N-Connex

Networks for Harsh Environments

Lightning Bolt

Part # AS14006

nlt Digital Solutions

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1. Package Contents

- Lightning Bolt
- 2x Dual band 2.4/5GHZ Omni Antenna 7/9dBi

2. Introduction

The N-Connex Lightning Bolt provides convenient WiFi capability to N-Connex based networks. Built for harsh environmentsThe Lighting Bolt is a compact 2.4/5GHz 2x2 MIMO wireless access point suitable for use some operations. The Lighting Bolt has two N-Type antenna connectors to fit an assortment of industry standard antenna options. Powered by PoE, a single Cat6 cable provides network connectivity and power, making installation easy and intuitive.

The secret power of the N-Connex Lighting Bolt is the built-in WiFi tracking function. When paired with NLTs flagship software Digital Mine and NLT WiFi tracking tags the N-Connex Lightning Bolt becomes a powerful tracking device. The Lightning Bolt is capable of tracking and reporting to NLT Digital Mine software, personnel, vehicles, or assets that are within its vicinity.

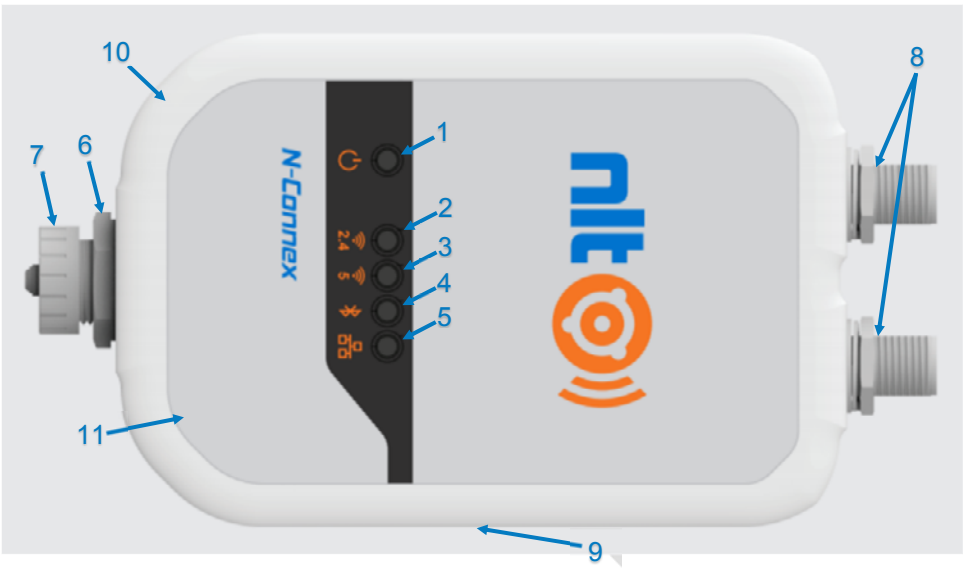
The N-Connex Lightning Bolt can be deployed at a maximum distance of 300m from a PoE switch using Cat6 ethernet cables and N-Connex PoE extenders.

3. Features

Power	Active PoE 48V/7W 802.3at
Standard	• IEEE 802.11n • IEEE 802.11bg (Mixed Mode) • IEEE 802.11ac
Frequency Band	2.4/5GHz Concurrent
Channel Width	• 2.4GHz 20/40Mhz • 5GHz 20/40/80MHz
Data Rate	• 802.11bg: Up to 54Mbps • 802.11n: Up to 300Mbps • 802.11ac: Up to 867Mbps

Receiver Sensibility	• -91dBm@802.11n • -95dBm@802.11bg
Antenna	N-Female external antenna connector. Comes with omni-directional antenna
Ethernet Interface	1x 10/100 BASE-T RJ45 Ethernet connector
LED Indicator	• Power • Ethernet Link • P2P Signal Strength
Maximum Simultaneous SSID	5
Vlan Tagging	Multiple
Flash/SDRAM	16M/64M
Operating Modes	• AP
Security	• WEP • 64/128bit WEP • WPA (TKIP with IEEE 802.1x) • WPA2 (AES with IEEE 802.1x) • WPA Mixed • 802.1x authentication
ESD	IEC61000-4-2 ESD 15KV Air, 8KV Contact Compliance
Mounting (Optional)	• Roof Mounting Bracket • Wall Mounting Bracket
Weight	315g
Unit Dimension	110mm(W) x 190mm(H) x 50mm(D)
Ingress Protection	IP67
Operating Temperature	-20 to 65 °C
Ambient Humidity	5% to 95 % RH (non- condensing)

4. Hardware Overview



1.Power LED

2.Wifi 2.4GHz LED

3.Wifi 5GHz LED

4.BLE LED (option)

5.Ethernet Link LED

6.Ethernet Port

7.Protective Cap

8.N-Type Female Antenna Connector

9.Mounting Loop

10.UV Stabilized Plastic

11.Reflective Sticker

5. Antenna

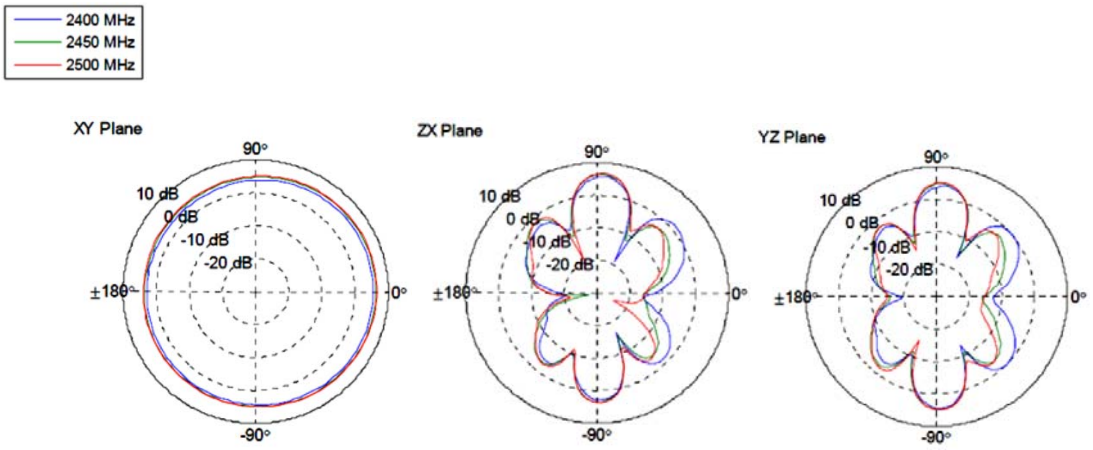
This radio transmitter [IC: 26833-AS14006] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

5.1. Features

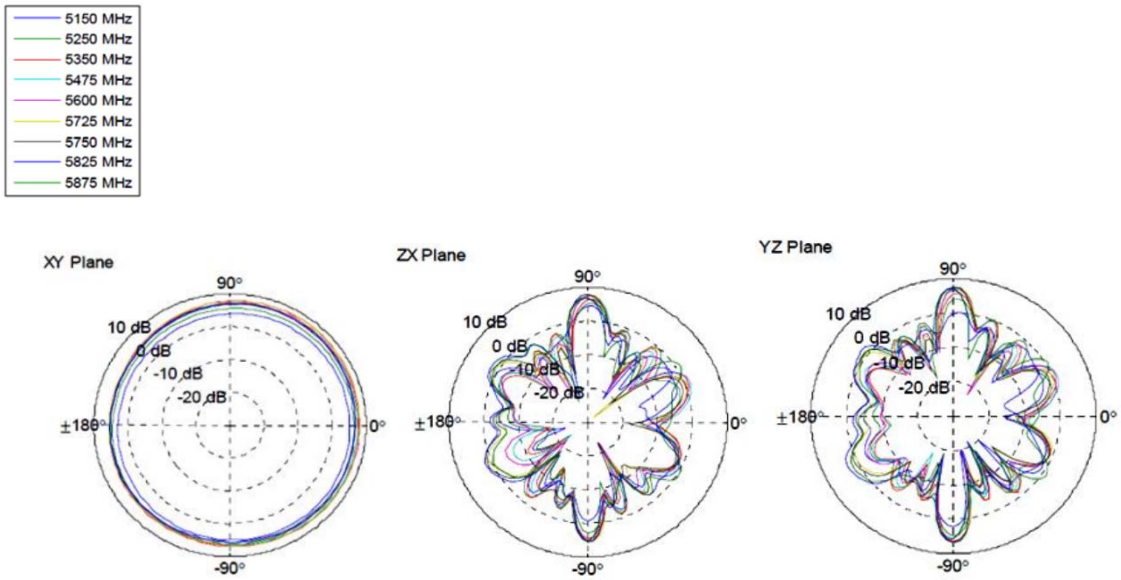
Frequency Range	2400 – 2500MHz 5150 – 5875MHz
Impedance	50Ω
VSWR	<= 2.0
Gain	7dBi @ 2400-2500MHz 9dBi @ 5150-5875MHz
Radiation	Omni
Connector	N-Type Male
Material	Fibreglass
Length	322mm

5.2. Antenna Pattern

5.2.1. Radiation Pattern Frequency 2.4GHz



5.2.2. Radiation Pattern Frequency 5GHz



6. Cable Connection

The NLT Lightning Bolt can be connected directly from a PoE Switch or a PoE Extender. The Bolt is a PoE Active device and need a compatible power source. The maximum distance on a single run of Cat6 is 100m from the source. NLT recommend using cat6 AWG23 ethernet cable to minimize losses

7. Configuration

7.1. Connecting to Logging Page

The Lightning BOLT has a default IP address of 192.168.1.1 and a subnet mask of 255.255.255.0

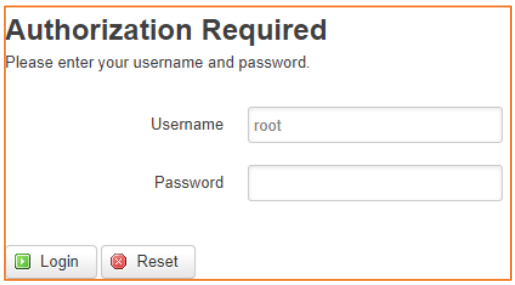
You must set your PC IP address to be on the same subnet as the Lighting BOLT (that is, the PC and BOLT must both be on network 192.168.1.0/ 24). To access the Lightning BOLT's management GUI interface, follow these steps:

I. Point the web browser to http://192.168.1.1

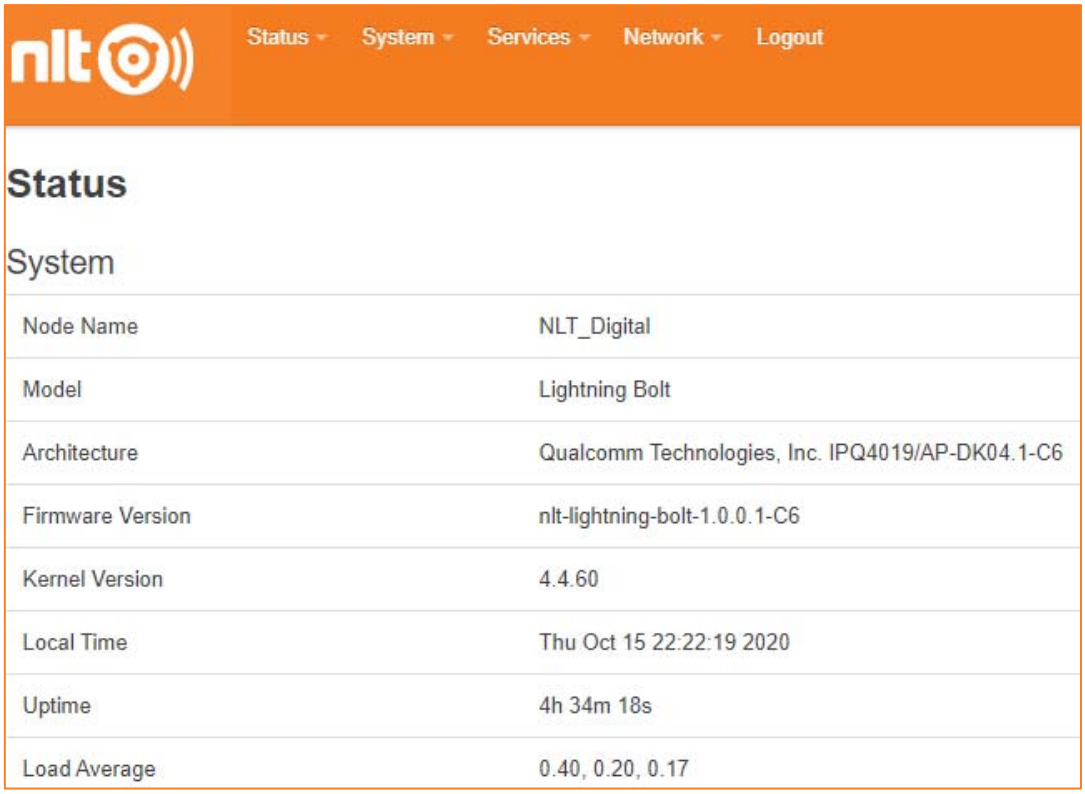
II. Log into the interface by entering the default credentials

Username: root
Password: nltinc

III. Click the "Login" button



After successfully logging into the Lightning Bolt the GUI will change to the start page of the unit:

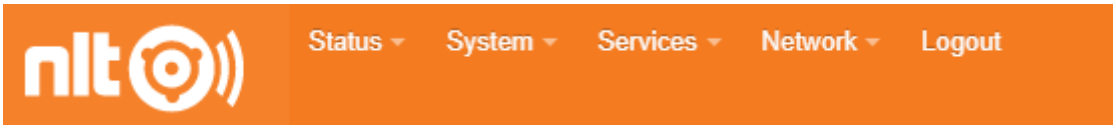


The GUI is divided into two areas; the orange banner across the top of the screen that lists 5 menu items (the first 4 are menu groups) and the larger area below which displays relevant information and accepts all configuration changes made by the user. The page as presented after logging into the unit shows the information presented in Overview which is a submenu item under the Status menu. These menu items will be explained in the following sections.

7.2. Status

7.2.1. Overview

From the top menu navigate to Status➔Overview



I. **System:** Shows Node Name, Model, Architecture, Firmware Version, Kernel Version, Local Time, Uptime, Load Average

System	
Node Name	NLT_Digital
Model	Lightning Bolt
Architecture	Qualcomm Technologies, Inc. IPQ4019/AP-DK04.1-C6
Firmware Version	nlt-lightning-bolt-1.0.0.1-C6
Kernel Version	4.4.60
Local Time	Thu Oct 15 22:25:05 2020
Uptime	4h 37m 5s
Load Average	0.03, 0.12, 0.15

II. **Memory:** Shows Total Available, Free, Buffered

Memory	
Total Available	23196 kB / 60292 kB (38%)
Free	19220 kB / 60292 kB (31%)
Buffered	3976 kB / 60292 kB (6%)

III. **Wireless:** Shows a status summary of the different SSID configured on the AP note that it is possible to have multiple SSIDs programmed on the Bolt.

Wireless	
Generic 802.11bgn Wireless Controller (wifi0)	100% **SSID:** NLT_Digital **Mode:** Master **Channel:** 1 (2.412 GHz) **Bitrate:** 192 Mbit/s **BSSID:** 08:B4:CF:06:24:0C **Encryption:** None
Generic 802.11ac Wireless Controller (wifi1)	100% **SSID:** NLT_Digital_5 **Mode:** Master **Channel:** 44 (5.220 GHz) **Bitrate:** 866.7 Mbit/s **BSSID:** 08:B4:CF:06:24:0B **Encryption:** None

IV. **Associated Stations**: Shows brief information of devices currently attached to any of the SSIDs that are active on the Bolt.

Associated Stations

	Network	MAC-Address	Host	Signal / Noise	RX Rate / TX Rate
wlan0	Master "NLT_DIGITAL"	8C:45:00:B9:AE:18	192.168.1.105	-7 / -83 dBm	24.0 Mbit/s, 20MHz 72.2 Mbit/s, 20MHz, MCS 7, Short GI

7.3. System

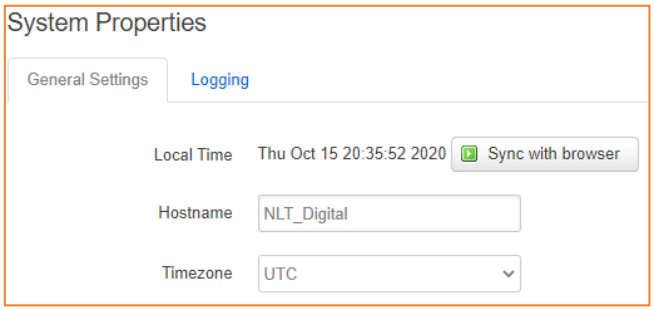
7.3.1. System Properties

From the top menu navigate to System→System

Local Time: Shows the local time. Sync with browser is done here

Hostname: Name of AP

Time zone: Select time zone from the list



Note: *To apply any changes click Save & Apply at the bottom of the screen*

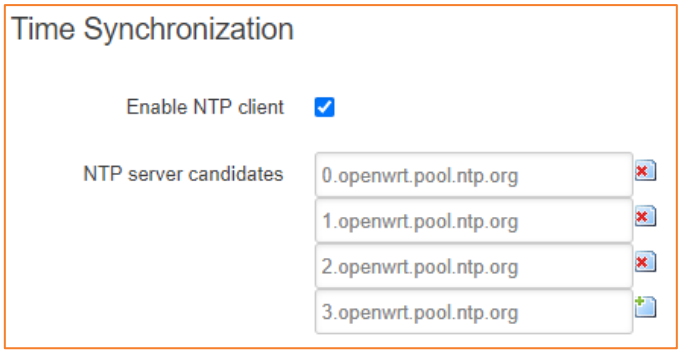
7.3.2. Time Synchronization

From the top menu navigate to System→System

Enable NTP Client: Tick to make the AP an NTP Client

Provide NTP Server: Tick make the AP the NT Server (Not Recommended)

NTP server Candidates: Input NTP IP. Multiple servers can be added



Note: *To apply any change click Save & Apply at the bottom of the screen*

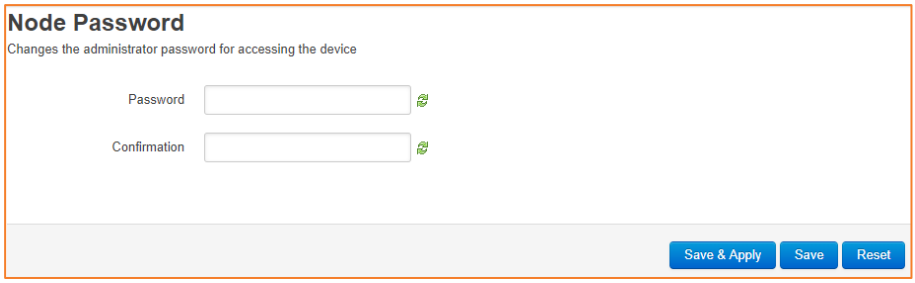
7.3.3. Change Password

I. From the top menu navigate to System→Administration

II. Enter the new “Password”

III. Re-enter the password “Confirmation”

IV. Click Save & Apply



7.3.4. Flash Operation

I. Backup / Restore

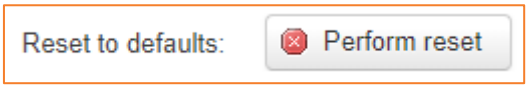
From the top menu navigate to System→Backup / Flash Firmware

A. Download Backup

1. Click Generate archive
2. The backup file (.gz) will download automatically

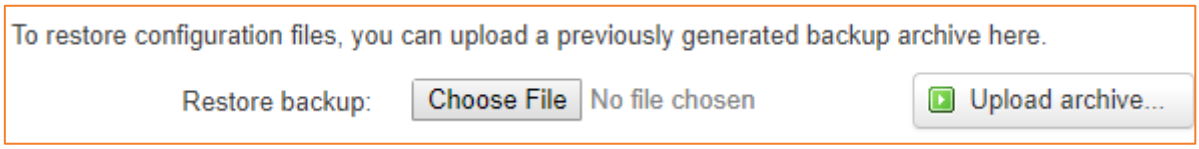
B. Reset to defaults

1. Click Perform reset
2. The device will reboot, which may take a few minutes



C. Restore Backup

1. Click Choose file
2. Find and select the file from your PC or Laptop (the file must be a tar file with the .gz extension)
3. Click open
4. Click Upload archive



Note: *Do not power off the AP during this operation*

Warning: *Configurations are specific to a Firmware level and only in some cases they are back compatible. Ensure the backup is compatible with the Firmware of*

the AP. An unsupported configuration upload has the potential to corrupt the AP and lock it. For further information, please contact your NLT representative

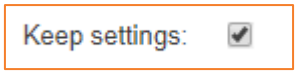
II. Flash new firmware image

A. From the top menu navigate to System→Backup / Flash Firmware.

B. Select Choose file.

C. Navigate to desired file on your laptop or PC and select it.

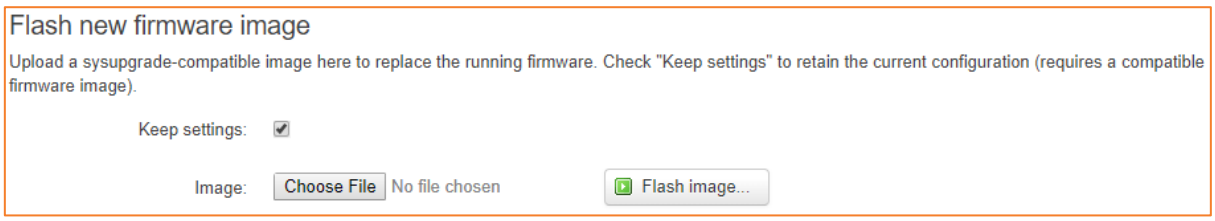
D. Select or unselect the "Keep settings" checkbox as required.



If Keep settings is selected, the upgrade to the new firmware will retain all configuration settings that had been set previously. If unchecked, the Lightning Bolt will return to a factory default state (including IP address and password).

Only tick "Keep settings" if the new firmware is compatible with the existing configuration. If unsure do not select this check box or contact your NLT representative for advice.

E. Click Flash Image



F. Ensure that there is no error message in the Flash Firmware -Verify page.

G. Click Proceed

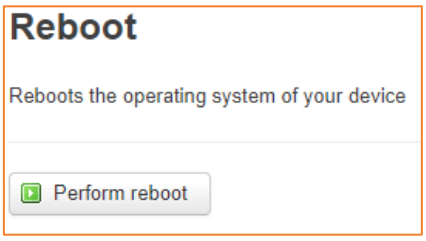
Note: *The FW upload/reflash can take some time, do not disconnect, or turn off the bolt during this process.*

Warning: *configurations are specific to firmware version and only in some cases they are backwards compatible. Changing firmware without ensuring the current configuration is compatible with the desired firmware has the potential to corrupt the AP and lock it. For further information, please contact your NLT representative*

7.3.5. Reboot

I. From the top menu navigate to System→Reboot

II. Click Perform reboot

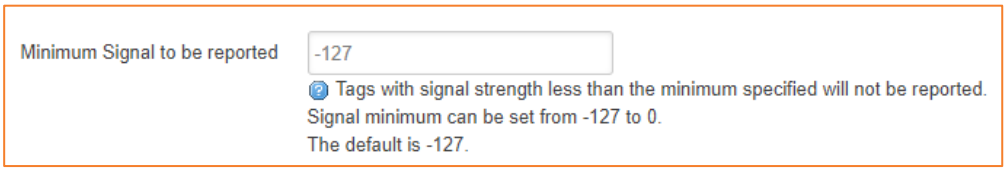


Note: *This could take a few minutes.*

7.4. Tracking

1. From the top menu navigate to Services→Wifitrackd
2. Tick/Untick Tracking Enable/Disable to turn on and Off Tracking

3. Navigate to Minimum Signal to be Reported and change value to desired value



3. Click Save and Apply

Warning: *Wrong configuration of thresholds could result on errors on the tracking logic. For further information, please contact your NLT representative*

7.5. Network

7.5.1. VLANs

From the top menu navigate to Network→VLANs

This page allows for different VLANS to be assigned to the corresponding SSID's.

From this menu you can Add, Delete or Edit VLANs

I. Management VLAN

   A. From the top menu navigate to Network→VLANs

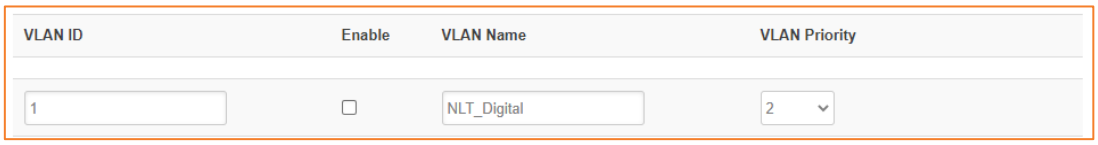
   B. Input the new VLAN ID for the management of the AP

   C. Tick Enable

D. Input a VLAN name. (Default: NLT_Digital)

E. Set the VLAN Priority (It is recommended to leave it as 2)

F. Click Save & Apply



Warning: *Do not select enable if the management of the AP is on (VLAN 1). Incorrect configuration can potentially lock the device.*

II. VLANs Configuration

A. From the top menu navigate to Network→VLANs

B. Click Add

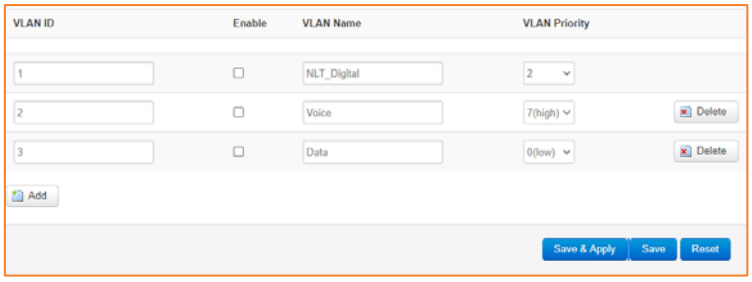
C. Select the new VLAN ID (accepted range is 1-4094)

D. Tick Enable

E. Input a VLAN name. (It is recommended to name the VLAN the same as the VLAN ID)

F. Set the VLAN Priority accordingly 7(Highest), 0 (Lowest)

G. Click Save & Apply

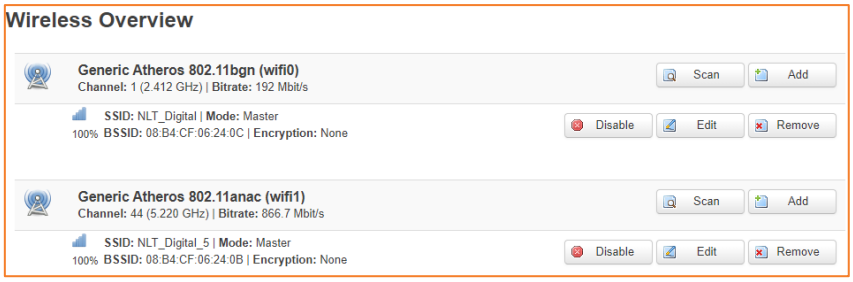


Note: *Do not power off the AP during this operation*

7.5.2. Wireless

From the top menu navigate to Network→Wifi

Within this menu you can add, edit remove or disable SSIDs on the 2.4GHz and 5GHz band.



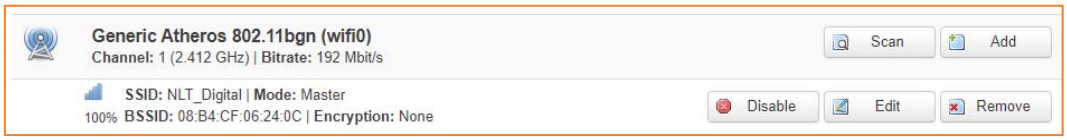
Add button: Create a new SSID on either the 2.4GHz or the 5GHz band.

Remove button: Delete a specific SSID configuration on either the 2.4GHz or the 5GHz band.

Edit button: settings of an existing SSID on either the 2.4GHz or the 5GHz band.

I. Wireless 2.4GHz (802.11bgn)

On the wireless overview, navigate to the 2.4GHZ section and click Edit on the SSID to action

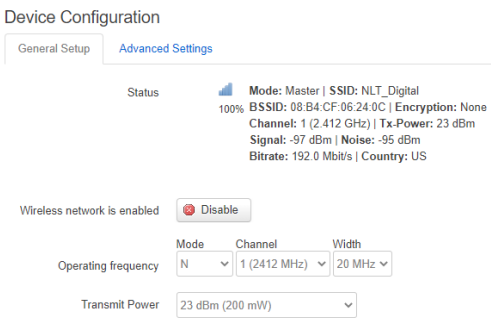


There are two sections: Device Configuration and Interface Configuration

The Device configuration area allows the user to setup the settings associated with the RF performance of the device. There are two tabs in this area: General Setup and Advanced settings.

The Interface Configuration area, which has three tabs: General Setup, Wireless Security and Advance Settings. This area, particularly General Setup and Wireless Security allows the user to configure or modify the specific settings of the SSID.

The following descriptions give details of each of the relevant settings and information.



A. Device Configuration

1. General Setup Tab

Wireless network is enabled: Disable/Enable the Wireless network by clicking the button

Operating Frequency Buttons:
(Mode) the drop box selection shows the WiFi mode that will be used for this SSID. The choice is Legacy (802.11b and g) or N (802.11n)

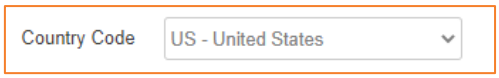
(Channel) the drop box selection shows the available channels for selection, this depends on the country selected.

(Width) the drop box selection shows two bandwidths for selection 20MHz and 40MHz

Note: *To apply changes click Save & Apply or for many changes click Save and after finishing click save & Apply (at the bottom of the screen)*

2. Advance Settings Tab
Select the advanced settings tab

Country Code: The drop box selection shows the available country codes (ISO/IEC Alpha2). This Selection affect the Operating Frequency and the Transmit power



Note: *To apply changes click Save & Apply or for many changes click Save and after finishing click save & Apply (at the bottom of the screen)*

B. Interface Configuration

1. General setup Tab

ESSID: Input SSID name

Mode: The drop box selection shows the available Modes the NLT Bolt Operates. See image below.

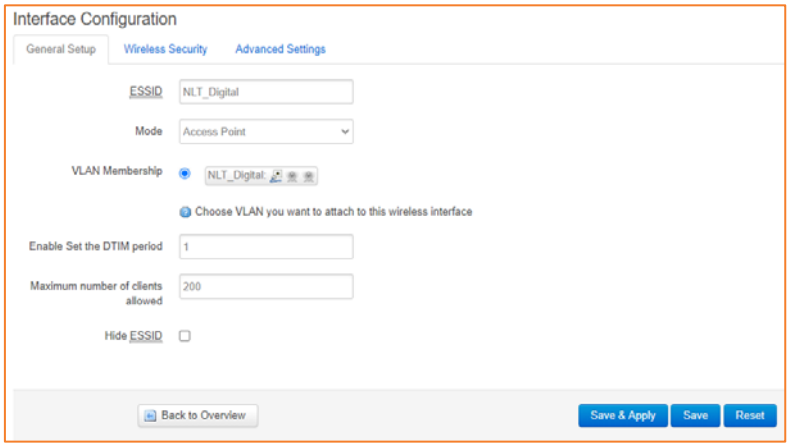
Note: *Configuration of most the common application, Access Point will be used in following section. For advanced configuration contact your NLT representative.*

VLAN Membership: Select from the list of pre-created VLANs. This associates the SSID to a corresponding VLAN

Enable Set the DTIM Period: The period to wake up wireless clients from Sleep Mode. For voice application it is recommended to be set to 1

Maximum number of Stations allowed: Limits the amount of a active connections to the access point, set to 255 by default.

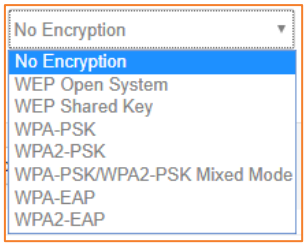
Hide ESSID: Tick to hide/show SSID. Most applications will show the SSID but hiding it may add a layer of security.



Note: *To apply changes click Save & Apply or for many changes click Save and after finishing all the changes click save & Apply (at the bottom of the screen)*

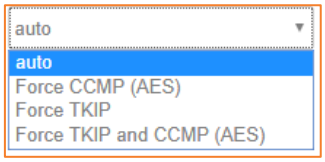
2. Wireless Security Tab

Encryption: The drop box selection shows the available type of encryptions available. See image below:

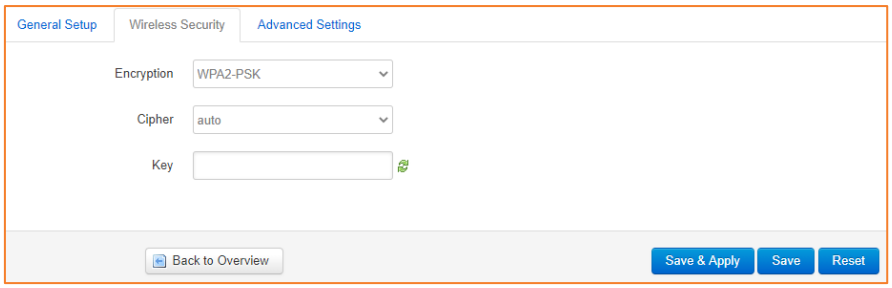


Note: *For This section WP2-PSK is used.*

Cipher: Subtype of encryption



Key: Enter the pre-shared Passkey to be used by devices that will associate with this SSID. Note that the key must meet the criteria of the Security setting chosen.



Note: *To apply changes click Save & Apply or for many changes click Save and after finishing all the changes click save & Apply (at the bottom of the screen)*

3. Advance Setting Tab

802.11h: This minimizes data loss when radio moves to the new channel

Separate Clients: The drop box selection shows the available type of encryptions available.

UAPSD Enable: Tick to enable. This feature reduces the latency of traffic flow that is delivered over the wireless media.

Multicast Rate: The multicast rate is the minimum speed that a wireless device must be able to communicate at in order to connect to the router. So, the lower the multicast rate, the further away, or more accurately, the weaker the wireless signal, are allowed to connect

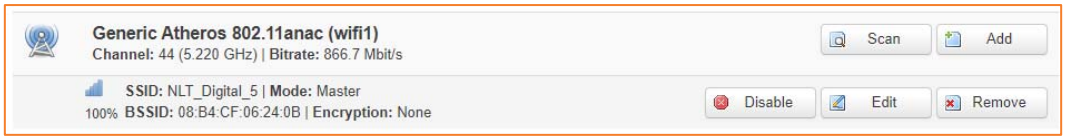
Fragmentation Threshold: This value is used to set the maximum size of a packet that can be sent. Smaller packets improve reliability, but they will decrease performance. Common Value 1584

RTS/CTS Threshold: Typical threshold is 1609

WMM Mode: Tick to enable Wi-FI Multimedia. QoS features (Voice, Video, etc)

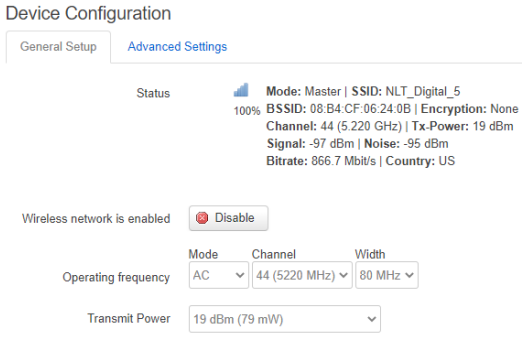
II. Wireless 5GHz (802.11anac)

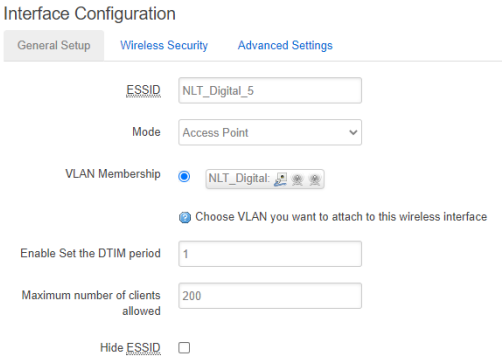
On the wireless overview, navigate to the 5 GHZ section and click Edit on the SSID to action



There are also two sections on the 5GHz configuration: Device Configuration and Interface Configuration

The following descriptions give details of each of the relevant settings and information.





A. Device Configuration
   1. General Setup Tab

Wireless network is enabled: Disable/Enable the Wireless network by clicking the button

Operating Frequency Buttons:
(Mode) the drop box selection shows the WiFi mode that will be used for this SSID. The choice is Legacy (802.11a), N (802.11n) or AC (802.11AC)

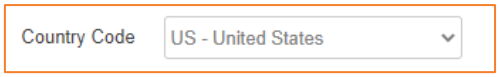
(Channel) the drop box selection shows the available channels for selection, this depends on the country selected.

(Width) the drop box selection shows two bandwidths for selection 20MHz, 40MHz and 80MHz

Note: *To apply changes click Save & Apply or for many changes click Save and after finishing click save & Apply (at the bottom of the screen)*

2. Advance Settings Tab
   Select the advanced settings tab

   Country Code: The drop box selection shows the available country codes (ISO/IEC Alpha2). This Selection affect the Operating Frequency and the Transmit power



   Note: *To apply changes click Save & Apply or for many changes click Save and after finishing click save & Apply (at the bottom of the screen)*

B. Interface Configuration
   General Setup and Wireless Security Tab are Configure identically than the 2.4GHZ wireless (refer to page 18)

   1. Advance Setting Tab
      The configuration is done identical to the 2.4GHvz except for:

      Number of Spatial Streams: Parameters MIMO. System 2x2

      LDPC: Low-density parity-check (LDPC) code is a linear error correcting code, a method of transmitting a message over a noisy transmission channel

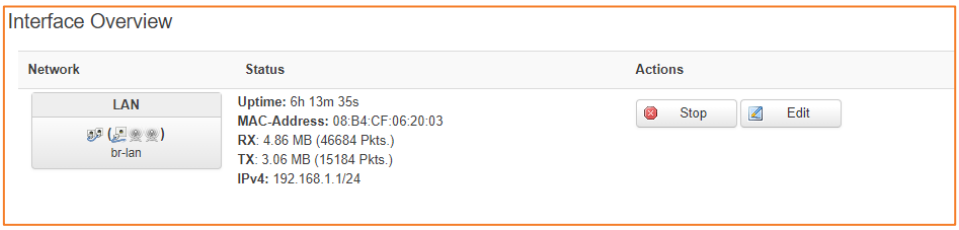
      RX STBC: Space -Time Block Coding Rx

      TX STBC: Space -Time Block Coding Tx

7.5.3. Network Administration - Change IP Address

The factory default IP address of the Bolt is 192.168.1.1 /24. It should be changed to an address that is compatible with the network's IP schema. The following instructions provide details to do this:

I. From the top menu navigate to Network→Lan Interface



II. Click Edit

III. Modify the IP address and other relevant details

Protocol: Chose between Static or DHCP (Static Recommended)

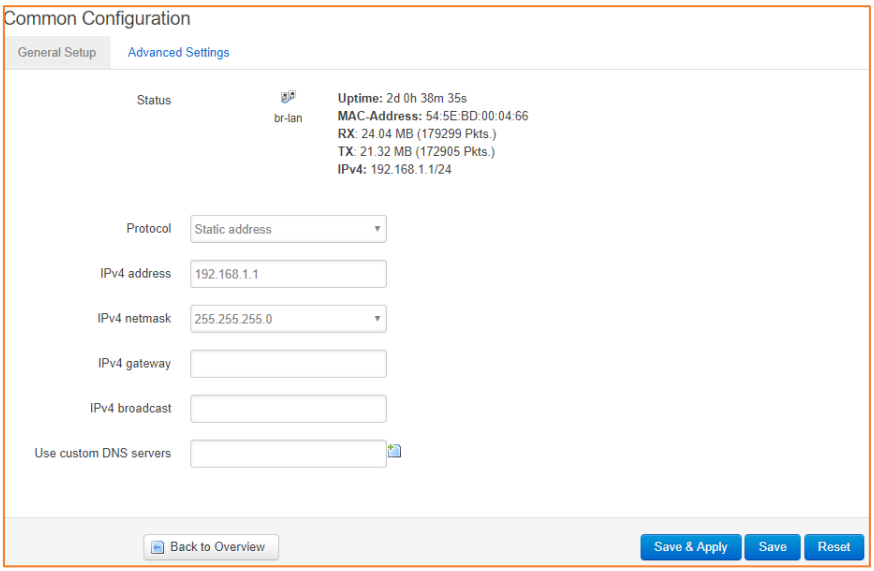
IPv4 address: Enter the IP address to be used for the Bolt

IPv4 netmask: Enter the network mask that is relevant for the network

IPv4 gateway: Gateway (Important for routing)

IPv4 broadcast: Auto-generated (no entry required)

Use custom DNS servers: At this time, this entry can be left blank



Warning: *Entering the wrong information (ie incorrect IP address) can make the device inaccessible. Double check your entries in these fields.*

7.6. Log Out

On the top menu Click Log Out

8. Contacting Technical Support

Contact your local NLT Digital representative or visit us www.nltdigital.com/

FCC Statement

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

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Radiation Exposure Statement:

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

ISED RSS Warning:

This device complies with Innovation, Science and Economic Development Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ISED RF exposure statement:

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
Le rayonnement de la classe b repecte ISED fixaient un environnement non contrôlés.Installation et mise en œuvre de ce matériel devrait avec échangeur distance minimale entre 20 cm ton corps.Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d'autres.

Note:5150-5250MHz band for indoor use only

Note : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates,uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.