Harmony Lite, R1.0

Operation and Maintenance Guide

Revision 2, updated in May, 2014

Document Number: PM-000003-01-EN

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Table of Contents

List of Tables

1 Preface

1.1 History of changes

The history of changes is shown in the following table:

TABLE 1. History of changes

Revision	Updates	Date
1	1st revision.	January, 2014
2	All across the document, the full name of the product is changed to Harmony Lite.	May, 2014

1.2 Scope of the document

This document provides the technical guide for commissioning and operating the software of Harmony Lite system, Lite Link Viewer.

INFO

This document only concerns Harmony Lite system release 1.0 (Lite, R1.0 in short) without specific statements in the context.

1.3 Intended audience

This document is prepared for the use of radio network planners and technicians who are responsible for the system operation and maintenance.

WARNING!

PERSONS HANDLING THIS EQUIPMENT MAY BE EXPOSED TO HAZARDS WHICH COULD RESULT IN PHYSICAL INJURY! IT IS THEREFORE MANDATORY TO CAREFULLY READ AND UNDERSTAND THIS DOCUMENT.

1.4 Document structure

The document is comprised of the following chapters.

TABLE 2. Document structure

Chapter	Title	Subject
Chapter 1	Preface	Provides an introduction on who and how to use this document.
Chapter 2	Commissioning	Provides the guidance to do the initial commission.
Chapter 3	System configuration	Provides the guidance to make system configurations.
Chapter 4	Wireless configuration	Provides the guidance to make wireless configurations.
Chapter 5	Ethernet configuration	Provides the guidance to make Ethernet configurations.
Chapter 6	Management	Provides the guidance to make management configurations.

TABLE 2. Document structure

Chapter	Title	Subject
Chapter 7	Alarms	Provides the information about alarm lists.
Chapter 8	Performance	Provides the guidance to make performance configurations.
Chapter 9	Diagnostics	Provides the guidance to make diagnostics configurations.
Chapter 10	About	Provides the information about the link view.

2 Commissioning

2.1 Before commissioning

Before Lite system become operational, initial configuration steps need to be carried out first. And the Commissioning wizard is recommended to be executed prior to the hardware installation on site.

The Lite system can be accessed by the Web Browser on a PC, such as Google Chrome (28.0 or higher), Firefox (26.0 or higher), IE (9.0 or higher). If Firefox or IE is to be used, Adobe Flash Player plug-in has to be installed first. (To download Adobe Flash Player, go to website *http://get.adobe.com/cn/flashplayer/*.)

Before logging into the Lite Web interface, the network configuration of the PC must be set as Figure 1. We suggest setting the PC IP address to 192.168.255.1 and subnet mask 255.255.255.248. This IP address is used to access Lite when the management PC is directly connected to Lite system. By default, the private IP address of Lite is 192.168.255.3 and the subnet mask 255.255.255.248.

FIGURE 1. PC network configuration

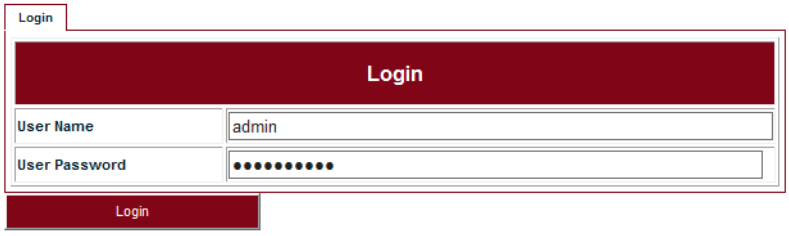
2.2 Commission steps

2.2.1 Logging in

Steps

1. Use the Web Browser to access the private IP address of Lite.

FIGURE 2. Step 1



2. Enter **User Name** and **User Password**, click **Login**. The home page of Link Viewer appears.

TABLE 3. Login parameters

User Name	User Password
energetic	wireless
readwrite	Rwrite
readonly	readonly

FIGURE 3. Link Viewer

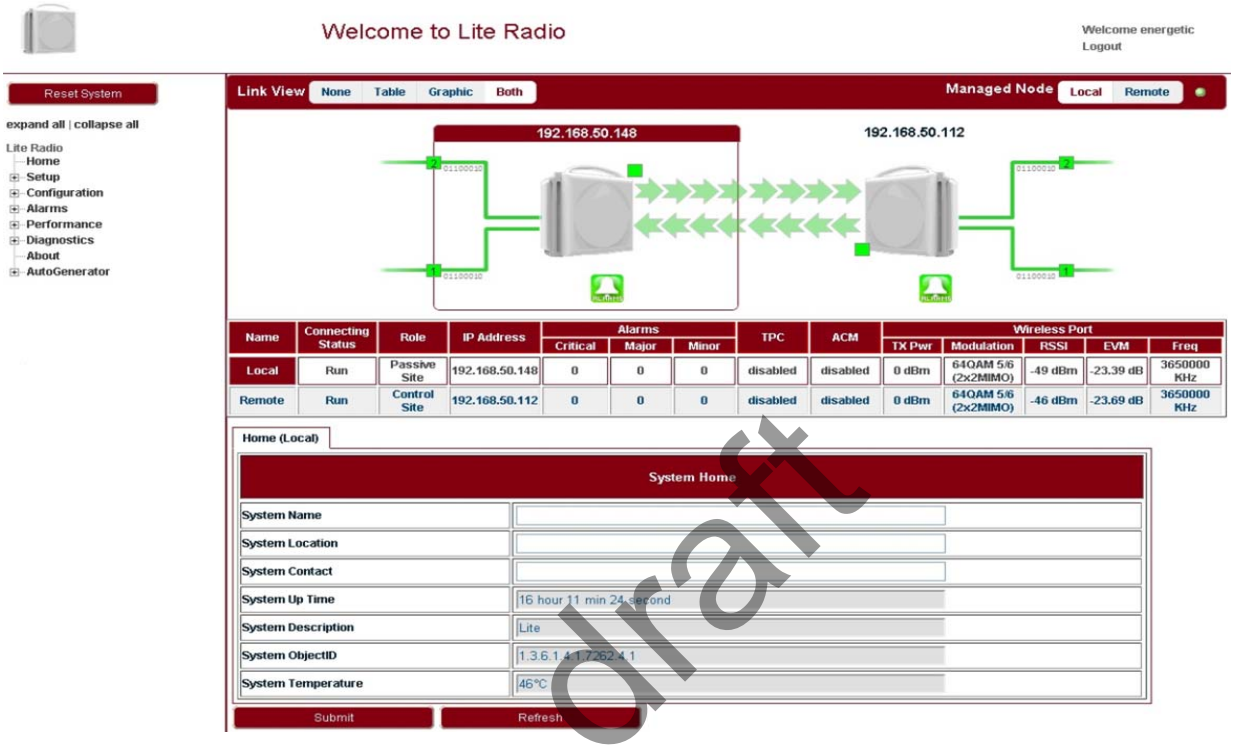


TABLE 4. System home

Parameter	Description
System Name	Configure the system name to identify the NE.
System Location	Configure the system location for easy management.
System Contact	Configure the contact information for easy management.
System Up Time	Show the system start up time. It is read only.
System Description	Configure the system description for easy management.
System ObjectID	It is used to SNMP. The value is 1.3.6.1.4.1.7262.4.1.
System Temperature	Show the current temperature. It is read only.

2.2.2 Setting the management IP

Go to **Configuration > Management > IP** tab (see Figure 4). The public management IP address and local management IP address are to be set.

INFO

Don’t use IP address from 192.168.254.96 ~ 192.168.254.99. These 4 IP addresses are reserved for internal use.

FIGURE 4. Management IP

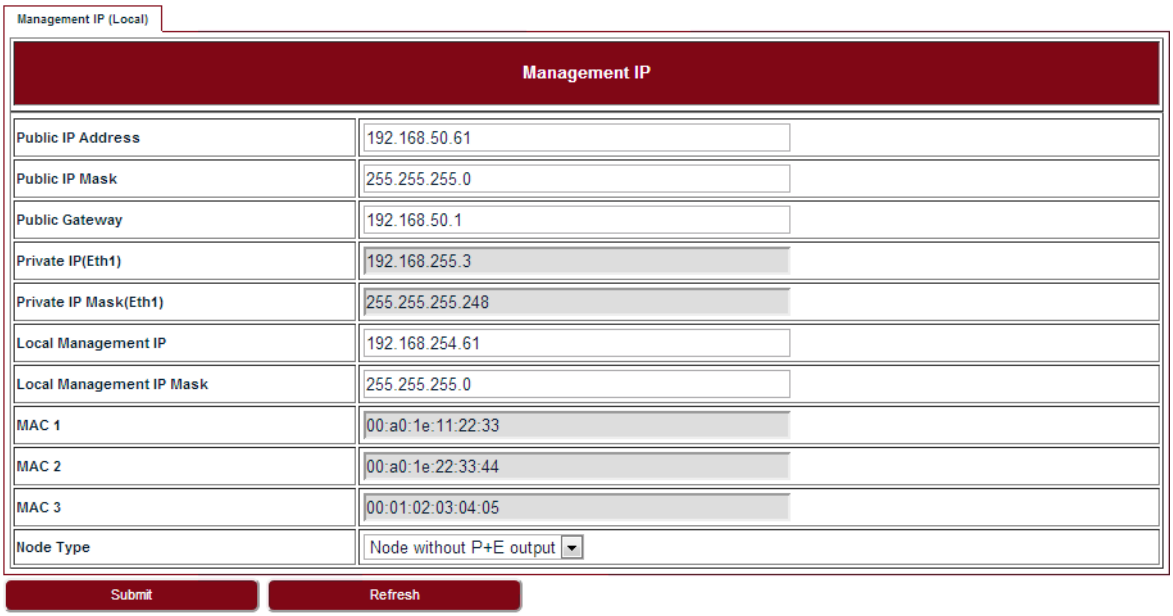


TABLE 5. Management IP

Parameter	Description
Public IP Address	Public IP is used to access Lite over Management VLAN (Tagged, typically using a switch or other intranet connectivity). It is for in-band management.
Public IP Mask	
Public Gateway	
Private IP (Eth 1)	Private IP is used for commissioning.
Private IP Mask (Eth 1)	
Local Management IP	Local Management IP is used to access Lite locally over one of the Ethernet ports untagged, for example, from a PC running WebLCT. It is also for out-of-band management.
Local Management IP Mask	
MAC 1	Display the MAC addresses of Eth1, Eth2 and wireless port.
MAC 2	
MAC 3	
Node Type	This field is used in chain site configuration. When it is changed to *Node with P+E output*, the private IP would be automatically changed to 192.168.255.4, to avoid IP address conflict in the chain site.

2.2.3 Setting the management VLAN

Go to **Configuration > Management > Management VLAN** tab (see Figure 5).

FIGURE 5. Management VLAN

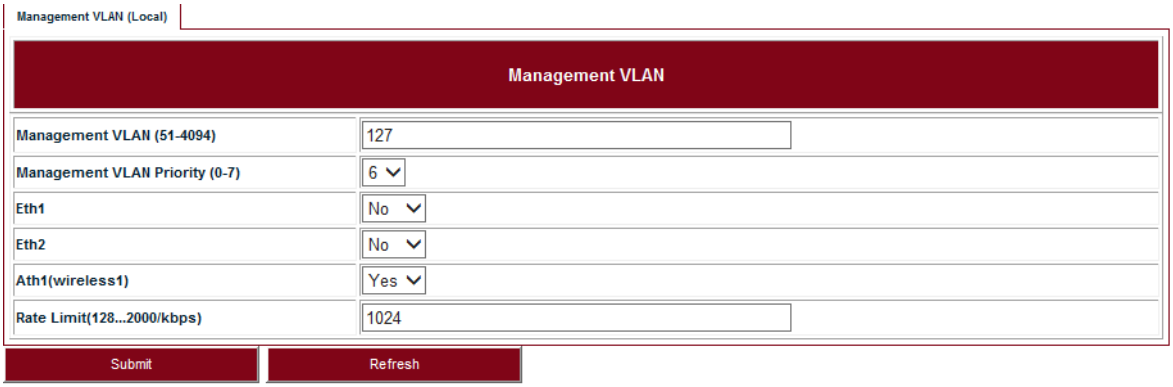


TABLE 6. Management VLAN

Parameter	Description
Management VLAN	Configure the management VLAN ID for remote login. VLAN range from 51 ~ 4094. Default: 127.
Management VLAN Priority	Configure the management VLAN priority. Value from 0 ~ 7. Default: 6.
Eth1	If the port is to be used as a part of the management VLAN, set to *Yes*. If *no*, it means this port is removed from the management VLAN.
Eth2	
Ath1(wireless1)	
Rate Limit	Configure the engress and eggress rate limit for management VLAN. Value from 128Kbps ~ 2Mbps. Default: 1024Kbps.

2.2.4 Setting the radio parameters

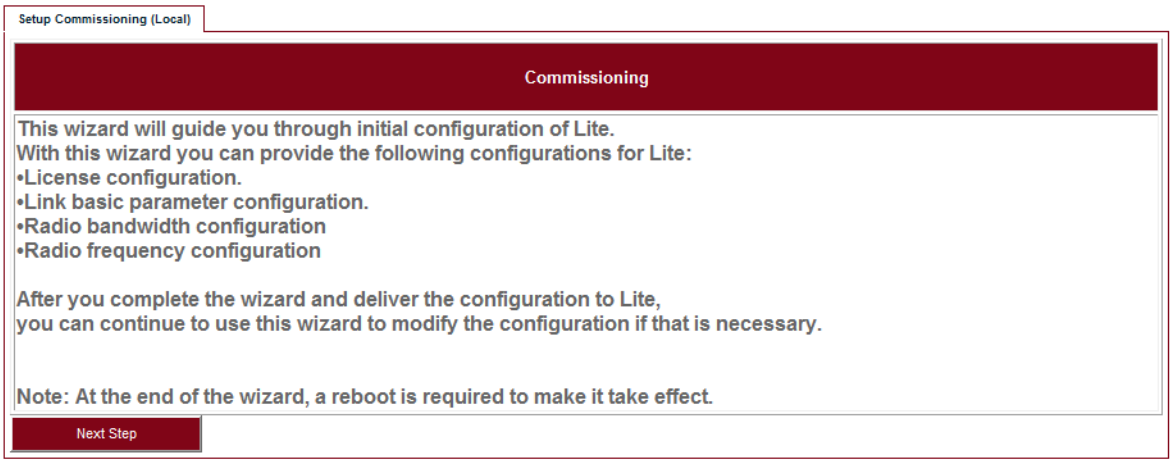
This operation should be done from both the passive and control ends of the link and channel selections should match to ensure the link comes up when properly aligned. Before setting the radio parameters, ensure that the correct radio standard is licensed for the geographic location where the radio is to be installed. For example: FCC for USA or Canada, ETSI for Europe and Asia, etc.

It is also important to verify that the correct maximum speed required is licensed, as per the link design specified for the radio in this location.

Steps

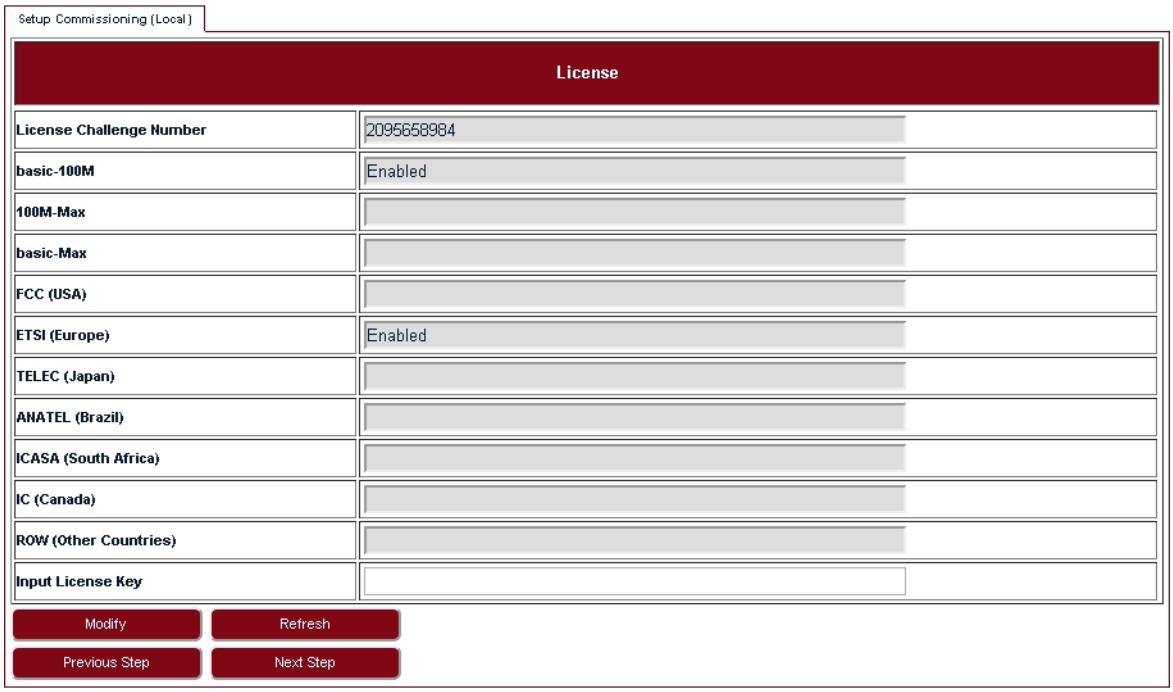
1. Go to **Setup > Commissioning** tab (see Figure 6) and click **Next Step**.

FIGURE 6. Step 1



2. Input the license key and click **Modify**. Click **Refresh** to make sure of the configuration.

FIGURE 7. Step 2



INFO

If changing from one radio standard to another, existing license must be cleared.

Please contact DragonWave Customer Support if a new license needs to be entered to change the radio standard or geographic location setting.

3. Set up wireless parameters according to Table 7.

FIGURE 8. Step 3

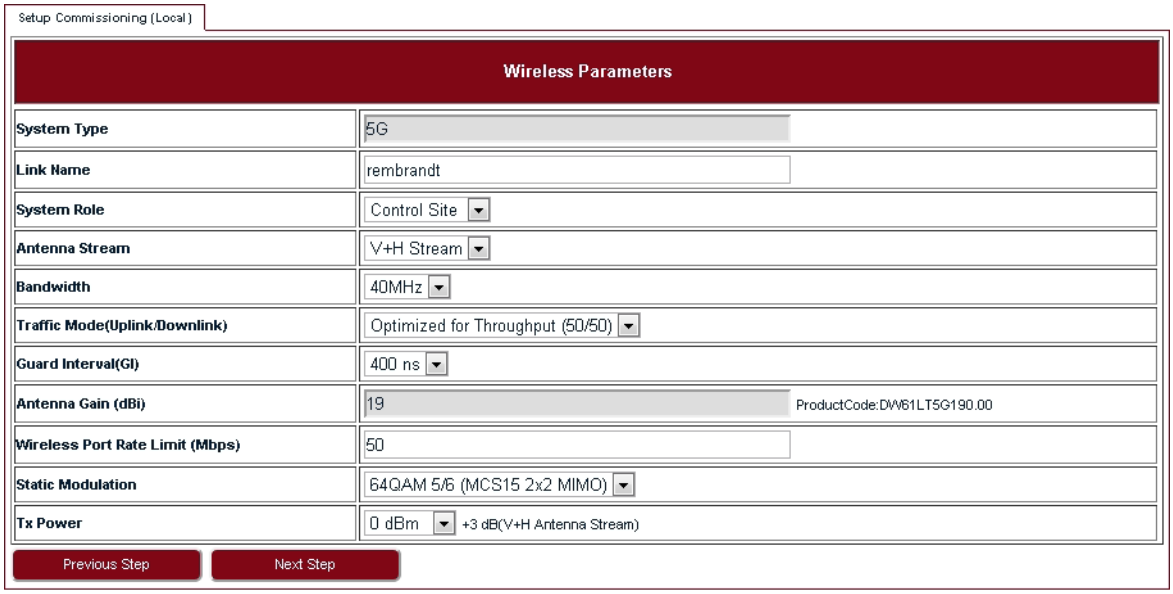


TABLE 7. Wireless parameters

Parameter	Description
Link Name	Up to 32 characters, and both numbers and characters are supported. The link name of both *Control Site* and *Passive Site* should be the same.
System Role	*Control Site* or *Passive Site*. One end of Lite should be configured as the Control Site, and the other end the Passive Site.
Antenna Stream	V+H Stream supported.
Bandwidth	*40 MHz* or *20MHz*.
Traffic Mode (Uplink/ Downlink)	*50/50* For 50/50, the uplink and downlink have the same bandwidth.
Guard Interval	*400 ns* or *800 ns*. If the maximum multi-path delay spreads more than 400 ns, we suggest to use 800 ns. Leaving the guard interval at 400 ns (the default) works in most applications. For installations where the link is over long stretches of water, or non-line of sight applications with lots of multi-path signals, selecting 800 ns guard interval can improve the performance.
Wireless Port Rate Limit	Rate limit on Wireless port. It will only take effect while the value is lower than the Wireless Throughput.
Static Modulation	If ACM is disabled, Lite will use Static Modulation as Tx side modulation. This is the modulation selected for this link and will not change unless ACM is enabled.
Tx Power	Tx power on each radio. Limited by EIRP. This rate limit is automatically assigned based on the modulation selected.

4. In **Configuration Summary** page, set the **Setup Frequency** field according to Table 9.

FIGURE 9. Step 6

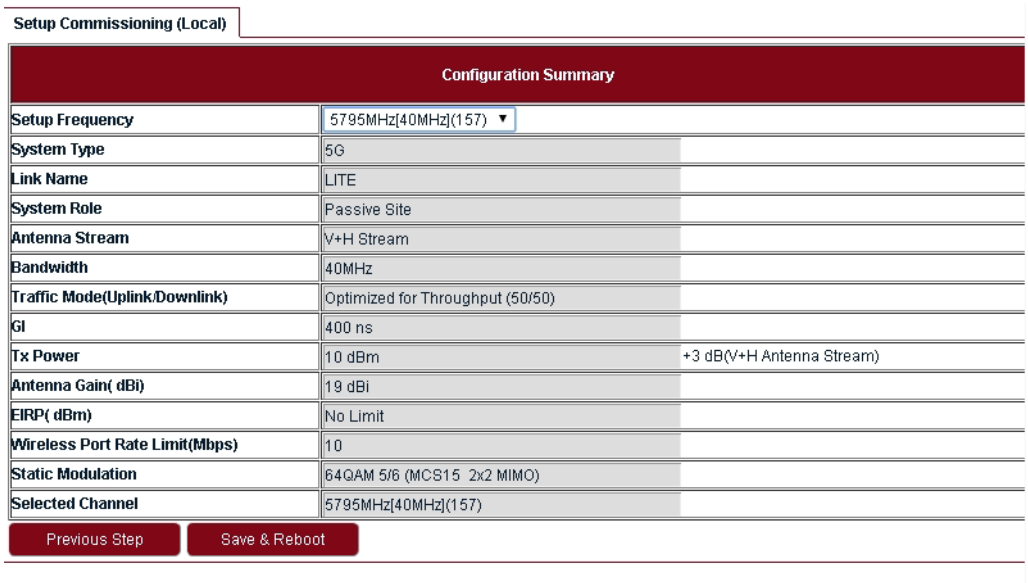


TABLE 8. Configuration summary

Parameter	Description
Setup Frequency	The setup frequency is the initial frequency to be used when the link is set up.

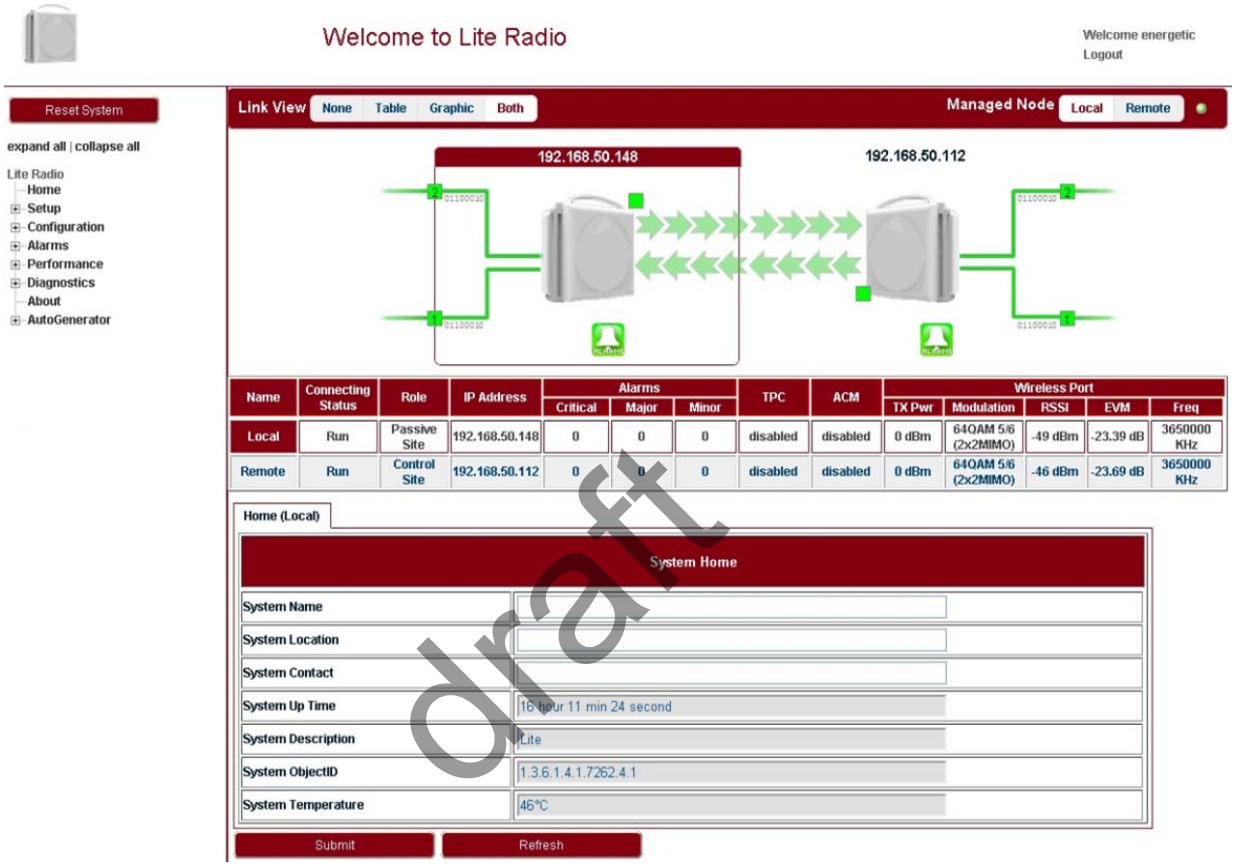
5. Check all the configurations in Figure 9 and click **Save & Reboot** so that Lite will restart and run under new configurations.

3 System configuration

3.1 System home

Go to the **Home** page to set the parameters.

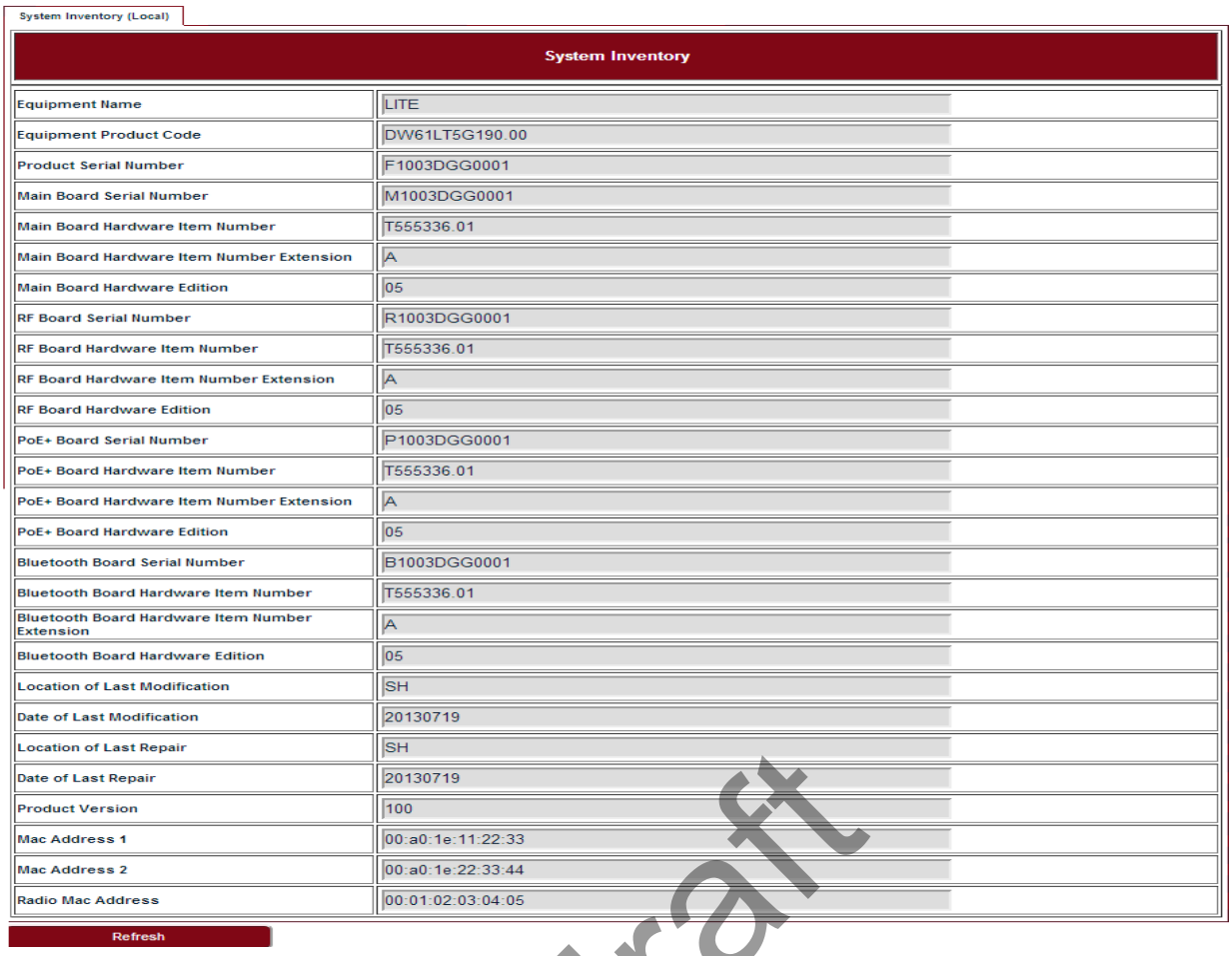
FIGURE 10. System Home



3.2 System inventory

Go to **Configuration > System > System Inventory** page.

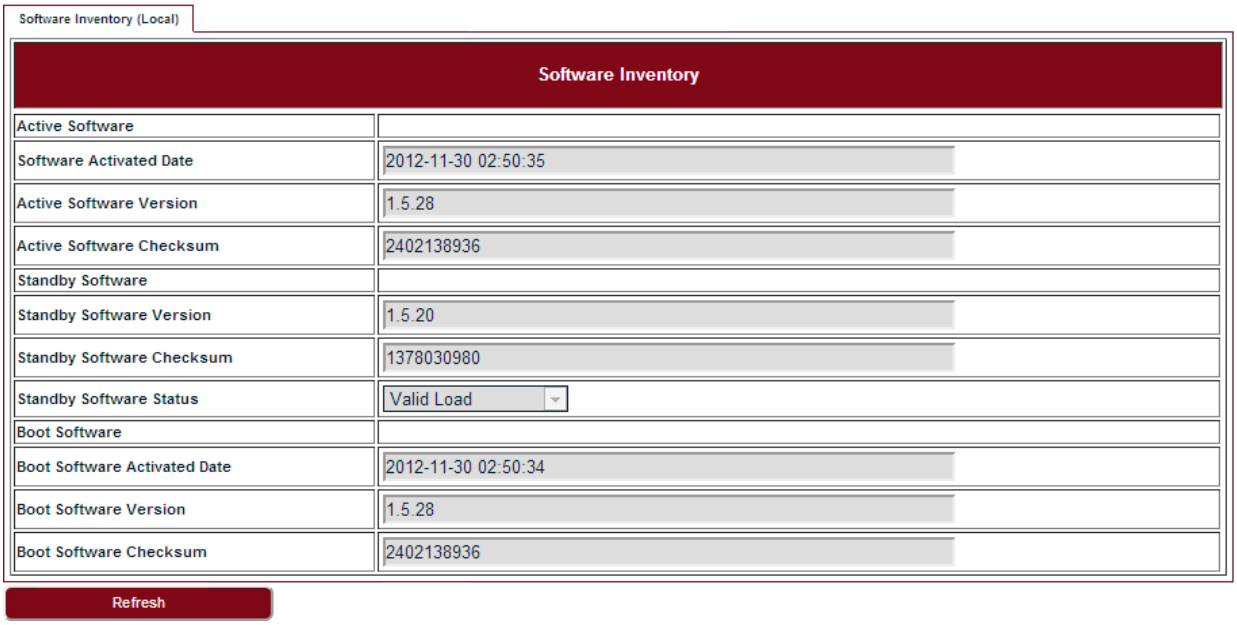
FIGURE 11. System inventory



3.3 Software inventory

Go to **Configuration > System > Software Inventory** page.

FIGURE 12. Software inventory

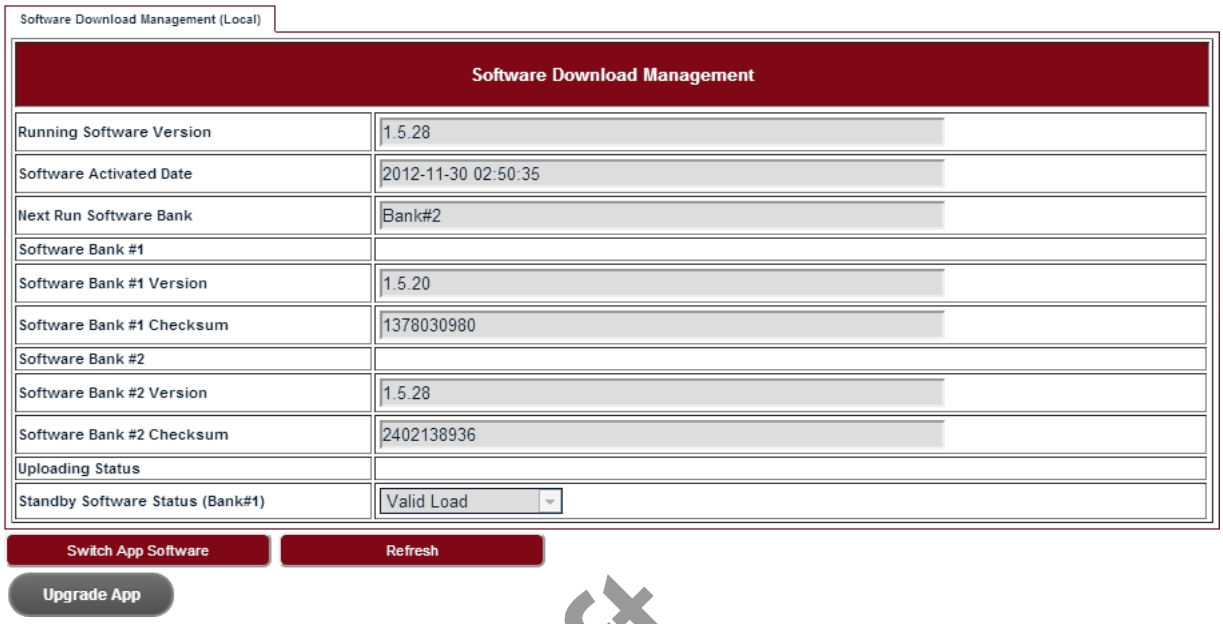


3.4 Software management

Steps

1. Go to **Configuration > System > Software Management** page.

FIGURE 13. Software download management



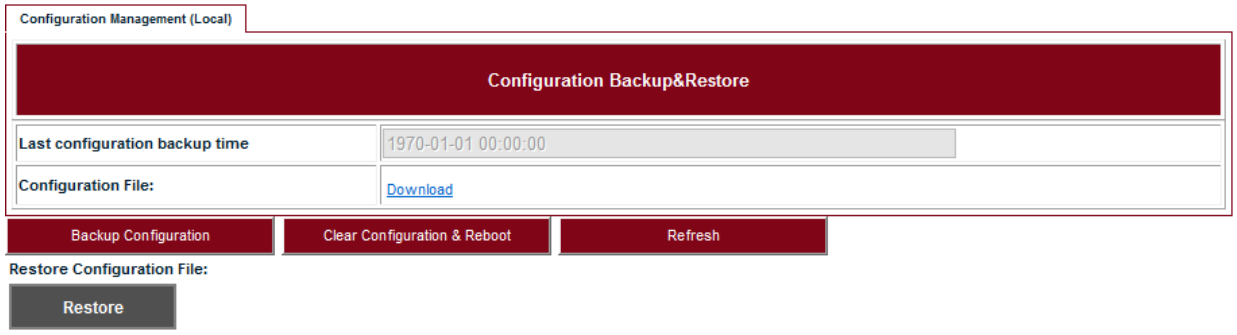
2. Click **Upgrade App** and go to the right folder path to open the target software.
3. Click **Switch App Software**, confirm the Next Run Software Bank is switched correctly.
4. Click **Reboot System.** After reboot, Lite would start up with the new software.

3.5 Configuration management

Steps

1. Go to **Configuration > System > Configuration Management** page.

FIGURE 14. Configuration backup & restore



2. Click **Backup Configuration** and click the **Download** link to download the backup configuration file.
3. Click **Clear Configuration & Reboot**, confirm to clear configuration and reboot.
4. Click **Restore** and go to the right folder path to open the target configuration file.

3.6 P+E output

Steps

1. Go to **Configuration > System > P+E Output** page.

FIGURE 15. P+E output configuration

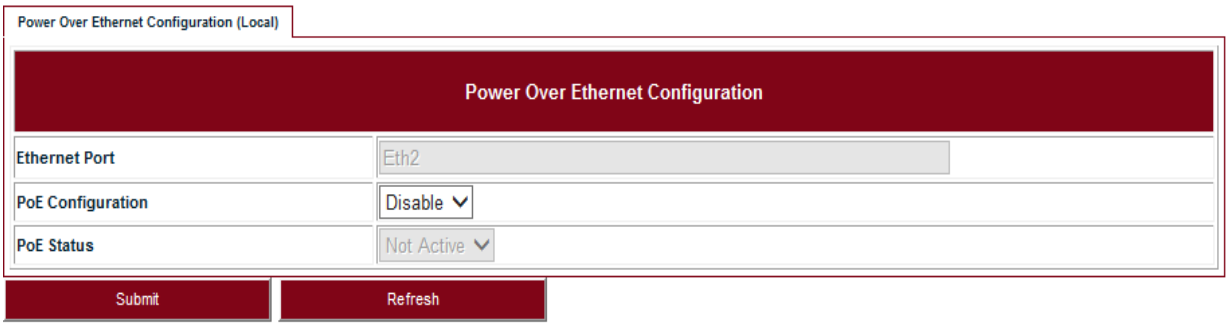


TABLE9. P+E output

Parameter	Description
PoE Configuration	Enable or Disable. Default: Disable.

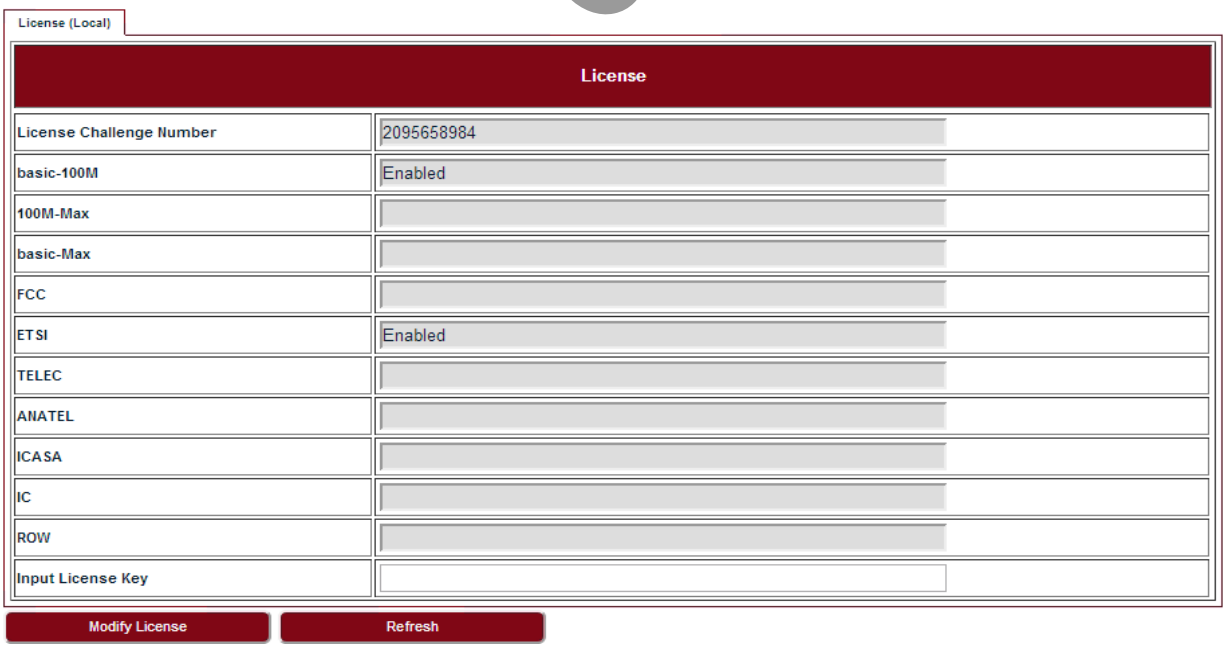
2. Click **Submit** to apply the configuration.

3.7 Licensing

Steps

1. Go to **Configuration > System > Licensing** page.

FIGURE 16. License



2. Click **Modify License** to make change on the license information.

3.8 SNTP

Steps

1. Go to **Configuration > System > SNTP** page.

FIGURE 17. SNTP

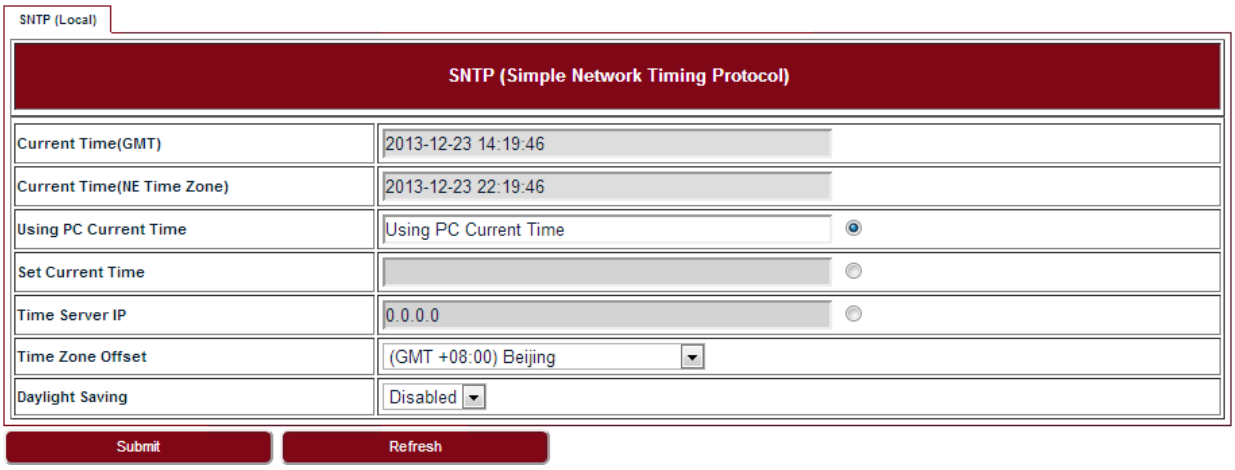


TABLE10. SNTP

Parameter	Description
Time Server IP	It is used to get SNTP time from Time Server.
Time Zone Offset	Configure the NE time zone when Time Server is configured. Values are from -12 ~ +13.
Daylight Saving	Configure the NE daylight saving when Time Server is configured. Value is Enabled or Disabled.

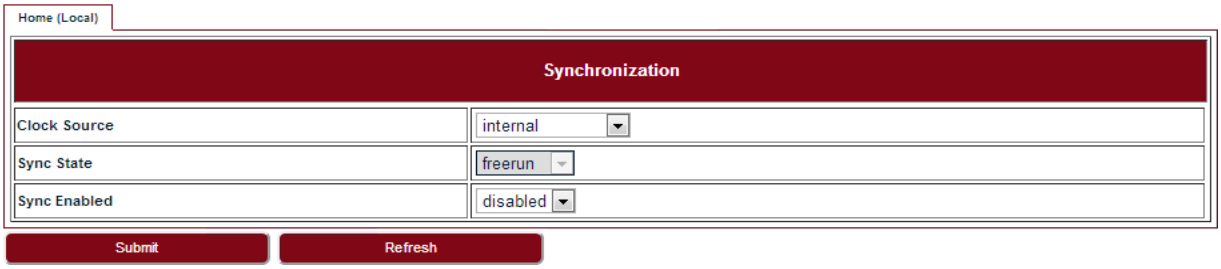
2. To set SNTP, fill out all the parameters and click **Submit.**

3.9 Synchronization

Steps

1. Go to **Configuration > System > Synchronization** page.

FIGURE 18. Synchronization



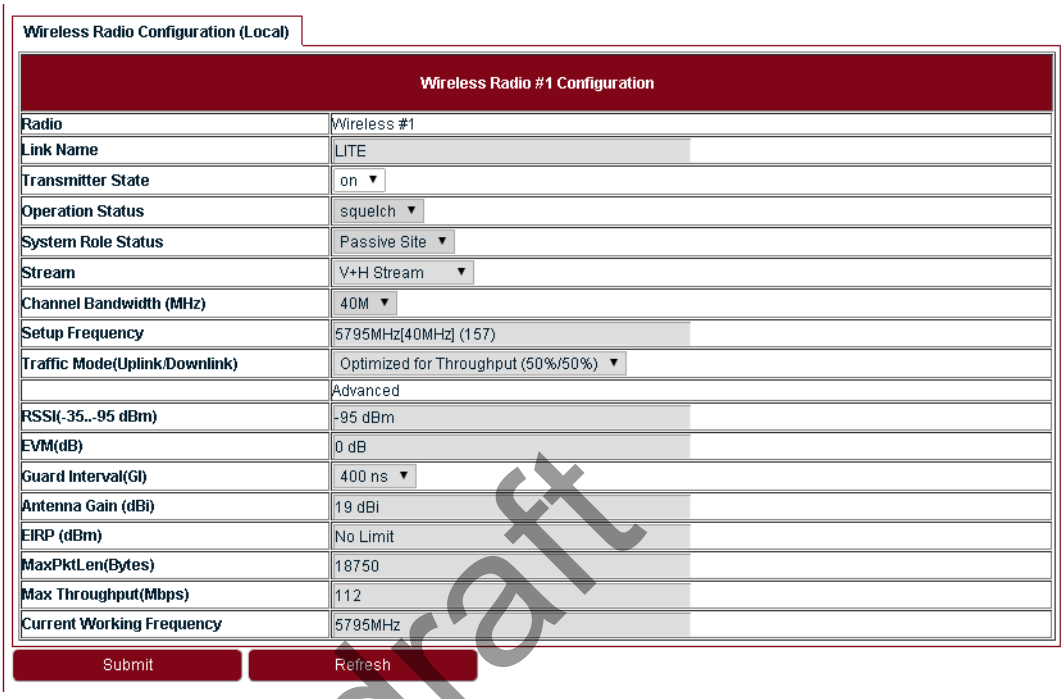
2. To set Synchronization, fill out all the parameters and click **Submit.**

4 Wireless radio configuration

4.1 Wireless radio #1 configuration

Go to **Configuration > Wireless Radio > Wireless** page to see the Wireless Radio Configuration.

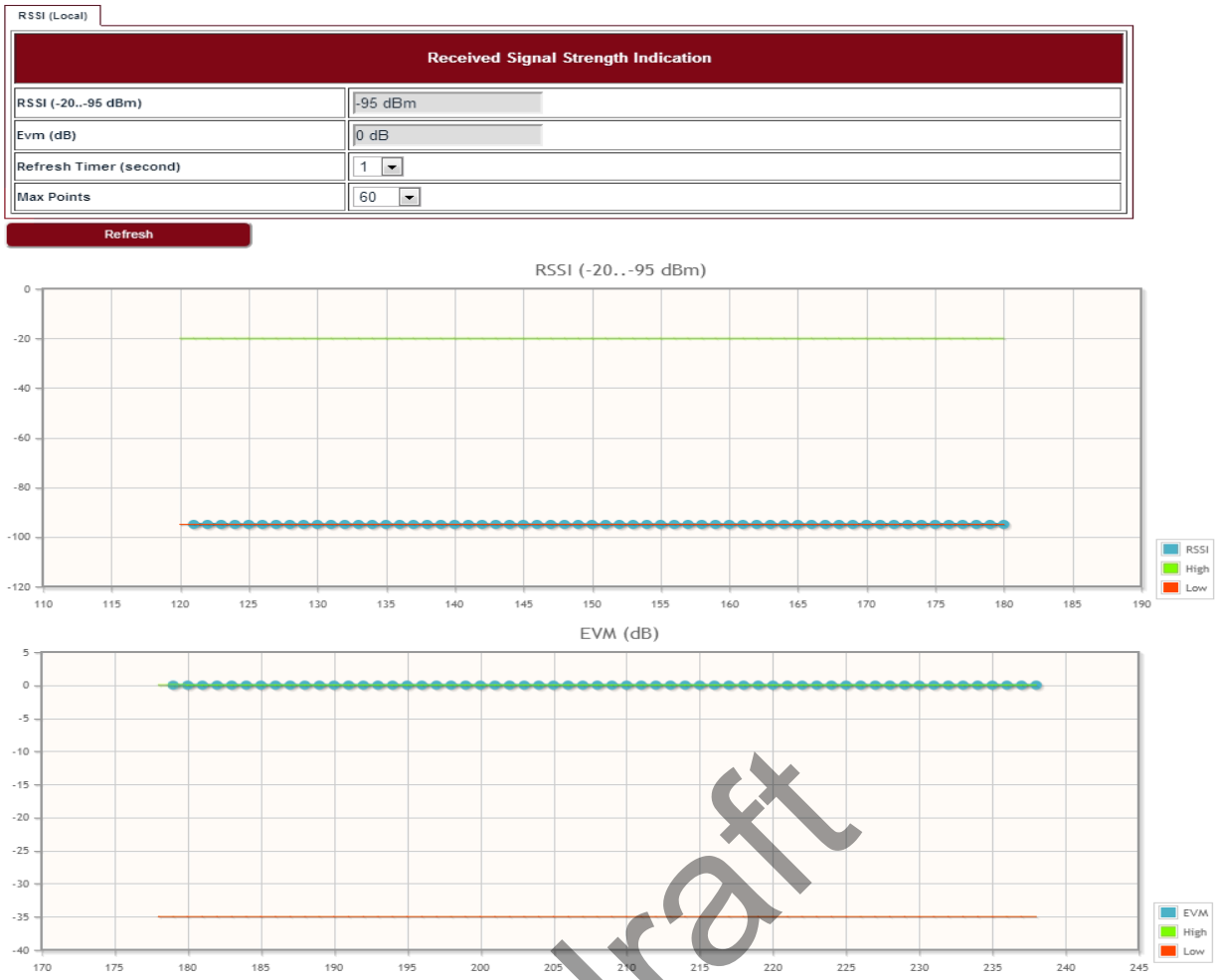
FIGURE 19. Wireless radio #1 configuration



4.2 Received Signal Strength Indication

Go to **Configuration > Wireless Radio > RSSI** page to see the Received Signal Strength Indication.

FIGURE 20. RSSI



4.3 Modulation and ACM

Go to **Configuration > Wireless Radio > ACM** page to set the modulation and ACM parameters.

FIGURE 21. ACM

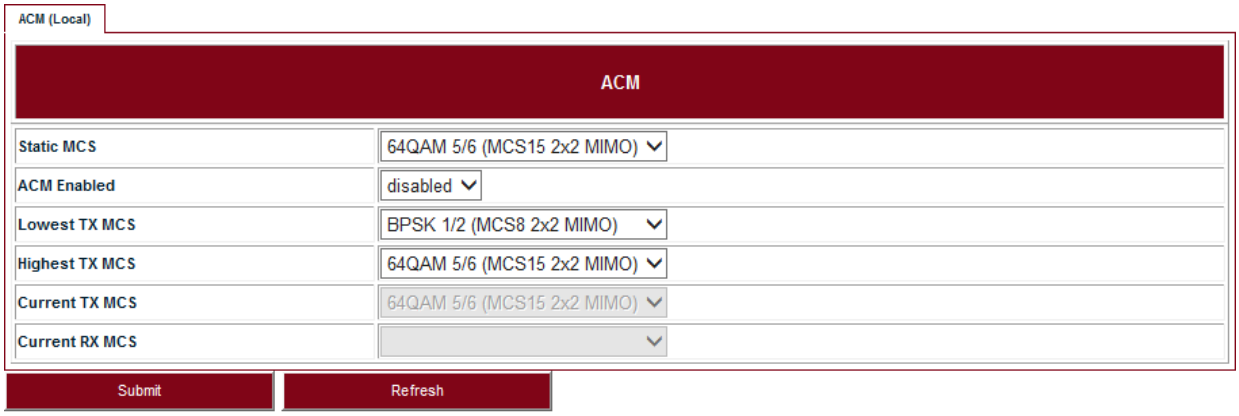


TABLE 11. ACM

Parameter	Description
Static MCS	The Tx modulation when ACM is disabled.
ACM Enabled	*Enabled* or *Disabled*.
Lowest TX MCS	MCS range for Lite, when ACM is enabled.
Highest TX MCS	

4.4 Tx power and Adaptive Transmit Power Control (ATPC)

Adaptive Transmit Power Control (ATPC) allows a Lite system to adjust its transmit power to compensate for far end signal loss caused by changes in atmospheric conditions, e.g., heavy rain. ATPC maintains the RSSI at the ATPC threshold, which is system mode dependent, and adjusts the transmit power as necessary in order to maintain the ATPC threshold during fading conditions.

Go to **Configuration > Wireless Radio > TPC** page.

FIGURE 22. TPC

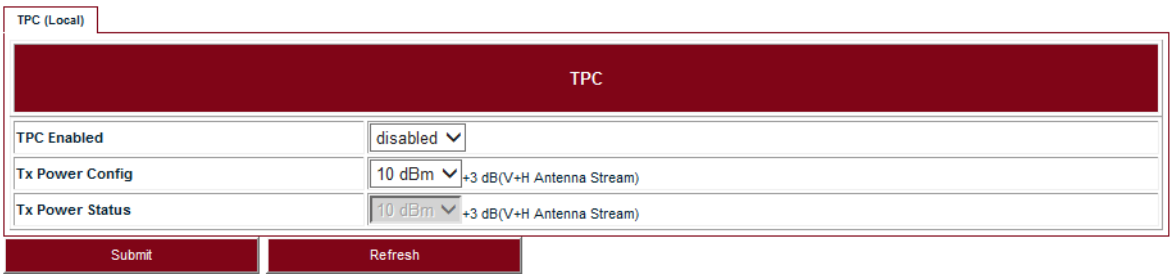


TABLE 12. TPC

Parameter	Description
ATPC Enabled	*Enabled or Disabled*. Default: *Disabled*.
Tx Power Config	Set the Tx Power on each chain, it is limited by local regulations.

5 Ethernet configuration

5.1 Ports

Go to **Configuration > Ethernet > Port > Ports** page to set the Ethernet Ports.

FIGURE 23. Ethernet ports

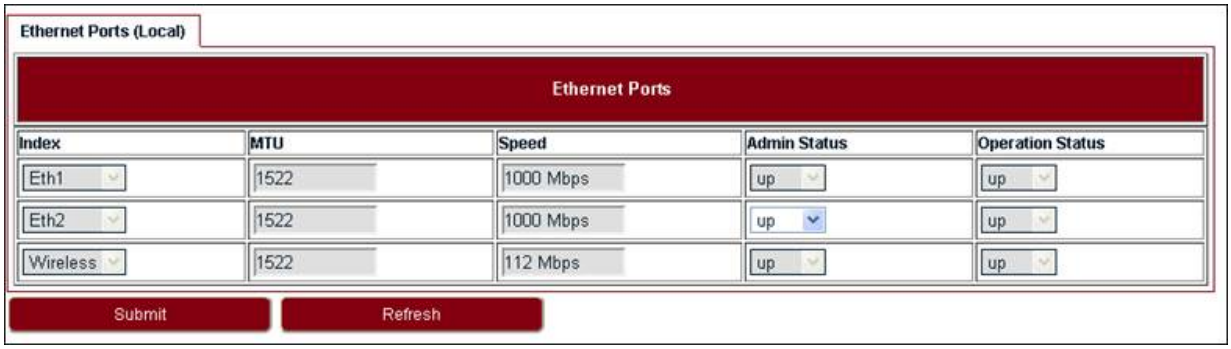


TABLE 13. Ethernet ports

Parameter	Description
MTU	The MTU of Lite is a fixed value: 1522.
Speed	It shows the current speed of the port.
Admin Status	By default the Admin Status of all ports is *up*, only the Admin Status of Eth2 can be set to *down*.
Operation Status	It displays the current port status which can be *up* or *down*.

5.2 Speed

Go to **Configuration > Ethernet > Port > Speed** page to set the Ethernet Port Speed Configuration.

FIGURE 24. Ethernet port speed configuration

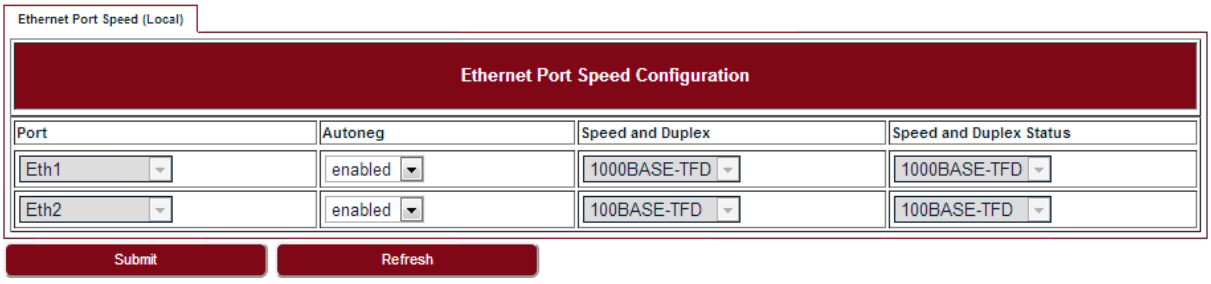


TABLE 14. Ethernet port speed configuration

Parameter	Description
Autoneg	The autonegotiation is *enabled* by default. It can be configured to *disabled*.

TABLE 14. Ethernet port speed configuration

Parameter	Description
Speed and Duplex	Under the autoneg disabled status, speed and duplex of port can be configured, only 100Base-THD, 100Base-TFD and 1000Base-TFD can be supported.
Speed and Duplex Status	It displays the current status of Ethernet speed and duplex.

5.3 VLAN management

Go to **Configuration > Ethernet > VLAN > VLAN** page to set the VLAN Configuration.

FIGURE 25. VLAN configuration

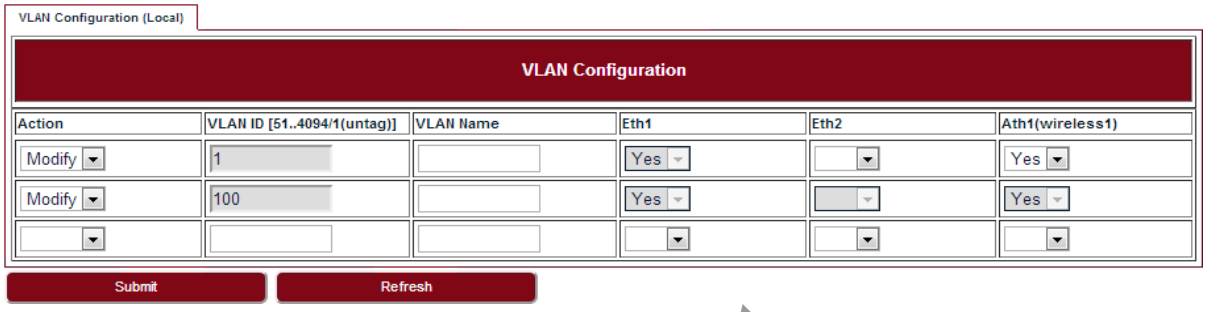


TABLE 15. VLAN configuration

Parameter	Description
VLAN ID	The VLAN 1 is a special VLAN used to forward untagged traffic and for local management, it is a permanent VLAN and cannot be deleted. It includes Eth1 and Wireless port by default. The available values of VLAN ID are 51 ~ 4094, 2 ~50 are reserved by system. They are all tagged VLAN. The maximum number of VLANs is 48.

To create a VLAN, select *Create* in the **Action** drop-down list and fill out all the parameters and click **Submit**.

Similarly, a VLAN can be modified or deleted by selecting *Modify* or *Delete* in the **Action** drop-down list and click **Submit**.

5.4 QoS scheduler

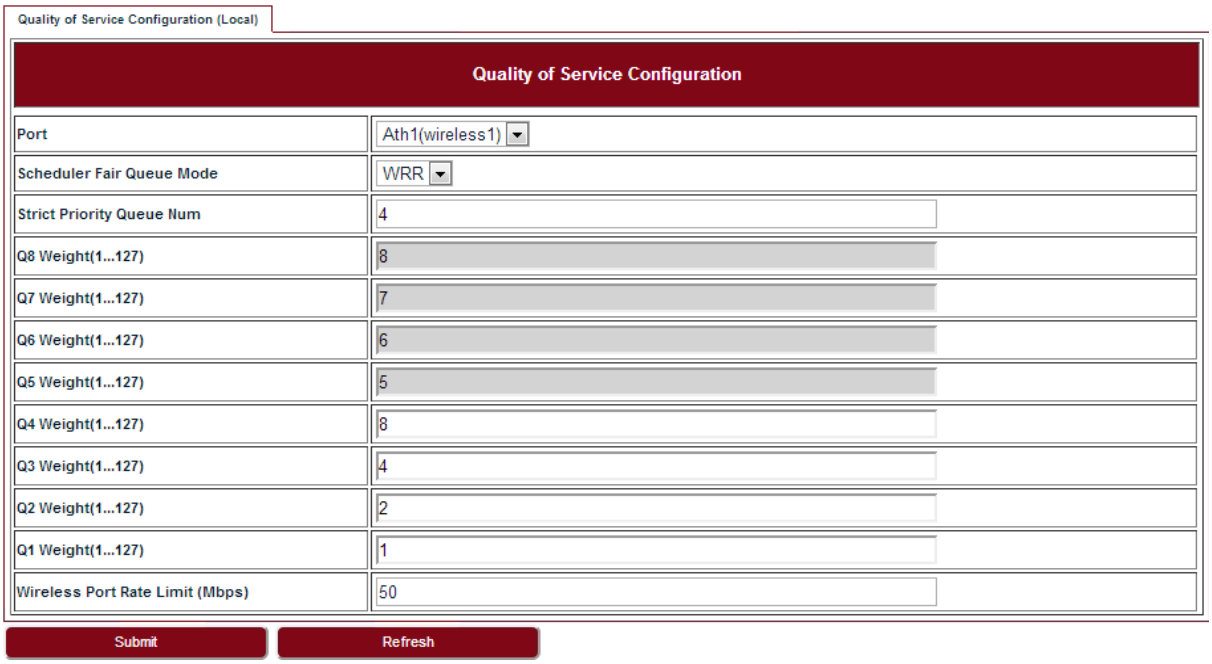
Go to **Configuration > Ethernet > QoS > QoS** page to set the QoS Scheduler. Three scheduling modes are supported:

- Strict Priority
- Weighted Round Robin (WRR)/Deficit Weighted Round Robin (DWRR)
- Strict Priority + WRR/DWRR

While the *Strict Priority Queue Number* is 8, it is SP mode. While the number is less than 8, it is SP + WRR or SP + DWRR two scheduler modes.

The default scheduling mode is SP+WRR, 4 SP queue + 4 WRR queue, the weight for Q4-Q1 are 8:4:2:1. The *Wireless Port Rate Limit* will only take effect when its value is lower than the Wireless Throughput.

FIGURE 26. Quality of Service Configuration



5.5 Traffic criteria

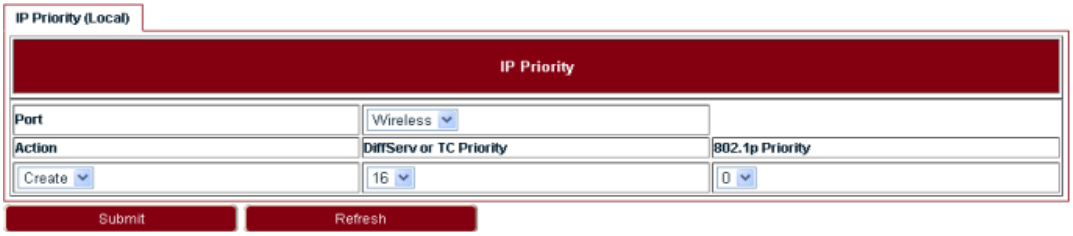
Go to **Configuration > Ethernet > QoS > Traffic Criteria** page to set the Traffic Criteria. The *Port* and *VLAN priority 802.1p* are the default traffic criteria for tagged traffic and untagged traffic. And they cannot be disabled. The *IPv4 DSCP* can be enabled if it is necessary, and it is prior to other criteria if the *DSCP-802.1p* mapping was configured in the list. Default setting is with *IPv4 DSCP* criteria disabled with the exclusion of the *VLAN priority 802.1p* and *Port* criteria that is always enabled.

FIGURE 27. Traffic Criteria

5.6 IP priority

Go to **Configuration > Ethernet > QoS > IP Priority** page to set the IP Priority. Frames whose *DiffServ or TC Priority* does not belong to any entry of the *IPv4 DSCP* priority table and which are tagged will be processed using *VLAN PRI 802.1p* priority, or which are untagged will be processed using *Port* criteria. Up to 64 values (between 0 and 63) can be configured by NMS.

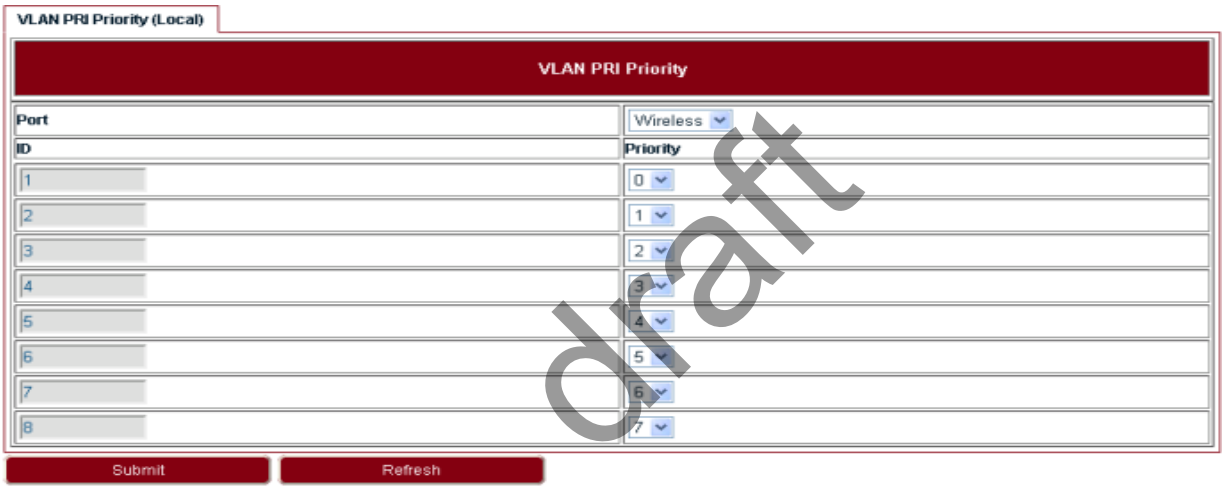
FIGURE 28. IP priority



5.7 VLAN PRI priority

Go to **Configuration > Ethernet > QoS > Vlan PRI Priority** page to set the VLAN PRI Priority. When VLAN priority field criterion is enabled, it is possible to associate an output priority to each one of VLAN priority field values. Classification for single tagged frames (802.1Q compliant) is based on VLAN Priority. For untagged frame, the VLAN priority is set to 0. Classification for Q-in-Q frames (both 802.1ad compliant and proprietary formats) is based on outer VLAN Priority. The eight default priority values for the VLAN priority fields can be configured.

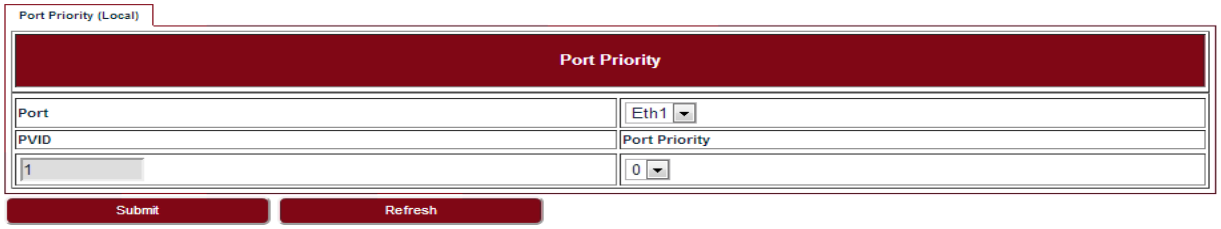
FIGURE 29. VLAN PRI priority



5.8 Port priority

Go to **Configuration > Ethernet > QoS > Port Priority** page to set the Port Priority. Port priority field criterion is enabled by default, it cannot be disabled. It is used to address the untagged frames which are not IPv4 frames or IPv4 frames but not match the DSCP and 802.1p mapping in IPv4 DSCP criteria. For untagged frame, the VLAN priority is set to 0 by default. The value for *Port Priority* can be set in range of 0-7.

FIGURE 30. Port priority



5.9 Aging time

Go to **Configuration > Ethernet > FDB > Aging Time** page to set the Ethernet Aging Time.

FIGURE 31. Aging time

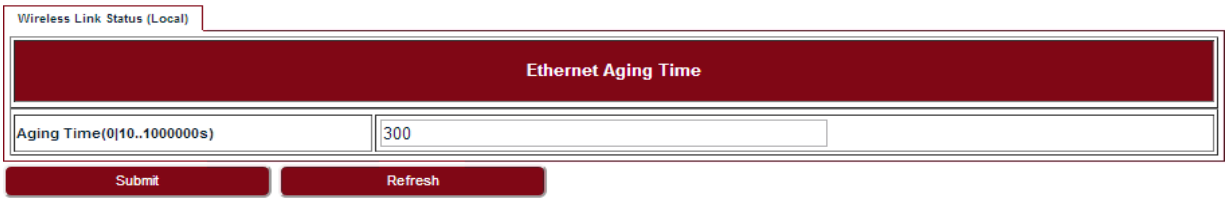


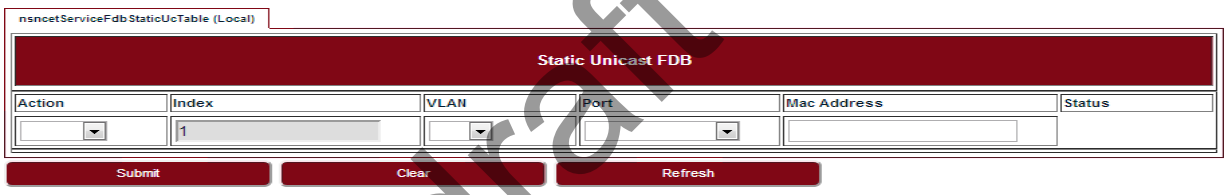
TABLE 16. Aging time

Parameter	Description
Aging Time	The values of aging time are 0/10-1000000s. If 0 was configured, it means Lite does not learn MAC address.

5.10 Static Unicast FDB

Go to **Configuration > Ethernet > FDB > Static Unicast FDB** page to set the Static Unicast FDB.

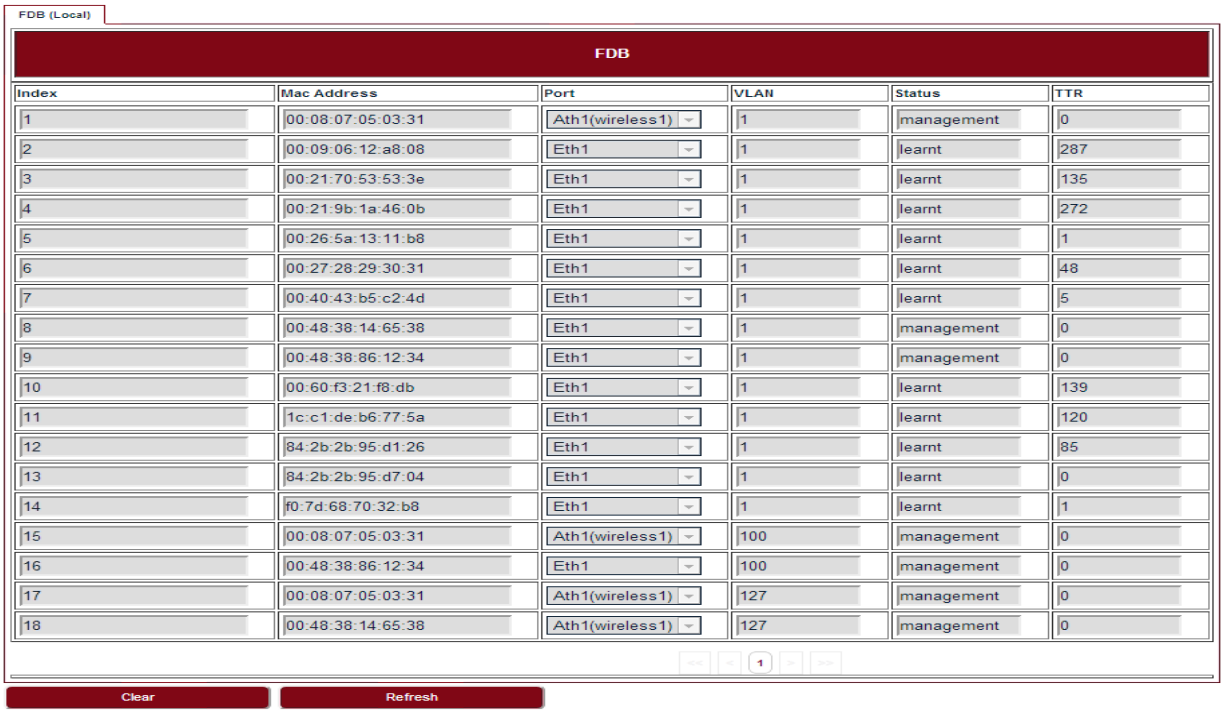
FIGURE 32. Static Unicast FDB



5.11 All FDB

Go to **Configuration > Ethernet > FDB > All FDB** page to see all FDB. The management status in FDB means system reserved MAC address, they were used by internal port.The learnt status is dynamic MAC address. TTR is the remaining time to be removed from FDB list. For management status MAC address, it is always zero.

FIGURE 33. All FDB

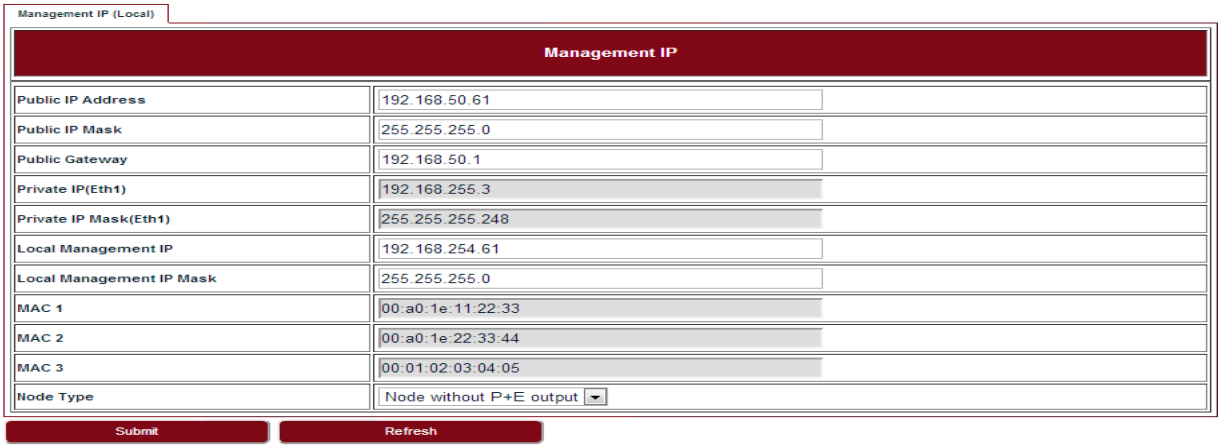


6 Management

6.1 IP

Go to **Configuration > Management > IP** page to set the Management IP.

FIGURE 34. Management IP



6.2 Management VLAN

Go to **Configuration > Management > Management VLAN** page to set the Management VLAN.

FIGURE 35. Management VLAN

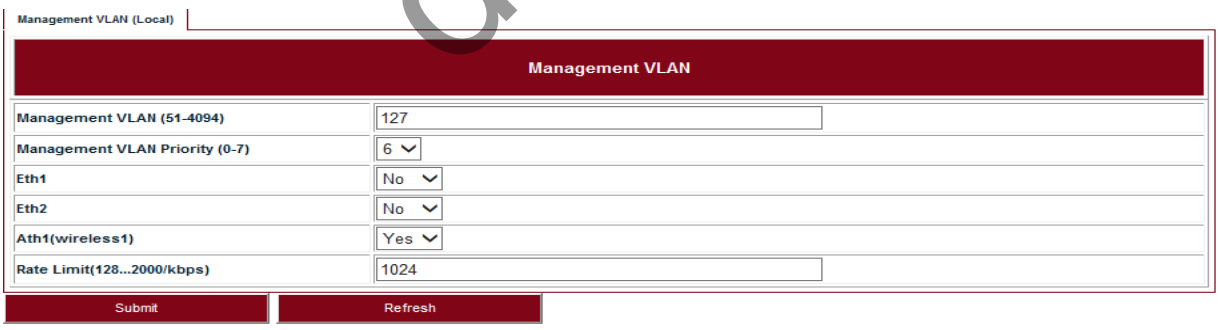


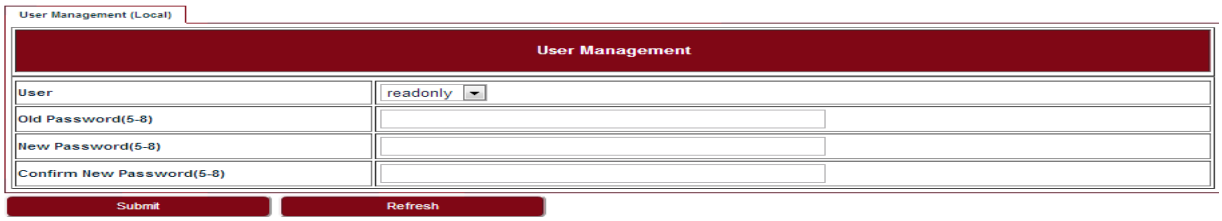
TABLE 17. Management VLAN

Parameter	Description
Management VLAN	Configure the management VLAN ID for remote login. Values are 51 ~ 4094. Default: 127.
Management VLAN Priority	Configure the management VLAN priority. Values are 0 ~ 7. Default: 6.
Eth1	Configure which port is in management VLAN.
Eth2	
Ath1 (wireless1)	
Rate Limit	It is engress and eggress rate limit for management VLAN. Values are 128Kbps ~ 2Mbps. Default: 1024Kbps.

6.3 SNMP

Go to **Configuration > Management > SNMP** page to change the User Name and Password. Default User Name is *energetic*, default Password is *wireless.*

FIGURE 36. User management



6.4 Trap

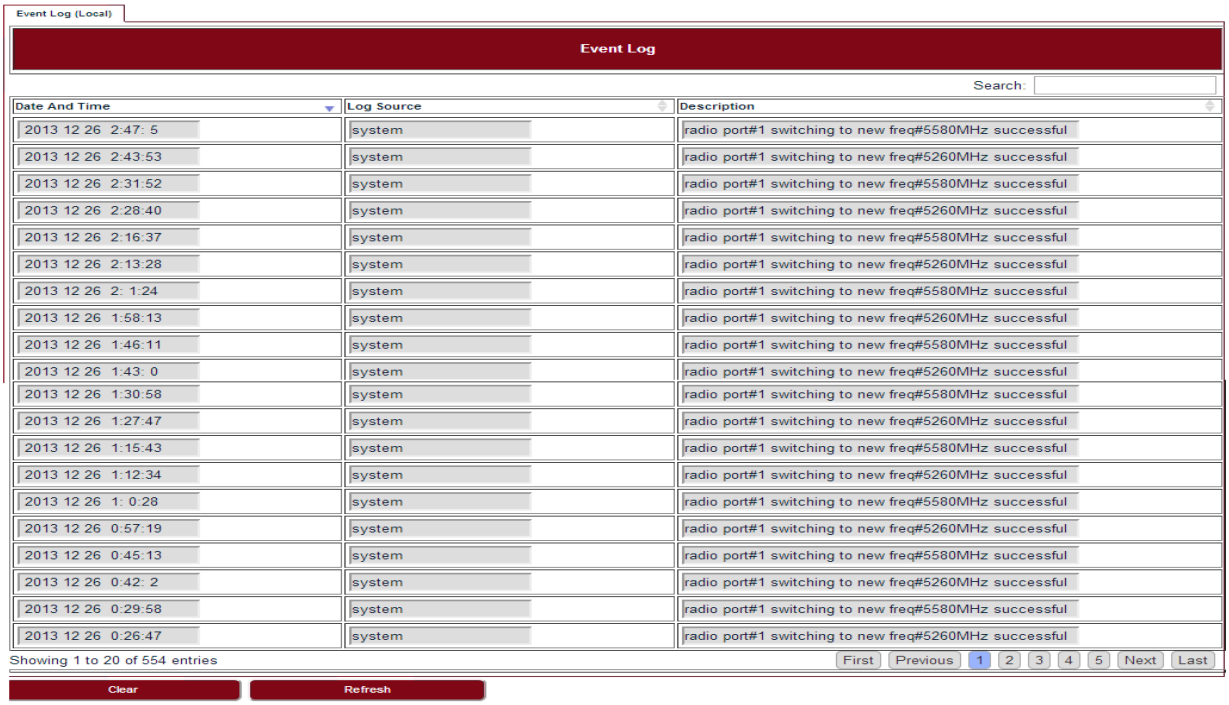
Go to **Configuration > Management > Trap** page to set the Trap Destination parameters.

FIGURE 37. Trap

6.5 Event log

Go to **Configuration > Management > Event Log** page to see all the event logs.

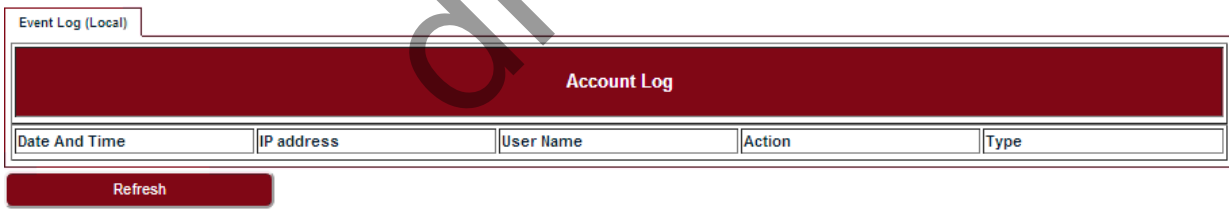
FIGURE 38. Event log



6.6 Account log

Go to **Configuration > Management > Account Log** page to see all the account logs.

FIGURE 39. Account log

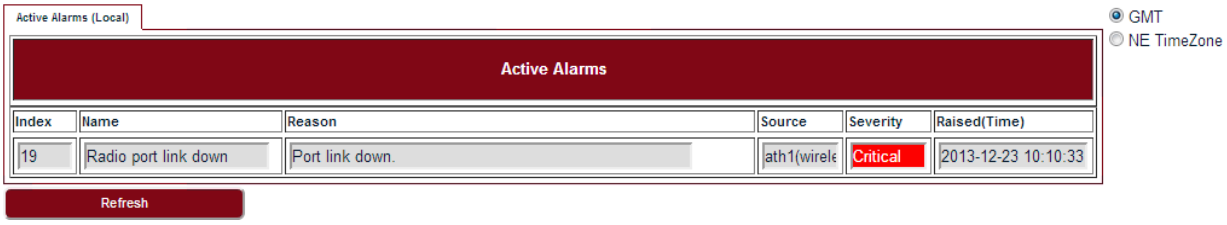


7 Alarms

7.1 Active alarms

Go to **Alarms > Active Alarms** page to see the current alarm list.

FIGURE 40. Active alarms



7.2 History alarms

Go to **Alarms > History Alarms** page to see the history alarm list.

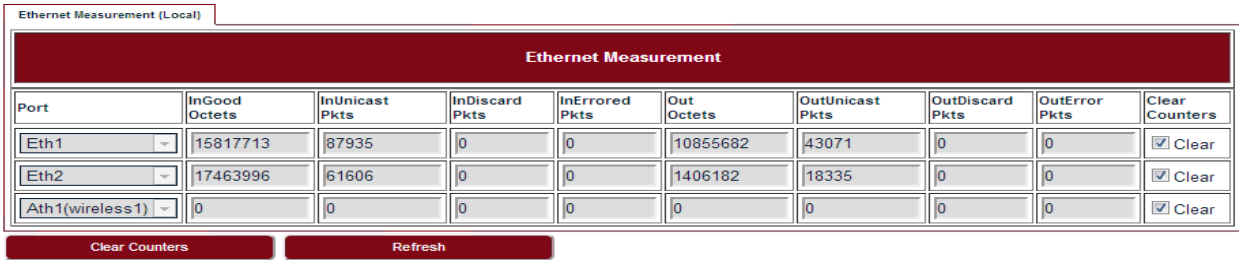
FIGURE 41. History alarms

8 Performance

8.1 Ethernet

Go to **Performance > Ethernet** page to see the Ethernet measurement.

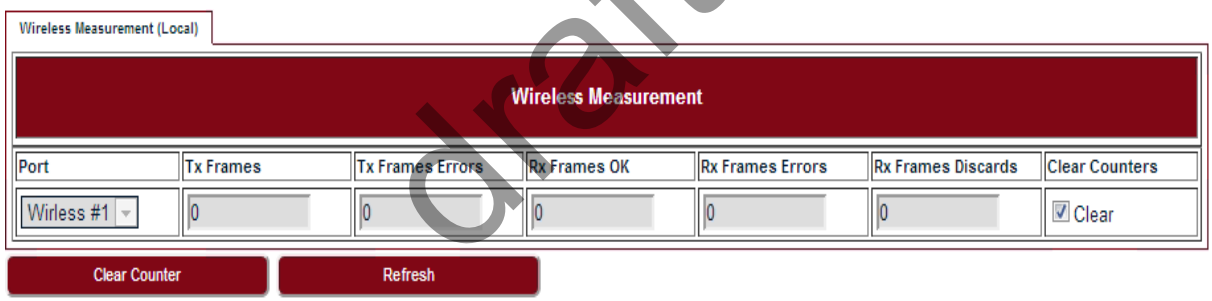
FIGURE 42. Ethernet



8.2 Wireless

Go to **Performance > Wireless** page to see the Wireless measurement.

FIGURE 43. Wireless



9 Diagnostics

9.1 Link status

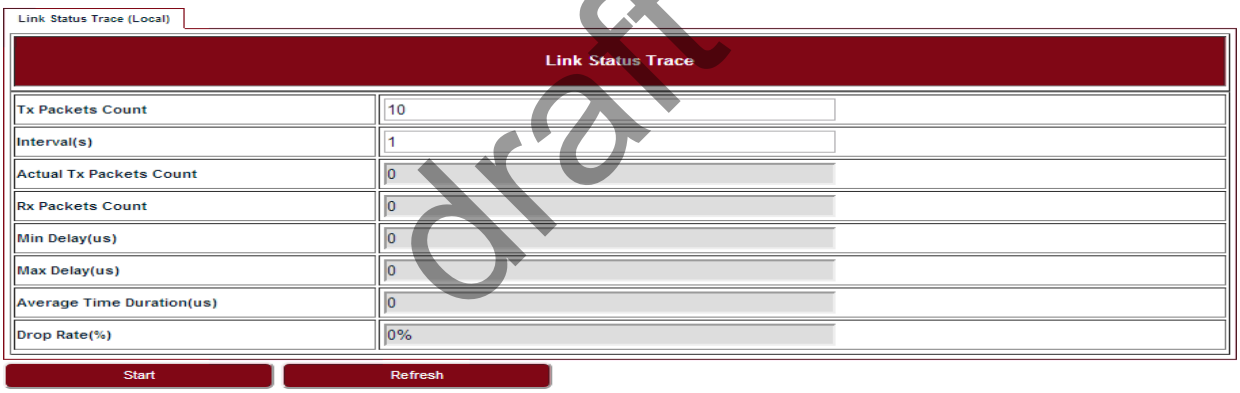
Go to **Diagnostics > Link Status** page to see the Wireless link status.

FIGURE 44. Link status

9.2 Link status trace

Go to **Diagnostics > Link Status Trace** page to see the link status trace.

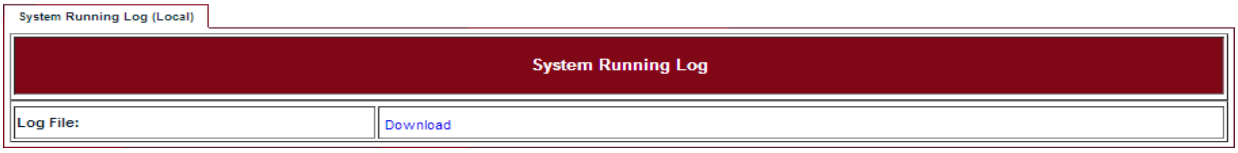
FIGURE 45. Link status trace



9.3 System running log

Go to **Diagnostics > System Running Log** page, click on “Download” to see the system running log.

FIGURE 46. System running log



10 About

Go to the **About** page to see the information about the Link Viewer release.

FIGURE 47. About Link Viewer

Operating Channel Declaration

Operating Channel List

Channels for 20MHz Channel Bandwidth

Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745 MHz	153	5765 MHz	157	5785 MHz
161	5805 MHz	165	5825 MHz	N/A	N/A

Channels for 40MHz Channel Bandwidth

Channel	Frequency	Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz	N/A	N/A

Note: There is no weather radar frequency band (5600-5650MHz) for the Microwave Outdoor Unit.

Declaration of Conformity for RF Exposure

This microwave outdoor unit product has been found to be compliant to the requirements set forth in CFR 47Section 1.1307 addressing RF Exposure from radio frequency devices as defined in Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

Antennas with less than 23.5 dBi gain should be located at a minimum of 39.03 cm in more from the body of all persons.

Calculation Formula: $P_d = (P_{out}*G)/(4*pi*r^2)$

Where
Pd = power density in mW/cm2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
r = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, 1mW/cm².

If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

Federal Communications Commission (FCC) Interference Statement
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 generate, 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 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.

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

RF exposure warning

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 39.03 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.