query or set which inactive SIM will be the active SIM card after the *SWITCHSIM command. AT*TARGETSIM? to query • 1—SIM Slot 1 • 2—SIM Slot 2 • 3—R2C eSIM AT*TARGETSIM=n to set • n=1—SIM Slot 1 • n=2—SIM Slot 2 • n=3—R2C eSIM
***SWITCHSIM**	Change which SIM card slot contains the active SIM card. If there is no SIM card in the inactive SIM card slot, an error message (“SIM Switching impossible, no SIM in inactive slot”) is returned. A reboot is not required. AT*SWITCHSIM switches the active SIM to the Target SIM card slot To determine whether or not there is a SIM card in the inactive SIM card slot, use , *SIM1PRESENT? or *ESIMPRESENT?.
***TRAFWUPTOUT**	This AT Command applies only to International devices on the Vodafone network. Query or set the timeout period after which, if there is no outgoing WAN traffic, the connection is terminated. The timeout period only takes effect if *RADIO_CONNECT or *RADIO_CONNECT_STARTUP is set to 1. AT*TRAFWUPTOUT? to query AT*TRAFWUPTOUT=n to set • n=2–65535 minutes (default is 2) *Note: This timer is reset to zero each time a WAN packet goes out.*

Table B-12: WAN/Cellular AT Commands

Command	Description
***UPBAND**	Query or set the maximum uplink bandwidth. AT*UPBAND? to query AT*UPBAND=n to set • n=0—Bandwidth Throttle is disabled for uplink traffic • n=1–204800—Maximum uplink bandwidth in Kilobits per second (Kbps). This is the long-term bandwidth limit. Default value is 12288.
***UPBURST**	Query or set the maximum size for bursts of uplink traffic. AT*UPBURST? to query AT*UPBURST=n to set • n=32–204800—Maximum size for bursts of uplink traffic in Kilobits (Kb). This allows the LX40 to handle temporary bursts of traffic without dropping packets. When the actual uplink traffic is less than the value configured in *UPBAND, ALEOS collects credits that can be used for bursty traffic. The value configured here is the maximum amount of credit that can be collected. Default value is 24576. *Note: Sierra Wireless recommends that the Maximum Uplink Burst Size be set at 2× the value configured in the *UPBAND field. If the Maximum Uplink Burst Size is set at more than 60× the value configured in the *UPBAND field, the bandwidth throttle feature is disabled for uplink traffic.*
***UPBYTES?**	Query the number of uplink bytes sent. AT*UPBYTES? The value is updated every 30 seconds, and is reset to zero on LX40 reboot or reset to factory default settings.
***UPDROPPED?**	Query the number of uplink packets dropped because the limit set for Bandwidth Throttle in *UPBAND and *UPBURST have been exceeded. AT*UPDROPPED? The value is updated every 30 seconds, and is reset to zero on LX40 reboot or reset to factory default settings.
***UPPACKETS?**	Query the number of uplink packets sent. AT*UPPACKETS? The value is updated every 30 seconds, and is reset to zero on LX40 reboot or reset to factory default settings.

LAN

Note: A reboot is required before these commands take effect.

Table B-13: LAN AT Commands

Command	Description
***DHCPHOSTEND**	Query or set the ending IP address for the Ethernet DHCP pool. AT*DHCPHOSTEND? to query AT*DHCPHOSTEND=d.d.d.d to set • d.d.d.d=last IP address in Ethernet DHCP pool
***DHCPNETMASK**	Query or set the Ethernet DHCP subnet mask. AT*DHCPNETMASK? to query AT*DHCPNETMASK=d.d.d.d to set • d.d.d.d=Ethernet DHCP subnet mask
***DHCPSERVER**	Query or set the Ethernet DHCP server. AT*DHCPSERVER? to query AT*DHCPSERVER=n to set the DHCP server mode • n=0—Disable • n=1—Server • n=2—Auto For a description of the settings, see DHCP Mode on page 163.
***DNS1?** ***DNS2?**	Query or set the primary DNS (*DNS1) and secondary (*DNS2) IP addresses. AT*DNS1? to query DNS1 AT*DNS2? to query DNS2 AT*DNS1=d.d.d.d to set DNS1 AT*DNS2=d.d.d.d to set DNS2 • d.d.d.d=IP address
***DNSUSER**	Query or set the first alternate server for DNS override. (Applies only to primary DNS.) AT*DNSUSER? to query AT*DNSUSER=d.d.d.d • d.d.d.d=IP address of domain server
***ETHMODE**	Query or set the Ethernet port mode AT*ETHMODE? to query AT*ETHMODE=n to set • n = 0—Auto • n = 1—LAN • n = 2—WAN

Table B-13: LAN AT Commands

Command	Description
***HOSTAUTH**	Query or set the Host Authentication mode for PPPoE only. (It does not set host authentication for PPP/DUN.) AT*HOSTAUTH? to query AT*HOSTAUTH=n to set • n=0—None/Disables authentication for PPPoE (default). • n=1—Authentication through PAP • n=2—Authentication through PAP & CHAP
***HOSTPEERIP**	Query or set the IP address of the device's Ethernet port. By default this is 192.168.13.31. *Note: Any connected LAN device can access this IP addresses, whether using a private or public IP address. This IP address must be in the same subnet as the Ethernet DHCP pool.* AT*HOSTPEERIP? to query AT*HOSTPEERIP=d.d.d.d to set • d.d.d.d=local or peer IP address of the device
***HOSTPRIVIP**	Query or set the starting IP for the Ethernet DHCP pool. AT*HOSTPRIVIP? to query AT*HOSTPRIVIP=d.d.d.d to set • d.d.d.d=IP Address
***HOSTPRIVMODE**	Activate IP passthrough to the selected interface or query the IP passthrough setting. AT*HOSTPRIVMODE? to query AT*HOSTPRIMODE=n to activate IP Passthrough to the selected interface • n=0—IP passthrough on Ethernet • n=1—IP passthrough is disabled • n=2—IP passthrough on USB • n=3—IP passthrough on main serial port using DUN
***HOSTPW**	Query or set the host password for PPPoE only. (It does not set the password for PPP/DUN.) AT*HOSTPW? to query AT*HOSTPW=PASSWORD to set *Note: PASSWORD cannot be "password".*

Table B-13: LAN AT Commands

Command	Description
***HOSTUID**	Query or set the Host user ID for PPPoE only. (It does not set the user ID for PPP/DUN.) AT*HOSTUID? to query AT*HOSTUID=USER ID to set (up to 64 bytes) *Note: USER ID cannot be "user".*
***USBDEVICE**	Query or set the startup mode for the USB port. AT*USBDEVICE? to query AT*USBDEVICE=n to set • n=0 — USB Serial • n=1 — USBNET • n=2 — Disabled

Wi-Fi

- General
- General > Monitor
- Access Point (LAN) > General
- Access Point (LAN) > SSID #
- Access Point (LAN) > Captive Portal
- Client (WAN) AT Commands

Note: A reboot is required before these commands take effect.

Wi-Fi Command Syntax

Most of the Wi-Fi AT commands are formatted to take two extra parameters after the value parameter that is being set. The first extra parameter is the Wi-Fi card, while the second parameter will be either the SSID (Access Point) or Remote AP (Client). If no extra parameters are provided, the AT command will be queried/set on Wi-Fi Card A and SSID/Remote AP 1. **Either 0 or 2 extra parameters must be provided.**

- Values for Wi-Fi Card are A/a and B/b (B/b applies to the RV55 only).
- Values for SSID are 1 to 4 (SSIDs 2 to 4 apply to the MP70 only).
- Values for Remote AP are 1 to 10.

For example:

- To query an AT command that depends on SSID, enter **AT*WIFIAP_SSIDNAME?,A,3** (where A is the Wi-Fi card and 3 is the SSID).
- To set an AT command that depends on SSID, enter **AT*WIFIAP_SSIDNAME=MyNetwork,b,1** (where b is the Wi-Fi card and 1 is the SSID).
- To query an AT command that depends on the Remote AP: **AT*WIFI_24GPREF?,A,5** (where A is the Wi-Fi card and 5 is the Remote AP).
- To set an AT command that depends on the Remote AP: **AT*WIFI_5GCHANNELS=1,3,11,B,10** (where 1,3,11 are the channels, B is the Wi-Fi card and 10 is the Remote AP).

Special Cases

AT*WIFI_MODE: On Dual Wi-Fi AirLink routers (such as the AirLink RV55), the Wi-Fi Modes setting is changed one Wi-Fi Card at a time when using AT commands. For example, if the router is in Wi-Fi A Client - Wi-Fi B Access Point mode.

- The set value for ‘disabled’ is 0
- The set value for ‘Access point’ is 1
- The set value for ‘Client’ is 2

If the command AT*WIFI_MODE=1,a,3 is used, then Wi-Fi Card A is set to Access point mode. This means the Wi-Fi Modes setting will now be Wi-Fi A Access Point - Wi-Fi B Access Point.

If the command AT*WIFI_MODE=0,B,1is used next, then Wi-Fi Card B is disabled. Wi-Fi Modes will now be set to Wi-Fi A Access Point.

AT*WIFI_24GCHANNELS and AT*WIFI_5GCHANNELS: When setting specific 2.4 GHz or 5 GHz channels, they can be set to empty lines by providing only the Wi-Fi Card and remote AP parameters:

- AT*WIFI_24GCHANNELS=,a,4
- AT*WIFI_5GCHANNELS=B,6

General

Table B-14: Wi-Fi AT Commands General

Command	Description
***WIFI_MODE**	Query or set the WI-Fi Mode. AT*WIFI_MODE? to query AT*WIFI_MODE=n to set • n=0—Disabled • n=1—AP (Access Point) • n=2—Client Examples: AT*WIFI_MODE?,a,4 (Query on Wi-Fi A) AT*WIFI_MODE=0,b,1 (Set to disabled on Wi-Fi B)
***WCC**	Query the Wi-Fi country code
***WIFI_CLIENTMODE**	Query or set the Client Mode. AT*WIFI_CLIENTMODE? to query AT*WIFI_CLIENTMODE=n to set • n=0—Manual • n=1—Automatic Example: AT*WIFI_CLIENTMODE=0 (Set client mode to Manual)
***WIFI_RESCANTIMEOUT**	Query or set how often the LX40 re-scans for a configured Access Point when Client Mode is set to Automatic. AT*WIFI_RESCANTIMEOUT? to query AT*WIFI_RESCANTIMEOUT=n to set • n=10–3600 seconds (Default is 10) Example: AT*WIFI_RESCANTIMEOUT=10 (Set rescan timeout to 10)
WIFI_AVAILABLENET?	When in Client Mode, query the available network.
***WIFI_CONNECT**	Connect the LX40 to the available Wi-Fi network AT*WIFI_CONNECT=1 to set
***INTSTATE_RAW?2**	In Client Mode, query the condition of the Wi-Fi interface (i.e. the reason for the WAN state returned by *INTSTATE?2). AT*INTSTATE_RAW?2 The values returned depend on the interface being queried. If no interface is specified, the command queries the cellular network. AT*INTSTATE_RAW?2 returns: • 0—Wi-Fi disconnected • 1—Wi-Fi associating • 2—Wi-Fi associated • 3—Wi-Fi connecting • 4—IP acquired

General > Monitor

Table B-15: Wi-Fi AT Commands General > Monitor

Command	Description
***IPPINGSEC**	Query or set the ping monitor test interval (in seconds) for an interface. AT*IPPINGSEC?2 to query the ping monitor test interval AT*IPPINGSEC=2,n to set the ping monitor test interval for an interface • n=1–15300 seconds
***MONITORTYPE**	Query or set the monitor type that is enabled on each interface. AT*MONITORTYPE?2 to query AT*MONITORTYPE=2,n to set • n=0—Disable • n=1—Enable
***IPPINGADDR**	Query or set the ping monitor IP address or FQDN for an interface when the ping monitor test interval (*IPPINGSEC) is set. AT*IPPINGADDR?2 to query AT*IPPINGADDR=2,d.d.d.d or n to set • d.d.d.d=IP address • n=domain name *Note: AT*IPPINGSEC must to be set to a value other than 0 to enable pinging.*
***WIFI_PINGTIMEOUT**	Query or set the time between pings AT*WIFI_PINGTIMEOUT? to query AT*WIFI_PINGTIMEOUT=n to set • n=1 to 20 seconds (default is 20)
***WIFI_NUMPINGS**	Query or set the number of pings AT*WIFI_NUMPINGS? to query AT*WIFI_NUMPINGS=n to set n=1 to 12 (default is 5) Example: AT*WIFI_NUMPINGS=5 (Set number of pings to 5)
***WIFI_RSSIMONITOR**	Query or set Wi-Fi RSSI Link Monitoring AT*WIFI_RSSIMONITOR? to query AT*WIFI_RSSIMONITOR=n to set • n=0—Disabled • n=1—Enabled
***WIFI_RSSITHRESHOLD**	Query or set Wi-Fi RSSI Loss Threshold AT*WIFI_RSSITHRESHOLD? to query AT*WIFI_RSSITHRESHOLD=n to set • n=-100 to -20 (-55 default)

Table B-15: Wi-Fi AT Commands General > Monitor

Command	Description
***WIFI_RSSIHYSTERESIS**	Query or set Wi-Fi RSSI Hysteresis AT*WIFI_RSSIHYSTERESIS? to query AT*WIFI_RSSIHYSTERESIS=n to set • n=0 to 30 (10 default)
***WIFI_RSSIDOWNTIME**	Query or set Wi-Fi Service Loss Wait Time in seconds AT*WIFI_RSSIDOWNTIME? to query AT*WIFI_RSSIDOWNTIME=n to set • n=0 to 3600 (3 default)
***WIFI_RSSIUPTIME**	Query or set Wi-Fi Service Restored Wait Time in seconds AT*WIFI_RSSIUPTIME? to query AT*WIFI_RSSIUPTIME=n to set • n=0 to 3600 (10 default)

Access Point (LAN) > General

Table B-16: Wi-Fi AT Commands Access Point (LAN) > General

Command	Description
***WIFIAP_EN**	Query or set the Wi-Fi Access Point mode. AT*WIFIAP_EN? to query AT*WIFIAP_EN=n to set • n=2—b/g Enabled • n=3—b/g/n 2.4 GHz enabled • n=4—n/ac 5 GHz enabled Examples: AT*WIFIAP_EN?,A,1 (Query on Wi-Fi A, SSID 1) AT*WIFIAP_EN= 4,B,1 (Set to “n/ac 5 GHz” on Wi-Fi B, SSID 1)
***WIFIAP_CHANNELBGN**	Query or set the Wi-Fi Access Point channel and frequency to use (2.4 GHz channels only). AT*WIFIAP_CHANNELBGN? to query AT*WIFIAP_CHANNELBGN=n to set • n=1–11 (available channels) Example: • AT*WIFIAP_CHANNELBGN?,A,2 (Query on Wi-Fi A) • AT*WIFIAP_CHANNELBGN=5,A,1 (Set to channel 5 on Wi-Fi A) *Note: Enter only channels that the LX40 supports. These channels are listed under the Channel, Frequency, Width and Channel and Frequency settings. If you enter unsupported channels or channels that are excluded by your Country Code settings, these channels will not take effect. See also The Wi-Fi channel I selected is not working.*

Table B-16: Wi-Fi AT Commands Access Point (LAN) > General

Command	Description
***WIFIAP_CHANNELNAC**	Query or set the Wi-Fi Access Point channel, width and frequency to use (5 GHz channels only). AT*WIFIAP_CHANNELNAC? to query AT*WIFIAP_CHANNELNAC=n to set • n=0—Ch 36 (5.180 GHz) 20 MHz • n=1—Ch 36 (5.180 GHz) 20/40 MHz • n=2—Ch 36 (5.180 GHz) 80 MHz • n=3—Ch 40 (5.200 GHz) 20 MHz! • n=4—Ch 40 (5.200 GHz) 20/40 MHz • n=5—Ch 40 (5.200 GHz) 80 MHz • n=6—Ch 44 (5.220 GHz) 20 MHz • n=7—Ch 44 (5.220 GHz) 20/40 MHz • n=8—Ch 44 (5.220 GHz) 80 MHz • n=9—Ch 48 (5.240 GHz) 20 MHz • n=10—Ch 48 (5.240 GHz) 20/40 MHz • n=11—Ch 48 (5.240 GHz) 80 MHz • n=12—Ch 149 (5.745 GHz) 20 MHz • n=13—Ch 149 (5.745 GHz) 20/40 MHz • n=14—Ch 149 (5.745 GHz) 80 MHz • n=15—Ch 153 (5.765 GHz) 20 MHz • n=16—Ch 153 (5.765 GHz) 20/40 MHz • n=17—Ch 153 (5.765 GHz) 80 MHz • n=18—Ch 157 (5.786 GHz) 20 MHz • n=19—Ch 157 (5.786 GHz) 20/40 MHz • n=20—Ch 157 (5.786 GHz) 80 MHz • n=21—Ch 161 (5.805 GHz) 20 MHz • n=22—Ch 161 (5.805 GHz) 20/40 MHz • n=23—Ch 161 (5.805 GHz) 80 MHz • n=24—Ch 165 (5.825 GHz) 20 MHz Example: • AT*WIFIAP_CHANNELBGN? (Query on Wi-Fi A) • AT*WIFIAP_CHANNELNAC=20,b,1 (Set to channel 157 on Wi-Fi B) *Note: Enter only channels that the LX40 supports. These channels are listed under the Channel, Frequency, Width and Channel and Frequency settings. If you enter unsupported channels or channels that are excluded by your Country Code settings, these channels will not take effect. See also The Wi-Fi channel I selected is not working.*

Table B-16: Wi-Fi AT Commands Access Point (LAN) > General

Command	Description
***WIFIAP_BEACONFREQ**	Query or set the Beacon Interval in milliseconds AT*WIFIAP_BEACONFREQ? to query AT*WIFIAP_BEACONFREQ=n to set • n=10 to 65535 (default 100) Examples: AT*WIFIAP_BEACONFREQ?,a,4 (Query on Wi-Fi A) AT*WIFIAP_BEACONFREQ=200 (Set to 200 on Wi-Fi A)
***WIFIAP_DTIMFREQ**	Query or set the DTIM interval AT*WIFIAP_DTIMFREQ? to query AT*WIFIAP_DTIMFREQ=n to set n=1 to 255 (default 1) Examples: AT*WIFIAP_DTIMFREQ?,A,3 (Query on Wi-Fi A) AT*WIFIAP_DTIMFREQ=100,a,2 (Set to 100 on Wi-Fi A)
***WIFIAP_80211W**	Query or set 802.11w support AT*WIFIAP_80211W? to query AT*WIFIAP_80211W=n to set • n=0—Disabled • n=1—Optional • n=2—Required Examples: AT*WIFIAP_80211W?,A,3 (Query on Wi-Fi A) AT*WIFIAP_80211W=0,B,1 (Set to Disabled on Wi-Fi B)

Access Point (LAN) > SSID

Table B-17: Wi-Fi AT Commands Access Point (LAN) > SSID #

Command	Description
***WIFIAP_SSIDNAME**	Query or set the SSID name AT*WIFIAP_SSIDNAME? to query AT*WIFIAP_SSIDNAME=n to set • n=ASCII SSID string Examples: AT*WIFIAP_SSIDNAME?,a,1 (Query on Wi-Fi A, SSID 1) AT*WIFIAP_SSIDNAME=MyNetwork,A,1 (Set to “MyNetwork” on Wi-Fi A, SSID 1)
***WIFIAP_SSIDBCAST**	Query or set the broadcast Wi-Fi Access Point SSID. AT*WIFIAP_SSIDBCAST? to query AT*WIFIAP_SSIDBCAST=n to set • n=0—Disable • n=1—Enable Examples: AT*WIFIAP_SSIDBCAST?,B,1 (Query on Wi-Fi B, SSID 1) AT*WIFIAP_SSIDBCAST=1 (Set to enabled on Wi-Fi A, SSID 1)
***WIFIAP_MAXCLIENT**	Query or set the maximum number of Wi-Fi Access Point clients. AT*APMAXCLIENT? to query AT*APMAXCLIENT=n to set • n=0–10 Examples: AT*WIFIAP_MAXCLIENT? (Query on Wi-Fi A, SSID 1) AT*WIFIAP_MAXCLIENT=37,A,2 (Set to 37 on Wi-Fi A, SSID 2)
***WIFIAP_ISOLATION**	Query or set the client isolation setting (Allow Clients to See One Another) for the Wi-Fi Access Point SSID. AT*WIFIAP_ISOLATION? to query AT*WIFIAP_ISOLATION=n to set • n=0—disable • n=1—enable Examples: AT*WIFIAP_ISOLATION?,A,4 (Query on Wi-Fi A, SSID 4) AT*WIFIAP_ISOLATION=0 (Set to disabled on Wi-Fi A, SSID 1)
***WIFIAP_ADVERTISEWAN**	Query or set advertising the default gateway to Wi-Fi clients. AT*WIFIAP_ADVERTISEWAN? to query AT*WIFIAP_ADVERTISEWAN=n to set • n=0—Disable • n=1—Enable (default) Examples: AT*WIFIAP_ADVERTISEWAN?,A,4 (Query on Wi-Fi A, SSID 4) AT*WIFIAP_ADVERTISEWAN=0 (Set to disabled on Wi-Fi A, SSID 1)

Table B-17: Wi-Fi AT Commands Access Point (LAN) > SSID #

Command	Description
***WIFIAP_BRIDGED**	Query or set the Bridge Wi-Fi Access Point to Ethernet feature. AT*WIFIAP_BRIDGED? to query AT*WIFIAP_BRIDGED=n to set • n=0—Disable • n=1—Enable AT*WIFIAP_BRIDGED?,A,2 (Query on Wi-Fi A, SSID 2) AT*WIFIAP_BRIDGED=1,b,1 (Set to enabled on Wi-Fi B, SSID 1)
***WIFIAP_AGEOUTTIMER**	Query or set the length of time (in seconds) that a client is inactive before the access point drops the connection to the client. AT*WIFIAP_AGEOUTTIMER? to query AT*WIFIAP_AGEOUTTIMER=n to set • n=60 – 3600 (Default is 900) Examples: AT*WIFIAP_AGEOUTTIMER?,A,3 (Query on Wi-Fi A, SSID 3) AT*WIFIAP_AGEOUTTIMER=900,A,4 (Set to 900 on Wi-Fi A, SSID 4)
***WIFIAP_SECTYPE**	Query or set the Wi-Fi Access Point Security Encryption type. AT*WIFIAP_SECTYPE? to query AT*WIFIAP_SECTYPE=n to set • n=0—Openn=1—WEP • n=2—WPA Personal • n=3—WPA2 Personal • n=4—WPA2 Enterprise *Note: WEP is not a recommended Wi-Fi Security protocol because of its vulnerabilities and because only alphanumeric characters can be used for the passphrase. Use WPA/WPA2 instead.* Examples: AT*WIFIAP_SECTYPE?,a,1 (Query on Wi-Fi A, SSID 1) AT*WIFIAP_SECTYPE=3,A,1 (Set to WPA2 Personal on Wi-Fi A, SSID 1)
***WIFIAP_WEPKEYLEN**	Query or set the length of the Wi-Fi Access Point WEP key. AT*WIFIAP_WEPKEYLEN? to query AT*WIFIAP_WEPKEYLEN=n to set • n=0—64-bit • n=1—128-bit • n=2—Custom Examples: AT*WIFIAP_WEPKEYLEN?,A,2 (Query on Wi-Fi A, SSID 2) AT*WIFIAP_WEPKEYLEN=2,A,1 (Set to Custom on Wi-Fi A, SSID 1)
***WIFIAP_WEPKEY**	Query the Wi-Fi Access Point WEP key generated at boot from the WEP passphrase. AT*WIFIAP_WEPKEY? to query Example: AT*WIFIAP_WEPKEY?,B,1 (Query on Wi-Fi B, SSID 1)

Table B-17: Wi-Fi AT Commands Access Point (LAN) > SSID #

Command	Description
***WIFIAP_WEPENCTYPE?**	Query the Wi-Fi Access Point WEP encryption type. AT*WIFIAP_WEPENCTYPE? • n=0—Disabled (Open) • n=1—WEP *Note: WEP is not a recommended Wi-Fi Security protocol because of its vulnerabilities and because only alphanumeric characters can be used for the passphrase. Use WPA/WPA2 instead.*
***WIFIAP_WPACRYPT**	Query or set the Wi-Fi Access Point WPA/WPA2 encryption type. AT*WIFIAP_WPACRYPT? to query AT*WIFIAP_WPACRYPT=n to set • n=0—TKIP • n=1—AES *Note: If you are using WPA2, only AES is allowed.* Examples: AT*WIFIAP_WPACRYPT?,A,3 (Query on Wi-Fi A, SSID 3) AT*WIFIAP_WPACRYPT=1,A,4 (Set to AES on Wi-Fi A, SSID 4)
***WIFIAP_RADIUSAUTHIP**	Query or set the IP address for the RADIUS Authentication Server AT*WIFIAP_RADIUSAUTHIP? to query AT*WIFIAP_RADIUSAUTHIP=<IP address> to set Examples: AT*WIFIAP_RADIUSAUTHIP?,A,3 (Query on Wi-Fi A, SSID 3) AT*WIFIAP_RADIUSAUTHIP=8.8.8.8,B,1 (Set to 8.8.8.8 on Wi-Fi B, SSID 1)
***WIFIAP_ RADIUSAUTHPORT**	Query or set the port number for the RADIUS Authentication Server AT*WIFIAP_RADIUSAUTHPORT? to query AT*WIFIAP_RADIUSAUTHPORT=<Port number> to set Examples: AT*WIFIAP_RADIUSAUTHPORT?,a,1 (Query on Wi-Fi A, SSID 1) AT*WIFIAP_RADIUSAUTHPORT=1812,a,4 (Set to port 1812 on Wi-Fi A, SSID 4)
***WIFIAP_ RADIUSAUTHSECRET**	Query or set the shared secret for the RADIUS Authentication Server AT*WIFIAP_RADIUSAUTHSECRET? to query AT*WIFIAP_RADIUSAUTHSECRET=<ASCII string> to set Examples: AT*WIFIAP_RADIUSAUTHSECRET?b,1 (Query on Wi-Fi B, SSID 1) AT*WIFIAP_RADIUSAUTHSECRET=Secret (Set to “Secret” on Wi-Fi A, SSID 1)

Table B-17: Wi-Fi AT Commands Access Point (LAN) > SSID #

Command	Description
***WIFIAP_RADIUSACCTIP**	Query or set the IP address for the RADIUS Accounting Server AT*WIFIAP_RADIUSACCTIP? to query AT*WIFIAP_RADIUSACCTIP=<IP address> to set Examples: AT*WIFIAP_RADIUSACCTIP?A,4 (Query on Wi-Fi A, SSID 4) AT*WIFIAP_RADIUSACCTIP=0.0.0.0,A,1 (Set to 0.0.0.0 on Wi-Fi A, SSID 1)
***WIFIAP_ RADIUSACCTPORT**	Query or set the port number for the RADIUS Accounting Server AT*WIFIAP_RADIUSACCTPORT? to query AT*WIFIAP_RADIUSACCTPORT=<Port number> to set Examples: AT*WIFIAP_RADIUSACCTPORT?,A,2 (Query on Wi-Fi A, SSID 2) AT*WIFIAP_RADIUSACCTPORT=1812,B,1 (Set to port 1812 on Wi-Fi B, SSID 1)
***WIFIAP_ RADIUSACCTSECRET**	Query or set the shared secret for the RADIUS Accounting Server AT*WIFIAP_RADIUSACCTSECRET? to query AT*WIFIAP_RADIUSACCTSECRET=<ASCII string> to set Examples: AT*WIFIAP_RADIUSACCTSECRET? (Query on Wi-Fi A, SSID 1) AT*WIFIAP_RADIUSACCTSECRET=Example,A,2 (Set to “Example” on Wi-Fi A, SSID 2)
***WIFIAP_HOSTIP**	Query or set the Host Wi-Fi Access Point device IP address. AT*WIFIAP_HOSTIP? to query AT*WIFIAP_HOSTIP=d.d.d.d to set • d.d.d.d=IP Address Examples: AT*WIFIAP_HOSTIP?,A,2 (Query on Wi-Fi A, SSID 2) AT*WIFIAP_HOSTIP=192.168.17.31,B,1 (Set to 192.168.17.31 on Wi-Fi B, SSID 1)
***WIFIAP_STARTIP**	Query or set the Access Point DHCP start of IP address pool. AT*WIFIAP_STARTIP? to query AT*WIFIAP_STARTIP=d.d.d.d to set • d.d.d.d=IP Address Examples: AT*WIFIAP_STARTIP?,A,1 (Query on Wi-Fi A, SSID 1) AT*WIFIAP_STARTIP=192.168.17.100 (Set to 192.168.17.100 on Wi-Fi A, SSID 1)

Table B-17: Wi-Fi AT Commands Access Point (LAN) > SSID #

Command	Description
***WIFIAP_ENDIP**	Query or set the ending IP address for the Wi-Fi Access Point DHCP pool. AT*WIFIAP_ENDIP? to query AT*WIFIAP_ENDIP=d.d.d.d to set • d.d.d.d=IP Address Examples: AT*WIFIAP_ENDIP?,B,1 (Query on Wi-Fi B, SSID 1) AT*WIFIAP_ENDIP=192.168.17.250,a,4 (Set to 192.168.17.250 on Wi-Fi A, SSID 4)
***WIFIAP_NETMASK**	Query or set the Wi-Fi DHCP subnet mask. AT*WIFIAP_NETMASK? to query AT*WIFIAP_NETMASK=d.d.d.d to set • d.d.d.d=IP Address Examples: AT*WIFIAP_NETMASK? (Query on Wi-Fi A, SSID 1) AT*WIFIAP_NETMASK=255.255.255.0,A,3 (Set to 255.255.255.0 on Wi-Fi A, SSID 3)

Access Point (LAN) > Captive Portal

Table B-18: Wi-Fi AT Commands Access Point (LAN) > Captive Portal

Command	Description
***WIFICP_ENABLE**	Query or set enable/disable the captive portal feature AT*WIFICP_ENABLE? to query AT*WIFICP_ENABLE=n to set • n=0—Disable • n=1—Enable Examples: AT*WIFICP_ENABLE?,A,1 (Query on Wi-Fi A) AT*WIFICP_ENABLE=0,B,1 (Set to disabled on Wi-Fi B)
***WIFICP_STATUS?**	Query the current status of the captive portal feature AT*WIFICP_STATUS? Possible responses: • Inactive • Disable • Idle • Initializing • Running • Stopped • Error

Table B-18: Wi-Fi AT Commands Access Point (LAN) > Captive Portal

Command	Description
***WIFICP_START**	Restarts captive portal with the current configuration AT*WIFICP_START=1 Automatically resets to zero when the order is processed Example: AT*WIFICP_START=1,A,3 (Restart Captive Portal on Wi-Fi A)
***WIFICP_UAMSERVER**	Query or set the URL of the server you want to redirect clients to AT*WIFICP_UAMSERVER? to query AT*WIFICP_UAMSERVER=<url> to set Examples: AT*WIFICP_UAMSERVER? (Query on Wi-Fi A) AT*WIFICP_UAMSERVER=<url>,B,1 (Redirect to <url> on Wi-Fi B)
***WIFICP_UAMSECRET**	Query or set the shared secret between the router and the portal AT*WIFICP_UAMSECRET? to query AT*WIFICP_UAMSECRET=<ASCII string> to set Examples: AT*WIFICP_UAMSECRET?,B,1 (Query on Wi-Fi B) AT*WIFICP_UAMSECRET=Secret (Set to “Secret” on Wi-Fi A)
***WIFICP_DNSMODE**	Query or set the DNS method (Auto, Any DNS, User Defined) AT*WIFICP_DNSMODE? to query AT*WIFICP_DNSMODE=n to set • n=0—Auto • n=1—Any DNS • n=2—User Defined Examples: AT*WIFICP_DNSMODE?A,1 (Query on Wi-Fi A) AT*WIFICP_DNSMODE=0,A,4 (Set to “Auto” on Wi-Fi A)
***WIFICP_DNSIP1**	If the DNS mode is set to User Defined (*WIFICP_DNSMODE), use this AT Command to query or set the IP address for DNS 1. AT*WIFICP_DNSIP1? to query AT*WIFICP_DNSIP1=<IP address> to set Examples: AT*WIFICP_DNSIP1?A,2 (Query on Wi-Fi A) AT*WIFICP_DNSIP1=127.0.0.1,B,1 (Set to 127.0.0.1 on Wi-Fi B)
***WIFICP_DNSIP2**	If the DNS mode is set to User Defined (*WIFICP_DNSMODE), use this AT Command to query or set the IP address for DNS 2 AT*WIFICP_DNSIP2? to query AT*WIFICP_DNSIP2=<IP address> to set Examples: AT*WIFICP_DNSIP2?A,3 (Query on Wi-Fi A) AT*WIFICP_DNSIP2=127.0.0.1 (Set to 127.0.0.1 on Wi-Fi A)

Table B-18: Wi-Fi AT Commands Access Point (LAN) > Captive Portal

Command	Description
***WIFICP_NASID**	Query or set the RADIUS NAS Identifier for each device accessing a portal AT*WIFICP_NASID? to query AT*WIFICP_NASID=<ID> to set Examples: AT*WIFICP_NASID?,a,1 (Query on Wi-Fi A) AT*WIFICP_NASID=Airlink1,A,3 (Set to “Airlink1” on Wi-Fi A)
***WIFICP_RADIUSIP**	Query or set the IP address of the RADIUS server AT*WIFICP_RADIUSIP? to query AT*WIFICP_RADIUSIP=<IP address> to set Examples: AT*WIFICP_RADIUSIP?A,4 (Query on Wi-Fi A) AT*WIFICP_RADIUSIP=192.168.14.100,A,4 (Set to 192.168.14.100 on Wi-Fi A)
***WIFICP_ RADIUSAUTHPORT**	Query or set the UDP port used for RADIUS authentication traffic *WIFICP_RADIUSAUTHPORT? to query *WIFICP_RADIUSAUTHPORT=<Port number> to set Default port is 1812. Examples: AT*WIFICP_RADIUSAUTHPORT? (Query on Wi-Fi A) AT*WIFICP_RADIUSAUTHPORT=1812,B,1 (Set to port 1812 on Wi-Fi B)
***WIFICP_ RADIUSACCTPORT**	Query or set the UDP port used for RADIUS accounting traffic *WIFICP_RADIUSACCTPORT? to query *WIFICP_RADIUSACCTPORT=<Port number> to set Default port is 1813 Examples: AT*WIFICP_RADIUSACCTPORT?,b,1 (Query on Wi-Fi B) AT*WIFICP_RADIUSACCTPORT=1813,a,2 (Set to port 1813 on Wi-Fi A)
***WIFICP_RADIUSSECRET**	Query or set the shared secret with the RADIUS server *WIFICP_RADIUSSECRET? to query *WIFICP_RADIUSSECRET=<ASCII string> to set Examples: AT*WIFICP_RADIUSSECRET?,A,1 (Query on Wi-Fi A) AT*WIFICP_RADIUSSECRET=Example,A,3 (Set to “Example” on Wi-Fi A)
***WIFICP_MACAUTHMODE**	Query or set the MAC address authorization mode for the captive portal feature AT*WIFICP_MACAUTHMODE? to query AT*WIFICP_MACAUTHMODE=n to set • n=0—Local MAC authentication • n=1—Server MAC authentication Examples: AT*WIFICP_MACAUTHMODE?,B,1 (Query on Wi-Fi B) AT*WIFICP_MACAUTHMODE=1,A,3 (Set to Server on Wi-Fi A)

Client (WAN) AT Commands

Table B-19: Wi-Fi Client (WAN) AT Commands

Command	Description
***WIFI_REMOTESSIDNAME**	Query or set the network name of the remote access point. AT*WIFI_REMOTESSIDNAME? to query AT*WIFI_REMOTESSIDNAME=<Remote AP SSID> to set For the Remote AP SSID, the LX40 supports: • Upper and lower case letters • Numbers • Spaces • Special characters: ‘ - = [ ] \ ; ’ , . / ~ ! @ # $ % ^ & * ( ) _ + { } | : ”< > ? Special characters used must also be supported by connected devices. The SSID is case-sensitive. Examples: AT*WIFI_REMOTESSIDNAME?,A,6 (Query on Wi-Fi A, remote SSID 6) AT*WIFI_REMOTESSIDNAME=NETWORK,A,10 (Set to “NETWORK” on Wi-Fi A, remote SSID 10)
***WIFI_24GPREF**	Query or set the 2.4GHz channels the LX40 uses for Wi-Fi. AT*WIFI_24GPREF? to query AT*WIFI_24GPREF=n to set • n=0—No 2.4GHz Channels • n=1—All 2.4GHz Channels • n=2—Specific 2.4GHz Channels Examples: AT*WIFI_24GPREF?,A,5 (Query on Wi-Fi A, remote SSID 6) AT*WIFI_24GPREF=1,B,7 (Set to “All 2.4GHz Channels” on Wi-Fi B, remote SSID 7)
***WIFI_24GCHANNELS**	Query or set the 2.4GHz channels to use AT*WIFI_24GCHANNELS? to query AT*WIFI_24GCHANNELS=n to set • n=Comma-delimited list of channels Examples: AT*WIFI_24GCHANNELS?,A,1 (Query on Wi-Fi A, remote SSID 1) AT*WIFI_24GCHANNELS=1,3,11,B,1 (Specify channels 1, 3, and 11 on Wi-Fi B, remote SSID 1)
***WIFI_5GPREF**	Query or set the 5GHz channels the LX40 uses for Wi-Fi. AT*WIFI_5GPREF? to query AT*WIFI_5GPREF=n to set • n=0—No 5GHz Channels • n=1—All 5GHz Channels • n=2—Specific 5GHz Channels Examples: AT*WIFI_5GPREF?,b,3 (Query on Wi-Fi B, remote SSID 3) AT_WIFI_5GPREF=0,A,3 (Set to “No 5GHz Channels” on Wi-Fi A, remote SSID 3)

Table B-19: Wi-Fi Client (WAN) AT Commands

Command	Description
***WIFI_5GCHANNELS**	Query or set the 5GHz channels to use AT*WIFI_5GCHANNELS? to query AT*WIFI_5GCHANNELS=n to set • n=Comma-delimited list of channels Examples: AT*WIFI_5GCHANNELS?,B,9 (Query on Wi-Fi B, remote SSID 9) AT*WIFI_5GCHANNELS=1,2,13,20 (Specify channels 1, 2, 13, and 20 on remote SSID 1)
***WIFI_SECTYPE**	Query or set the authentication mechanism used by the remote AP AT*WIFI_SECTYPE? to query AT*WIFI_SECTYPE=n to set • n=0—Open • n=2—WEP • n=3—WPA/WPA2 Personal • n=4—WPA2-Enterprise Examples: AT*WIFI_SECTYPE? (Query on remote SSID 1) AT*WIFI_SECTYPE=2,A,10 (Set to WEP on Wi-Fi A, remote SSID 10)
***WIFI_80211W**	Query or set 802.11w operation AT*WIFI_80211W? to query AT*WIFI_80211W=n to set • n=0—Disabled • n=1—Optional • n=2—Required Examples: AT*WIFI_80211W?,a,4 (Query on Wi-Fi A, remote SSID 4) AT*WIFI_80211W=0,B,1 (Set to Disabled on Wi-Fi B, remote SSID 1)
***WIFI_STATICIPMODE**	Query or set the Wi-Fi WAN IP mode. AT*WIFI_STATICIPMODE? to query AT*WIFI_STATICIPMODE=n to set • n=0 — Dynamic • n=1 — Static Examples: AT*WIFI_STATICIPMODE?,A,7 (Query on Wi-Fi A, Remote AP 7) AT*WIFI_STATICIPMODE=1,a,2 (Set to static on Wi-Fi A, Remote AP 2)
***WIFI_STATICIP**	Query or set the Wi-Fi static WAN IP. AT*WIFI_STATICIP? to query AT*WIFI_STATICIP=<IP address> to set Examples: AT*WIFI_STATICIP?,A,7 (Query on Wi-Fi A, Remote AP 7) AT*WIFI_STATICIP=192.168.1.131,b,2 (Set on Wi-Fi B, Remote AP 2)

Table B-19: Wi-Fi Client (WAN) AT Commands

Command	Description
***WIFI_STATICNETMASK**	Query or set the Wi-Fi static WAN Netmask. AT*WIFI_STATICNETMASK? to query AT*WIFI_STATICNETMASK=<IP address> to set Examples: AT*WIFI_STATICNETMASK?,A,7 (Query on Wi-Fi A, Remote AP 7) AT*WIFI_STATICNETMASK=255.255.255.0,A,2 (Set on Wi-Fi A, Remote AP 2)
***WIFI_STATICGATEWAY**	Query or set the Wi-Fi static WAN Gateway. AT*WIFI_STATICGATEWAY? to query AT*WIFI_STATICGATEWAY=<IP address> to set Examples: AT*WIFI_STATICGATEWAY?,A,7 (Query on Wi-Fi A, Remote AP 7) AT*WIFI_STATICGATEWAY=192.168.1.254,A,4 (Set on Wi-Fi A, Remote AP 4)
***WIFI_STATICDNS1**	Query or set the Wi-Fi static WAN DNS1. AT*WIFI_STATICDNS1? to query AT*WIFI_STATICDNS1=<IP address> to set Examples: AT*WIFI_STATICDNS1?,A,7 (Query on Wi-Fi A, Remote AP 7) AT*WIFI_STATICDNS1=8.8.8.8,A,2 (Set on Wi-Fi A, Remote AP 2)
***WIFI_STATICDNS2**	Query or set the Wi-Fi static WAN DNS2. AT*WIFI_STATICDNS2? to query AT*WIFI_STATICDNS2=<IP address> to set Examples: AT*WIFI_STATICDNS2?,A,7 (Query on Wi-Fi A, Remote AP 7) AT*WIFI_STATICDNS2=8.8.4.4,A,4 (Set on Wi-Fi A, Remote AP 4)
***WIFI_AUTHTYPE**	Query or set the authentication type AT*WIFI_AUTHTYPE? to query AT*WIFI_AUTHTYPE=n to set • n=0—EAP-TLS • n=1—PEAP Examples: AT*WIFI_AUTHTYPE?,A,6 (Query on Wi-Fi A, remote SSID 6) AT*WIFI_AUTHTYPE=1,A,2 (Set to PEAP on Wi-Fi A, remote SSID 2)

Table B-19: Wi-Fi Client (WAN) AT Commands

Command	Description
***WIFI_PEAPCERT**	Query or set whether to use PEAP Authentication with or without a Client CA Certificate AT*WIFI_PEAPCERT? to query AT*WIFI_PEAPCERT=n to set • n=0—Not Used • n=1—Required Examples: AT*WIFI_PEAPCERT?,a,7 (Query on Wi-Fi A, remote SSID 7) AT*WIFI_PEAPCERT=1 (Set to Required on remote SSID 1) **Warning:** *Selecting Not Used and not using a Client CA certificate may put your system at risk.*
***WIFI_EAPID**	Query or set the Extensible Authentication Protocol (EAP) Identity AT*WIFI_EAPID? to query AT*WIFI_EAPID=<ASCII string> to set Examples: AT*WIFI_EAPID?,a,8 (Query on Wi-Fi A, remote SSID 8) AT*WIFI_EAPID=ID,A,9 (Set to “ID” on Wi-Fi A, remote SSID 9)
***WIFI_CACERT**	Query the current Client CA Certificate file name AT*WIFI_CACERT? to query Example: AT*WIFI_CACERT?,B,2 (Query on Wi-Fi B, remote SSID 2)
***WIFI_CERT**	Query the current Client Certificate file name AT*WIFI_CERT? to query Example: AT*WIFI_CERT?,b,10 (Query on Wi-Fi B, remote SSID 10)
***WIFI_PRIVATEKEY**	Query the current Private Key file name AT*WIFI_PRIVATEKEY? to query Examples: AT*WIFI_PRIVATEKEY? (Query on remote SSID 1)

VPN

Table B-20: VPN Commands

Command	Description
***IPSEC_INBOUND**	Query or set the incoming public Internet traffic. AT*IPSEC_INBOUND? to query AT*IPSEC_INBOUND=n to set • n=0—Blocked (Incoming public Internet traffic is blocked. Only traffic through the VPN tunnel is allowed.) Default • n=1—Allowed (Incoming public Internet traffic is allowed.)
***IPSEC_OB_ALEOS**	Query or set outgoing traffic from the AirLink LX40. AT*IPSEC_OB_ALEOS? to query AT*IPSEC_OB_ALEOS=n to set • n=0—Blocked (Outgoing traffic from the AirLink LX40 to the public Internet is blocked. Only traffic through the VPN tunnel is allowed.) • n=1—Allowed (Outgoing traffic from the AirLink LX40 to the public Internet is allowed.) Default
***IPSEC_OB_HOST**	Query or set the outgoing Host out of band traffic. AT*IPSEC_OB_HOST? to query AT*IPSEC_OB_HOST=n to set • n=0—Blocked (Public Internet traffic from the host device is blocked. Only traffic through the VPN tunnel is allowed.) Default • n=1—Allowed (Public Internet traffic from the host device is allowed.)
***IPSEC1_AUTH** ***IPSEC2_AUTH** ***IPSEC3_AUTH** ***IPSEC4_AUTH** ***IPSEC5_AUTH**	Query or set the authentication type for # VPN. AT*IPSEC[VPN number]_AUTH? to query AT*IPSEC[VPN number]_AUTH=n to set • n=0—None • n=1—MD5 • n=2—SHA1 (default) *Note: MD5 is an algorithm that produces a 128-bit digest for authentication. SHA is a more secure algorithm that produces a 160-bit digest.*
***IPSEC1_DH** ***IPSEC2_DH** ***IPSEC3_DH** ***IPSEC4_DH** ***IPSEC5_DH**	Query or set how the AirLink LX40 VPN creates an SA with the VPN server. The DH (Diffie-Hellman) key exchange protocol establishes pre-shared keys during the phase 1 authentication. The AirLink LX40 supports three prime key lengths, including Group 1 (768 bits), Group 2 (1,024 bits), and Group 5 (1,536 bits). AT*IPSEC[VPN number]_DH? to query AT*IPSEC[VPN number]_DH=n to set • n=0—None • n=1—DH1 • n=2—DH2 (default) • n=5—DH5

Table B-20: VPN Commands

Command	Description
***IPSEC1_ENCRYPT** ***IPSEC2_ENCRYPT** ***IPSEC3_ENCRYPT** ***IPSEC4_ENCRYPT** ***IPSEC5_ENCRYPT**	Query or set the type/length of encryption key used to encrypt/decrypt ESP (Encapsulating Security Payload) packets for # VPN. AT*IPSEC[VPN number]_ENCRYPT? to query AT*IPSEC[VPN number]_ENCRYPT=n to set • n=0—None • n=1—DES • n=2—3DES • n=3—AES-128 (default) • n=7—AES-256 *Note: 3DES supports 168-bit encryption. AES (Advanced Encryption Standard) supports both 128-bit and 256-bit encryption.*
***IPSEC1_GATEWAY** ***IPSEC2_GATEWAY** ***IPSEC3_GATEWAY** ***IPSEC4_GATEWAY** ***IPSEC5_GATEWAY**	Query or set the IP address of the server that # VPN client connects to. AT*IPSEC[VPN number]_GATEWAY? to query AT*IPSEC[VPN number]_GATEWAY=[IP address] to set
***IPSEC1_IKE_AUTH** ***IPSEC2_IKE_AUTH** ***IPSEC3_IKE_AUTH** ***IPSEC4_IKE_AUTH** ***IPSEC5_IKE_AUTH**	Query or set the IKE authentication type for # VPN. AT*IPSEC[VPN number]_IKE_AUTH? to query AT*IPSEC[VPN number]_IKE_AUTH=n to set • n=1—MD5 • n=2—SHA1 *Note: MD5 is an algorithm that produces a 128-bit digest for authentication. SHA is a more secure algorithm that produces a 160-bit digest.*
***IPSEC1_IKE_DH** ***IPSEC2_IKE_DH** ***IPSEC3_IKE_DH** ***IPSEC4_IKE_DH** ***IPSEC5_IKE_DH**	Query or set how the AirLink LX40 VPN creates an SA with the VPN server. The DH (Diffie-Hellman) key exchange protocol establishes pre-shared keys during the phase 1 authentication. The AirLink LX40 supports three prime key lengths, including Group 1 (768 bits), Group 2 (1,024 bits), and Group 5 (1,536 bits). AT*IPSEC[VPN number]_IKE_DH? to query AT*IPSEC[VPN number]_IKE_DH=n to set • n=1—DH1 • n=2—DH2 (default) • n=5—DH5

Table B-20: VPN Commands

Command	Description
***IPSEC1_IKE_DPD** ***IPSEC2_IKE_DPD** ***IPSEC3_IKE_DPD** ***IPSEC4_IKE_DPD** ***IPSEC5_IKE_DPD**	Query or set Dead Peer Detection (DPD). AT*IPSEC[VPN number]_IKE_DPD? to query AT*IPSEC[VPN number]_IKE_DPD=n to set • n=0—Disabled (default) • n=1—Enabled (When DPD is enabled, the AirLink LX40 checks to see if the server is still present if there has been no traffic for a configured interval. If it does not receive an acknowledgment, it retries at 5 second intervals. If there is no acknowledgment after 5 retries, the status of the VPN is set to Not Connected and the device attempts to renegotiate IPSEC security parameters with its peer.) *Note: Sierra Wireless recommends that you Enable IKE DPD. Otherwise the AirLink* LX40 *has no way of detecting that the connection to the VPN server is still available.*
***IPSEC1_IKE_DPD_INTERVAL** ***IPSEC2_IKE_DPD_INTERVAL** ***IPSEC3_IKE_DPD_INTERVAL** ***IPSEC4_IKE_DPD_INTERVAL** ***IPSEC5_IKE_DPD_INTERVAL**	Query or set the DPD interval (in seconds). If there has been no traffic for the period of time set in this field, the AirLink LX40 retries checking with the server, as described in *IPSEC[VPN Number]_IKE_DPD. AT*IPSEC[VPN number]_IKE_DPD_INTERVAL? to query AT*IPSEC[VPN number]_IKE_DPD_INTERVAL=n to set • n=0–3600 (default is 1200) If n=0, DPD monitoring is turned off (disabled), but the AirLink LX40 still responds to DPD requests from the server.
***IPSEC1_IKE_ENCRYPT** ***IPSEC2_IKE_ENCRYPT** ***IPSEC3_IKE_ENCRYPT** ***IPSEC4_IKE_ENCRYPT** ***IPSEC5_IKE_ENCRYPT**	Query or set the type/length of IKE encryption key used to encrypt/decrypt ESP (Encapsulating Security Payload) packets for # VPN. AT*IPSEC[VPN number]_IKE_ENCRYPT? to query AT*IPSEC[VPN number]_IKE_ENCRYPT=n to set • n=1—DES • n=5—3DES • n=7—AES-128 (default) • n=9—AES-256 *Note: 3DES supports 168-bit encryption. AES (Advanced Encryption Standard) supports both 128-bit and 256-bit encryption.*
***IPSEC1_IKE_LIFETIME** ***IPSEC2_IKE_LIFETIME** ***IPSEC3_IKE_LIFETIME** ***IPSEC4_IKE_LIFETIME** ***IPSEC5_IKE_LIFETIME**	Query or set how long the # VPN tunnel is active (in seconds). AT*IPSEC[VPN number]_IKE_LIFETIME? to query AT*IPSEC[VPN number]_IKE_LIFETIME=n to set • n=180–86400 (default is 7200)
***IPSEC1_LIFETIME** ***IPSEC2_LIFETIME** ***IPSEC3_LIFETIME** ***IPSEC4_LIFETIME** ***IPSEC5_LIFETIME**	Query or set how long the # VPN tunnel is active (in seconds). AT*IPSEC[VPN number]_LIFETIME? to query AT*IPSEC[VPN number]_LIFETIME=n to set • n=180–86400 (default is 7200)

Table B-20: VPN Commands

Command	Description
***IPSEC1_LOCAL_ADDR** ***IPSEC2_LOCAL_ADDR** ***IPSEC3_LOCAL_ADDR** ***IPSEC4_LOCAL_ADDR** ***IPSEC5_LOCAL_ADDR**	Query or set the device subnet address for # VPN. AT*IPSEC[VPN number]_LOCAL_ADDR? returns the device subnet address AT*IPSEC[VPN number]_LOCAL_ADDR=[subnet address] to set
***IPSEC1_LOCAL_ADDR_MASK** ***IPSEC2_LOCAL_ADDR_MASK** ***IPSEC3_LOCAL_ADDR_MASK** ***IPSEC4_LOCAL_ADDR_MASK** ***IPSEC5_LOCAL_ADDR_MASK**	Query or set the device subnet mask information (24-bit netmask). AT*IPSEC[VPN number]_LOCAL_ADDR_MASK? to query AT*IPSEC[VPN number]_LOCAL_ADDR_MASK =[subnet mask] to set Default is 255.255.255.0
***IPSEC1_LOCAL_ADDR_TYPE** ***IPSEC2_LOCAL_ADDR_TYPE** ***IPSEC3_LOCAL_ADDR_TYPE** ***IPSEC4_LOCAL_ADDR_TYPE** ***IPSEC5_LOCAL_ADDR_TYPE**	Query or set the network address type for # VPN. AT*IPSEC[VPN number]_LOCAL_ADDR_TYPE? to query AT*IPSEC[VPN number]_LOCAL_ADDR_TYPE=n to set • n=1—Use the Host Subnet • n=5—Single Address • n=17—Subnet Address (default)
***IPSEC1_LOCAL_ID** ***IPSEC2_LOCAL_ID** ***IPSEC3_LOCAL_ID** ***IPSEC4_LOCAL_ID** ***IPSEC5_LOCAL_ID**	Query or set the local (My Identity) ID for the # VPN. • If IP is selected as the local (My Identity) type, AT*IPSEC[VPN number]_LOCAL _ID? returns the WAN IP address assigned by the Mobile Network Operator • If FQDN or User FQDN is selected as the local (My Identity) type, AT*IPSEC[VPN number]_LOCAL_ID? returns the FQDN (for example me@mycompany.com) To set the local ID: AT*IPSEC[VPN number]_LOCAL _ID=[IP address] or [FQDN], depending on the setting for Local ID (My Identity) type.
***IPSEC1_LOCAL_ID_TYPE** ***IPSEC2_LOCAL_ID_TYPE** ***IPSEC3_LOCAL_ID_TYPE** ***IPSEC4_LOCAL_ID_TYPE** ***IPSEC5_LOCAL_ID_TYPE**	Query or set the local (My Identity) ID type for the # VPN. AT*IPSEC[VPN number]_LOCAL_ID_TYPE? to query AT*IPSEC[VPN number]_LOCAL_ID_TYPE=n to set • n=1—IP • n=2—FQDN • n=3—User FQDN *Note:* • *IP (default) allows you to use an IP address* • *FQDN allows you to use a fully qualified domain name (FQDN) e. g., modemname.domainname.com* • *User FQDN allows you to use a user FQDN whose values should include a username (e.g. user@domain.com)*

Table B-20: VPN Commands

Command	Description
***IPSEC1_NEG_MODE** ***IPSEC2_NEG_MODE** ***IPSEC3_NEG_MODE** ***IPSEC4_NEG_MODE** ***IPSEC5_NEG_MODE**	Query or set the negotiation mode for # VPN. AT*IPSEC[VPN number]_NEG_MODE? returns AT*IPSEC[VPN number]_NEG_MODE=n to set • n=1—Main • n=2—Aggressive *Note: Aggressive mode offers increased performance at the expense of security.*
***IPSEC1_PFS** ***IPSEC2_PFS** ***IPSEC3_PFS** ***IPSEC4_PFS** ***IPSEC5_PFS**	Query or set the Perfect Forward Secrecy (PFS) setting for # VPN. PFS provides additional security through a DH shared secret value. When this feature is enabled, one key cannot be derived from another. This ensures previous and subsequent encryption keys are secure even if one key is compromised. AT*IPSEC[VPN number]_PFS? to query PFS AT*IPSEC[VPN number]_PFS=n to set PFS • n=0—Yes (default) • n=1—No
***IPSEC1_REMOTE_ADDR** ***IPSEC2_REMOTE_ADDR** ***IPSEC3_REMOTE_ADDR** ***IPSEC4_REMOTE_ADDR** ***IPSEC5_REMOTE_ADDR**	Query or set the IP address of the device behind the LX40 for # VPN. AT*IPSEC[VPN number]_REMOTE_ADDR? to query AT*IPSEC[VPN number]_REMOTE_ADDR=[IP address] to set
***IPSEC1_REMOTE_ADDR_MASK** ***IPSEC2_REMOTE_ADDR_MASK** ***IPSEC3_REMOTE_ADDR_MASK** ***IPSEC4_REMOTE_ADDR_MASK** ***IPSEC5_REMOTE_ADDR_MASK**	Query or set the remote subnet mask information (24-bit netmask). AT*IPSEC[VPN number]_REMOTE_ADDR_MASK? to query AT*IPSEC[VPN number]_REMOTE_ADDR_MASK =[subnet mask] to set Default is 255.255.255.0
***IPSEC1_REMOTE_ADDR_TYPE** ***IPSEC2_REMOTE_ADDR_TYPE** ***IPSEC3_REMOTE_ADDR_TYPE** ***IPSEC4_REMOTE_ADDR_TYPE** ***IPSEC5_REMOTE_ADDR_TYPE**	Query or set network information of the IPsec server behind the IPsec LX40 for # VPN. AT*IPSEC[VPN number]_REMOTE_ADDR_TYPE? to query AT*IPSEC[VPN number]_REMOTE_ADDR_TYPE=n to set • n=5—Single Address • n=17—Subnet Address (default)
***IPSEC1_REMOTE_ID** ***IPSEC2_REMOTE_ID** ***IPSEC3_REMOTE_ID** ***IPSEC4_REMOTE_ID** ***IPSEC5_REMOTE_ID**	Query or set the remote (Peer Identity) ID for the # VPN. • If IP is selected as the remote (Peer Identity) type, AT*IPSEC[VPN number]_REMOTE_ID? returns the WAN IP address assigned by the Mobile Network Operator • If FQDN or User FQDN is selected as the remote (Peer Identity) type, AT*IPSEC[VPN number]_REMOTE_ID? returns the FQDN (for example me@mycompany.com) To set the remote ID: AT*IPSEC[VPN number]_REMOTE _ID=[IP address] or [FQDN], depending on the setting for remote ID (Peer Identity) type.

Table B-20: VPN Commands

Command	Description
***IPSEC1_REMOTE_ID_TYPE** ***IPSEC2_REMOTE_ID_TYPE** ***IPSEC3_REMOTE_ID_TYPE** ***IPSEC4_REMOTE_ID_TYPE** ***IPSEC5_REMOTE_ID_TYPE**	Query or set the remote (Peer Identity) ID type for the # VPN. AT*IPSEC[VPN number]_REMOTE_ID_TYPE? to query AT*IPSEC[VPN number]_REMOTE_ID_TYPE=n to set • n=1—IP • n=2—FQDN • n=3—User FQDN *Note:* • *FQDN allows you to use a fully qualified domain name (FQDN) e. g., modemname.domainname.com* • *User FQDN allows you to use a user FQDN whose values should include a username (e.g. user@domain.com)*
***IPSEC1_SHARED_KEY1** ***IPSEC2_SHARED_KEY1** ***IPSEC3_SHARED_KEY1** ***IPSEC4_SHARED_KEY1** ***IPSEC5_SHARED_KEY1**	Query the pre-shared Key (PSK) used to initiate the # VPN tunnel. AT*IPSEC[n]_SHARED_KEY1? [n]=server number
***IPSEC1_STATUS?** ***IPSEC2_STATUS?** ***IPSEC3_STATUS?** ***IPSEC4_STATUS?** ***IPSEC5_STATUS?**	Query the VPN # connection status. AT*IPSEC[VPN number]_STATUS? to query • Disabled • Not Connected • Connected *Note: Use this when troubleshooting a VPN # connection.*
***IPSEC1_TUNNEL_TYPE** ***IPSEC2_TUNNEL_TYPE** ***IPSEC3_TUNNEL_TYPE** ***IPSEC4_TUNNEL_TYPE** ***IPSEC5_TUNNEL_TYPE**	Query or set the VPN # tunnel type. AT*IPSEC[VPN number]_TUNNEL_TYPE? to query AT*IPSEC[VPN number]_TUNNEL_TYPE=n to set • n=0—Disable the tunnel (default) • n=1—IPsec Tunnel • n=2—GRE Tunnel • n=3—SSL Tunnel *Note: For a successful configuration, all settings for the VPN tunnel must be identical between the AirLink* LX40 *VPN and the enterprise VPN server.*

Security

Table B-21: Security AT Commands

Command	Description
F0 (F1, F2, ... F9)	Query or set the Inbound Trusted IP List. ATF? to query the list ATF[n]=d.d.d.d to set • n=0–9 Trusted IP list index number • d.d.d.d = IP Address Using 255 in the IP address will allow any number Example: 166.129.2.255 allows access by all IPs in the range 166.129.2.0–166.129.2.255. Example: atf? 0=192.32.32.21 1=192.32.32.22 2=192.32.32.23 3=0.0.0.0 4=0.0.0.0 5=0.0.0.0 6=0.0.0.0 7=0.0.0.0 8=0.0.0.0 9=0.0.0.0 OK If the index number does not have an IP address associated with it, the query returns 0.0.0.0 for that index number. *Note: You can only query or configure the first nine Inbound Trusted IP addresses with this AT Command. You cannot query or configure Trusted range entries with this AT Command.*
FM	Query or set the Inbound Trusted IP mode (Friends List)—Only allow specified IPs to access the device. ATFM? to query the setting ATFM=n to set • n=0—Disable Trusted IP mode • n=1—Enable Trusted IP mode—Only packets from IP addresses in the Trusted IP list are allowed. Packets from other IP addresses are ignored.

Services

Table B-22: Services AT Commands

Command	Description
AirLink Management System	
***AVMS_CONNECT**	Query or set the ALMS connection. Running AT*AVMS_CONNECT=1 has the same functionality as clicking Connect in Services > ALMS > AirLink Management Service. AT*AVMS_CONNECT? to query AT*AVMS_CONNECT=n to set • n=0—No functionality • n=1—Connect to ALMS
***AVMS_ENABLE**	Query or set the ALMS activation status. AT*AVMS_ENABLE? to query AT*AVMS_ENABLE=n to set • n=0—Disable device initiated ALMS management • n=1—Enable MSCI protocol for ALMS management • n=2—Enable LWM2M protocol for ALMS management • n=3—Enable LWM2M protocol for ALMS management, with an automatic Fallback to MSCI if communication fails
***AVMS_INTERVAL**	Query or set the ALMS communication (heartbeat) interval in minutes. AT*AVMS_INTERVAL? to query AT*AVMS_INTERVAL= n to set • n=INTERVAL (in minutes)
***AVMS_NAME**	Assigns or queries the name to the AirLink LX40 as it appears in ALMS. AT*AVMS_NAME? to query AT*AVMS_NAME=n to set • n=ALMS NAME
***AVMS_SERVER**	Query or set the ALMS server IP address or FQDN. AT*AVMS_SERVER? to query AT*AVMS_SERVER=n to set • n= IP Address or FQDN of ALMS server
***AVMS_STATUS?**	Query the ALMS connection status.
***AVMS_AUTOSYNC**	Query or set ALMS autosynchronization of configuration parameters. AT*AVMS_AUTOSYNC? to query AT**AVMS_AUTOSYNC=n to set • n=0—Disable ALMS autosynchronization • n=1—Enable ALMS autosynchronization
***AVMS_VERIFYPEER**	Query or set peer certificate verification during SSL handshake. AT*AVMS_VERIFYPEER? to query AT*AVMS_VERIFYPEER=n to set • n=0—Disable peer certificate verification during SSL handshake • n=1—Enable peer certificate verification during SSL handshake

Table B-22: Services AT Commands

Command	Description
Low Power	
***ENGHRS**	Query or set the number of hours the engine has been running. AT*ENGHRS? to query AT*ENGHRS=n to set • n=HOURS Maximum value is 65535.
***MSCISERVER**	Set or query the MSCI server setting AT*MSCISERVER? to query AT*MSCISERVER=n to set • n=0—Access is disabled • n=1—Access is LAN only • n=2—Access is WAN and LAN
Dynamic DNS	
***DOMAIN**	Query or set the domain name used for the IP Manager[a] Dynamic DNS configuration. AT*DOMAIN? to query AT*DOMAIN=DOMAIN to set (up to 20 characters) Example: AT*DOMAIN=eairlink.com **Tip:** *Only letters, numbers, hyphens, and periods can be used in a domain name.* *Note: This AT command is only usable if the Dynamic DNS Service type is set to IP Manager[a].*
***DYNDNS**	Query or set the Dynamic DNS Service type to use. AT*DYNDNS? to query AT*DYNDNS=n to set • n=0—Disable (default) • n=2—dyndns.org • n=5—noip.com • n=8—regfish.com • n=10—IP Manager *Note: Only IP Manager[a] can be fully configured using AT Commands.*

Table B-22: Services AT Commands

Command	Description
***IPMANAGER1** ***IPMANAGER2**	*Note: This AT command is only usable if the Dynamic DNS Service type is set to IP Manager[a].* Query or set a FQDN or IP address of the IP server to send IP change notifications to. You can configure two independent IP Manager servers. AT*IPMANAGER[n]? to query AT*IPMANAGER[n]=SERVER to set. • n=1—First IP Manager server • n=2—Second IP Manager server • SERVER=Server FQDN or IP address Note: You can disable updates to a server by setting blank entry (e.g., “AT*IPMANAGER1=”).
***IPMGRKEY1** ***IPMGRKEY2**	*Note: This AT command is only usable if the Dynamic DNS Service type is set to IP Manager[a].* Query or set the 128-bit password/key used to authenticate the IP update notifications. If the key's value is all zeros, a default key is used. If all the bytes in the key are set to FF, then no key is used (i.e., the IP change notifications will not be authenticated). AT*IPMGRKEY[n]? to query AT*IPMANAGER[n]=KEY to set • n=1—First IP Manager server • n=2—Second IP Manager server • KEY=128-bit key in hexadecimal [32 hex characters]
***IPMGRUPDATE1** ***IPMGRUPDATE2**	*Note: This AT command is only usable if the Dynamic DNS Service type is set to IP Manager[a].* Query or set the interval (in minutes) to send an IP update notification to the corresponding server. This occurs even if the IP address of the device does not change. If the value is set to 0, then periodic updates are not issued (i.e., IP change notifications is only be sent when the IP actually changes). AT*IPMGRUPDATE[n] to query AT*IPMGRUPDATE[n]=INTERVAL to set • n=0—Disables the update interval (updates only on changes) • n=1—First IP Manager server • n=2—Second IP Manager server • INTERVAL=1–255—interval (in minutes) to send an update

Table B-22: Services AT Commands

Command	Description
***MODEMNAME**	*Note: This AT command is only usable if AT*DYNDNS is set to 10 (IP Manager[a]).* Query or set the device name used by IP Manager. (This name is displayed on the Status > Home page.) AT*MODEMNAME? to query AT*MODEMNAME=NAME to set (up to 20 characters long) • NAME=device name (for example, mydevice) The value in *DOMAIN provides the domain zone to add to this name. Example: If *MODEMNAME=mydevice and *DOMAIN=eairlink.com, the device's fully qualified domain name is mydevice.eairlink.com. **Tip:** *Each device using IP Manager needs a unique name. I.e., two devices cannot both be called "mydevice". One could be named "mydevice1" while the other could be named "mydevice2".*
SMS	

+CMGD	This command and AT+CMGL enable you to manage incoming SMS messages. To use these commands, the SMS mode must be set to Outbound Only. (See SMS Modes on page 258.)
	Use AT+CMGD to delete SMS messages.
	AT+CMGD=<index>[,flag]
	where:
	<index> is the index number of the message
	<flag> is:
	• 0=Delete stored SMS messages with the indicated index number(s). This is the default value.
	• 1=Ignore the value of the index and delete all SMS messages whose status is "received read".
	• 2=Ignore the value of the index and delete all SMS messages whose status is:
	  • received read
	  • stored unsent
	• 3=Ignore the value of the index and delete all SMS messages whose status is:
	  • received read
	  • stored unsent
	  • stored sent
	• 4=Ignore the value of the index and delete all SMS messages.

Table B-22: Services AT Commands

Command	Description
+CMGL	Use this command to list/read SMS messages. To use this command, the SMS mode must be set to Outbound Only. (See SMS Modes on page 258.) AT+CMGL=<status> where <status> is: • ALL • REC UNREAD—Received, unread • REC READ—Received, read

***SMSM2M**
***SMSM2M_8**
***SMSM2M_u**
	You can only use these commands locally.
	• AT*SMSM2M sends an SMS in ASCII text (requires quotation marks; maximum 140 characters)
	• AT*SMSM2M_8 sends an 8-bit SMS (requires quotation marks; maximum 140 characters)
	• AT*SMSM2M_U sends a unicode (UCS-2) SMS (requires quotation marks; maximum 140 characters)
	Format:
	AT*SMSM2M="[phone] [ascii message]"
	AT*SMSM2M_8="[phone] [hex message]"
	AT*SMSM2M_U="[phone] [unicode message]"
	• The phone number can only consist of numbers (NO spaces or other characters). The phone number should be as it appears in the Last Incoming Phone Number field.
	  • Example 1 (US): 14085551212 (including leading 1 and area code)
	  • Example 2 (US): 4085551212 (ignore leading 1, include area code)
	  • Example 3 (UK): 447786111717 (remove leading 0 and add country code)
	• You can enter multiple phone numbers as a comma-separated list with no spaces. The length of the phone number string (the phone numbers and commas) must be under 256 characters.
	  • For example, 1234567890,1234567890,1234567890,1234567890,1234567890
	Command Examples:
	AT*SMSM2M="18005551212 THIS IS A TEST" sends in ASCII.
	AT*SMSM2M_8="17604053757 5448495320495320412054455354" sends the message “THIS IS A TEST” as 8-bit data.
	AT*SMSM2M_U="17604053757 0054004800490053002000490053002000410020005400450053 0054" sends the message “THIS IS A TEST” as 2-byte unicode data.
	
	Note: Not all cellular Mobile Network Operators support 8-bit or unicode SMS messages.

Table B-22: Services AT Commands

Command	Description
***SMS_PASSWORD**	Query or set the SMS password. AT*SMS_PASSWORD? to query AT*SMS_PASSWORD=n n=SMS password *Note: To use this command, you must first enter AT*ENTERCND along with your user password (that is, AT*ENTERCND=<user password>).* If no password has ever been configured, a default password is created from the last four characters of the SIM ID (for all SIM-based devices). *Note: The configured password remains in place, even when the device is reset to factory default settings.*
***SMSWUPTOUT**	This AT Command only to International devices on the Vodafone network. Query or set the connection timeout for the SMS Wakeup feature. When this feature is enabled, an IP connection is initiated on receipt of a specific type of SMS. The IP connection closes after the timeout period specified in this AT command. Outgoing traffic sent after the timer is set does not reset the timer. AT*SMSWUPTOUT? to query AT*SMSWUPTOUT=n to set • n=2–65535 minutes (default is 2) See also *RADIO_CONNECT on page 436.
Telnet/SSH	
***DEFAULTTELNETUSER**	Query or set the Telnet default user name. AT*DEFAULTTELNETUSER? to query AT*DEFAULTTELNETUSER=n to set • n=None—Prompted for a user name and password when logging into a Telnet session (default) • n=user—Prompted for a password only when logging into a Telnet session (User name is “user”.) *Note: The default user name is only for Telnet; not SSH.*
***TELNETTIMEOUT**	Query or set the Telnet/SSH idle time out. By default, this value is set to close the telnet/SSH connection if no data is received for 2 minutes. AT*TELNETTIMEOUT? to query AT*TELNETTIMEOUT=n to set • n=1–255 minutes (default is 2)
***TSSH**	Query or set the remote login server mode. AT*TSSH? to query AT*TSSH=n to set • n=0—Telnet (default) • n=1—SSH

Table B-22: Services AT Commands

Command	Description
***TPORT**	Query or set the Telnet/SSH port. AT*PORT? to query AT*PORT=n to set • n=1–65535 (default is 2332) Many networks have the ports below 1024 blocked. It is recommended to use a higher numbered port.
***TQUIT**	AT*TQUIT which will kill an open telnet session.
Management (SNMP)	
SNMP General Configuration	
***SNMP**	Query or set the SNMP option. AT*SNMP? to query AT*SNMP=n to set • n=0—Disable • n=1—Enable
***SNMPCONTACT**	Add string contact information in SNMPv2 and SNMPv3. AT*SNMPCONTACT=string • string=email address (Example: admin@sierrawireless.com)
***SNMPLOCATION**	Add string location information in SNMPv2 and SNMPv3. AT*SNMPLOCATION=string • string=location information (Example: Building 19–67B)
***SNMPNAME**	Add string name in SNMPv2 and SNMPv3. AT*SNMPNAME=STRING • STRING=name (Example: John Doe)
***SNMPPORT**	Query or set the port number in SNMPv2 and SNMPv3. AT*SNMPPORT? to query AT*SNMPPORT=n to set • n=1–65535 (default is 161)
***SNMPVERSION**	Query or set the SNMP version. AT*SNMPVERSION? to query AT*SNMPVERSION=n to set • n=2—version 2 • n=3—version 3
SNMP Read Only Configuration	
***SNMPROCOMMUNITY**	Read-only community string in SNMPv2 and SNMPv3. (SNMP equivalent of a password; for example: public)
***SNMPROUSER**	Query or set a read only SNMP username string in SNMPv3.

Table B-22: Services AT Commands

Command	Description
***SNMPROUSERAUTHTYPE**	Query or set the read only authentication type in SNMPv3. AT*SNMPROUSERAUTHTYPE? to query AT*SNMPROUSERAUTHTYPE=n • n=0—MD5 • n=1—SHA
***SNMPROUSERSECLVL**	Query or set the read only security level in SNMPv3. AT*SNMPROUSERSECLVL? to query AT*SNMPROUSERSECLVL=n to set • n=0—none • n=1—authentication only • n=2—authentication + privacy
SNMP Read/Write Configuration	
***SNMPRWCOMMUNITY**	Read/write community string in SNMPv2 and SNMPv3. (SNMP equivalent of a password; for example: private)
***SNMPRWUSER**	Query or set a read/write SNMP username string in SNMPv2 and SNMPv3.
***SNMPRWUSERAUTHTYPE**	Query or set the read/write authentication type in SNMPv3. AT*SNMPRWUSERAUTHTYPE? to query AT*SNMPRWUSERAUTHTYPE=n to set • n=0—MD5 • n=1—SHA
***SNMPRWUSERSECLVL**	Query or set the read/write security level in SNMPv3. AT*SNMPRWUSERSECLVL? to query AT*SNMPRWUSERSECLVL=n to set • n=0—none • n=1—authentication only • n=2—authentication + privacy
***SNMPRWUSERPRIVTYPE**	Query or set the read/write privacy type in SNMPv3. AT*SNMPRWUSERPRIVTYPE? to query AT*SNMPRWUSERPRIVTYPE=n to set • n=0—DES • n=1—AES
SNMP TRAP Configuration	
***SNMPENGINEID**	Specify an identification name string for a SNMP engine in SNMPv3. (For example: Shark-0012E8)
***SNMPTRAPAUTHTYPE**	Query or set the SNMP TRAP authentication type in SNMPv3. AT*SNMPTRAPAUTHTYPE? to query AT*SNMPTRAPAUTHTYPE=n to set • n=0—MD5 • n=1—SHA

Table B-22: Services AT Commands

Command	Description
***SNMPTRAPCOMMUNITY**	SNMP TRAP community string in SNMPv2 and SNMPv3. (SNMP equivalent of a password)
***SNMPTRAPDEST**	Query or set the SNMP TRAP destination in SNMPv2 and SNMPv3. (for example: 192.168.13.33)
***SNMPTRAPPORT**	Query or set the SNMP TRAP port in SNMPv2 and SNMPv3. • 1–65535 (default is 162)
***SNMPTRAPPRIVTYPE**	Query or set the SNMP TRAP privacy type in SNMPv3. AT*SNMPTRAPPRIVTYPE? to query AT*SNMPTRAPPRIVTYPE=n to set • n=0—DES • n=1—AES
***SNMPTRAPSECLVL**	Query or set the SNMP TRAP security level in SNMPv3. AT*SNMPTRAPSECLVL? to query AT*SNMPTRAPSECLVL=n to set • n=0—none • n=1—authentication only • n=2—authentication + privacy
***SNMPTRAPUSER**	Query or set a SNMP TRAP username string in SNMPv3.
Email (SMTP) Commands	
***SMTPADDR**	Query or set the mail server IP address or FQDN. AT*SMTPADDR? to query AT*SMTPADDR=[d.d.d.d] or [NAME] to set • d.d.d.d=IP Address • NAME=domain name (maximum: 40 characters)
***SMTPFROM**	Query or set the email address from which the SMTP message is being sent (required by some mail servers). AT*SMTPFROM? to query AT*SMTPFROM=EMAIL to set • EMAIL=email address (maximum: 30 characters)
***SMTPSUBJ**	Query or set the email subject line to use for sending emails. AT*SMTPSUBJ? to query AT*SMTPSUBJ=STRING to set
***SMTPPW**	Query or set the email server password (required by some mail servers). AT*SMTPPW? to query AT*SMTPPW=PASSWORD to set
***SMTPUSER**	Query or set the email account username (required by some mail servers). AT*SMTPUSER? to query AT*SMTPUSER=USER to set (maximum: 40 characters)

Table B-22: Services AT Commands

Command	Description
Time (SNTP) Commands	
***SNTP**	Query or set daily SNTP updates of the system time. AT*SNTP? to query AT*SNTP=n to set • n=0—Off • n=1—On
***SNTPADDR**	SNTP Server IP address, or fully-qualified domain name, to use if *SNTP=1. AT*SNTPADDR? to query AT*SNTPADDR=[d.d.d.d] or [NAME] • d.d.d.d=IP Address • NAME=FQDN

a. IP Manager will be deprecated in ALEOS 4.17.0.

Standard (Hayes) commands

The following table contains Hayes commands supported on the AirLink LX40.

Table B-23: Standard (Hayes) AT Commands

Command	Description
+++	AT escape sequence (not preceded by AT) If a serial terminal is in a data mode, typing this sequence on that serial terminal causes the terminal to re-enter AT command mode. There must be an idle time on the serial port before and after the sequence. The idle time is set by the value in S50. After you type the AT escape sequence, the terminal remains in AT command mode for 15 seconds before it automatically leaves AT command mode and returns to the previous data mode. *Note: The "+" is ASCII character 0x2B.* *Note: The detection of this sequence is disabled if DAE=1.*
&C	Query or set Data Carrier Detect (DCD) mode. DCD is a hardware signal that notifies the software that the device is communicating with another device. AT&C? to query AT&Cn to set • n=0—Always assert DCD • n=1—Assert DCD enable when network is ready (default) • n=2—In Coverage *Note: Do not use an equal sign (=) when issuing the command.*

Table B-23: Standard (Hayes) AT Commands

Command	Description
D[*method*] [*d.d.d.d*] [*/ppppp*] **or** **D[*method*] [[@]*name*] [*/ppppp*]**	Dial a connection to a remote IP and Port using either UDP, TCP, or Telnet. You can only use ATD#19788 and ATDT#19788 locally. *method* = P—Establish a UDP connection T—Establish a TCP connection N—Establish a Telnet connection *d.d.d.d* = IP address to establish connection to *name* = Domain name to establish connection to *ppppp* = IP port to establish connection to Examples: **ATD**—Dial (establish) default connection per **S53** **ATDP***nnn.nnn.nnn.nnn*[/ppppp]—Dial (establish) UDP session to the specified IP address/port. If the method, IP address, or port is omitted, the values from S53 are used. If a Telnet connection is requested (N) and the port is not supplied, port 23 will be used instead of the value from S53. If a domain name is specified, the '@' symbol can be used to explicitly indicate the start of the name. For example, if "**ATDPHONY**" is issued, this will be interpreted as dial a UDP connection to "HONY". To dial using the default method to host "PHONY", one would issue "ATD@PHONY". To end the connection, issue the **+++** escape sequence or drop the DTR line (if Ignore DTR **S211=0** or **&D2**). *Note: The source port of the session is the **Device Port** (set by ***DPORT**).*
&D	Query or set Data Terminal Ready (DTR) mode. AT&D? to query AT&Dn to set • n=0—Devices ignores DTR, same effect as HW DTR always asserted (same as S211=1); DTD is assumed to be on. • n=2—DTR drop causes the connection to drop. *Note: Do not use an equal sign (=) when issuing the command.*

Table B-23: Standard (Hayes) AT Commands

Command	Description
***DATZ**	Query or set the option, on any serial interface, to block device reset using ATZ. AT*DATZ?[comm port] to query AT*DATZ=[comm port],n to set • [comm port]=0—RS232 Serial Port • [comm port]=1—RS485 Serial Port • [comm port]=3—USB Serial • [comm port]=4—Telnet/SSH • [comm port]=99—ALL Ports (not valid for query; use only for setting) *Note: Specifying a [comm port] is optional. When no [comm port] is included in the command—AT*DATZ? or AT*DATZ=1, for example—the command applies to the serial interface being used to send the command.* • n=0—Off. Block is disabled—ATZ resets the device. (default) • n=1—On. Block is enabled—ATZ does not reset the device.
E	Toggle AT command echo mode. ATE? to query ATEn to set • n=0—Echo Off; does not echo commands to the computer • n=1—Echo On; echoes commands to the computer (so you can see what you type) *Note: Do not use an equal sign (=) when issuing the command.*
H	ATH hangs up, immediately terminates the session (PAD or PPP).
HOR	Half-Open Response—In UDP auto answer (half-open) mode. ATHOR? to query ATHOR=n to set • n=0—No response codes when UDP session is initiated • n=1—RING CONNECT response codes sent out serial link before the data from the first UDP packet *Note: Quiet Mode must be Off.*
Q	Query or set AT quiet mode. If quiet mode is set, there are no responses to AT commands except for data queried. ATQ? to query ATQn to set • n=0—Off (default) • n=1—Quiet mode on *Note: Do not use an equal sign (=) when issuing the command.*

Table B-23: Standard (Hayes) AT Commands

Command	Description
\Q	Query or set the serial port flow control. AT\Q? to query AT\Qn to set • n=0—No flow control • n=1—Hardware flow control • n=4—Transparent software flow control *Note: Do not use an equal sign (=) when issuing the command.*
&S	Query or set DSR. AT&S? to query AT&Sn to set • n=0—Always assert • n=1—Assert DSR while in data mode (UDP, TCP, PPP) *Note: Do not use an equal sign (=) when issuing the command.*
S0	Query or set TCP auto answer (the number of rings required before the device automatically answers a call). ATS0? to query ATS0n to set • n=0—Disable • n=1—Enable *Note: Do not use an equal sign (=) when issuing the command.*
S7	Query or set the number or seconds to wait for connection completion. ATS7? to query ATS7n to set • n=0–255

Table B-23: Standard (Hayes) AT Commands

Command	Description
S23	Query or set the Serial port configuration. ATS23? to query. ATS23=[Baud,][Data bits, Parity, Stop Bits] to set *Note: Setting data bits, parity, and stop bits is supported with or without commas. For example, either* ATS23=115200,8,N,2 *or* ATS23=115200,8N2 *will produce the same result.* ATS23=[Baud] to set the baud rate for the default port. Baud: • 300 • 1200 • 2400 • 4800 • 9600 • 19200 • 38400 • 57600 • 115200 Data bits: • 7 • 8 Parity: • O=Odd • E=Even • N=None • M=Mark Stop Bits: • 1 • 2 Example: ATS23=115200,8,N,2 (Sets the device to 115200, etc.) The settings take effect after reboot. *Note: Must be 8 data bits for PPP mode.*
S211	For applications or situations where hardware control of the DTR signal is not possible, the device can be configured to ignore DTR. When Ignore DTR is enabled, the device operates as if the DTR signal is always asserted. ATS211? to query ATS211=n to set • n=0—Use hardware DTR (default) • n=1—Ignore DTR • n=3—Ignore DTR and assert DSR.

Table B-23: Standard (Hayes) AT Commands

Command	Description
S221	Query or set the Connect Delay—the number of seconds to delay the connect response when establishing a TCP connection. ATS221? to query ATS221=n to set • n=0–255
V	Query or set the AT command responses (verbosity). ATV? to query ATVn to set • n=0—Numeric (terse) command responses (The numeric responses follow the Hayes Standards for commands.) • n=1—Text string (verbose) command responses (default) *Note: Do not use an equal sign (=) when issuing the command.*
&V	Lists most AT commands and their current values. If the parameter is not configured, the AT command returns “Not Set”.
&W	Saves the settings for parameters that are temporarily set without being permanently written to the memory. This command does not apply to ALEOS because once you issue an AT command or change a setting in ACEmanager and click Apply, the changes are saved in non-volatile memory and are persist across reboots.
X	Query or set the Extended Call Progress Result mode. ATX? to query ATXn to set • n=0—No extended code (default) • n=1—Adds the text 19200 to the connect response
Z	Reboots the AirLink LX40. *Note: If *DATZ is set to 1, Z is blocked. See *DATZ on page 481.*

I/O

Table B-24: Input/Output AT Commands

Command	Description
***ANALOGIN[n]?**	Query individual analog input values (in volts). AT*ANALOGIN[n]? • n=1
***DIGITALIN[n]?**	Query individual digital inputs. The digital inputs report either a 0 (open) or 1 (closed). AT*DIGITALIN[n]? • n=1

Table B-24: Input/Output AT Commands

Command	Description
***PULSECNT1?**	Query the I/O pulse counts for digital in. AT*PULSECNT1?
***RELAYOUT1**	Query or set the relay status. AT*RELAYOUT1? to query AT*RELAYOUT1=n to set • n=0—OFF • n=1—Drive Active Low

Applications

Table B-25: Applications > Data Usage Commands

Command	Description

***DATACURDAY?**	Display data usage for the current day (in kB).
	Example:
	`AT*DATACURDAY?`
	`<value>`
	
	`OK`

***DATAPLANUNITS**	Query or set the units for the data usage report.
	AT*DATAPLANUNITS? to query
	AT*DATAPLANUNITS=<unit> to set
	• <unit>=1—Sets the units to Megabytes (MB)
	• <unit>=2—Sets the units to Kilobytes (kB)
	Examples:
	`AT*DATAPLANUNITS?`
	`<unit>`
	
	`OK`
	`AT*DATAPLANUNITS=<units>`
	`OK`The query or set applies to the Active SIM. Use *DATAPLANUNITSSIM1 or *DATAPLANUNITSESIM to query or set a specific SIM card, based on the slot it is installed in.

Table B-25: Applications > Data Usage Commands

Command	Description

***DATAPLANUNITSSIM1**	Query or set the units for the data usage report for the SIM card in Slot 1 (upper slot).
	AT*DATAPLANUNITSSIM1? to query
	AT*DATAPLANUNITSSIM1=<unit> to set
	• <unit>=1—Sets the units to Megabytes (MB)
	• <unit>=2—Sets the units to Kilobytes (kB)
	Examples:
	`AT*DATAPLANUNITSSIM1?`
	`<unit>`
	
	`OK`
	`AT*DATAPLANUNITSSIM1=<units>`
	`OK`

***DATAPLANUNITSESIM**	Query or set the units for the data usage report for the R2C eSIM (if available).
	AT*DATAPLANUNITSESIM? to query
	AT*DATAPLANUNITSESIM=<unit> to set
	• <unit>=1—Sets the units to Megabytes (MB)
	• <unit>=2—Sets the units to Kilobytes (kB)
	Examples:
	`AT*DATAPLANUNITSESIM?`
	`<unit>`
	
	`OK`
	`AT*DATAPLANUNITSESIM=<units>`
	`OK`

***DATAPREVDAY?**	Query the data usage for the previous day (in kB).
	Example:
	`AT*DATAPREVDAY?`
	`<value>`
	
	`OK`

Table B-25: Applications > Data Usage Commands

Command	Description

***DATAUSAGEENABLE**	Query or set enabling Data Usage.
	AT*DATAUSAGEENABLE? to query
	AT*DATAUSAGEENABLE=<status> to set
	• <status>=0—Data Usage disabled
	• <status>=1—Data Usage enabled
	Example:
	`AT*DATAUSAGEENABLE?`
	`<status>`
	
	`OK`
	`AT*DATAUSAGEENABLE=<status>`
	`OK`Tthe query or set applies to the Active SIM. Use *DATAUSAGEENABLESIM1 or *DATAUSAGEENABLEESIM to query or set a specific SIM card, based on the slot it is installed in.

***DATAUSAGEENABLESIM1**	Query or set enabling Data Usage for the SIM card in Slot 1.
	AT*DATAUSAGEENABLESIM1? to query
	AT*DATAUSAGEENABLESIM1=<status> to set
	• <status>=0—Data Usage disabled
	• <status>=1—Data Usage enabled
	Example:
	`AT*DATAUSAGEENABLESIM1?`
	`<status>`
	
	`OK`
	`AT*DATAUSAGEENABLESIM1=<status>`
	`OK`

***DATAUSAGEENABLEESIM**	Query or set enabling Data Usage for the R2C eSIM (if available).
	AT*DATAUSAGEENABLEESIM? to query
	AT*DATAUSAGEENABLEESIM=<status> to set
	• <status>=0—Data Usage disabled
	• <status>=1—Data Usage enabled
	Example:
	`AT*DATAUSAGEENABLEESIM?`
	`<status>`
	
	`OK`
	`AT*DATAUSAGEENABLEESIM=<status>`
	`OK`

Table B-26: Applications > ALEOS Application Framework (AAF)

Command	Description
***AAFINSTALL**	Query installed AAF applications and their status and install new AAF applications. • AT*AAFINSTALL? returns the installation status of the last installed application, and list of installed AAF applications and the status of each application. • AT*AAFINSTALL?<application name> returns the status of the specified AAF application. • AT*AAFINSTALL=<hostname>,<user>,<password>,<application filename> downloads and installs the specified AAF application from the FTP server at <hostname> using <user> <password> credentials.
***AAFUNINSTALL**	Install an AAF application. AT*AAFUNINSTALL=<application name> uninstalls the specified AAF application.

***AAFLIST?**	Queries AAF apps installed on device and their version number.
	AT*AAFLIST?
	Example:
	`AT*AAFLIST?`
	`Name: ammer, Version: 1.0.3.003`
	`Name: BWMSTest, Version: 1.0.0`
	
	`OK`

Admin

Table B-27: Admin > Advanced Commands

Command	Description
\ACEPW	Set the ACEmanager user password remotely. AT\ACEPW=<password> to set • <password>=character string The password can be 8 to 32 characters long and can contain a mixture of letters, numbers, and/or special characters. The password is case sensitive. *Note: The special character comma ',' cannot be used.* To change the password, send the AT Command. You will not be asked to re-enter or confirm the new password. *Note: If the password is lost, the only way to recover access to the AirLink router is to press the hardware Reset button to reset all device settings to factory default. After resetting to factory defaults, the user password will be reset to the default password. If the router supports unique default passwords, the default password will be printed on the device label. Note that using the Reset button also resets the M3DA password to the default password. For more information, see Change Password on page 329.*
***ALEOSRMLPM**	Query or set how ALEOS handles device operation when the radio module is in Low Power mode. This feature is intended for testing and diagnostic purposes, not as part of normal device operation. AT*ALEOSRMLPM? to query AT*ALEOSRMLPM=n to set • n=0—ALEOS does nothing • n=1—ALEOS Normal Behavior (default)
***BLOCK_RESET_CONFIG**	Query or set the ability to block resetting the device to factory default settings using the hardware Reset button. AT*BLOCK_RESET_CONFIG? to query AT*BLOCK_RESET_CONFIG=n to set • n=0—Reset button can be used to reset the device to factory default settings. (default). • n=1—Device cannot be reset to factory default settings using the Reset button on the device. *Note: This command only blocks the ability to reset to defaults using the Reset button on the device. You can still reset the device to the factory default settings using the "Reset to Factory Default" button in ACEmanager or the *RESETCFG AT command.*
***BOARDTEMP?**	Query the temperature of the internal hardware, in degrees Celsius.

Table B-27: Admin > Advanced Commands

Command	Description
***MSCIUPDADDR**	Query or set the IP address or FQDN and port that periodic device status updates are sent to. AT*MSCIUPDADDR? to query AT*MSCIUPDADDR=[IP address or FQDN][/port] to set Examples: 192.168.14.100/3333 MyDevice.com/3333
***MSCIUPDPERIOD**	Query or set the device status update interval (in seconds). This specifies how frequently the device status update is sent to the port configured in *MSCIUPDADDR. AT*MSCIUPDPERIOD? to query AT*MSCIUPDPERIOD=n to set • n=0—Disabled • n=1–255 seconds
NSLOOKUP	Immediately performs an NSLookup on the supplied FQDN. ATNSLOOKUP=[FQDN]
***POWERIN?**	Query the voltage input to the internal hardware.
***RESETBTNCONFIG**	Query and set Reset Button Configuration setting in Admin > Reset. AT*RESETBTNCONFIG? to query AT*RESETBTNCONFIG=n to set • n=0—Disabled • n=1—Reset All • n=2—Reset to Custom Configuration
***RESETCFG**	AT*RESTCFG resets the device to factory default settings according to the Reset Mode configured on the Admin > Advanced page. See Reset Configuration on page 340. **Important:** *There is no confirmation requested. The AT command takes effect immediately.*
***RESETCONFIG**	Query or set Reset Configuration setting in Admin > Reset. AT*RESETCONFIG? to query AT*RESETCONFIG=n to set • n=0—Reset All • n=1—Preserve Core Settings • n=2—Preserve Only User Password • n=3—Reset to Custom Configuration
***RESETTPL?**	Queries the existence of a reset template on a device. If a reset template does not exist, NOTSET will be returned. Otherwise, the query returns the name of the template.

Table B-27: Admin > Advanced Commands

Command	Description
***REMOTELOG**	Exports the log file to a remote destination (Syslog Server). AT*REMOTELOG=<server>[,<port>,<format>,<protocol>,<encrypt>] where: parameters between brackets are optional. If the port is not specified, the default port, 514, is used. *Note: This AT command is backwardly compatible with the existing AT command* AT*REMOTELOG=<server>,<port>.
***RSTTPLUPDATE**	Uploads a reset template on device using FTP server. AT*RSTTPLUPDATE=<FTP server IP>,<user>,<password>,<Reset Template Name>

***SECUREMODE**	Query or set the secure mode that blocks most ports (and ICMP) for over-the-air (OTA) or OTA and local to prevent unwanted access to the device.
	AT*SECUREMODE? to query
	AT*SECUREMODE=n to set
	• n=0 Off; normal behavior
	• n=1 Disables:
	  • Web management ports (ACEmanager and ALMS access) from the OTA interface
	  • Internet Control Message Protocol (ICMP), used for PING, for OTA and Wi-Fi
	• n=2 Disables:
	  • Web management ports from the Over-the-air (OTA) interface
	  • Internet Control Message Protocol (ICMP) for OTA and Wi-Fi
	  • ICMP for local ports (Ethernet, USB, and Serial)
	Note: Telnet and SSH ALEOS ports remain open regardless of the secure mode setting. This enables you to connect an AT console to manage the device. DHCP and DNS ports also remain open to allow the device to provide IP addresses to hosts and relay the DNS service.

Table B-27: Admin > Advanced Commands

Command	Description
***SYSRESETS?**	Query the number of resets since the device was reset to factory default settings.
***USBBYPASS**	Query or set Radio Passthru mode. AT*USBBYPASS? to query AT*USBBYPASS=n to set • n=0—Disable • n=1—Enable *Note: To use this command, you must first enter AT*ENTERCND along with your user password (that is, AT*ENTERCND=<user password>).* *Note: The set command is only supported from a physical USB interface (either DB9 serial, or USB if set to USB Serial mode). Telnet supports the query command only.*

C: SMS Commands

SMS Command format

PW [Password] [Prefix][Command or Command parameter1] [Command parameter2 (if applicable)] [Command parameter n]

Note: There is no space between the prefix and the command (or the 1st command parameter in the case of multi-parameter commands). There must be a single space between all other fields to act as a delimiter.

The default password is the last 4 digits of the SIM ID number (for SIM-based devices) and the last 4 digits of the ESN (for non-SIM devices). If you do not know the SIM ID or ESN number, you can find it in ACEmanager on the Status > WAN/Cellular page.

The default prefix is “&&&”.

Whether or not a password and prefix are required varies depending on the SMS mode selected in ACEmanager.

SMS mode	Password (configurable in all modes)	Prefix
Password Only	Always required	Required Use default (not configurable)
Control Only	Required when sending from a non-trusted phone number	Prefix is configurable. The prefix can be omitted if the ALEOS Command Prefix field in ACEmanager (Services > SMS) is configured to be blank.
Gateway Only	Always required	Required Use default (not configurable)
Control and Gateway	Required when sending from a non-trusted phone number	Required Configurable, but cannot be blank

When an SMS command is received, the AirLink LX40 performs the action requested and sends a response back to the phone number from which it received the SMS.

For more examples and detailed instructions, see SMS on page 257.

List of SMS Commands

Command	Action	Result
Note: Some responses start with "reply from [device name]:" However, this feature is currently unavailable for the Enable and Provision commands.		
[prefix]enable <value>	Enable/disable the device(s) being managed by ALMS.	"AVMS enable set to status:" <value> <value>=0 Disable <value>=1 MSCI <value>=2 LWM2M <value>=3 Try LWM2M, Fallback to MSCI
[prefix]status	None	status IP [Network IP] [Network Status]: [technology type] RSS signaled Lat = [Latitude] Long = [Longitude] Time = [hh:mm:ss] *Note: Location Service must be enabled to obtain Lat and Long data.*
PW [password] [prefix] factoryresetmode <value>	Configures the Reset Configuration for reset to factory defaults. See Reset Configuration on page 340.	"Factory reset set to config:" <value> <value>=0 Reset All <value>=1 Preserve Core Settings <value>=2 Preserve Only User Password <value>=3 Reset to Custom Configuration
PW [password] [prefix]factoryreset	Performs a reset to factory defaults according to the configured reset mode.	"Device has been factory reset"
[prefix]reset	Resets the device 30 seconds after the first response message is sent.	First message: Reset in 30 seconds Second message: Status message when back up.
[prefix]relay x y	Sets the I/O relay to the desired setting.	relay x set to y x can be 1 y can be 0 or 1 (Off or Drive active low)
[prefix]relay x ?	Queries the current value of the I/O relay.	relay x set at y x can be 1 y is the current value of the I/O relay. (0 = Off; 1 = Drive active low)

Command	Action	Result
[prefix]gps	The device replies with its current location.	The device sends a link to a map showing its location. You can copy the link into a browser to view the location, or if the SMS is sent from a smartphone, you can click the link to view the map. *Note: Location Service must be enabled.*
[prefix]Provision <APN> <Network User ID> <Network Password> <Network Authentication Mode> *Note: You can omit any of the above parameters.* • *To omit a parameter before the one you want to change, use a period (.) in place of the omitted parameter. Example: &&&provision . user@carrier.com . chap changes only the user ID and authentication mode.* • *If you want to omit any parameters after the one you want to change, simply omit them. Example: &&&provision access.apn changes only the apn.*	After the unit is installed and the SIM card inserted, you can use this command to provision the account. Network Authentication Mode is optional. If used, enter one of the following: • None • PAP • CHAP These are not case sensitive. If an unknown mode is entered or the field is omitted, None is used.	"provision" "apn:" <APN> "user ID" <Network User ID> "PW" <Network Password> "auth mode" <Network Authentication Mode> *Note: If a parameter is omitted, the response displays "Not Set" for that parameter.*
[prefix]AVMS <server> <interval> *Note: All of the above must be on a single line. The interval must be greater than 0. Omitting any field results in a response of "not set" and the configuration parameter does not change.*	Modifies the ALMS server's URL and ALMS communication period (interval in minutes)	"AVMS" "srv:" <Server> "interval:" <Interval>
[prefix]AVMSCHECKIN	Prompts the device to communicate with the ALMS server. Once AirLink Management Service receives the heartbeat message, it can respond and send an MSCI command to the device (i.e Write/Read/ Firmware Update).	"AVMS connection requested"

D: Q & A and Troubleshooting

ACEmanager Web UI

The ACEmanager page is not displaying properly.

1. Ensure the you are using a supported browser. See page 16 for a list of supported browsers.
2. Hold the Shift key + click the Refresh button. This reloads the page, while ignoring what is in the cache.

If the problem persists:

- Clear the cache. The procedure varies, depending on the browser.
- Restart the browser.
- Restart your computer.

Templates

The template does not upload properly when I use Internet Explorer 9.

Note: Internet Explorer 9 is no longer supported by ACEmanager.

To resolve the problem:

1. In Internet Explorer 9, go to Tools > Internet Options.
2. Select the Security tab.

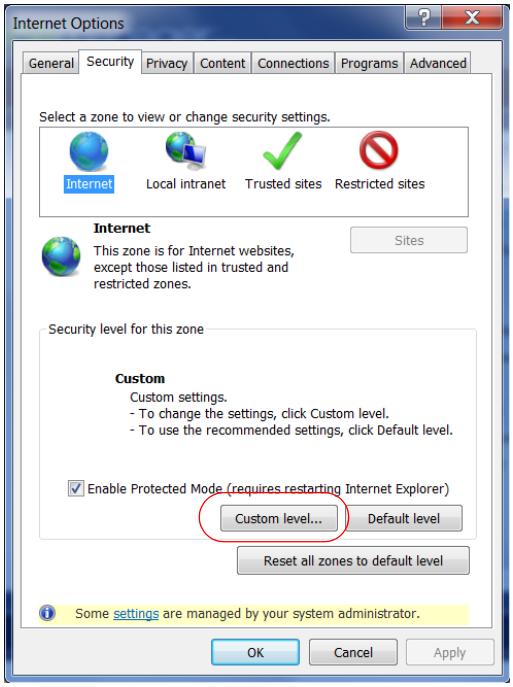


Figure D-1: Internet Explorer 9: Tools > Internet Options > Security tab

3. Click Custom level....
4. Scroll down until you see “Include local directory path when uploading files to a server”.
5. Select Disable.

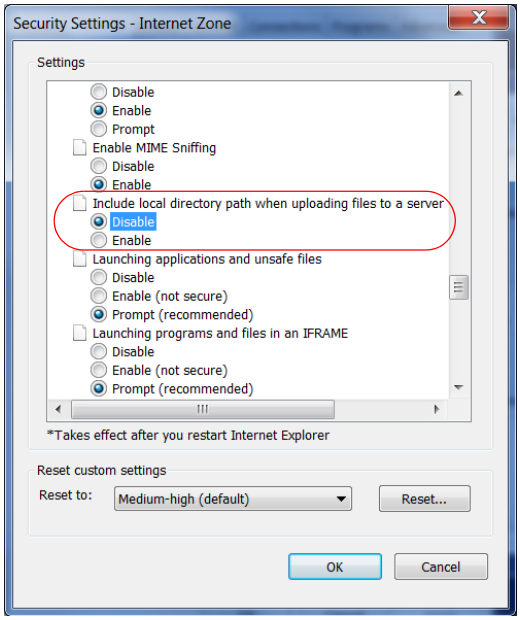


Figure D-2: Internet Explorer 9: Security Settings

6. Click OK.

Updating the ALEOS Software and Radio Module Firmware

I am unable to update the ALEOS software and radio module firmware using ACEmanager.

Note: For LTE-M/NB-IoT AirLink routers: Due to the lower data rates supported by LTE-M/NB-IoT networks, over-the-air software updates can take an extended period of time. When using a Windows PC and ACEmanager to update ALEOS software over-the-air, please ensure that sleep and low power states are disabled on the PC so that the file transfer is not disrupted. Under these conditions, the ALEOS upgrade may take between 3 to 5 hours.

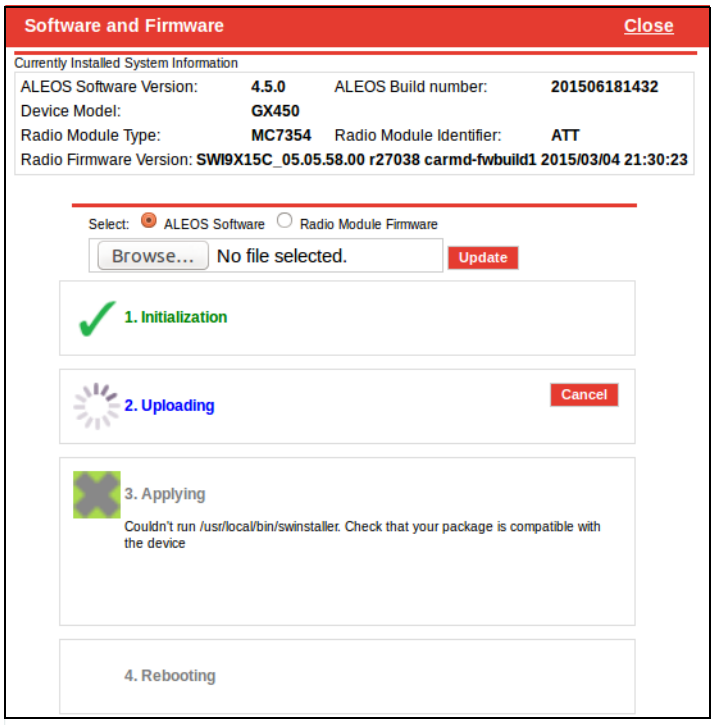
Sierra Wireless recommends using ALMS or AMM for remote software upgrades.

If you are having trouble updating the ALEOS software or radio module firmware, especially if you are updating from an older version of ALEOS:

1. Try using a different browser. (ACEmanager supports the latest versions of Edge and Firefox.)
2. Delete the browser cookies/cache before logging into ACEmanager. (The Web browser short-cut is Control + Shift + Delete.)

3. Backup your device settings by downloading and saving the template. See Saving a Custom Configuration as a Template on page 20.
4. Reset the device to factory default settings. (See Reset to Factory Default on page 339 or press and hold the reset button on the device for 7 to 10 seconds.)
5. Begin the update process (see Update the ALEOS Software and Radio Module Firmware on page 25) and follow the prompts.
6. If after 30 minutes the WebUI is frozen, log in using a different browser and confirm whether or not the ALEOS software and radio module firmware has been updated correctly.
7. If you are still having problems, contact your Sierra Wireless distributor.

When I try to update ALEOS using ACEmanager, I see the following message: "... Check that your package is compatible with the device".



This message also appears if you are only updating the radio module firmware and you have the Update ALEOS radio button selected.

To correct the problem:

1. Close the Update page.
2. Retry the radio firmware update, being careful to select the Radio Module Firmware that is appropriate for your LX40.

When I try to update ALEOS using ACEmanager, I see the following message: "Please select a firmware for xxxx".

This message appears and you are blocked from continuing with the update if you are only updating the radio module and you select a radio module firmware file designed for a different radio module.

To correct the problem:

1. Click OK.
2. Select a radio module firmware file for the radio module in the AirLink LX40 you are updating and click update. (To check which radio module is in your device, in ACEmanager, go to Status > About.)

Poor Wireless Network Connection

ACE manager indicates that my AirLink LX40 has a poor wireless connection. What can I do to improve it?

For GSM networks:

1. Check the RSSI value. If ACEmanager (Status screen) indicates a good RSSI value, go to step 2. If it indicates a poor RSSI value:
   - Check the antenna connection.
   - Make sure you have the correct antenna for the device.
   - You may be in an area with poor coverage. Check with your Mobile Network Operator, or if possible, try moving the AirLink LX40 to a new location.
2. Check the Ec/Io value. If ACEmanager (Status screen) indicates a poor Ec/Io value:
   - This may be a temporary network problem caused by local interference.
   - A nearby laptop or other electronic equipment may be interfering with the signal. Try moving the AirLink LX40 to a different location.

For LTE networks:

1. Check the RSSI value. If ACEmanager (Status screen) indicates a good RSSI value, go to step 2. If it indicates a poor RSSI value:
   - Check the antenna connection.
   - Make sure you have the correct antenna for the device.
   - Try moving the AirLink LX40 to a different location.
2. Check the RSRP value. If ACEmanager (Status screen) indicates a good RSRP value, go to step 3. If it indicates a poor RSRP value:
   - This may be a temporary network problem caused by local interference.
   - Check the antenna connection.
   - Make sure you have the correct antenna for the device.
   - You may be in an area with poor coverage. Check with your Mobile Network Operator, or if possible, try moving the AirLink LX40 to a new location.
3. Check the RSRQ value. If ACEmanager (Status screen) indicates a poor RSRQ value:
   - A nearby laptop or other electronic equipment may be interfering with the signal. Try moving the AirLink LX40 to a different location.

Connection not working

My LX40 appears to be connected to the host, but no data is being transferred.

1. Check to see if MAC filtering is enabled (Security > MAC Filtering).
2. If MAC filtering is enabled:
   - Ensure that the MAC Address for the host in question is on the Allowed List.
   - Ensure that there are no typos in the MAC Address.

     – Or –
   - If it is not required, disable MAC Filtering and reboot the device.

My host device is unable to connect to the Internet, even when there is good mobile network coverage and ALEOS can Ping an external IP address.

1. Check the DNS proxy setting described on page 177.

   You may need to change this setting to Disable so that all connected devices acquire the Mobile Network Operator-defined DNS server as the first DNS server. The AirLink LX40 is not used as the DNS resolver.

Wi-Fi

The Wi-Fi channel I selected is not working.

Each country controls which Wi-Fi channels are allowed in that country. If the Wi-Fi channel you selected is not working:

1. In ACEmanager, go to Wi-Fi > General > Country Code, and ensure that it is set to the country in which the router is operating.
2. Go to Wi-Fi > Access Point (LAN) > Channel and Frequency (or Channel, Frequency, Width, depending on the Access Point Mode selected), and ensure that the channel you selected is permitted in the country selected.

   If you are not sure:

   a. Go to Admin > Log > View Log to generate a log file. If the Wi-Fi channel selected is not permitted in the country selected in the Country Code, you will see messages similar to the following in the log file:

```
Apr 26 01:10:40 info ALEOS_WIFI_CRD: hostapd: uap0: IEEE 802.11 Configured channel (149) not found from the channel list of current mode (2) IEEE 802.11a
Apr 26 01:10:40 info ALEOS_WIFI_CRD: hostapd: uap0: IEEE 802.11 Hardware does not support configured channel
```

3. If you see this in the log, select a channel that is permitted in the country the router is operating in. (If necessary, check online resources such as https://en.wikipedia.org/wiki/List_of_WLAN_channels/ to determine the permitted channels.)

   Note: The Country Code settings configure a subset of the channels available in the default setting (United States). You cannot enable any channels beyond those available in the default setting.

4. Reboot the router.

LTE Networks

How do I obtain and interpret SINR values for LTE networks?

You can use the AT*CELLINFO? command to obtain an SINR (Signal to Interference plus Noise Ratio) value. (See *CELLINFO2? on page 416.)

The values vary depending on the network characteristics and the AirLink LX40, but in general, a positive value provides usable throughput. The following table provides guidelines for interpreting SINR values.

SINR Value	Throughput
< 0	Poor
0 to 5	Fair
6 to 10	Good
> 10	Excellent

If the SINR value indicates poor throughput:

- Move the antenna away from noisy equipment.
- Move closer to the nearest cell tower line of sight, or further away from the interfering cell tower.

SIM Card is Blocked

My SIM card has a PIN number. I've entered the wrong PIN several times and now the SIM card is blocked.

AirLink products do not support Personal Unlocking Key (PUK) entry. However, if you need to unblock the SIM card:

1. Contact your Mobile Network Operator to obtain the PUK.
2. Remove the SIM card from the AirLink LX40 and insert it in a cell phone that accommodates a MiniSIM (2FF) card.
3. Enter the PUK to unblock the SIM card and then return the SIM card to the AirLink LX40.

Note: Be careful when entering the PUK. You have a limited number of attempts to enter the correct PUK (generally 10) before the SIM card is permanently disabled and a new SIM card is required. If the PUK does not unblock the SIM card after the first few attempts, contact your Mobile Network Operator.

Remote connections

I cannot connect to the AirLink LX40 remotely over the Mobile Network Operator's Private Network via the Web UI, although I can connect to it locally.

Some Mobile Network Operators' private networks have restrictions on the maximum transmission unit (MTU) size. This is more prevalent with LTE networks.

Possible solutions:

- Use your Mobile Network Operator's public network.
- Ask your Mobile Network Operator to reduce the MTU size on the router or other equipment at their end of the private network. Setting the MTU value below 1500 bytes (for example 1326 bytes) has resolved the problem on some private networks.

Radio Band Selection

I set the radio band in the UI (WAN/Cellular > Setting the Band) or by using the AT!BAND AT command, but after I reboot the band setting reverts to its former value.

For some SIM cards, you need to set the band before inserting the SIM card.

To resolve this problem:

1. Remove the SIM card.
2. Set the band to the desired value.
3. Reboot the device.
4. Insert the SIM card.

Low Voltage Standby Mode

How do I get my LX40 out of Low Voltage Standby mode?

The problem: While configuring Low Voltage Standby mode, I inadvertently set the Resume Immediately Voltage too high (i.e. higher than the voltage available where the LX40 is installed). Now the LX40 is stuck in standby mode.

I connected the LX40 to a higher voltage source, and it resumed normal operation. I reset the Low Voltage Standby values, but the LX40 returned to Standby mode as soon as it was reconnected to the lower voltage source, even though the lower voltage source provided a higher voltage than the new value I just set in the Resume immediately at Voltage field.

The solution: Low Voltage Standby mode settings take effect as soon as you click Apply, but they are not permanently stored until the LX40 is rebooted. To bring a LX40 out of Low Voltage Standby mode if the Resume immediately at Voltage field is set too high:

1. Connect the LX40 to a power source and supply voltage that is greater than the value configured in the Resume immediately at Voltage field.
2. When the LX40 resumes normal operation, launch ACEmanager and reset the values in the Services > Power Management > Low Voltage Standby fields.
3. While still using the voltage applied in step 1, Click the Reboot button in ACEmanager to reboot the LX40.

   The LX40 reboots.
4. Wait until the LX40 reboots itself a second time, or for at least 3 minutes, if you are not sure if the LX40 has done its automatic reboot.

Once the second reboot is complete, it is safe to disconnect the LX40 from the higher power source and return it to the original installation and power source.

Reliable Static Routing (RSR)

I launched ACEmanager with Internet Explorer 9. I configured RSR, but after I enabled RSR and clicked Apply, all the values reverted to the defaults.

Note: Internet Explorer 9 is no longer supported by ACEmanager.

There is a known issue. If you configure and enable RSR with ACEmanager in Internet Explorer 9, and then click Apply, the values in the ACEmanager screen appear as default values.

This is an ACEmanager display issue only. The configuration is applied properly, but the configured values are not displayed. Click Refresh to view the configured values.

Inbound Ports Used by ALEOS

When I configure ports for an application on a LAN client such as a router or laptop, I want to ensure that the ports I use do not conflict with the inbound ports that ALEOS uses. Which ports does ALEOS use?

Table D-1 shows the inbound ports that are set in ALEOS and cannot be configured. Table D-2 show the default setting for ports you can configure and where to change the ports in ACEmanager.

Table D-1: ALEOS Non-configurable Inbound Ports

Port	Use
9494 – 9497 17335 17345 – 17353 21000 – 21003	Used internally for Location and Events Reports
500 4500	Used internally for IPSec VPN
8088	Used internally for ALMS

Table D-2: ALEOS Configurable Inbound Ports

Default Port	Feature	ACEmanager location
161	SNMP Port	Services > Management (SNMP)
2332	SSH/Telnet Remote Login Server Port	Services > Telnet/SSH

Table D-2: ALEOS Configurable Inbound Ports

Default Port	Feature	ACEmanager location
9191	ACEmanager Port	Services > ACEmanager
9300	SSL tunnel Port	VPN > SSL Tunnel
9443	ACEmanager SSL Port	Services > ACEmanager
9494	Poll Port	> Global Settings
12345	Device Port used for incoming TCP/ UDP traffic	Serial > Port Configuration

Setting for Band

The options available in the WAN/Cellular > Cellular > General > Setting for Band field depend on your region or your Mobile Network Operator. (To check your Mobile Network Operator, in ACEmanager, go to Status > About > Radio Module Identifier field.)

Table D-3: Setting for Band—Radio Module WP7601

Setting for Band Option	Technology	Bands Available
All bands	LTE	Band 4 Band 13
North America	LTE	Band 4 Band 13
LTE All	LTE	Band 4 Band 13

Table D-4: Setting for Band—Radio Module WP7603

Setting for Band Option	Technology	Bands Available
All bands	LTE	Band 2 Band 4 Band 5 Band 12
	WCDMA	Band 2 Band 4 Band 5
North America 3G	WCDMA	Band 2 Band 5

Table D-4: Setting for Band — Radio Module WP7603

Setting for Band Option	Technology	Bands Available
North America	LTE	Band 2 Band 4 Band 5 Band 12
	WCDMA	Band 2 Band 5
WCDMA All	WCDMA	Band 2 Band 4 Band 5
LTE All	LTE	Band 2 Band 4 Band 5 Band 12

Ethernet Ports

What do the LEDs above the Ethernet port mean?

There are two LEDs at the top of the Ethernet port. The green one is lit when a cable is connected to the host and the connection is running at 100baseT. The amber (activity) LED blinks when traffic is passing through the port.

LAN Networks

The server on my LAN network is receiving data from some hosts on the network, but not others. What's wrong?

If you have a network with multiple LAN devices that are sending data to the same server and the server is not receiving data from one (or more) of the devices, it may be because the Mobile Network Operator has a WAN firewall that is blocking the ports used by the NAT for over-the-air (OTA) destinations.

To correct this problem:

1. Launch ACEmanager.
2. Go to the LAN tab.
3. Select Ethernet.
4. Refer to the instructions for setting the Starting Ephemeral Port on page 93.

Wi-Fi

My is configured to act as an access point, but I don't see an option to use WEP encryption.

1. Launch ACEmanager.
2. Go to the LAN/Wi-Fi tab.
3. Select Wi-Fi.
4. In the Enable Access Point field, change the value from "b/g/n Enabled" to "b/g Enabled".

   Once this change is made, an "Open WEP" section appears below the Wi-Fi Configuration section.

WEP encryption is only supported on 802.11b and 802.11g. It is not supported on 802.11n.

VPN

My VPN connection is not working. When I try to debug it using the logs on the Admin page, VPN information does not show up in the log.

VPN information is collected in the Linux logs. To view this information:

1. Log into ACEmanager as User and go to Admin > Log.
2. In the drop-down menu beside Linux Syslog, ensure that Display is selected.

   If you change the setting:

   a. Click Apply.

   b. Reboot the device.
3. Click View Log.
4. On the View Log page, click Clear and then click Refresh.

VPN Troubleshooting

If you see the following lines in the log, it means the VPN Server is not answering.

```
notice openvpn[9199]: [UNDEF] Inactivity timeout (--ping-restart), restarting
notice openvpn[9199]: TCP/UDP: Closing socket
```

Check the VPN Server status.

When I configure a VPN, my Internet connection stops working.

When you configure a VPN, outgoing traffic from the host to the public Internet is blocked by default, as a security measure. If you want to enable public Internet traffic from the host:

1. In ACEmanager, go to VPN > Split Tunnel.
2. Change the Outgoing Host Out of Band field to Allowed.
3. Click Apply.

Port Forwarding

I set up port forwarding rules. I did not receive an error message, but it seems that data is not being forwarded.

If the Public Start Port and Public End Port fields are not set up correctly, data is not forwarded.

1. In ACEmanager, go to Security > Port Forwarding.

- If you are forwarding data to a single port:
  - Ensure that the value in the Public Start Port field is **not** 0.
  - Ensure that the value in the Public End Port field **is** 0.
  - Ensure that the value in the Private Port start field is **not** 0.
- If you are forwarding data to a range of ports:
  - Ensure that the value in the Public Start Port field is not 0.
  - Ensure that the value in the Public End Port field is greater than the value in Public Start Port field.
  - Ensure that the value in the Private Port Start field is not 0.

For complete instructions, see Port Forwarding on page 220.

SMS

I tried to send an SMS message, and received an error code. What does the error code mean?

The following acknowledgment error codes may appear if your message was not successfully sent:

Table 4-5: SMS error codes

Code	Explanation
100	Not in coverage (no cellular service)
201	Parse Error on field #1 (Start Field)
202	Parse Error on field #2 (Phone number and separator)
203	Parse Error on field #3 (Data type and separator)
204	Parse Error on field #4 (Payload length and separator)
205	Parse Error on field #5 (Message and End Field)
301	No buffers available
302	SMS queue full

Supported SMS data types are ASCII, 8-bit, and Unicode, and are all case-sensitive. SMS messages being sent MUST be in ASCII hex format.

I tried to send an SMS command and received the error “not set”. The parameter was not changed.

Check the format of the SMS command. There should be no space between the prefix and the command (or the 1st command parameter in the case of multi-parameter commands), and a single space between all other fields to act as a delimiter. For more information, see SMS Commands on page 493 and SMS on page 257.

AirLink Management Service

I don’t understand the message that appears in the Status field in the Services > ALMS page.

The error messages in the Services > ALMS > Status field can be due to a communication failure, a problem with the ALMS server, or a failure when parsing a valid ALMS server response. The following table describes the error messages and the corrective action.

Error message	Meaning	Corrective action
Communication Failure Errors		
[HTTP] Initialization error	The transfer object could not be initialized.	Contact ALMS support.
[HTTP] Unsupported protocol	The ALMS server URL protocol is not supported.	In ACEmanager, check the ALMS URL in the Service > ALMS > Server URL field. The default value is https://na.m2mop.net/device/msci/com.
[HTTP] Failed initialization	The transfer library could not be initialized.	Contact ALMS support.
[HTTP] URL using bad/illegal format or missing URL	The ALMS server URL is missing or not properly formatted.	In ACEmanager, check the ALMS URL in the Service > ALMS > Server URL field. The default value is https://na.m2mop.net/device/msci/com.
[HTTP] Couldn't resolve host name	The ALMS server URL could not be resolved.	In ACEmanager, check the ALMS URL in the Service > ALMS > Server URL field. The default value is https://na.m2mop.net/device/msci/com. Also check the cellular connectivity.
[HTTP] Couldn't connect to server	Connection to the ALMS server URL failed.	In ACEmanager, check the ALMS URL in the Service > ALMS > Server URL field. The default value is https://na.m2mop.net/device/msci/com. Also check the cellular connectivity.
[HTTP] Timeout was reached	The transfer timeout (equal to the communication period if defined or 5 minutes) expired.	Check cellular connectivity.
[HTTP] Server returned nothing (no headers, no data)	No data was received from the ALMS server.	Check cellular connectivity.
[HTTP] Unrecognized or bad HTTP Content or Transfer-Encoding	The ALMS server HTTP response contains a malformed content or transfer-encoding header field.	Contact ALMS support.
[HTTP] Out of memory	A memory allocation problem occurred.	Contact ALMS support.

Error message	Meaning	Corrective action
[HTTP] SSL peer certificate or SSH remote key was not OK	This message appears if you are using an HTTPS server URL, the TLS Verify Peer Certificate field is set to Enable, and the server SSL certificate validation fails. If this happens, communication with the ALMS server is terminated.	If you see this error message: 1. Check to see that you have a valid URL in the Server URL field. 2. In ACEmanager, go to Admin > Advanced and check the Date and Time field to confirm that the values are correct.[a] The SSL certificates have a start and end date. If the device has a date and time outside of this interval, the certification check will fail. 3. Contact your IT Administrator, or if you want the traffic to go through without verifying the server certificate, change the setting in the Services > ALMS > TLS Verify Peer Certificate field (described on page 238) to Disable.
ALMS Server Errors		
[AVMS] HTTP error '500'	ALMS server reported error 500 in the HTTP response.	Refer to the available ALMS server documentation for a list of all possible error codes and their significance.
Error message indicating a failure when parsing a valid ALMS server response		
XML processing error	The content of a valid ALMS server response cannot be parsed.	ALMS server responses are malformatted. Contact ALMS support.

a. If the values are not correct and the device is not receiving date and time from the Mobile Network Operator or go to Services > Time (SNTP), and enable time update. For the SNTP Server, use the same service as the authenticating server.

When I try to update the radio module using ALMS, I receive an error message.

The following table provides a brief explanation of the firmware update error messages.

Error message	Meaning	Corrective action
Cannot Install Firmware	The system has encountered errors from which it cannot recover and requires at least a reboot before trying to update again.	1. Reboot the device. 2. If the problem persists, press the reset button for 7–10 seconds to reset the device to the factory default settings (release the reset button when all four LEDs turn from red to yellow) and try again. 3. If it still does not work, contact ALMS support.
Link not up in 3 minutes...Exiting	The radio module was not able to establish the connection in 3 minutes. The update has been aborted, but can be relaunched as soon as the connection is OK.	Wait for network connectivity and then try again.
Unable to download JUD file from <url>	The URL is wrong, or the download failed (interruption, no space left...).	Contact ALMS support.

Error message	Meaning	Corrective action
Core version not found in JUD file	JUD file is not valid. Core Version is a mandatory field.	There is a problem with the package on the ALMS server. Contact ALMS support.
Required information (URL, Size or MD5) is missing from JUD file	JUD file is not valid. URL, Size, and MD5 sum of the firmware package are mandatory fields.	There is a problem with the package on the ALMS server. Contact ALMS support.
Cannot perform upgrade — No space left on device	Firmware is larger than available space for the download.	Contact ALMS support. The support team will need to access the device to clear space, or you can return the device to Sierra Wireless under an RMA.
Unable to download ALEOS firmware from <url>	Firmware URL is not valid, or the download failed.	Retry. If the download fails several times, contact ALMS support. The support team will need a log from the device.
Undefined ALEOS firmware URL	ALEOS firmware URL not specified, so firmware cannot be retrieved.	Contact ALMS support to confirm that there is not a problem with the service.
ALEOS firmware MD5 check failed	The downloaded firmware package failed the integrity check. The update is aborted.	There is a problem with the package on the device or the download may have failed. Restart the firmware download. If the problem persists, contact ALMS support. There may be a problem with the package on the ALMS server.
Unable to apply ALEOS firmware and Unable to apply ALEOS firmware (retry)	ALEOS firmware could not be applied. Check the ALEOS log messages to determine exactly why the update failed.	Retry. If the problem persists, contact ALMS support and provide them with the log messages.
Radio Module URL is missing from JUD file	JUD file is not valid. The Radio Module Firmware URL is a mandatory field.	There is a problem with the package on the ALMS server. Contact ALMS support.
Radio Module package MD5 sum is missing from JUD file	JUD file is not valid. The Radio Module Firmware MD5 sum is a mandatory field.	There is a problem with the package on the ALMS server. Contact ALMS support[a].
Radio Module firmware MD5 check failed	The downloaded firmware package failed the integrity check. The update is aborted.	There is a problem with the package on the device or the download may have failed. Try downloading the file again. If the problem persists, contact ALMS support[a]. There may be a problem with the package on the ALMS server.
Radio Module backup failed	The radio module was saved to prevent a power failure. If the firmware cannot be backed-up on persistent storage, the firmware update will not proceed because of the risk that the radio module update will not be able to finish if interrupted.	Contact ALMS support[a]. The support team will need to access the device to clear space, or you can return the device to Sierra Wireless under an RMA.
Radio Module firmware download failed	Firmware URL is not valid, or download failed.	Retry several times. If the problem persists, contact ALMS support[a]. The support team will need a log from the device.

Error message	Meaning	Corrective action
Undefined Radio Module firmware URL	The URL cannot be retrieved. The update is aborted.	Retry. If the problem persists, contact ALMS support.
Radio Module firmware update failed	Radio module firmware could not be applied. Check the ALEOS log messages to determine exactly why the update failed.	Retry. If the problem persists, contact ALMS support.

Event Reporting

I set up ACEmanager to send an email/SMS report, but when I clicked the Test report button no report was sent.

After you set up the event reporting fields and click Apply, wait about a minute before you click the Test report button. The AirLink LX40 needs this time to apply the new configuration.

I configured event reporting, but I did not receive a report when I should have.

- If the Action Type for the Event Reporting is Email or SNMP TRAP, be sure that these services are also configured on the Services tab.
  - To configure email, go to Services > Email (SMTP).
- To configure SNMP TRAP, go the Services > Management (SNMP).If the Action Type is SMS, you may need to change the default settings in the Advanced section of the Services > SMS page.

ALEOS Application Framework (AAF)

I'm unable to load an application from AAF.

1. In ACEmanager, go to Services > Telnet/SSH.
2. In the AT Server Mode field, select Telnet.
3. Click Apply.
4. Re-try loading the application from AAF.

Network Operator Switching

What happens to my Radio Module Firmware settings (Admin > Radio Module Firmware) when I reset the LX40 to the factory default settings?

If the Reset Mode field on the Admin > Advanced screen is set to "Preserve Cellular Authentication Settings" (default setting), the Radio Module settings on the Admin > Radio Module Firmware screen are preserved over the reset, i.e. there is no change to the settings.

If the Reset Mode field on the Admin > Advanced screen is set to "Reset All", then the settings on the Admin > Radio Module Firmware screen revert are reset. The Automatic option is reset to "Automatic" and the ALMS option is reset to "Update Current Only". If

you have previously selected a radio module firmware version manually that does not match the SIM card, “Reset All” may change the radio module firmware because once the LX40 reverts to “Automatic”, which SIM card is installed in the LX40 determines which radio module firmware is used. This could override a previous manual selection.

E:Glossary of Terms

Acronym or Term	Definition
3GPP	3rd Generation Partnership Project 3GPP unites 6 telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TTA, TTC), and provides their members with a stable environment to produce Reports and Specifications that define 3GPP technologies.
API	Programming Interface A protocol intended to be used as an interface by software components to communicate with each other.
AT	A set of device commands, preceded by “AT” originally developed by Hayes, Inc. for their devices. The structure (but not the specific commands, which vary greatly from manufacturer to manufacturer) is a de facto device industry standard.
CE, CE Label	The CE label is a mandatory conformity marking for products placed on the market in the European Economic Area (EEA). With the CE marking on a product, the manufacturer declares that the product conforms with the essential requirements of the applicable EC directives.
CnS	Sierra Wireless’ proprietary Control and Status protocol interface
DCE	Data Communications Equipment A device that sits between the data terminal equipment (DTE) and a data transmission circuit. Usually the DCE is a modem.
Diversity	Antenna diversity, also called space diversity, is a scheme that uses two or more antennas to improve the quality and reliability of a wireless link. Often, especially in urban and indoor environments, there is no clear line-of-sight (LOS) between transmitter and receiver. Instead the signal is reflected along multiple paths before finally being received. Each bounce can introduce phase shifts, time delays, attenuations, and distortions that can destructively interfere with one another at the aperture of the receiving antenna.
DMNR	Dynamic Mobile Network Routing
EIA	Electronics Industry Association EIA was a standards and trade organization composed as an alliance of trade associations for electronics manufacturers in the United States. They developed standards to ensure the equipment of different manufacturers was compatible and interchangeable. The EIA ceased operations on February 11, 2011, but the former sectors continue to serve the constituencies of EIA.
EMC	Electromagnetic Compatibility The branch of electrical science which studies the unintentional generation, propagation and reception of electromagnetic energy with reference to the unwanted effects (Electromagnetic interference, or EMI) that such energy may induce.
EMI	Electromagnetic Interference The disturbance that affects an electrical circuit due to either electromagnetic induction or electromagnetic radiation emitted from an external source
ERP	Effective Radiated Power A standardized theoretical measurement of radio frequency (RF) energy. It is determined by subtracting system losses and adding system gains.

Acronym or Term	Definition
ESN	Electronic Serial Number The unique first-generation serial number assigned to the Air Link devices for use on the wireless network. Compare to MEID.
Ethernet	Computer networking technologies for local area networks (LANs).
EU	The European Union Organization of European countries.
FCC	Federal Communications Commission The U.S. federal agency responsible for interstate and foreign communications. The FCC regulates commercial and private radio spectrum management, sets rates for communications services, determines standards for equipment, and controls broadcast licensing.
FW	Firmware Software stored in ROM or EEPROM; essential programs that remains even when the system is turned off. Firmware is easier to change than hardware but more permanent than software stored on disk.
GPRS	General Packet Radio Service A packet-oriented mobile data service on 2G and 3G cellular communication systems. GPRS was originally standardized by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies. It is now maintained by the 3rd Generation Partnership Project (3GPP).
GPS	Global Positioning System A system that uses a series of 24 satellites to provide navigational data.
GSM	Global System for Mobile Communications (originally Groupe Spécial Mobile) GSM is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital mobile networks used by mobile phones
HSPA	High Speed Packet Access An amalgamation of two mobile telephony protocols: High Speed Downlink Packet Access (HSDPA) and High Speed Uplink Packet Access (HSUPA). This extends and improves the performance of existing 3rd generation mobile telecommunication networks utilizing the WCDMA protocols.
HSPA+	Also called evolved HSPA This allows bit-rates to reach as high as 168 Mbit/s in the downlink and 22 Mbit/s in the uplink. An improved 3GPP standard.
IC	Industry Canada The government department responsible for overseeing and regulating wireless and communication technologies in Canada.
IEC	International Electrotechnical Commission A non-governmental international standards organization that prepares and publishes International Standards for all electrical, electronic and related technologies—collectively known as “electro technology.”
IS	Interim Standard After receiving industry consensus, the TIA/EIA forwards the standard to ANSI for approval.
ISAKMP	Internet Security Association and Key Management Protocol A security protocol defined by RFC 2408 for establishing Security Associations (SA) and cryptographic keys in an Internet environment. ISAKMP only provides a framework for authentication and key exchange and is designed to be key exchange independent.

Acronym or Term	Definition
ITU	International Telecommunication Union A specialized agency of the United Nations responsible for issues that concern information and communication technologies. The ITU coordinates the shared global use of the radio spectrum, promotes international cooperation in assigning satellite orbits, and assists in the development and coordination of worldwide technical standards.
kbps	Kilobits per second 1000, not 1024, as used in computer memory size measurements of kilobytes.
LED	Light Emitting Diode A semiconductor diode that emits visible or infrared light.
LTE	Long Term Evolution High performance air interface for cellular mobile communication systems.
Mbps	Millions of bits per second, or Megabits per second.
MEID	Mobile Equipment IDentifier The unique second-generation serial number assigned to the device for use on the wireless network. *Compare to* ESN.
MSCI	Modem Status Configuration Interface ALEOS internal configuration database
NAM	Number Assignment Module Semi-permanent information stored in the device's non-volatile memory, including the device's Mobile Identification Number, the station class mark, Mobile Network Operator code, and other cellular identifiers. Essentially the phone number, it should be treated as confidential information and should not be disclosed to anyone other than the cellular service provider.
NV	Non-Volatile (memory)
OEM	Original Equipment Manufacturer A company that manufactures a product and sells it to a reseller.
OTAPA	Over the Air Parameter Administration A way of distributing new software updates or configuration settings to devices like cellphones and set-top boxes.
OTASP	Over the Air Service Provisioning. Also see OTAPA.
PAD	Packet Assembly/Disassembly
PCS	Personal Communications Services A cellular communication infrastructure that uses a different frequency range than AMPS.
PPP	Point to Point Protocol An alternative communications protocol used between computers, or between computers and routers on the Internet. PPP is an enhanced SLIP. Also see SLIP.
PRI	Product Release Instructions A file containing the settings used to configure devices for a particular service provider, customer, or purpose.
RF	Radio Frequency

Acronym or Term	Definition
RoHS	Restriction of use of Hazardous Substances mandated by EU Directive 2002/95.
RS-232	A series of standards for serial binary single-ended data and control signals connecting between a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports.
Rx	Receive
SIM, SIM Card	Subscriber identity module or subscriber identification module. An integrated circuit which securely stores the international mobile subscriber identity (IMSI) and the related key used to identify and authenticate subscribers on mobile telephony devices (such as mobile phones and computers).
SINR	Signal to Interference plus Noise Ratio (SINR) is an RF parameter that is directly proportional to throughput (the higher the number, the higher the throughput). It can help LTE radio installers gauge the signal quality between the cell tower and the radio module. For more information on interpreting the SINR values, see How do I obtain and interpret SINR values for LTE networks? on page 501.
SKU	Stock Keeping Unit Identifies an inventory item: a unique code, consisting of numbers or letters and numbers, assigned to a product by a retailer for purposes of identification and inventory control.
SLIP	Serial Line Internet (or Interface) Protocol An Internet Protocol designed to work over serial ports and modem connections. On personal computers, SLIP has been largely replaced by the Point-to-Point Protocol (PPP), which has more features and does not require its IP address configuration to be set before it is established. On microcontrollers SLIP is still the preferred way of encapsulating IP packets due to its very small overhead. Also see PPP.
SMS	Short Message Service A feature which allows users of a wireless device on a wireless network to receive or transmit short electronic alphanumeric messages (up to 160 characters, depending on the service provider).
TCH	Traffic Channel
TIA/EIA	Telecommunications Industry Association / Electronics Industry Association A standards setting trade organization, whose members provide communications and information technology products, systems, distribution services and professional services in the United States and around the world.
Tx	Transmit
UMTS	Universal Mobile Telecommunications System (UMTS). A third generation mobile cellular system for networks based on the GSM standard. Developed and maintained by the 3GPP (3rd Generation Partnership Project), UMTS is a component of the International Telecommunications Union IMT-2000 standard set.
USB	Universal Serial Bus An industry standard defining the cables, connectors and communications protocols used in a bus for connection, communication and power supply between computers and electronic devices.

Acronym or Term	Definition
VRRP	Virtual Router Redundancy Protocol
X.509	A Public Key Infrastructure (PKI) and Privilege Management Infrastructure (PMI) are standards that specify formats for public key certificates, certificate revocation lists, attribute certificates, a certification path validation algorithm, etc.

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