



MLBase™

User's Guide

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Revision F



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Revision History

Date	Rev.	Comments
12/23/2021	A	Initial Release
7/20/2023	B	Removed surge protector and 4' antenna cable from Items List and surge arrestor in Installation Section. Added appendix on using an MLBase as a repeater.
3/1/2024	C	Added Terminal Commands appendix.
07/18/2024	D	Guide format updated. Items list updated. SD card information added/updated throughout, including new section 2.6 SD Card Message Logging. Appendix D – Terminal Commands updated.
02/24/2025	E	SD Card Message Logging section moved to appendix. Added 2.6 SD Card Information.
8/7/2025	F	Updates to guide format and LED Status Lights subsection.

How To Use This Guide

When you see a keyboard key's name in bold angle brackets (<>), this indicates a particular keystroke you must make in order to perform certain functions.

When you see two bolded locations separated by a vertical bar character (**Location 1 | Location 2**), this indicates that the second location can be accessed only after the first. For example, an Import option that is available in a File drop-down menu in a toolbar would be denoted with **File | Import**.

References to other Canary Systems® user's guides, third-party documentation or other external sources will appear bolder and italicized. For example: For more information, see the ***MultiLogger User's Guide***.



Notes & Hints

Notes and Hints appear in boxes like this. **Notes** contain information you need to know to ensure that you use certain features correctly, minimizing any errors. **Hints** indicate tips on how to use certain features more effectively, such as any shortcuts to certain functions.



WARNING

WARNINGS appear in boxes like this. **WARNINGS** contain information deserving of special attention by the user or for cases where not following instructions carefully could result in loss or alteration of important data or other serious negative effects.

Related Documentation

Visit the User's Guide page on the Canary Systems website to view and download the most current versions of our technical documentation and user's guides at canarysystems.com/support/users-guides.

The following documents contain information that may be useful throughout the course of this manual:

- ***MLWebHardware User's Guide*** for additional information on data collection and import.
- ***MLWeb User's Guide*** for additional information on data visualization and presentation.
- ***MLRemote User's Guide*** for additional information on configuring the MLRemote devices.

Technical Support

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Note

To contact Canary Systems for assistance or regarding the purchase of a support contract, you can reach the Support Team at:

+1.603.525.9800

support@canarysystems.com

Our website also provides numerous Application Notes, the latest versions of our software components, and all the latest User's Guides. Click the **Support** menu at canarysystems.com to access these resources.

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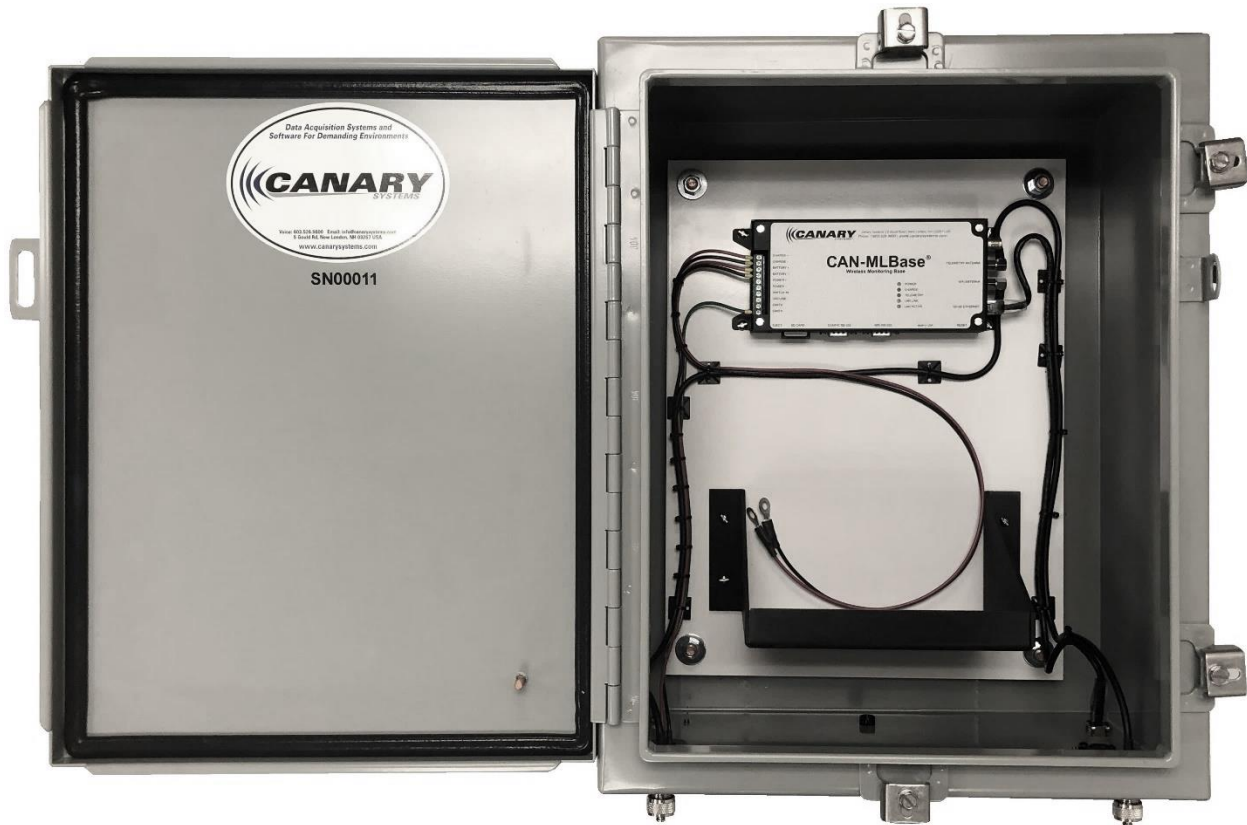
1. Introduction

1.1 Overview

The Canary Systems® MLBase™ is the communication station for the point-to-multipoint, programmable wireless MLRemote® systems. This system consists of two components, a base communications station (CAN-MLBase) and one or more wireless remotes (CAN-MLRemote).

Each network of MLRemotes communicate with a single MLBase. Multiple networks, each with their own MLBase can be deployed.

A view of the MLBase enclosure is shown below:



Offline Mode and SD Card

The MLBase ships with a 16GB SD card already inserted into the MLBase module. The SD card allows the MLBase to collect and store data from all MLRemotes on the network, as well as to store program updates prior to being sent to the MLRemote stations.



Note

In order for the SD card to function as intended, the current firmware must be installed. Contact Canary Systems to confirm firmware version or prepare upgrade.

When the card is installed in the MLBase, packets from MLRemotes are directly acknowledged and stored for collection by our MLGateway software service. This improves network reliability and optimizes network traffic by reducing or eliminating duplicated transmissions of packets by MLRemotes (data packets in particular). If no memory card is installed, or the MLBase is running older firmware, the MLBase operates in a "pass through" mode where MLRemotes send packets directly to the server and acknowledgements must be sent directly by the MLGateway software service.

System Measurements

The MLBase is capable of reading its own panel temperature, humidity using a built-in digital humidity sensor, solar and battery current, and recording the status of a switch closure input.

MLRemote Network Communication

Standard MLRemote devices communicate with their MLBase using an integrated 900MHz radio module.



Note

Several other radio modules are also available in order to provide operations globally. Contact Canary Systems for help selecting the radio module that will work best for your location.

A distance of up to 100km (60 miles) may be achieved with the standard 900MHz radio and optional directional antenna with excellent topography.

Server Network Communication

The MLBase is also equipped with an integrated 2.4/5 GHz Wi-Fi module used for connecting the MLBase to a site's network. The MLBase module has a built-in Ethernet port for situations where a wired network is available. The Wi-Fi module is used to receive program updates from MLWebHardware and to send data back to the server where MLSuite is installed.



Note

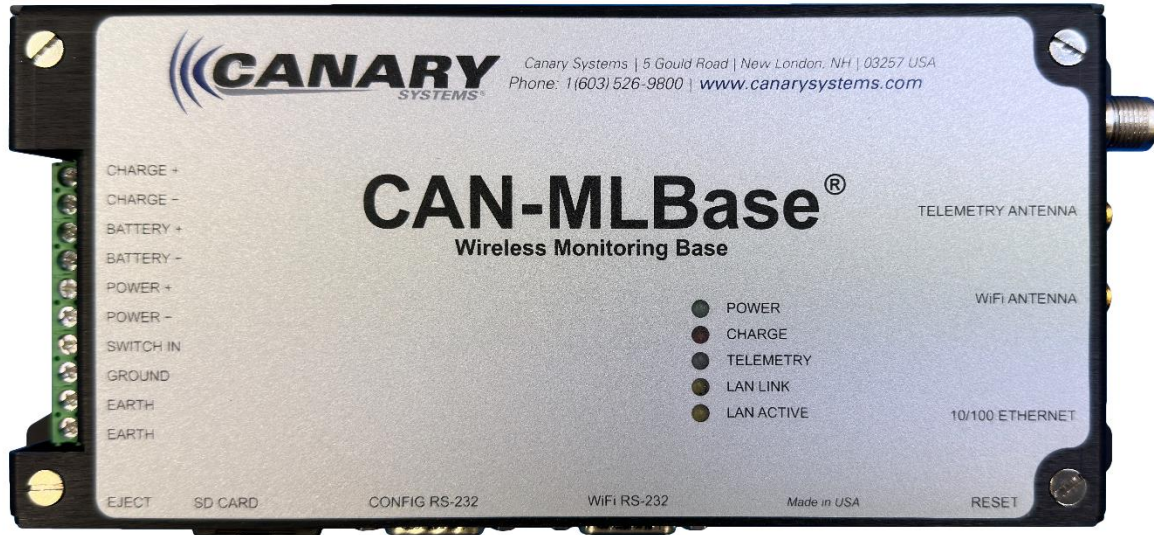
In areas where a 2.4GHz signal is not available, an MLBase can be shipped with a cellular data module. Contact Canary Systems for more information on these modules.

Power

A 50Ahr lead-acid battery provides power. Recharging is provided through a solar panel or AC power connection.

LED Status Lights

The front of the MLBase module features five LED status lights used for reporting basic system operation. All LEDs are controlled by the microcontroller to allow for reduced power consumption by supporting "flashing" operation. Flash modes are specified for different reporting conditions.



LED status lights are available for the following:

POWER (Green LED) – Indicates power to the device.

- **Inactive** – The device is powered down.
- **Flashing** – The system is powered and operating normally.

CHARGE (Red LED) – Indicates battery charging current.

- **Inactive** - The charge current is less than 20mA.
- **Normal flashing (single flash)** - The charge current is greater than 20mA but less than 150mA.
- **Fast flashing (double flash)** - The charge current is above 150mA.

TELEMETRY (Blue LED) – Indicates RF activity.

- **Inactive** – There is no current RF module activity.
- **Flashing** – The RF module is currently receiving.

LAN LINK (Yellow LED) – Indicates a valid LAN/WLAN link is detected.

- **Inactive** – There is no active LAN/WLAN or cellular network connection.
- **Flashing** – There is an active LAN/WLAN or cellular network connection.

LAN ACTIVE (Yellow LED) – Indicates LAN/WLAN link activity.

- **Inactive** – There is currently no communication over LAN/WLAN or cellular network.
- **Flashing** – There is currently active communication over LAN/WLAN or cellular network.

Firmware and SD Card LED Status Lights

Additional LED status indicators are active when loading firmware or inserting a SD card.

For the operations described below, retries are provided. It may be acceptable if there are a few failed attempts, but continuous error indication means failed operation. When the maximum number of retries is reached, the bootloader will reboot.

A single flash of all LEDs simultaneously indicates a system reboot and the bootloader is initialized.

POWER (Green LED) – Indicates SD card mounting status during firmware operations

- **Fast flashing** – The SD card is inserted but the file system is not mounted.
- **Continuous fast flashing** – The SD card could not be mounted after insertion or does not have proper formatting (FAT32).
- **Temporary fast flashing** – A valid SD card is detected and the file system is mounting (lasts a couple of seconds before resuming normal flashing).

CHARGE (Red LED) – Indicates SD card initialization failures.

- **Flashing** – Each flash indicates a failed attempt to initialize the SD card. This means the SD card is not inserted or is corrupted.

TELEMETRY (Blue LED) – Indicates bootloader operation and firmware update progress.

- **Flashing with other LEDs** – The bootloader is working properly and retry logic is active when initializing the SD card, mounting the file system, and opening the firmware file to update NVM memory.
- **Flashing alone** – Each flash indicates the next 20KB from the firmware file was stored to Non Volatile Memory (NVM).

LAN LINK (Yellow LED) – Indicates file system operation failures.

- **Flashing** – Each flash indicates a failed attempt to perform an operation with the file system on the SD card. This may mean the bootloader cannot find firmware or backup file on the microSD, or indicates file system corruption.

LAN ACTIVE (Yellow LED) – Indicates NVM operation failures.

- **Flashing** – Each flash indicates a failed attempt to perform an operation with the NVM when storing firmware blocks.

Warranty

The warranty for the MLBase is applicable for one year from the date of shipment. The warranty does not cover the battery, or failure by misuse or by nature, including lightning, flood, or other catastrophe.

Should you encounter problems with your MLBase, contact Canary Systems at the address listed in the front of this manual.

1.2 Specifications

Wired/Wireless Ethernet (used for communication with the Server Network)

Ports: RS-232 (DE-9), Ethernet (RJ-45)

Speed: 300 - 921.6kbps

Interface: Ethernet 10Base-T or 100Base-TX (Auto-sensing)

Standards: WPA, WEP, ARP, UDP/IP, TCP/IP, ICMP, SNMP, AutoIP, DHCP, TFTP, Telnet, HTTP

Security: 256-bit AES Encryption

Range (line-of-sight): 1 mile (1.31km) with directional antenna

RF Module (used for communication with MLRemotes)

RF Module: 900MHz

Standard Range: Up to 15km (9miles)

Extended Range (with enhanced module): Up to 100km (60 miles) with directional antenna

RF Module: 2.4GHz (optional)

Range with the 2.4GHz module: Up to 3.2km (2miles)

Status LEDs

Power (green): Status of battery voltage

Charge (red): Status of charger output voltage

Activity (blue): Activity on radio link (from radio)

LAN Link (yellow): Network link status (from Wi-Fi)

LAN Active (yellow): Network activity (from Wi-Fi)

System Measurements

Internal Temperature Measurement Range: -40 to +60 C (-40 to +140 F)

Internal Temperature Measurement Accuracy: 0.5 C (1 F)

Temperature Output: Degrees C or F

Internal Humidity Measurements Range: 0-100 % RH

Internal Humidity Measurements Accuracy: +/- 4.5%

Internal Voltage Measurement (Solar Panel): 0-20 VDC

Internal Voltage Measurement (Battery Input/Output): 0-16 VDC

Internal Voltage Measurement Accuracy: +/- 0.1 VDC accuracy (over temperature range)

Memory

Size: 16GB SD Card

System Power

Battery: 12V 50Ah sealed lead-acid

Solar Panel

Output Voltage: 18VDC maximum (loaded)

Output Power: 2.25A maximum (40W)

AC Adaptor

Output Voltage: 18VDC

Output Power: 1A maximum

Physical

Operating Temperature: -40 to +60° C (-40 to +140° F)

Enclosure Size (L x W x H): 51 x 41 x 25cm (20 x 16 x 10 in)

Enclosure Tab Mounting (L x W): 54 x 25.5 cm (21.25 x 10 in)

Weight: 20 kg (44 lbs)

Models

Model	Battery	Solar	Antenna (Server)	Antenna (MLRemotes)	Transmitting
MLBase-M-50S	50Ah	40W	698-960/1710-2700MHz Omnidirectional LTE DAS	800/900MHz dBi Omnidirectional	Cellular
MLBase-W-50S	50Ah	40W	2.4GHz to 5.8GHz Wideband Directional	800/900MHz dBi Omnidirectional	Wi-Fi

1.3 Connections

Connections to the MLBase are provided at the bottom of the enclosure.



1.4 Items List

The below items are included with shipment of MLBase enclosures (shipped with the product but not installed during manufacturing). Contact Canary Systems for questions or additional details on specific accessory needs.

Accessories

Part #	Quantity	Description
380	1	12V 50Ahr lead-acid battery.
1728	1	40 Watt Solar Panel
2209	1	Bracket, Panel Arm
1996	2	U-Bolt, Clamping
3002	1	Screwdriver, slotted tip mini electronic 3.0mm tip; 50mm blade; red cap, Canary logo imprint: 1 color, white
1333	1	Connector, ethernet RJ45 male cable plug, metal, gland, olive drab bayonet coupling
1459	2	Cable, N-male to N-male, 10', 195 Series
2925	1	Wide-band Yagi antenna, 2.4GHz-5.8GHz 8dBi enclosed directional antenna with pole mount.
927	1	AC adapter, universal input, 100-240 VAC, output 18 V, 1.66 A, IEC 320 connector, comes with line cord and three pin plug
2779	1	Cable, null modem, DB9F to DB9F

Optional Accessories

Part #	Quantity	Description
1562	1	Uni-strut (13/16"X1-5/8") enclosure mounting kit, 16" (406.4mm) length with pipe clamps for 1.5" -2" pipe, hardware

900MHz (Standard/EU/AU Configurations) Accessory

Part #	Quantity	Description
1458	1	Antenna, omni, 6dbi, 100W, 824MHz - 980MHz with mounting bracket, N-female connector

Antenna (Server) Accessory Options

Part #	Quantity	Description
3235	1	Antenna, Omni directional DAS, 698-960/1710-2170 MHz 4/7 dBi with mounting bracket
3764	1	Antenna, 2.4 GHz 12dBi 180 degree sector panel antenna with mounting bracket

2. MLBase Installation

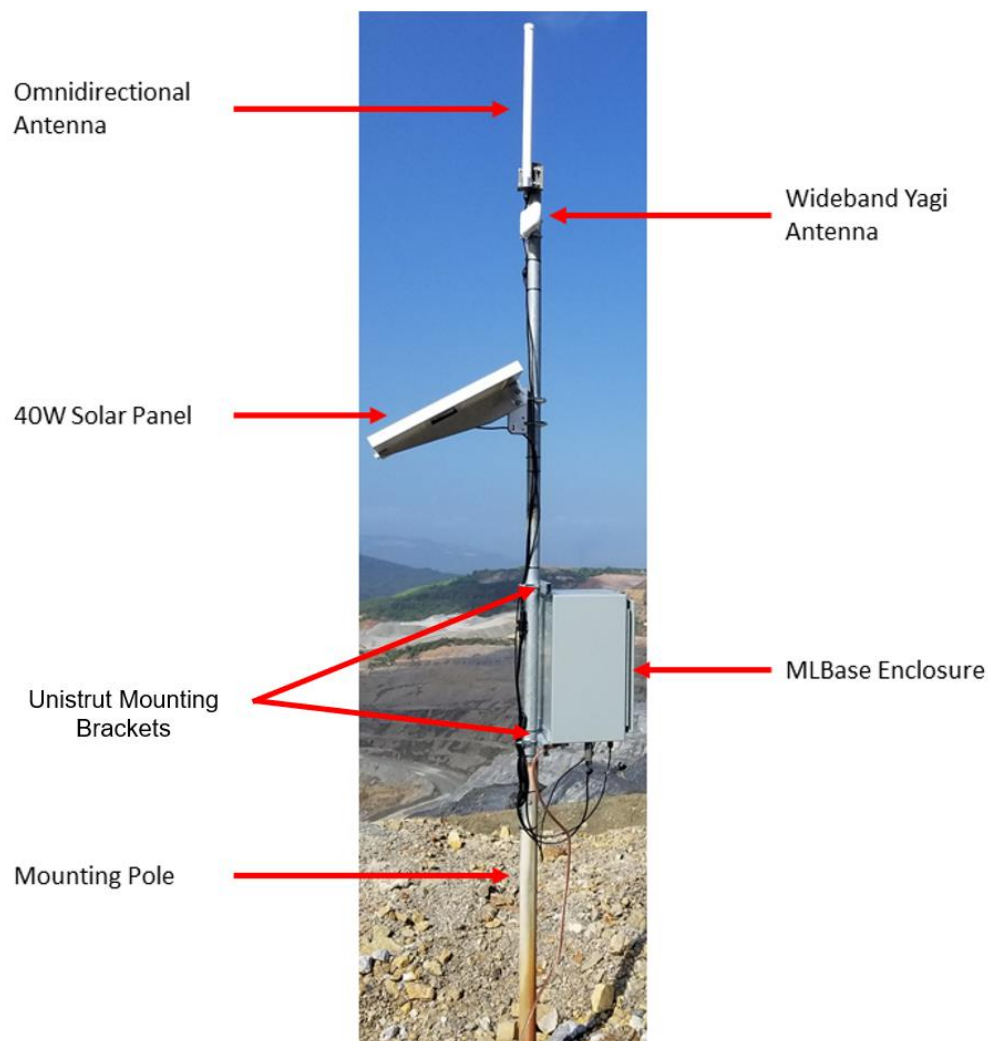
The steps required for installation include:

- **Enclosure installation** – See section 2.1
- **Solar panel installation** – See section 2.2
- **AC adaptor installation** – See section 2.3
- **Antenna installation** – See section 2.4
- **Install battery** – See section 2.5
- **SD card information** – See section 2.6

2.1 Enclosure Installation

Proper site selection and installation of the MLBase™ station is important for best radio communication results.

The enclosure can be mounted to a pole or the side of a building. Typical pole mount deployment is shown below:



Typical pole installation requires the following materials:

- 3m (10') length of schedule 80 PVC (do not use schedule 40) or galvanized steel pipe
- (2) 80lb bags of QUIKRETE® pre-mixed concrete
- (1) 5-gallon bucket
- 2m (6') copper ground stake
- 2m (6') of #10 copper ground wire and clamp

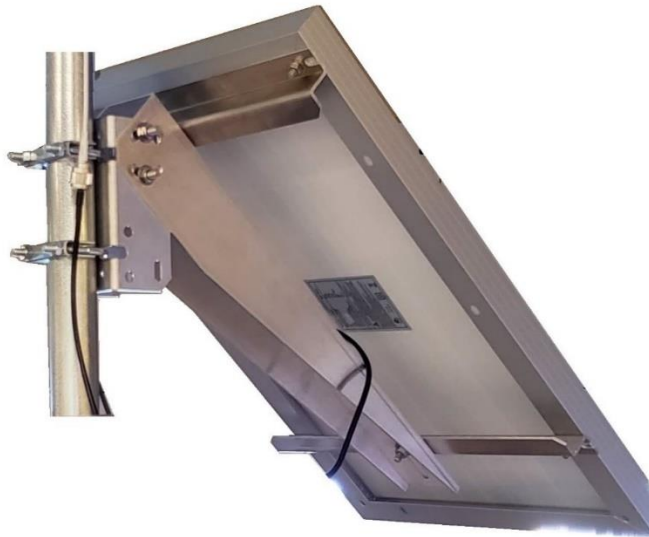
General installation steps are as follows:

1. Position the station where best southern exposure is provided for maximum solar exposure. If necessary, extend the sensor cables to get out from behind berms, high-walls or embankments.
2. Excavate to a minimum of 1.2m (4'), deeper if possible. Install the bucket, locate the pipe in the bucket and fill with mixed concrete. Follow the directions on the bag for concrete mixing. Use a level to adjust the position of the pipe before it sets. Use lumber or other suitable props to hold the pipe in position overnight. See the manufacturer's instructions for the precise curing time.
3. Drive the ground stake as close as possible to the bucket.
4. Attach the Unistrut mounting brackets to the enclosure. Be sure to install the U-bolt pipe clamps on the brackets prior to attaching to the enclosure.
5. Hold the enclosure against the pipe and affix the pipe clamp hardware to the pipe to secure the enclosure.
6. Use the copper ground wire and clamp to secure the ground wire between the ground rod and enclosure.

See the following sections on installing the solar panel, antennas, and battery.

2.2 Solar Panel Installation

See the included instruction sheet for the bracket and solar panel supplied.



The solar panel should be positioned for maximum sun exposure. In the Northern hemisphere this means aligning the panel with a southward exposure. In the Southern hemisphere, align the panel in a northward direction. Use a compass to derive the correct angle. Remember to correct compass headings for declination.

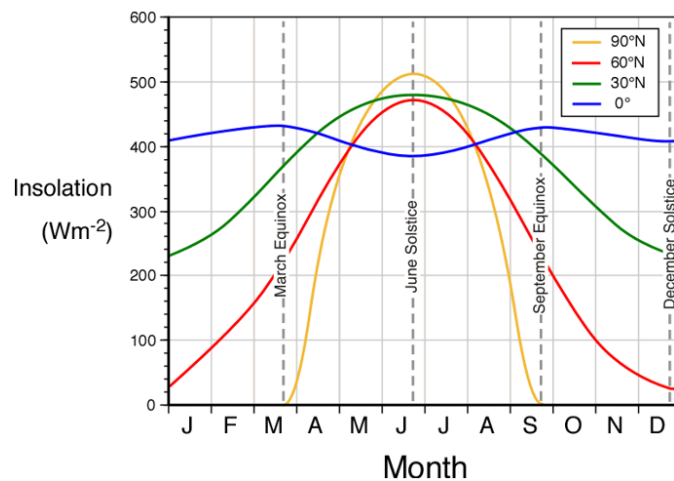
Once installed, route the supplied cable down the pole and secure with tie-wraps, where it can be plugged in to the bottom of the enclosure.



Note

The solar panel should be plugged in after the battery has been connected.

The other key criterion for solar panel installation is the tilt angle. The following chart illustrates the variability between summer and winter and latitude. *Insolation* is a measure of solar radiation energy received on a given surface and recorded during a given time.



Insolation throughout the year at differing latitudes

The chart depicts northern hemisphere solar energy, reverse the months for the southern hemisphere. As can be seen, solar energy varies considerably over the course of the year so the tilt angle should be adjusted to capture the maximum radiation during the worst month of the year. In the Northern Hemisphere this is December. In the Southern Hemisphere this is June.

Northern Hemisphere	December	Southern Hemisphere	June
70°	0°	0°	70°
60°	10°	10°	60°
50°	20°	20°	50°
40°	30°	30°	40°
30°	40°	40°	30°
20°	50°	50°	20°
10°	60°	60°	10°
0°	70°	70°	0°

Northern solar energy versus southern solar energy

2.3 AC Adaptor Installation

An AC adaptor may be used in place of the solar panel for AC powered applications.

Installation is simple. The adaptor includes a robust connector to connect to the bottom of the enclosure. Use the appropriate AC power cord for connecting to a standard AC receptacle.

2.4 Antenna Installation

The MLBase comes with connectors for two antennas.

- The 900 MHz omnidirectional antenna is used to communicate with the MLRemote network.
- The wideband 2.4 GHz Yagi antenna is used to provide a connection to the Wi-Fi network the server is on.

The MLBase module has both an integrated Radio and Wi-Fi connection. Additionally, an Ethernet cable can be used for sites where a dedicated networks are available.

This section outlines installation instructions for both antennas.

Omnidirectional Antenna

The L-com 900 MHz 6 dBi Omnidirectional Antenna includes a right-angle bracket for side of pole mounting.



The antenna kit includes cables to connect the antenna to the bottom of the MLBase enclosure. The connector on the antenna is Type-N female.

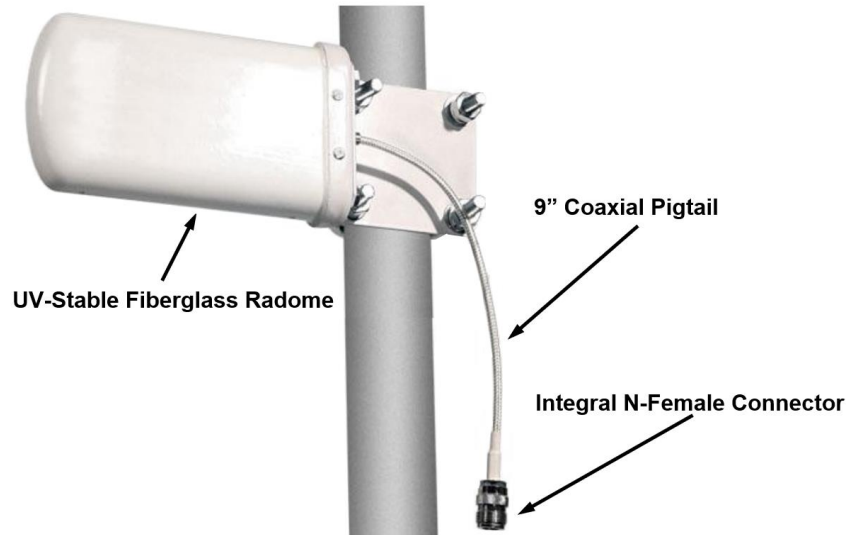
The antenna's attached mount bracket is secured to the side of pole using the included U-bolts.

Connect one end of the provided cable to the antenna and the other to the connector labeled **Antenna** on the bottom of the MLBase station. See section 1.3 *Connections* of this guide for reference.

Wideband Yagi Antenna

The Wi-Fi antenna shipped with the MLBase is the L-com Ultra-Wideband directional Antenna.

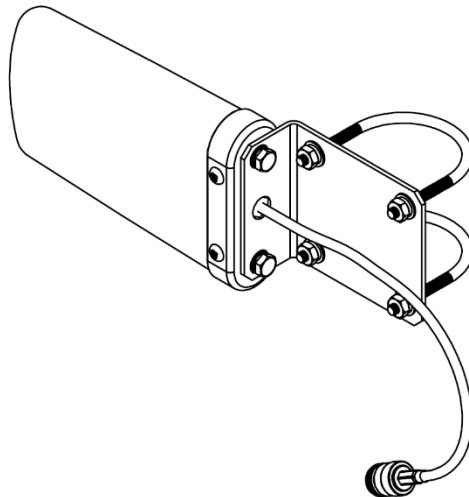
The antenna includes a right-angle bracket for side of pole mounting.



The antenna kit includes a cable to connect the antenna to the bottom MLBase enclosure. The connector on the antenna is Type-N female.

The antenna mounts to the side of pole using the included pipe clamps for 1.5" (50.8mm).

The following illustration depicts assembly of the bracket and pipe clamps.



The mounting bracket allows the antenna to adjust the angle of elevation. In most cases, horizontal orientation is best.

Connect one end of the provided cable to the antenna and the other to the connector labeled **Wi-Fi** on the bottom of the MLBase station. See section 1.3 *Connections* of this guide for reference.

2.5 Battery Installation

The battery is a 12V 50Ah sealed lead-acid battery. It is packaged separately from the MLBase enclosure.



Note

Battery installation should only be completed **after** the MLBase has been installed in its field location.

Tools Required: 3/8" socket wrench and 3/8" open-end wrench.

1. Remove the battery from the packaging, locate the terminal attachment hardware.
2. Open the MLBase enclosure and locate the bracket at the bottom of the enclosure. Move the battery terminal leads away from the back of the bracket.
3. Position the battery with the terminals facing forward and lift the battery over the bracket to be placed into the back of the panel, as shown below. Bring the terminal leads up over the battery.
4. Attach the leads using the hardware supplied. The red (positive) lead is installed on the right terminal, the black (negative) lead is installed on the left terminal. Note the battery terminal colors match the lead colors.



WARNING

Attach the red lead first to prevent short circuits.



A correctly wired battery installed in an MLBase enclosure

Once the battery terminals are installed the 3-pin solar connector can be plugged in.

2.6 SD Card Information

MLBase supports SD card storage for queuing and archiving MLRemote data, internal telemetry data, and service data, such as system event logs and firmware. New MLBase units from production are equipped with a 16GB SDHC card. MLBase modules have a SD card slot and an Eject button at the bottom side of the module's enclosure to the left of the communication ports.



Hint

For information on LED statuses and the SD card, refer to [Firmware and SD Card LED Status Lights](#) in section [1.1 Overview](#).

2.6.1 Ejecting the SD Card

If ejecting the SD card when the MLBase unit is powered on, first press the Eject button next to the card slot. Pressing the button safely closes all open files and unmounts the File System.

When the button is pressed and the File System is unmounted, the green Power LED starts fast flashing (double flash), which indicates the File System is unmounted and the card is ready to be physically removed. After the card is removed from the slot, the LED returns to its normal flashing.

2.6.2 Installing the SD Card

To install an SD card, simply insert it into the slot. MLBase starts initializing the card and mounting the File System automatically. During this process, the green Power LED starts fast flashing (double flash); this process normally takes a few seconds. Upon the File System being successfully mounted, the LED returns to its normal flashing.

2.6.3 SD Card Content

MLBase sets its serial number as the FAT volume label on the SD card.

For each MLRemote sending its data, MLBase creates a directory in the root with the MLRemote's network address as the name. Each such directory contains all data received from the corresponding MLRemote and a service file of the communication packet queue.

In addition, MLBase writes a log of system events to daily files in the LOG directory on the SD card. The format of these log files is compatible with the MLGateway log file format. For more information on SD card message logging, see [Appendix E – SD Card Message Logging](#).

3. Wi-Fi Module Configuration

The MLBase™ communicates with the server's network using an embedded Wi-Fi module. This section outlines the steps to configure the Wi-Fi module.

If the MLBase is installed in a location without an available Wi-Fi network, the MLBase still collects data using Offline mode. This data can be retrieved manually from the SD card. Contact Canary Systems® for details on retrieving and importing data from the SD card.



Note

In order for the SD card to function as intended, the current firmware must be installed. Contact Canary Systems to confirm firmware version or prepare upgrade.

3.1 Overview

There are two primary ways to configure the Wi-Fi module for use with the MLBase:

- Serial connection with the supplied 9-pin to 9-pin Null-Modem serial cable
- Wireless network connection using the integrated Wi-Fi adaptor

Serial connection is the recommended method, as the networking connections, either via Ethernet or Wi-Fi adaptor, are pre-configured at the factory for testing and may not function properly on local networks.

This section outlines serial connection configuration. See *Appendix A - Wi-Fi Module Connection Via Browser* for details pertaining to configuration with a wireless network connection.



Hint

For other communication configuration options, contact Canary Systems.

3.2 Connecting the Wi-Fi Module

1. Using the Null-Modem Cable, connect the module's CONFIG RS-232 port to a computer.



Hint

A Null-Modem to USB converter may be required depending on the computers available ports.

2. Open PuTTY on the computer being used to program the MLBase Unit.



Hint

The latest version of PuTTY can be downloaded from putty.org/.

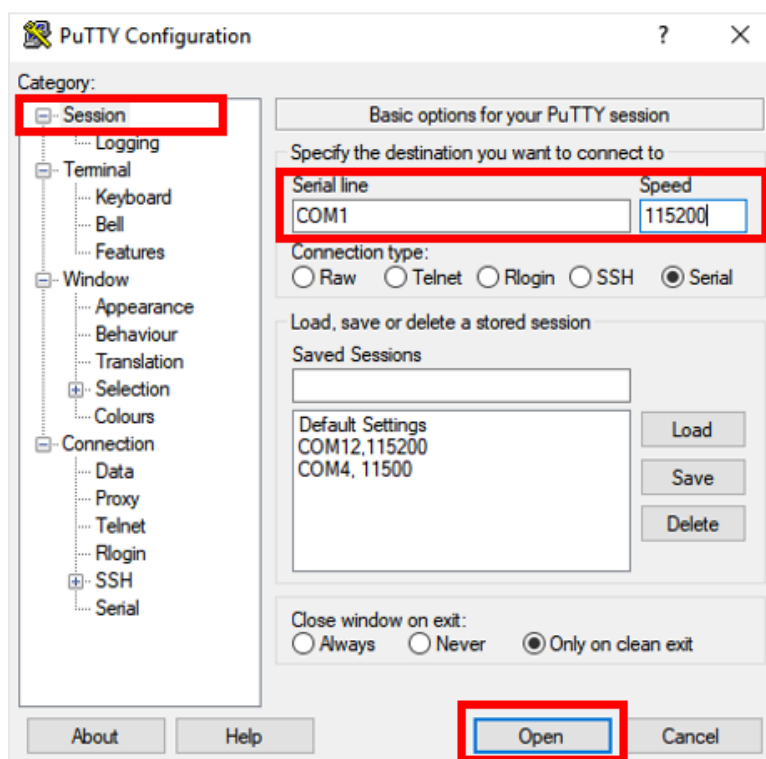
3. Update the PuTTY Configuration as follows:

- a) Set the Serial line to the correct COM port (This can be found using Device Manager)
- b) Set the Baud Rate (Speed) to 115200



Note

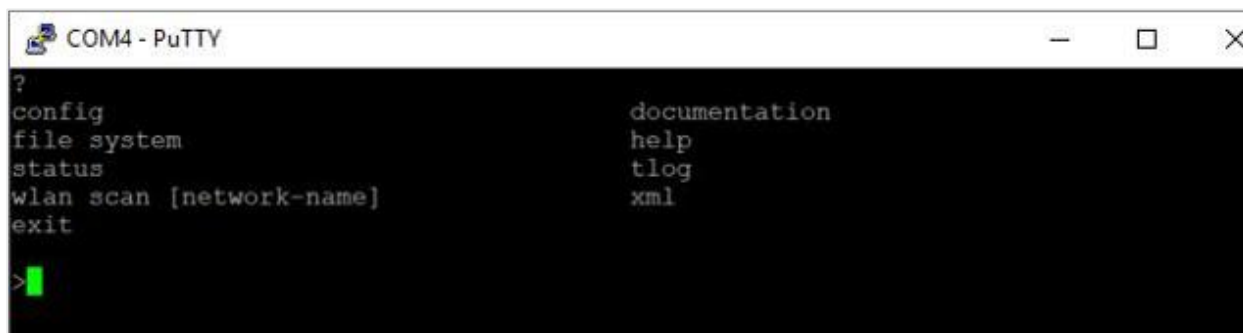
If Wi-Fi module factory defaults are applied, it is important to note that the default baud rate will have changed to 9600.



Note

Make sure the MLBase is powered on before continuing to the next step.

4. Click **Open** to connect to the Wi-Fi module.
5. In the Command terminal that opens, type "?" to display a list of possible Wi-Fi module commands.



Once the connection is established continue to *3.3 Configuring the Wi-Fi Module*.

3.3 Configuring the Wi-Fi Module

Once connected using PuTTY, the most efficient way to configure the device is by updating the pre-configured XML script in this section. Once the outlined updates have been made the XML can be copying and pasting it into the command terminal.

Alternatively, if you are unable to access the pre-configured XML, manually entering CLI commands is also an option. This can be a time-consuming task and requires accuracy.

Both options are outlined in this section.

XML Programming

The highlighted portions of the XML indicate network settings that need to be updated prior to copying the XML.

After updating the highlighted items within the script, copy the entire XML (on this page and the following three) and paste the copied text into the PuTTY command terminal.



Note

If XML is copied across multiple pages from this document, the page headers and footers will also be copied. These should be removed when pasted into the command terminal.

```
<?xml version="1.0" standalone="yes"?>
<!-- Automatically generated XML -->
<!DOCTYPE configrecord [
  <!ELEMENT configrecord (configgroup+)>
  <!ELEMENT configgroup (configitem+)>
  <!ELEMENT configitem (value+)>
  <!ELEMENT value (#PCDATA)>
  <!-- ATTLIST configrecord version CDATA #IMPLIED -->
  <!-- ATTLIST configgroup name CDATA #IMPLIED -->
  <!-- ATTLIST configgroup instance CDATA #IMPLIED -->
  <!-- ATTLIST configitem name CDATA #IMPLIED -->
  <!-- ATTLIST configitem instance CDATA #IMPLIED -->
]
```

```
<!ATTLIST value name CDATA #IMPLIED>
]>
<configrecord version = "0.1.0.1">
  <configgroup name = "Interface" instance = "ap0">
    <configitem name = "State">
      <value>Disabled</value>
    </configitem>
    <configitem name = "IP Address">
      <value>192.168.0.1/24</value>
    </configitem>
    <configitem name = "MSS">
      <value>1460 bytes</value>
    </configitem>
    <configitem name = "DHCP IP Address Range">
      <value name = "Start">&lt;Minimum&gt;</value>
      <value name = "End">&lt;Maximum&gt;</value>
    </configitem>
  </configgroup>
  <configgroup name = "Interface" instance = "eth0">
    <configitem name = "State">
      <value>Enabled</value>
    </configitem>
    <configitem name = "DHCP Client">
      <value>Disabled</value>
    </configitem>
    <configitem name = "IP Address">
      <value>192.168.0.203/24</value>
    </configitem>
    <configitem name = "Default Gateway">
      <value>192.168.0.1</value>
    </configitem>
    <configitem name = "Hostname">
      <value></value>
    </configitem>
    <configitem name = "Priority">
      <value>1</value>
    </configitem>
    <configitem name = "Primary DNS">
      <value>192.168.0.1</value>
    </configitem>
    <configitem name = "Secondary DNS">
      <value>&lt;None&gt;</value>
    </configitem>
    <configitem name = "MSS">
      <value>1460 bytes</value>
    </configitem>
  </configgroup>
  <configgroup name = "Interface" instance = "wlan0">
    <configitem name = "State">
      <value>Enabled</value>
    </configitem>
    <configitem name = "DHCP Client">
      <value>Disabled</value>
    </configitem>
    <configitem name = "IP Address">
      <value>192.168.0.201/24</value>
    </configitem>
    <configitem name = "Default Gateway">
      <value>192.168.0.1</value>
    </configitem>
  </configgroup>
</configrecord>
```

```
</configitem>
<configitem name = "Hostname">
  <value></value>
</configitem>
<configitem name = "Priority">
  <value>2</value>
</configitem>
<configitem name = "Primary DNS">
  <value>192.168.0.1</value>
</configitem>
<configitem name = "Secondary DNS">
  <value>&lt;None&gt;</value>
</configitem>
<configitem name = "MSS">
  <value>1460 bytes</value>
</configitem>
</configgroup>
<configgroup name = "CPM">
  <configitem name = "Role" instance = "USB Host Overcurrent">
    <value name = "CP">1</value>
    <value name = "State">Enabled</value>
  </configitem>
  <configitem name = "Role" instance = "WLAN Active">
    <value name = "CP">9</value>
    <value name = "State">Enabled</value>
  </configitem>
</configgroup>
<configgroup name = "Line" instance = "1">
  <configitem name = "Protocol">
    <value>Tunnel</value>
  </configitem>
  <configitem name = "Baud Rate">
    <value>460800 bits per second</value>
  </configitem>
  <configitem name = "Threshold">
    <value>513 bytes</value>
  </configitem>
</configgroup>
<configgroup name = "Line" instance = "HOST_CDC_ACM">
  <configitem name = "Name">
    <value></value>
  </configitem>
  <configitem name = "State">
    <value>Enabled</value>
  </configitem>
  <configitem name = "Protocol">
    <value>Command Line</value>
  </configitem>
  <configitem name = "Gap Timer">
    <value>&lt;Four Character Periods&gt;</value>
  </configitem>
  <configitem name = "Threshold">
    <value>56 bytes</value>
  </configitem>
  <configitem name = "Push">
    <value></value>
  </configitem>
</configgroup>
<configgroup name = "WLAN Profile" instance = "YOUR_NETWORK_NAME">
  <configitem name = "Basic">
```

```
<value name = "Network Name">YOUR_NETWORK_NAME</value>
<value name = "State">Enabled</value>
</configitem>
<configitem name = "Security">
  <value name = "Suite">WPA2</value>
  <value name = "WEP Key Size">40</value>
  <value name = "WEP TX Key Index">1</value>
  <value name = "WEP Key 1 Key"></value>
  <value name = "WEP Key 2 Key"></value>
  <value name = "WEP Key 3 Key"></value>
  <value name = "WEP Key 4 Key"></value>
  <value name = "WPAX Authentication">PSK</value>
  <value name = "WPAX Key Type">Passphrase</value>
  <value name = "WPAX Passphrase">YOUR_PASSWORD</value>
  <value name = "WPAX Key"></value>
  <value name = "WPAX IEEE 8021X">PEAP</value>
  <value name = "WPAX Username"></value>
  <value name = "WPAX Password"></value>
  <value name = "WPAX Credentials"></value>
  <value name = "WPAX EAP-TTLS Option">EAP-MSCHAPV2</value>
  <value name = "WPAX PEAP ver">0</value>
  <value name = "WPAX PEAP Option">EAP-MSCHAPV2</value>
  <value name = "WPAX PEAP Credentials"></value>
  <value name = "WPAX FAST Option">MD5</value>
  <value name = "WPAX Encryption">CCMP, TKIP</value>
</configitem>
<configitem name = "Advanced">
  <value name = "TX Power Maximum">17 dBm</value>
  <value name = "Power Management">Disabled</value>
  <value name = "PM Interval">1 beacons (100 ms each)</value>
</configitem>
</configgroup>
<configgroup name = "Tunnel Accept" instance = "1">
  <configitem name = "Mode">
    <value>Always</value>
  </configitem>
  <configitem name = "Local Port">
    <value>10002</value>
  </configitem>
</configgroup>
<configgroup name = "Tunnel Line" instance = "1">
  <configitem name = "DTR">
    <value>Continuously asserted</value>
  </configitem>
</configgroup>
<configgroup name = "Tunnel Connect" instance = "1">
  <configitem name = "Mode">
    <value>Always</value>
  </configitem>
  <configitem name = "Local Port">
    <value>10002</value>
  </configitem>
</configgroup>
<configgroup name = "USB Host">
  <configitem name = "State">
    <value>Enabled</value>
  </configitem>
</configgroup>
</configrecord>
```

CLI Configuration

This section outlines how to program the Wi-Fi module using CLI commands.

Enable your terminal window and press **<ENTER>**. The following prompt should display:

```
Command Line started.
```

```
>
```

If the prompt does not display, check the serial port settings, connection, COM setting, and cabling.

1. Configure Wi-Fi

```
>config
```

```
config>wlan profile CanaryExample
```

```
CONFIRM: Create a new instance named "CanaryExample"?
```

```
(okay/cancel)okay
```

```
Created WLAN Profile Instance CanaryExample.
```

```
WARNING: Change will not persist after reboot unless you "write".
```

```
config WLAN Profile CanaryExample>basic
```

```
config WLAN Profile CanaryExample Basic>network name CanaryExample
```

```
Changed WLAN Profile CanaryExample Basic Network Name to "CanaryExample".
```

```
WARNING: Change will not persist after reboot unless you "write".
```

```
WARNING: Change will not take effect unless you "wlan apply" or "write".
```

```
config WLAN Profile CanaryExample Basic>state enabled
```

```
WARNING: Change will not take effect unless you "wlan apply" or "write".
```

```
config WLAN Profile CanaryExample Basic>exit
```

```
config WLAN Profile CanaryExample>security
```

```
config WLAN Profile CanaryExample Security>suite wpa2
```

```
Changed WLAN Profile CanaryExample Security Suite to "WPA2".
```

```
WARNING: Change will not persist after reboot unless you "write".
```

```
WARNING: Passphrase must be between 8 and 63 characters long.
```

```
WARNING: Change will not take effect unless you "wlan apply" or "write".
```

```
config WLAN Profile CanaryExample Security>wpax
```

Your Access
Point Name

Your Security
Suite

Your Key Type

```
config WLAN Profile CanaryExample Security WPAX>key type passphrase
```

WARNING: Passphrase must be between 8 and 63 characters long.

WARNING: Change will not take effect unless you "wlan apply" or "write".

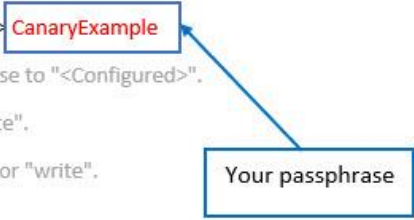
```
config WLAN Profile CanaryExample Security WPAX>passphrase
```

```
config WLAN Profile CanaryExample Security WPAX passphrase> CanaryExample
```

Changed WLAN Profile CanaryExample Security WPAX Passphrase to "<Configured>".

WARNING: Change will not persist after reboot unless you "write".

WARNING: Change will not take effect unless you "wlan apply" or "write".



Your passphrase

```
config WLAN Profile CanaryExample Security WPAX>write
```

WLAN changes were applied.

```
config WLAN Profile CanaryExample Security WPAX>exit
```

```
config WLAN Profile CanaryExample Security>exit
```

```
config WLAN Profile CanaryExample>exit
```

```
config>line 1
```

```
config Line 1>threshold 513
```

WARNING: Flow control is required for XML import/export and file upload through Command Line.

```
config Line 1>write
```

```
config Line 1>exit
```

2. Cycle power on the MLBase module. The LAN Link light should start flashing.

If the LAN does NOT start flashing, either the SSID or passphrase were entered incorrectly, OR there is another WLAN profile which is active. Other WLAN profiles should be deleted. To discover the names of WLAN profiles which require deleting use the WLAN connect command:

```
>config
```

```
config>wlan connect [network-name]
```

Your AP Name

```
config>exit
```

3. Configure IP:

```
>config
```

```
config>interface wlan0
```

```
config Interface wlan0>state enabled
```

Changed Interface wlan0 State to "Enabled".

WARNING: Change in Interface settings require "write" and reboot before they take effect.

```
config Interface wlan0>dhcp Client disabled
```

WARNING: Change in Interface settings require "write" and reboot before they take effect.

```
config Interface wlan0>ip address 172.25.10.69/24
```

Changed Interface wlan0 IP Address to "172.25.10.69/24".

WARNING: Change in Interface settings require "write" and reboot before they take effect.

```
config Interface wlan0>default gateway 172.25.10.1
```

Changed Interface wlan0 Default Gateway to "172.25.10.1".

WARNING: Change in Interface settings require "write" and reboot before they take effect.

```
config Interface wlan0>write
```

WLAN changes were applied.

```
config Interface wlan0>exit
```

```
config>exit
```

Common CLI Commands

To check any setting:

- <command><space><tab>

Show options for current level:

- ?

Check wireless status:

- config
- interface wlan0
- show

Check network status:

- status
- wlan
- show

Check available networks:

- wlan scan (from base menu)

Security Suite Options:

- None
- WEIP
- WPA
- WPA2

Key Type Options:

- WPAX

4. MLWebHardware Configuration

Data collected by an MLRemote is transmitted to an MLBase via embedded wireless module.



Note

The standard MLBase includes an integrated 900MHz radio module, however, for regions where different frequencies are required, alternative modules are available.

The MLBase in turn sends the data to MLGateway over a wireless network or through wired network connection to be imported. MLWebHardware is used to configure how the data is imported.

In addition to the following subsections, consultation of the **MLWebHardware User's Guide** and **MLRemote User's Guide** may be required for successful full deployment of MLBase with MLRemotes. Refer to the following sections for specific details:

- **MLBase configuration** – See Section 4.1
- **MLRemote configuration and programming** – See *Section 3.1 Device Configuration* and *Section 3.2 Program Configuration* of the **MLRemote Users Guide**
- **Verifying and updating the program** – See *Section 3.3 Verify Program* and *3.4 Update Logger* of the **MLRemote Users Guide**
- **Data collection configuration** – See Section 4.2



Note

This section outlines the process for configuring an MLBase with one or more MLRemotes on a single network.

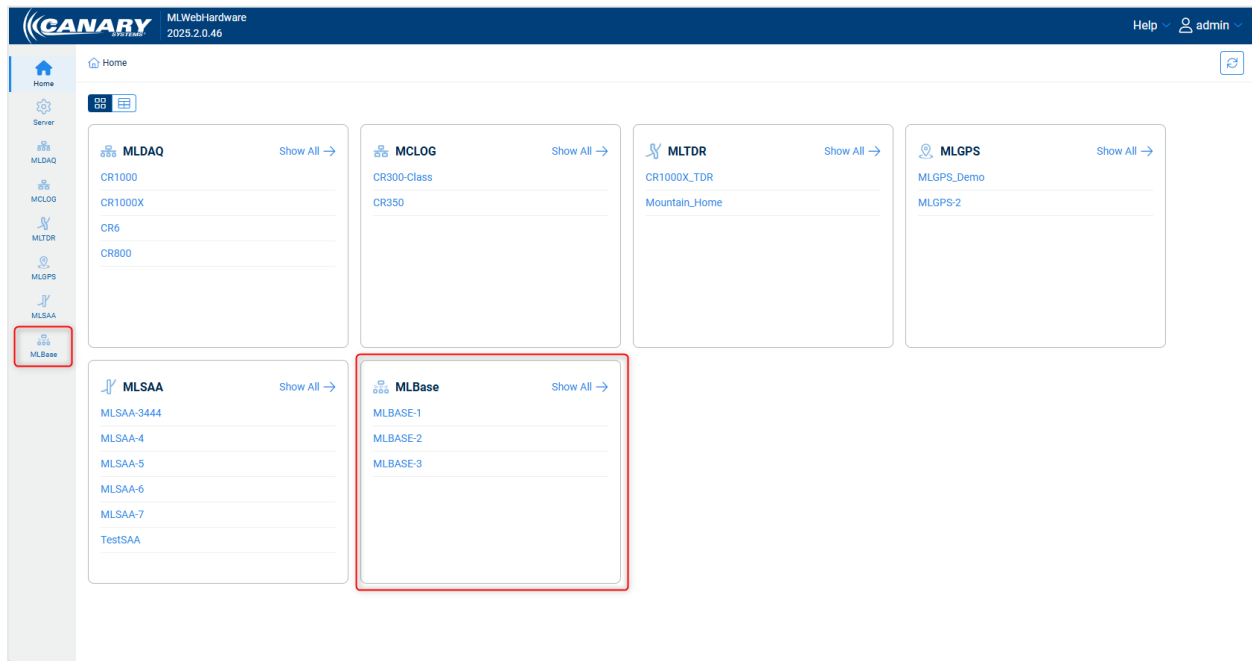
MLSuite must be installed on the server prior to configuration. See the latest version of the **MLSuite Installation Guide** for details on installing MLSuite.

4.1 MLWebHardware Configuration

A single MLBase is configured to communicate with one or more MLRemotes.

From the server, or using a remote connection to the server, log into MLWebHardware to configure the MLBase and any MLRemotes on its network. For additional information on logging into and navigating MLWebHardware, see the **MLWebHardware Users Guide**.

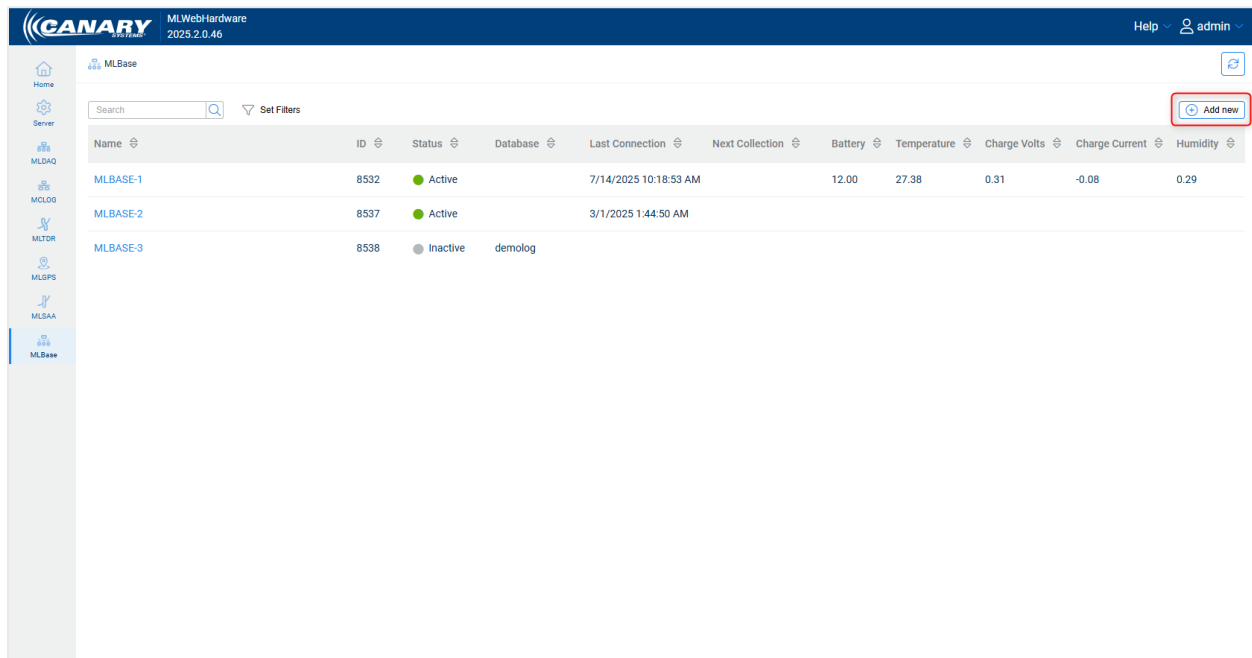
From the Home panel, click on the MLBase button of the MLWebHardware menu bar, or the MLBase card, to open the MLBase panel.



The screenshot shows the MLWebHardware dashboard with a sidebar on the left containing navigation links: Home, Server, MLDAQ, MCLOG, MLTDR, MLGPS, MLSAA, and MLBase (highlighted with a red box). The main content area displays several device category panels, each with a 'Show All' link. The MLBase panel is also highlighted with a red box and contains the following items:

- MLBase-1
- MLBase-2
- MLBase-3

From the MLBase panel, either select an item from the MLBase table to edit that item or click the **Add new** button to open the Device Configuration form for a new device.



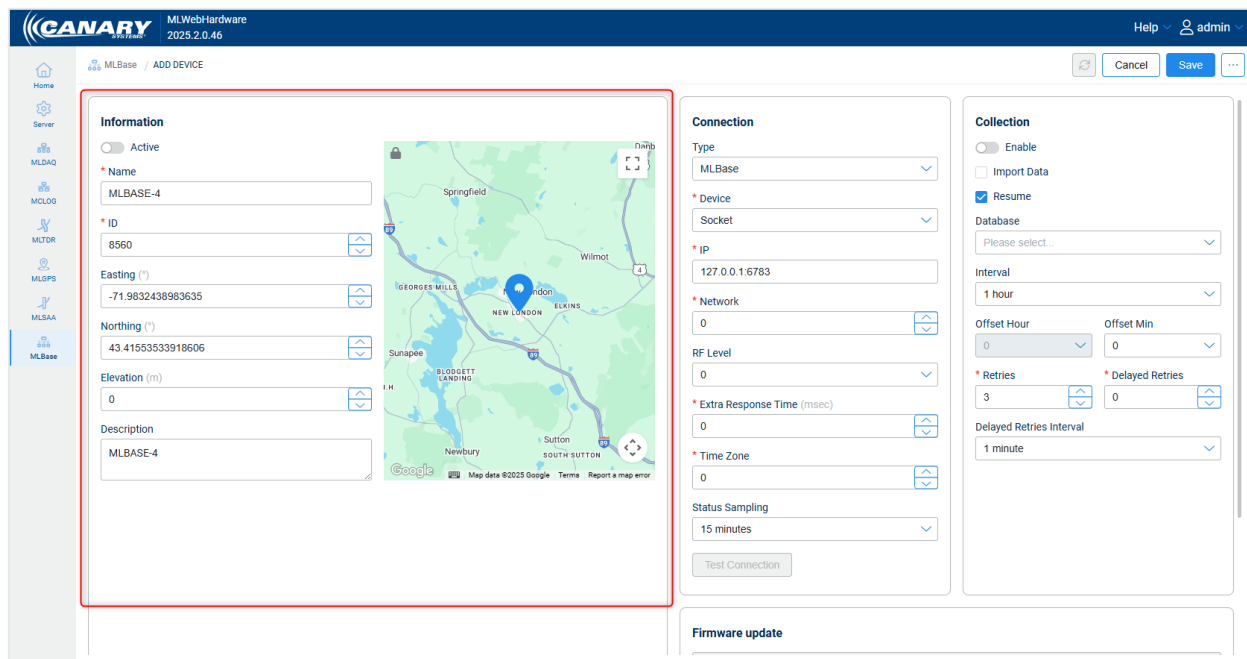
The screenshot shows the MLBase table in the MLWebHardware dashboard. The table has the following columns: Name, ID, Status, Database, Last Connection, Next Collection, Battery, Temperature, Charge Volts, Charge Current, and Humidity. The table contains three rows of data. The 'Add new' button is highlighted with a red box.

Name	ID	Status	Database	Last Connection	Next Collection	Battery	Temperature	Charge Volts	Charge Current	Humidity
MLBASE-1	8532	Active		7/14/2025 10:18:53 AM		12.00	27.38	0.31	-0.08	0.29
MLBASE-2	8537	Active		3/1/2025 1:44:50 AM						
MLBASE-3	8538	Inactive	demolog							

4.1.1 Information

Enter the details for the device into the **Information** card of the MLBase Device Configuration form.

- Name the MLBase something meaningful to help distinguish it from other MLBase devices configured on the server.
- Click the Save button to save the device configuration in MLWebHardware.



For more information about the details configured on the Information card refer to section 4.2 *Device Configuration* of the **MLWebHardware Users Guide**.

4.1.2 Physical MLBase Connection Configuration

The following steps outline how to configure a physical MLBase using a socket connection. This is the typical operating mode.

1. From the Type drop-down on the Connection card, select "MLBase."
2. From the Device drop-down list, select "Socket."
3. Enter the IP address and port assigned to the MLBase. Separated the IP address and port using a colon, for example: 127.25.10.24:10002



Hint

The default port for MLBase-M-50S models shipped by Canary Systems is 10001. For MLBase-W-50S models it is 10002.

4. Determine the radio Network ID:
 - a) Make sure the MLBase is inactive; the Active box on the Information card should be unchecked.

- b) Click Test Connection to retrieve the Network ID and RF Level of the radio.



Note

If for any reason the radio Network ID or RF Level need to be updated, this can be done from the Connection card. See *Appendix B – Updating the MLBase Radio Network ID* for steps to update the radio Network and RF Level.

5. Specify any additional time in milliseconds that should be allowed for receiving responses through the Socket, if needed. A value of 500 (0.5 seconds) or higher may be required to allow for these latencies.
6. Set the Time Zone offset, if needed. Enter a positive or negative value to reflect the difference between the MLRemote clock Server clock.



Hint

The clock on the device reflects the time of the server where the program was configured and pushed from.

7. Set the Status Sampling rate. This configures the rate at which the MLBase takes readings of important telemetry data such as battery and charger status, temperature, or humidity. This setting may also be disabled.

Connection
Type

MLBase

* Device

Socket

* IP

127.0.0.1:6763

* Network

0

RF Level

2

* Extra Response Time (msec)

0

* Time Zone

0

Status Sampling

15 minutes

Test Connection

8. After configuring the connection details, make sure the Device Configuration is set to inactive, and **Save**.



WARNING

Saving an Active MLBase Device Configuration updates the radio Network ID and RF Level to what has been set on the Connection card. If changes are needed, refer to *Appendix B – Updating the MLBase Radio Network ID*.

9. Navigate to the MLRemotes tab to begin adding MLRemote devices to the MLBase network.

For instructions on configuring MLRemote units in MLWebHardware, refer to the latest version of the **MLRemote User's Guide**.

4.1.3 Virtual Base Connection Configuration

The configuration of a virtual base is similar to a physical MLBase. For a virtual configuration, it is assumed that the server has a serial connection to a base radio or a device server with serial connection to a radio.

1. From the Type drop-down, selected "Virtual."
2. Follow steps 2 through 9 outlined in section 4.1.2 *Physical MLBase Connection Configuration* (step 7 may be disregarded for virtual configurations).

Connection
Type
Virtual
* Device
Socket
* IP
127.0.0.1:6763
* Network
0
RF Level
2
* Extra Response Time (msec)
0
* Time Zone
0
Status Sampling
15 minutes
Test Connection

For instructions on configuring MLRemote units in MLWebHardware, refer to the latest version of the **MLRemote User's Guide**.

4.2 Collection Configuration

Once the MLRemote devices have been configured, data collection for the MLBase can be configured from Collection card.

1. Enable collection to begin collecting data (collection begins at first set interval after saving configuration).
2. Check Import Data to begin importing data into the specified MLWeb database (importing begins at first set interval after saving configuration).
3. Check Resume to resume collection after a failed attempt.
4. Select the MLWeb Database name from the drop-down.
5. Specify the collection Interval and Offsets. These determine the frequency and time in which data is imported into MLWeb. See the **MLWeb Users Guide** for information on data configuration in MLWeb.
6. Click the Save button in the top right corner of the Device Configuration workspace to save the MLBase configuration.

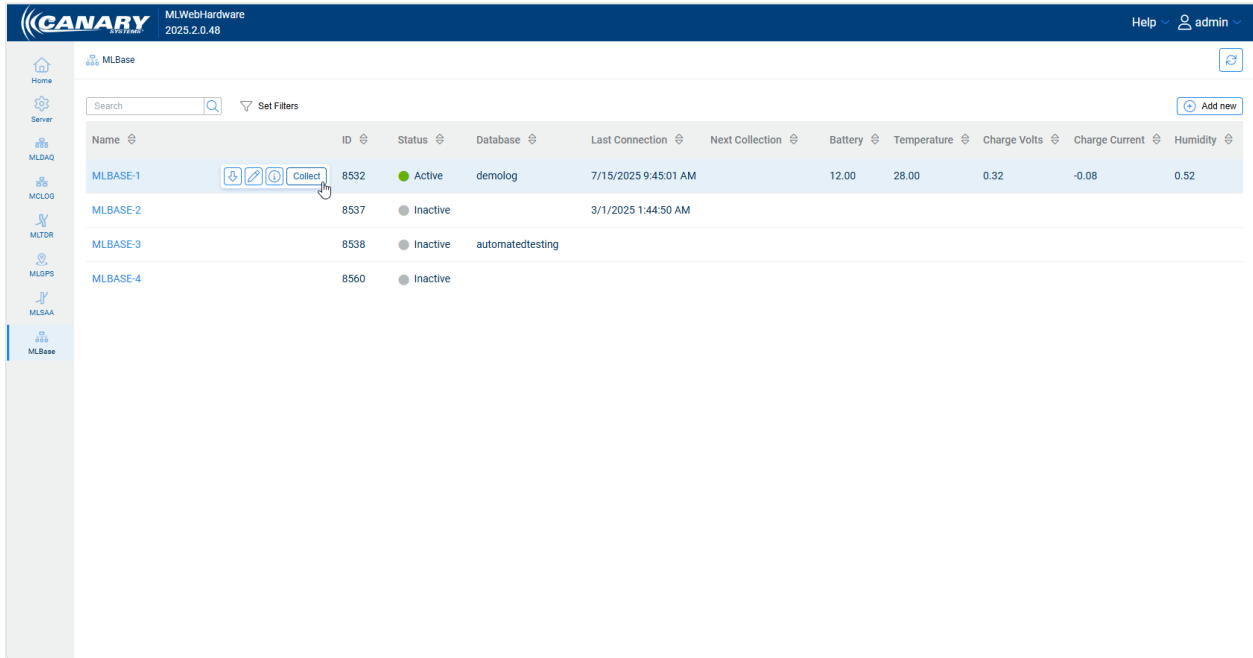
Collection
☒ Enable
☒ Import Data
☒ Resume
* Database
demolog
Interval
4 hours
Offset Hour
0
Offset Min
5
* Retries
3
* Delayed Retries
0
Delayed Retries Interval
1 minute

For more details on the collection configuration, see section 4.7 *Collection Configuration* of the **MLWebHardware Users Guide**.

4.3 Station Status

A configured MLBase is displayed in the MLBase table. From here, users can view key device information including status, database details, collection timing, and device conditions.

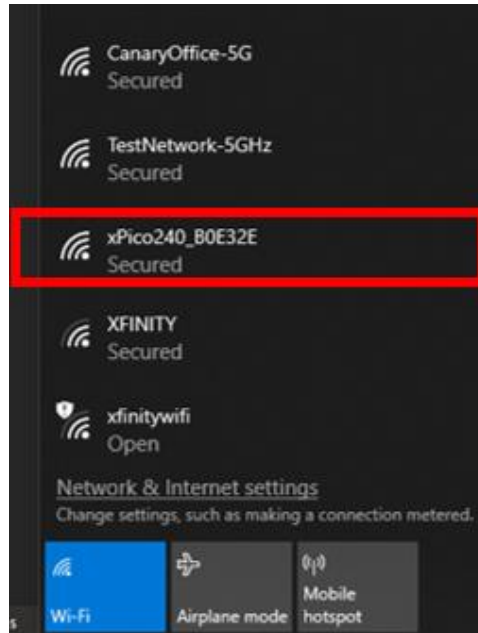
Manual collections can be initiated from this location by clicking the **Collect** button of the hover submenu that appears when hovering over an item in the table.



Name	ID	Status	Database	Last Connection	Next Collection	Battery	Temperature	Charge Volts	Charge Current	Humidity
MLBASE-1	8532	Active	demolog	7/15/2025 9:45:01 AM		12.00	28.00	0.32	-0.08	0.52
MLBASE-2	8537	Inactive		3/1/2025 1:44:50 AM						
MLBASE-3	8538	Inactive	automatedtesting							
MLBASE-4	8560	Inactive								

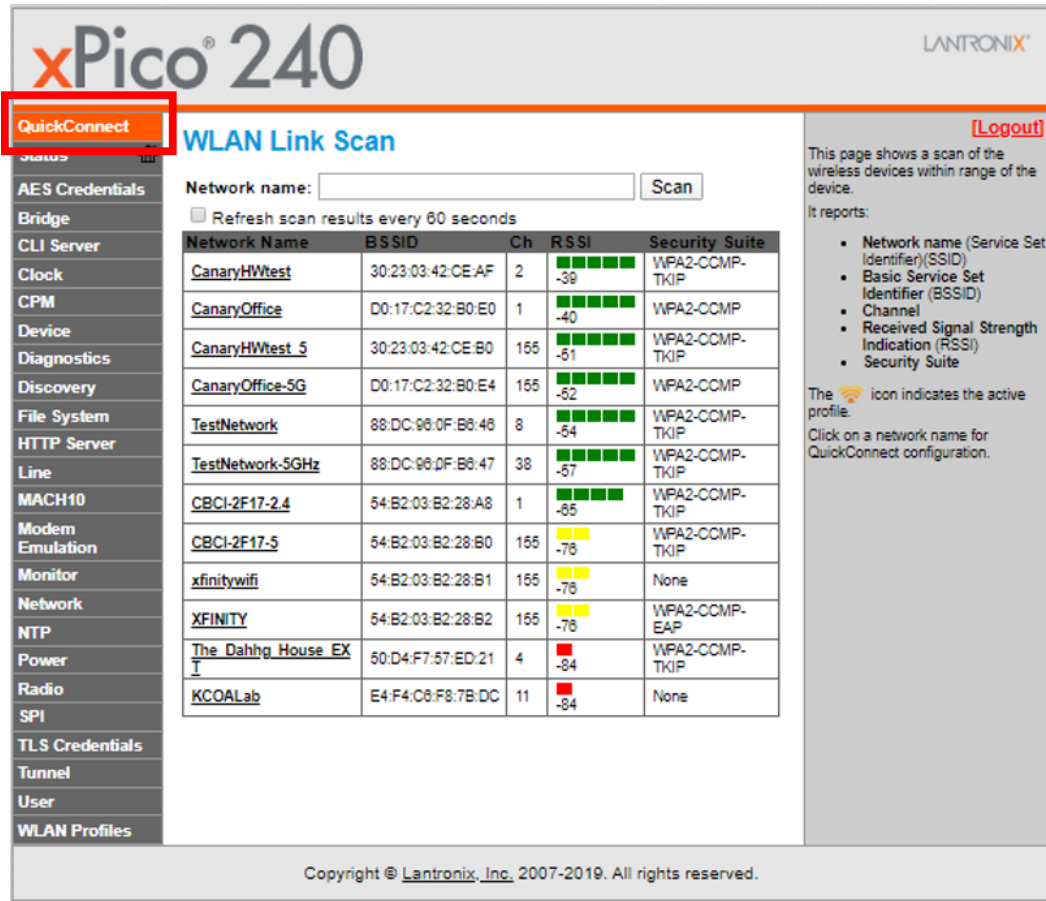
Appendix A – Wi-Fi Module Connection Via Browser

Connection over a web browser requires the user to connect to the Wi-Fi adaptor through their Wi-Fi settings. The values after the “_” in the module’s name represent the last six values of the device's serial number.



1. To access the Web Manager, open a standard web browser. Lantronix supports the latest version of Internet Explorer, Mozilla Firefox, Safari, and Chrome.
 - a) Enter the IP address or hostname of the Wi-Fi module in the address bar. The IP address may have been assigned manually or automatically by Dynamic Host Configuration Protocol (DHCP). The default IP address of the Wi-Fi module server is 192.168.0.1.
 - b) Enter the username and password. The factory-default username is “admin” and the password is “PASSWORD” (all capitalized). The Status web page displays product information, network settings, line settings, and tunneling settings.

2. Once connecting using the browser interface, click QuickConnect at the top left of the window to display a list of all networks visible to the Wi-Fi module.



xPico 240 LANTRONIX®

QuickConnect **WLAN Link Scan** [\[Logout\]](#)

Network name:

☐ Refresh scan results every 60 seconds

Network Name	BSSID	Ch	RSSI	Security Suite
<u>CanaryHWtest</u>	30:23:03:42:CE:AF	2	-39	WPA2-COMP-TKIP
<u>CanaryOffice</u>	D0:17:C2:32:B0:E0	1	-40	WPA2-COMP
<u>CanaryHWtest_5</u>	30:23:03:42:CE:B0	155	-51	WPA2-COMP-TKIP
<u>CanaryOffice-5G</u>	D0:17:C2:32:B0:E4	155	-52	WPA2-COMP
<u>TestNetwork</u>	88:DC:96:0F:B6:46	8	-54	WPA2-COMP-TKIP
<u>TestNetwork-5GHz</u>	88:DC:96:0F:B6:47	38	-57	WPA2-COMP-TKIP
<u>CBCI-2F17-2.4</u>	54:B2:03:B2:28:A8	1	-65	WPA2-COMP-TKIP
<u>CBCI-2F17-5</u>	54:B2:03:B2:28:B0	155	-76	WPA2-COMP-TKIP
<u>xfinitywifi</u>	54:B2:03:B2:28:B1	155	-76	None
<u>XFINITY</u>	54:B2:03:B2:28:B2	155	-76	WPA2-COMP-EAP
<u>The Dahlg House EX</u>	50:D4:F7:57:ED:21	4	-84	WPA2-COMP-TKIP
<u>KCOALab</u>	E4:F4:C6:F8:7B:DC	11	-84	None

This page shows a scan of the wireless devices within range of the device.

It reports:

- Network name (Service Set Identifier)(SSID)
- Basic Service Set Identifier (BSSID)
- Channel
- Received Signal Strength Indication (RSSI)
- Security Suite

The  icon indicates the active profile.

Click on a network name for QuickConnect configuration.

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3. From the list provided, select the designated network to open its WLAN profile.
4. Enter the correct WPA password and click Apply.

IT departments on site will provide:

- Desired Network IP address for assignment
- Network Default Gateway
- WPA Passphrase

5. Click Yes on the message box that opens after clicking Apply to continue.



xPico[®] 240 LANTRONIX[®]

QuickConnect

Status 

AES Credentials

Bridge

CLI Server

Clock

CPM

Device

Diagnostics

Discovery

File System

HTTP Server

Line

MACH10

Modem Emulation

Monitor

Network

NTP

Power

Radio

SPI

TLS Credentials

Tunnel

User

WLAN Profiles

WLAN Profile "CanaryOffice"

Connect To	
Network Name (SSID):	CanaryOffice
BSSID:	D0:17:C2:32:B0:E0
Security Suite:	WPA2-CCMP
Signal Strength:	-64

Security	
WPAx IEEE 80211r:	☐ Enabled ☒ Disabled
Key Type:	☒ Passphrase ☐ Hex
Password:	*****

Advanced

[\[Logout\]](#)

Use the **Apply** button to try out settings on the WLAN without saving them to Flash. If the settings do not work, when you reboot the device, it will still have the original settings.

Use the **Submit** button to update the WLAN settings and save them to Flash.

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6. Review the additional network settings and make any necessary updates. When everything is correctly configured for the desired network, click Submit.



WARNING

After submitting your results, it is important to NOT reboot the device or the connection will be lost.

xPico[®] 240



QuickConnect

- Status
- AES Credentials
- Bridge
- CLI Server
- Clock
- CPM
- Device
- Diagnostics
- Discovery
- File System
- HTTP Server
- Line
- MACH10
- Modem Emulation
- Monitor
- Network
- NTP
- Power
- Radio
- SPI
- TLS Credentials
- Tunnel
- User
- WLAN Profiles

WLAN Profile "CanaryOffice"

Changed WLAN Profile New_Profile Instance to "CanaryOffice".
 Changed WLAN Profile New_Profile Basic Network Name to "CanaryOffice".
 Changed WLAN Profile New_Profile Security Suite to "WPA2".
 Changed WLAN Profile New_Profile Security WPAx Passphrase to "<Configured>".
 Changed WLAN Profile New_Profile Security WPAx Encryption to "CCMP".
 The changes have been successfully applied.
WARNING: The changes will not persist after reboot unless you submit.

Basic	
Network Name (SSID):	CanaryOffice
State:	☒ Enabled ☐ Disabled
Security	
Suite:	WPA2 ▼
WPAx IEEE 80211r:	☐ Enabled ☒ Disabled
Authentication:	PSK ▼
Key Type:	☒ Passphrase ☐ Hex
Password:	*****
Encryption:	☒ CCMP ☐ TKIP
Advanced	
TX Power Maximum:	17 dBm
Power Management:	☐ Enabled ☒ Disabled
Submit	

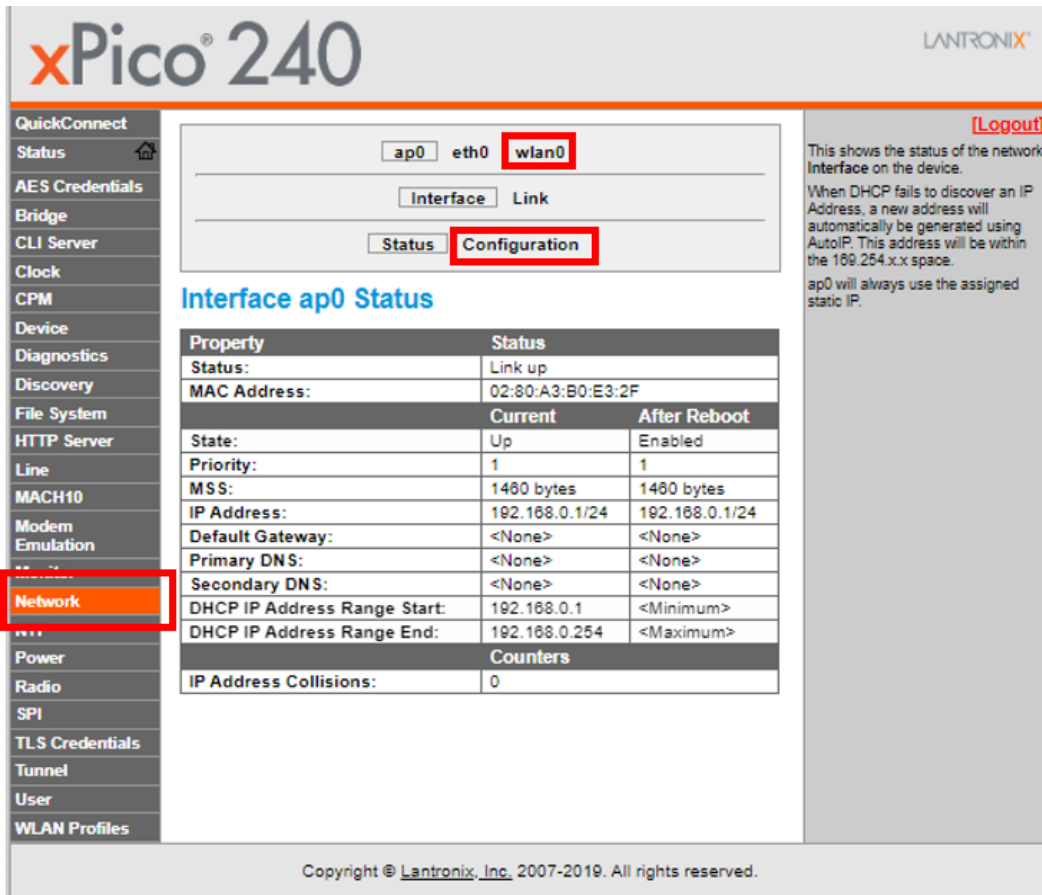
[Logout]

Use the Apply button to try out settings on the WLAN without saving them to Flash. If the settings do not work, when you reboot the device, it will still have the original settings.

Use the Submit button to update the WLAN settings and save them to Flash.

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7. Check that the Network Configurations are correct by navigating to the Network tab and selecting wlan0 and Configuration.



The screenshot shows the xPico 240 web interface. The left sidebar contains a menu with the 'Network' option highlighted. The main content area displays the 'Interface ap0 Status' configuration page. At the top, there are tabs for 'ap0', 'eth0', and 'wlan0', with 'wlan0' selected. Below these are tabs for 'Interface' and 'Link', and further down, 'Status' and 'Configuration', with 'Configuration' selected. The 'Interface ap0 Status' section contains a table with properties and their current status, as well as a table for DHCP IP address ranges and counters. A right sidebar contains a 'Logout' link and a note about DHCP and AutoIP.

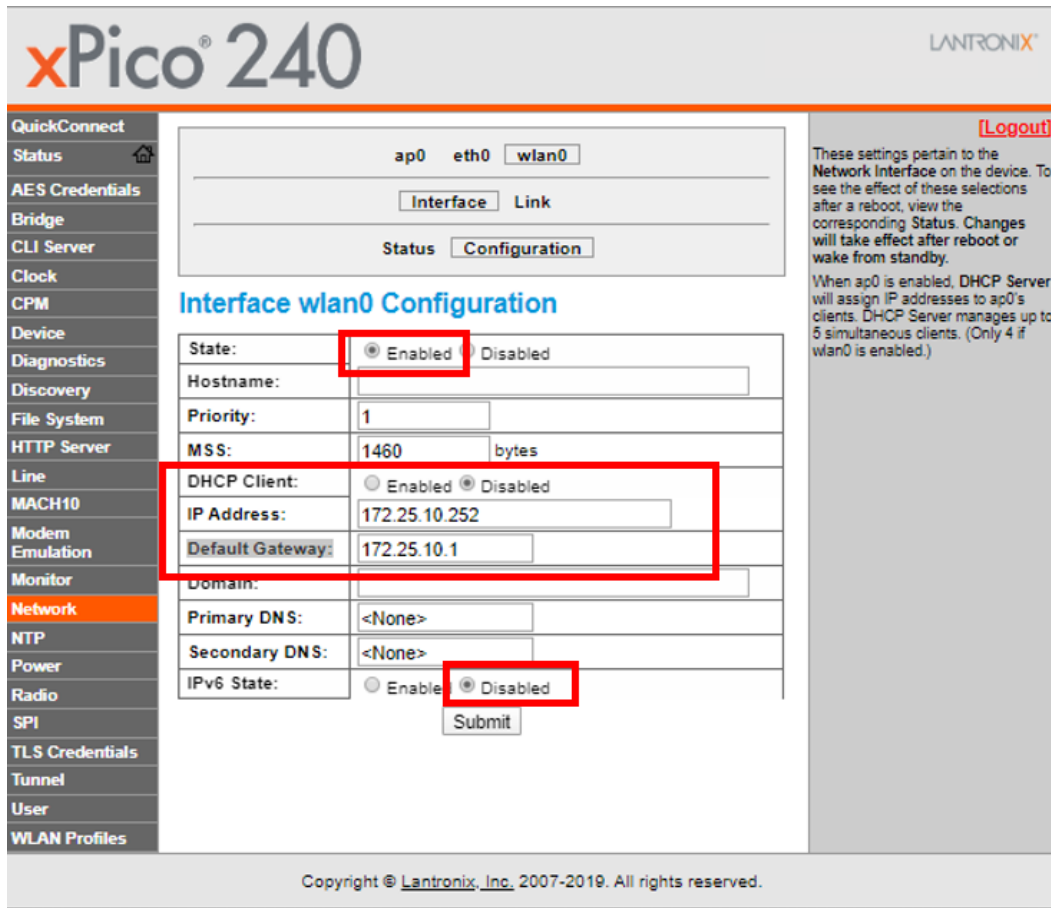
Interface ap0 Status

Property	Status
Status:	Link up
MAC Address:	02:80:A3:B0:E3:2F
	Current After Reboot
State:	Up Enabled
Priority:	1 1
MSS:	1460 bytes 1460 bytes
IP Address:	192.168.0.1/24 192.168.0.1/24
Default Gateway:	<None> <None>
Primary DNS:	<None> <None>
Secondary DNS:	<None> <None>
DHCP IP Address Range Start:	192.168.0.1 <Minimum>
DHCP IP Address Range End:	192.168.0.254 <Maximum>
	Counters
IP Address Collisions:	0

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8. Network Connections should be as follows:

- State: Enabled
- DHCP Client: Disabled
- IP Address: Insert given IP from IT department
- Default Gateway: Insert given Gateway from IT department
- IPv6 State: Disable



9. After verifying the Network Configurations, the MLBase can be rebooted to put these changes into effect. This can be done through the web interface.
 - a) On the web interface, select the Device button on the side panel and choose [Reboot].
 - b) After clicking [Reboot] click OK at the top of the page to finish the reboot.



xPico® 240 LANTRONIX®

QuickConnect Status Firmware Upgrade Logout

This displays the current status of the Device.

Device Status

Property	Status
Product Type:	xPico240
Product ID:	Y2
Product SKU:	XPC240100
Antenna:	U.FL
Serial Number:	0080A3B0E32E
Configuration Version:	[unversioned]
Configuration Modified:	Yes
Firmware Version:	3.1.0.0R9
Active Partition:	1
Build Date:	Mar 7 2019 (14:11:05)
Bootloader Version:	1.3.0.0R1
Bootloader Date:	Jun 28 2018 09:58:10
Uptime:	2 hours 4 minutes 4 seconds
Permanent Config:	Saved
	[Save]
	[Reboot]
	[Factory Defaults]

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Hint

The MLBase unit can also be rebooted physically on the device.

Appendix B – Updating the MLBase Radio Network ID

Each MLBase must have a unique Radio Network ID. The default Network ID when the system is shipped is "0." This same Network ID is also assigned to all MLRemote® devices communicating with this MLBase.

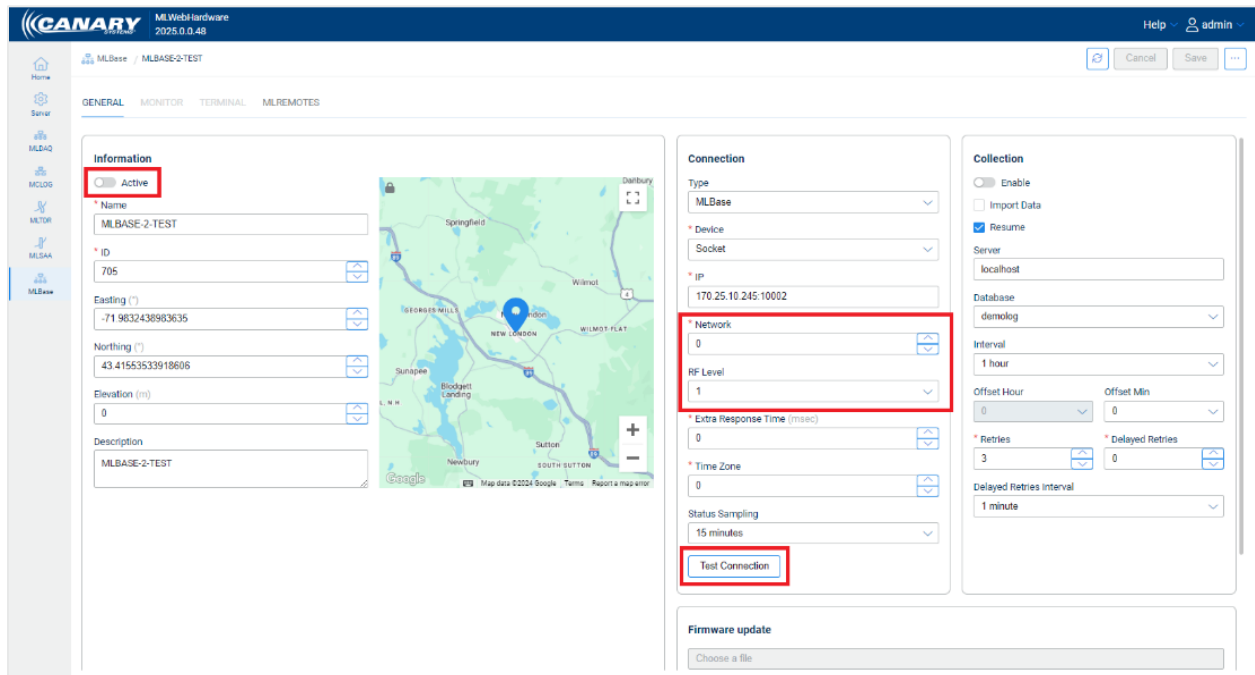


Note

If deploying multiple MLBase/MLRemote networks, the Network ID must be unique for each network.

Follow these steps to update the Network ID or RF Level of the radio.

1. Check the existing radio settings.
 - a) With the Active box on the Information card unchecked, and the proper IP and Port entered, click Test Connection. This returns the current radio settings.



2. Update the Network ID and or RF Level to the desired values.

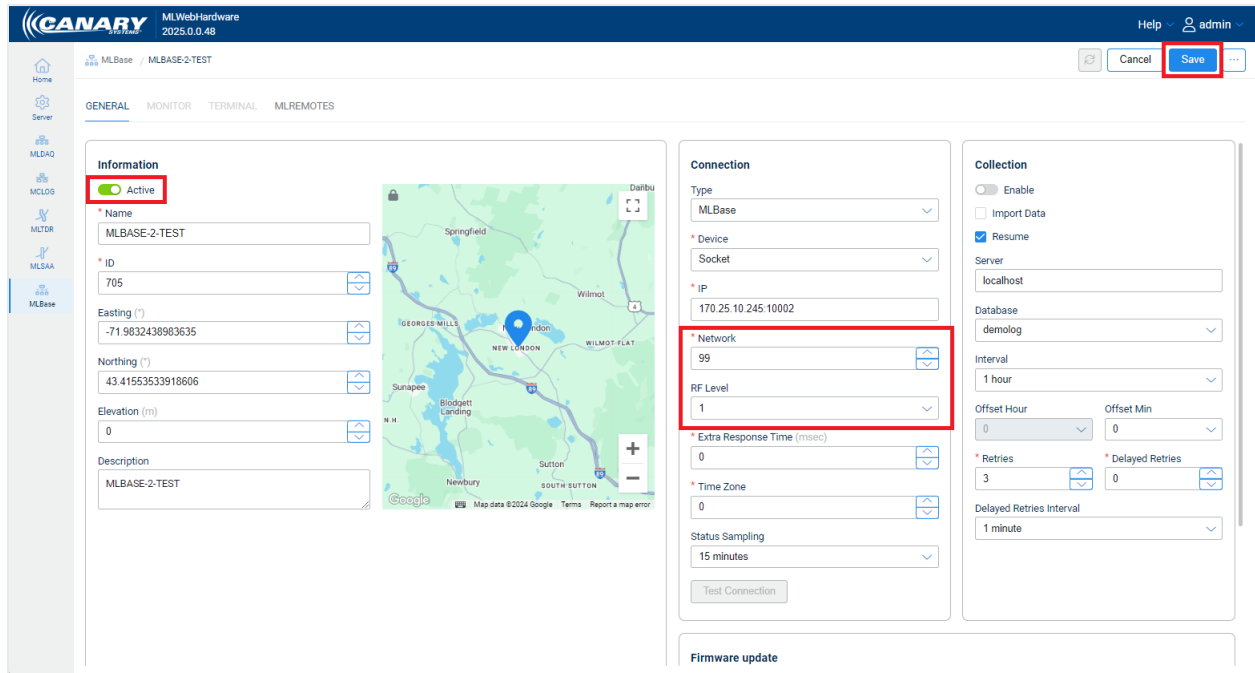


Hint

The suggested RF Level is 1. This configuration will work for most applications. Contact Canary Systems if higher radio power output is required.

3. Check the Active box on the Information Card.

4. Save the device configuration to update the radio settings on the device itself.



MLWeb hardware
2025.0.0.48

Help admin

Cancel Save

GENERAL MONITOR TERMINAL MLREMOTES

Home Server MLDAG MCLDG MLTOR MLCAA MLBase

Information

☒ Active

* Name
MLBASE-2-TEST

* ID
705

Easting (")
-71.9832438983635

Northing (")
43.41553533918606

Elevation (m)
0

Description
MLBASE-2-TEST

Connection

Type
MLBase

* Device
Socket

* IP
170.25.10.245

* Network
99

RF Level
1

* Extra Response Time (msec)
0

* Time Zone
0

Status Sampling
15 minutes

Test Connection

Collection

☐ Enable
☐ Import Data
☒ Resume

Server
localhost

Database
demolog

Interval
1 hour

Offset Hour
0

Offset Min
0

* Retries
3

* Delayed Retries
0

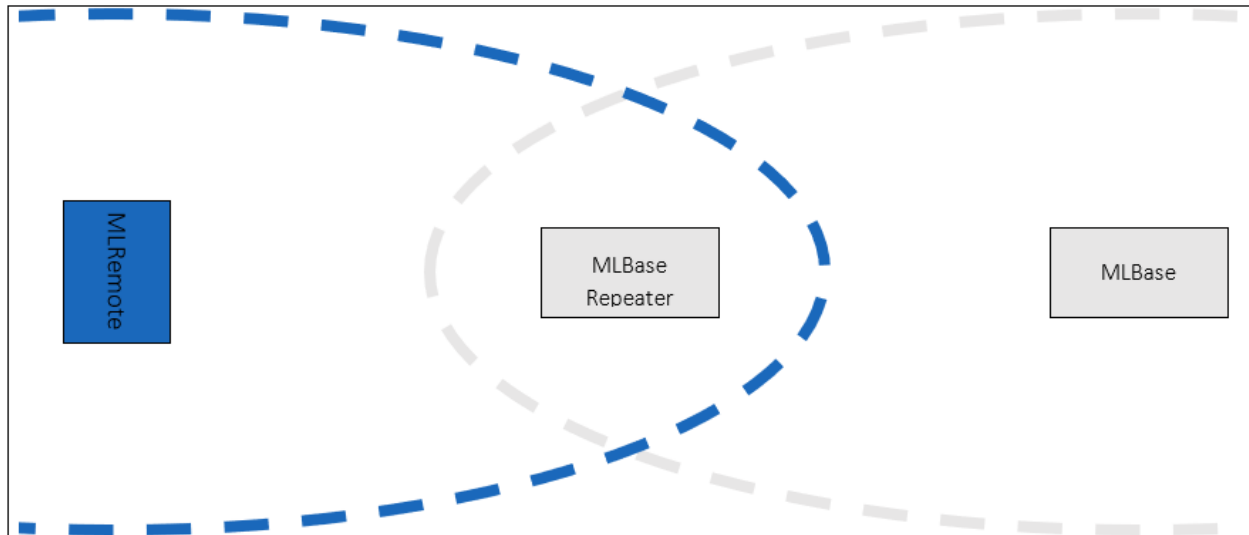
Delayed Retries Interval
1 minute

Firmware update

Appendix C – Using an MLBase as a Repeater

In situations where a radio connection cannot be established between an MLBase and an MLRemote,® an additional MLBase station can be deployed as a repeater.

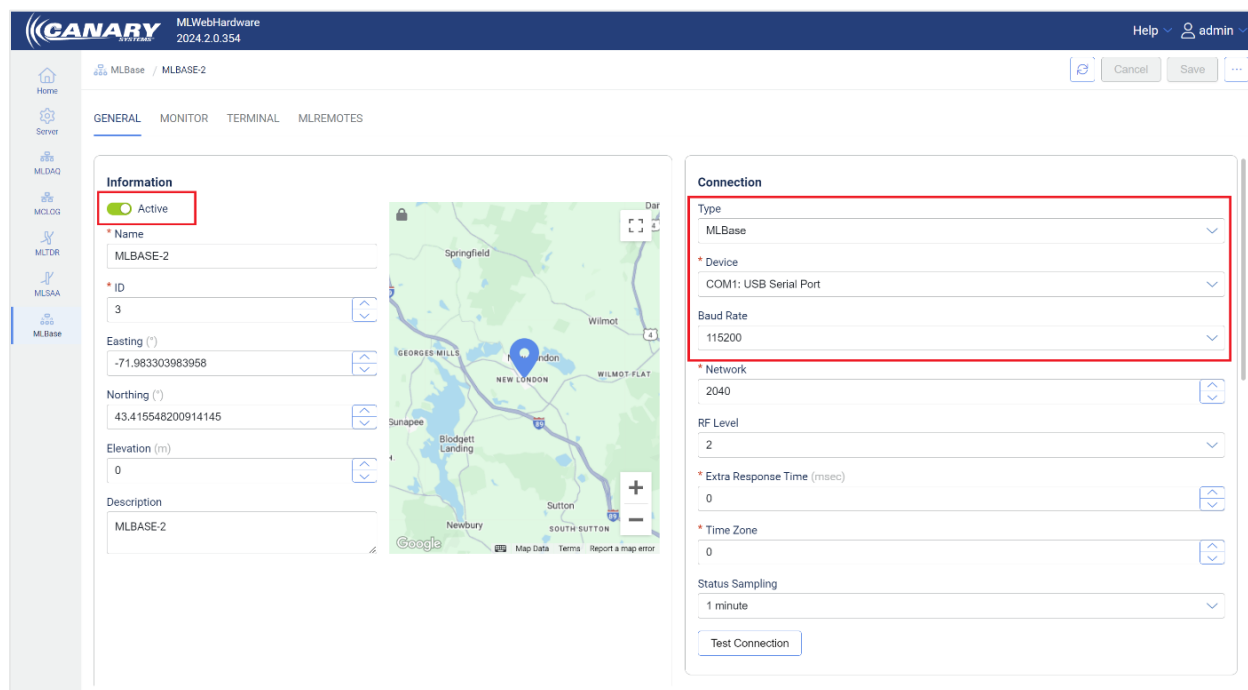
When selecting a site for a repeater, choose a place within both the range of the non-repeater MLBase and the MLRemote that is being repeated to. See the diagram below.



MLRemote station and radio range are indicated in blue. MLBase station and radio range are indicated in grey.

No new firmware is required to use an MLBase as a repeater. It is configured in the same way as a standard MLBase.

1. Connect to the MLBase via a serial cable to CONFIG RS-232 port on the module.
2. Open MLWebHardware and configure the Connection box.
 - a) Set Type to "MLBase."
 - b) Set Device to the correct COM port (in the example below this is COM13).
 - c) Set Baud Rate to "115200."
 - d) Check the Active box.



MLBase configuration screen in MLWebHardware. Relevant connection settings and active box are indicated.

3. Press Save.
4. The Test Connection button becomes live. Click to see the current Network and RF Level settings.
5. Change these settings to match those of the network the repeater belongs to, then press Save again. If no changes are needed, there is no need to resave.

Once the MLBase has been configured to the correct radio network settings, it is ready to function as a repeater.



Hint

To check if the repeater is functioning, connect to the non-repeater MLBase station using MLWebHardware. The RSSI should improve and the MLRemotes previously out of reach should now be checking in.

MLBase status readings can still be taken if the base is being used as a repeater.

If a Wi-Fi connection is available, a new MLBase node can be created in MLWebHardware to collect this information.

If Wi-Fi is not available, periodic visits to the MLBase repeater station can be accompanied by connection to the repeater via COM and opening the Monitor page on MLWebHardware.

Appendix D – Terminal Commands

The MLBase terminal supports direct entry of commands and response.

Commands are summarized in the below table.

Command	Return
MLBASE_HELP	Show list of commands
System	
MLBASE_GWPWR	Get/Set gateway power schedule. Syntax: MLBASE_GWPWR [<begin_time> <end_time> sec min hr day]
MLBASE_SD	Get information about SD card
MLBASE_SMR	Get/Set telemetry sample rate. Syntax: MLBASE_SMR [<sample_rate>]
MLBASE_SN	Get/Set serial number. Syntax: MLBASE_SN [<serial_number>]
MLBASE_SWPWR	Get/Set power output schedule. Syntax: MLBASE_SWPWR [<begin_time> <end_time> sec min hr day]
MLBASE_TIME	Get/Set device time. Syntax: MLBASE_TIME [mm/dd/yyyy hh:mm:ss]
MLBASE_VER	Get hardware revision, firmware and bootloader versions
Charger	
MLBASE_CHG	Turn on/off charger. Syntax: MLBASE_CHG [Y N]
MLBASE_LIC	Turn on/off Low Insolation Compensation. Syntax: MLBASE_LIC [Y N]
MLBASE_VMP	Get/Set VMP for solar panel at 25°C. Syntax: MLBASE_VMP [<VMP_value>]
Radio	
MLBASE_CM	Get/Set radio channel mask. Syntax: MLBASE_CM [<channel_mask>]
MLBASE_DB	Get radio RSSI value
MLBASE_ID	Get/Set radio network ID. Syntax: MLBASE_ID [<network_id>]
MLBASE_PL	Get/Set radio power level. Syntax: MLBASE_PL [0 1 2]
MLBASE_VR	Get radio hardware and firmware versions*

Command	Return
Measurements	
MLBASE_HMD	Get humidity
MLBASE_IBat	Get battery charge(+) or discharge(-) current
MLBASE_IIN	Get input current
MLBASE_TEMP	Get temperature
MLBASE_VBat	Get battery voltage
MLBASE_VIn	Get input voltage
MLBASE_VIntBat	Get internal battery voltage
Reset	
MLBASE_FRST	Factory reset
MLBASE_RST	Hardware reset

Response codes and associated information related to the MLBASE_VR terminal command can be found in the below table.

Response Code	Meaning	PRO SX Module	SX Module	Australia Module	2.4GHz Module
HS	Hardware Series	A00	A00	A00	Not supported
HV	Hardware Version	314A	3E4A	3146	4153
VR	Firmware Version	900A	900A	920A	300D
R?	Region (Power Level for radio module)	1	1	2	0/1 (Pro vs. non-pro)
SL, SH	Serial Number Low/High	[actual value]	[actual value]	[actual value]	[actual value]

Appendix E – SD Card Message Logging

MLBase creates a daily log (12:00AM to 11:59PM) in the \Daily Logs folder on the SD Card to record various date/time stamped system messages. The type, priority, and source of the messages are also recorded.

The inventory of this message logging is as follows:

Source	Type	Priority (0-10)	Message	Description
System				
0	Hardware	5	System initialized	The firmware successfully initialized all subsystems and hardware drivers after a restart.
0	Hardware	5	System software reset	The message is logged when the firmware initiates a system reset.
0	Hardware	9	System time synchronized	The system time was synchronized with the time from the packet's header received from MLGW.
0	Hardware	5	Firmware upgrade started	The message is logged when the first block of a new firmware file is received.
0	Hardware	5	Firmware upgraded	The firmware was successfully updated, and the system started with the new version of the firmware.
0	Hardware	5	SW power output turned on/off	The message is logged when the SW power output is turned on or off.
0	Hardware	2	WDT triggered	The system Watchdog has been triggered and the system will be reset.
0	Hardware	2	BOD triggered	The Brown-Out Detector was triggered because the battery voltage dropped below the voltage threshold corresponding to the battery type.
0	Hardware	2	<DriverName> error	A hardware driver error has occurred.

Source	Type	Priority (0-10)	Message	Description
Communication				
Source Addr	Hardware	9	Packet received	A binary packet was received.
Dest Addr	Hardware	9	Packet sent	A binary packet was sent.
0	Hardware	9	Internal telemetry packet sent	A packet with system telemetry data was prepared and sent to MLGW.
Source Addr	Hardware	7	Packet ACK timeout	The data packet was sent to MLGW, but no acknowledgment was received back in time.
Source Addr	Hardware	9	Packet read from queue	The packet was read from the queue file on the SD card.
Source Addr	Hardware	7	Packet queued	The packet was written to the queue file on the SD card.
Source Addr	Hardware	9	Packet saved	The packet was written to the storage NODE.PKT file on the SD card.
0	Hardware	9	MLGW queue file synchronized	The cached information of the MLGW queue file on the SD card was written to the drive.
0	Hardware	2	MLGW queue file reset	The MLGW queue file on the SD card could not be opened or read and a new file was created.
0	Hardware	5	ASCII command received	An ASCII terminal command updating system parameters was received.
0	Hardware	5	Binary command received	A binary command updating system parameters was received.
0	Hardware	2	Packet CRC error	The received packet has a mismatched CRC.
0	Hardware	2	Queued packet invalid format	The data read from the queue file on the SD card does not match the binary packet format.
0	Hardware	2	Queued packet CRC error	The packet read from the queue file on the SD card has a mismatched CRC.

Source	Type	Priority (0-10)	Message	Description
SD Card				
0	Hardware	5	SD card inserted	The message is logged when the SD card gets inserted.
0	Hardware	5	SD card removed	The message is logged when the SD card is removed, provided that the eject button was pressed before that.
0	Hardware	2	SD card removed unexpectedly	The message is logged when the SD card is removed, provided that the eject button was not pressed before that so the file system was not unmounted.
0	Hardware	5	SD card eject button pressed	The message is logged when the eject button is pressed.
0	Hardware	5	FS mounted	The file system on the SD card was successfully mounted.
0	Hardware	2	FS mount failed	Attempts to mount the file system on the SD card failed.