DragonWave

LITE, R1.0

Operation and Maintenance Guide

Issue 1, updated in January, 2014

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1 Preface

1.1 History of changes

The history of changes is shown in the following table:

TABLE 1. History of changes

Issue	Updates	Date
1	-	January, 2014

1.2 Scope of the document

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

INFO

This document only concerns 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.
Chapter 7	Alarms	Provides the information about alarm lists.
Chapter 8	Performance	Provides the guidance to make performance configurations.

TABLE 2. Document structure

Chapter	Title	Subject
Chapter 9	Diagnostics	Provides the guidance to make diagnostics configurations.
Chapter 10	About	Provides the information about the link view.
Chapter 11	AutoGenerator	Provides the guidance to make auto generator configurations.

2 Commissioning

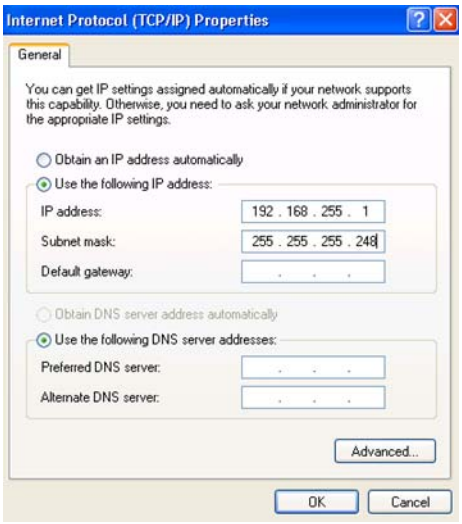
2.1 Before commissioning

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



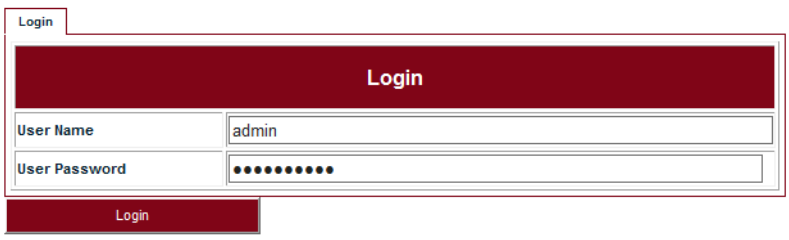
2.2 Commission steps

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** *admin* (by default) and User **Password** *sysmanager* (by default) and click **Login**. The home page of Link Viewer appears.

FIGURE 3. Link Viewer

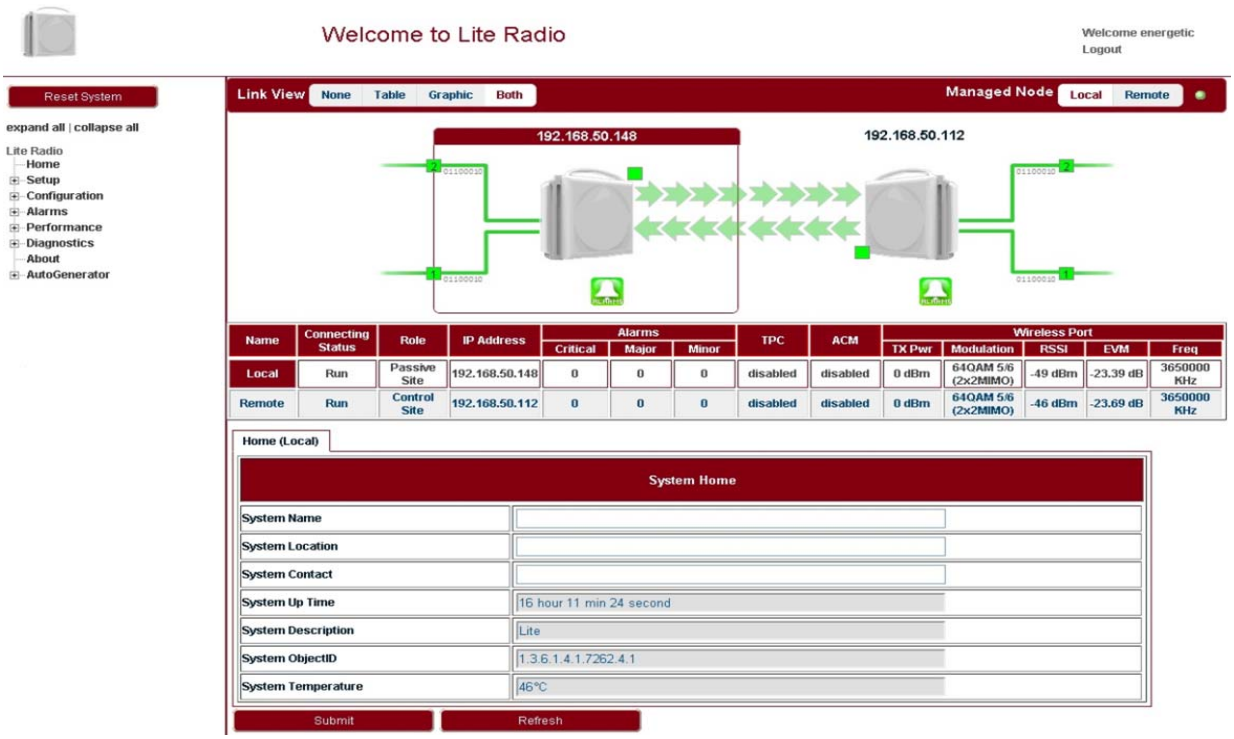


TABLE 3. System home

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	
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

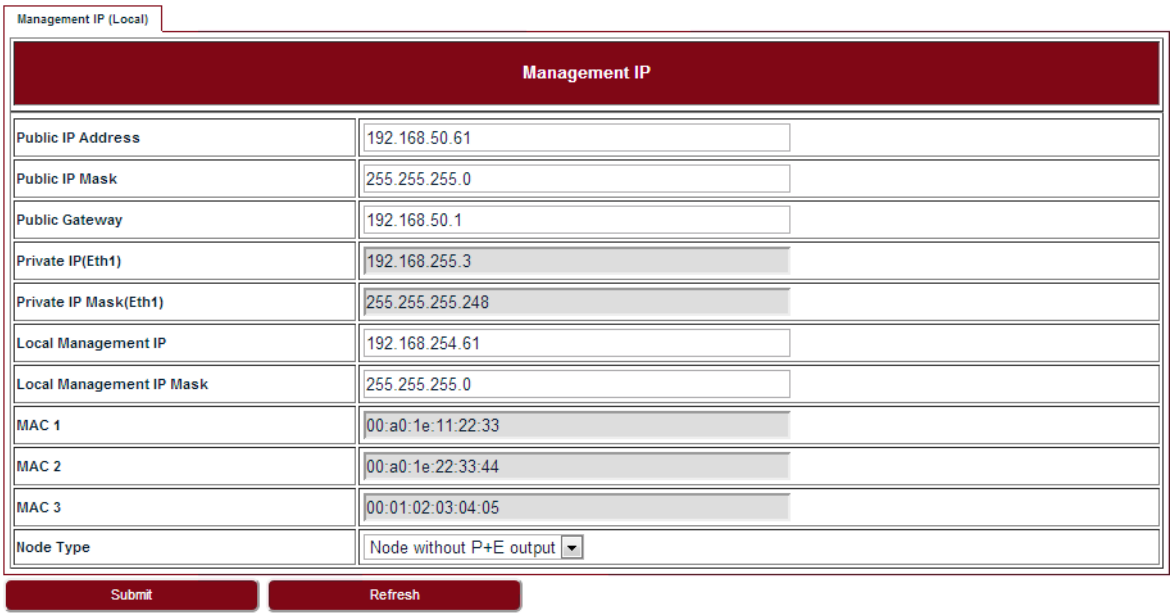


TABLE 4. Management IP

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 learned MAC addresses of Ethernet and Wireless ports.
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

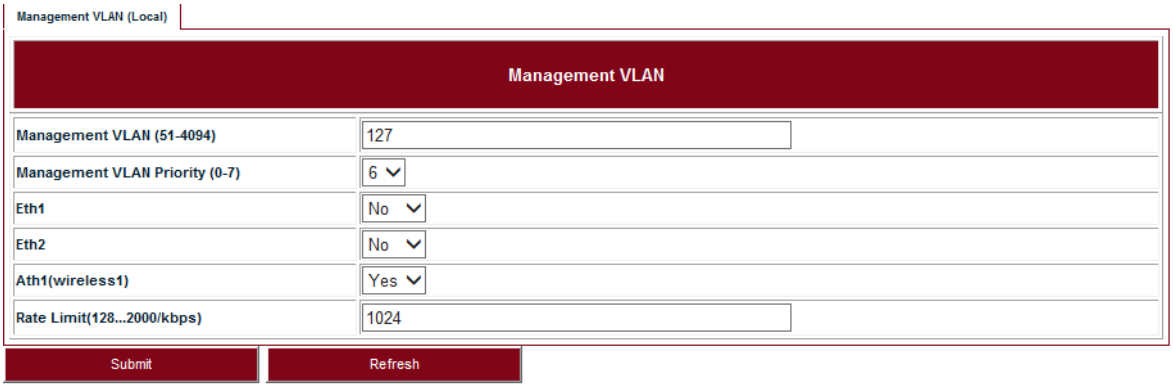


TABLE 5. Management VLAN

Parameter	Description
Management VLAN	Configure the management VLAN ID for remote login. VLAN range from 51 ~ 4096. 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. If the management VLAN setting has been set to yes, it doesn't need to be added into the VLAN table in **Ethernet > VLAN > VLAN** page.
Eth2	
Ath1(wireless1)	
Rate Limit	Configure the engress and eggress rate limit for management VLAN. Value from 128Kbps ~ 2Mbps. Default: 256Kbps.

2.2.4 Setting the radio parameters

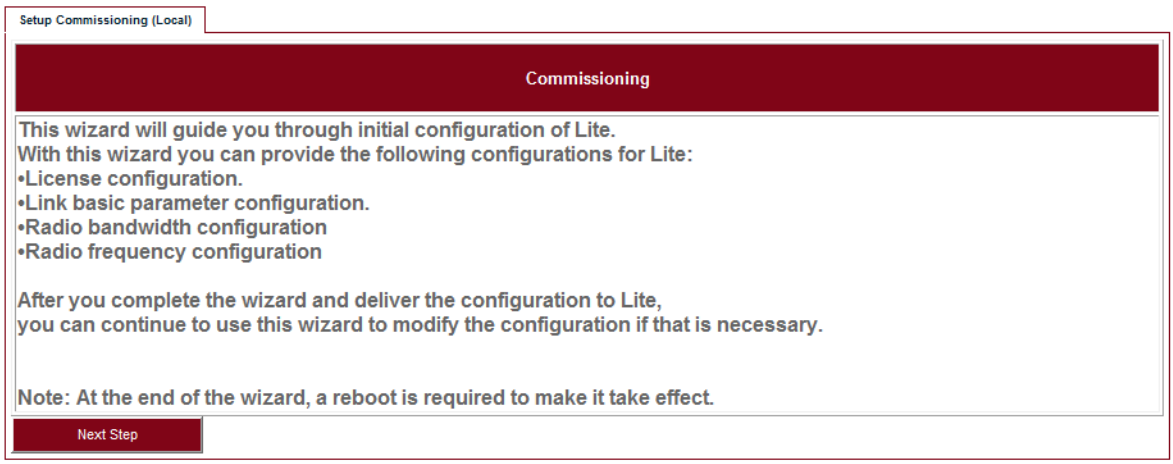
Before setting the radio parameters, ensure that the correct radio standard is licensed for the geographic location where the radio is to be installed. For example: FCC for USA or Canada, ETSI for Europe and Asia, etc.

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

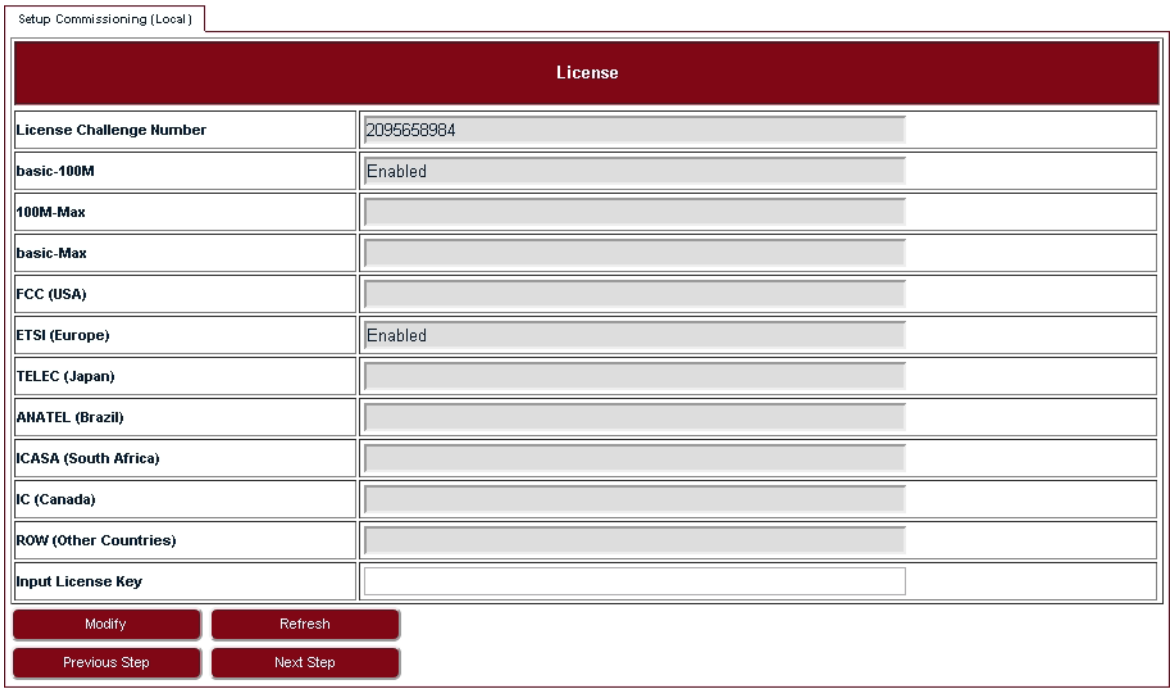
1. Go to **Setup > Commissioning** tab (see Figure 6) and click **Next Step**.

FIGURE 6. Step 1



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

FIGURE 7. Step 2



3. Set up wireless parameters according to Table 6.

FIGURE 8. Step 3

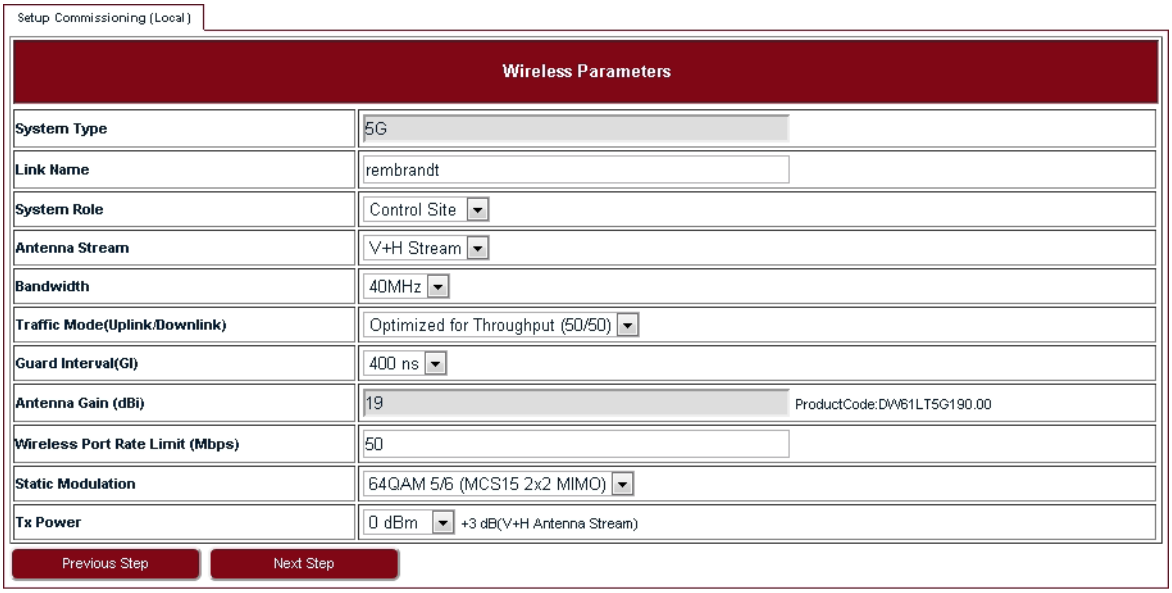


TABLE 6. Wireless parameters

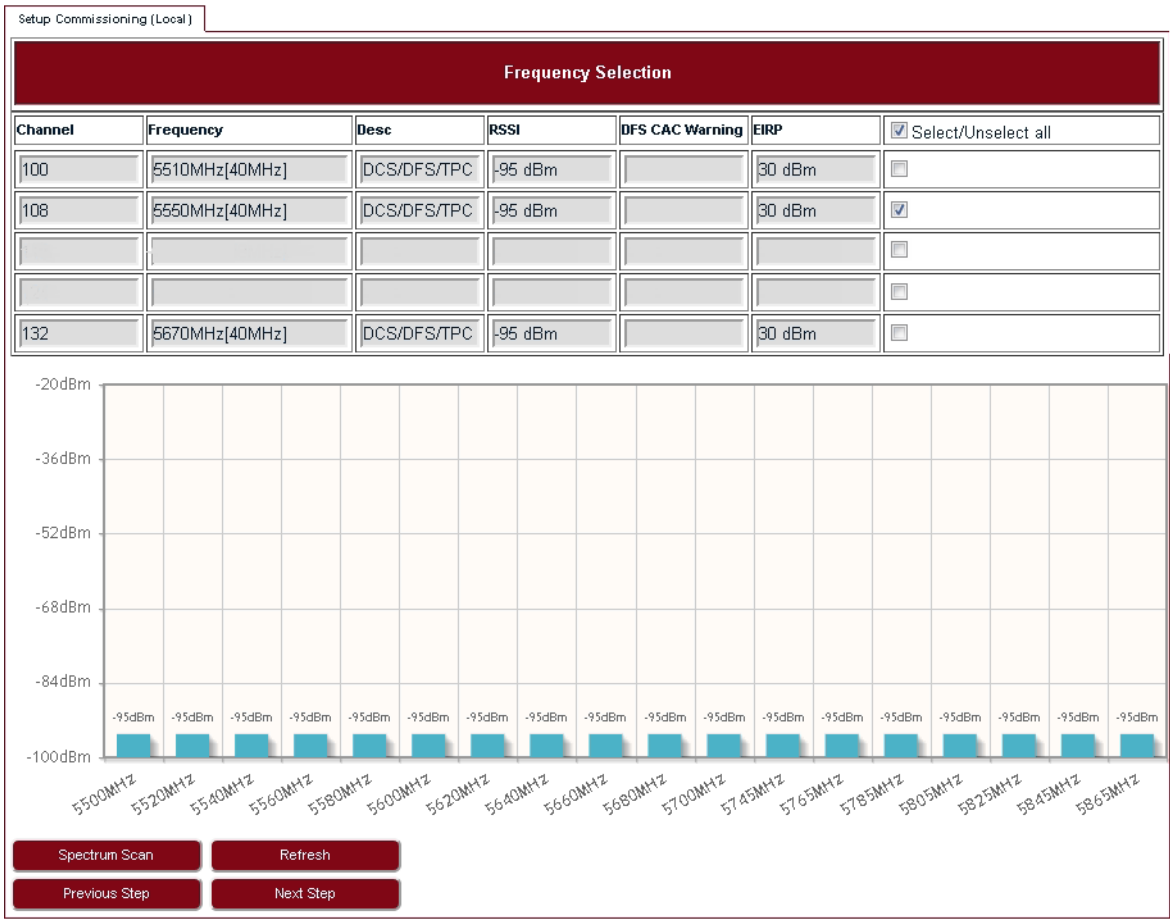
Parameter	Description
Link Name	Up to 32 characters, and both numbers and characters are supported.
System Role	*Control Site* or *Passive Site*. One end of LITE should be configured as the Control Site, and the other end the Passive Site.
Antenna Stream	V+H Stream supported.
Bandwidth	*40 MHz* or *20MHz*.

TABLE 6. Wireless parameters

Parameter	Description
Traffic Mode (Uplink/ Downlink)	*50/50*, *70/30*, 30/70 For 50/50, the uplink and downlink have same bandwidth. For 70/30, it supports asymmetric traffic for uplink and downlink.
Guard Interval	*400 ns* or *800 ns*. If the maximum multi-path delay spreads more than 400 ns, we suggest to use 800 ns.
Wireless Port Rate Limit	Rate limit on wireless port.
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 **Frequency Selection** page, click **Spectrum Scan** and Rx RSSI for each channel will be shown on Link Viewer (see Figure 9). This page allows the user to see which channels are currently in use by other radio equipment nearby. It also allows the user to select specific channels for this radio link.

FIGURE 9. Step 4



5. It is suggested to select one or more channels from those available which have RSSI that is lower than -90 dBm in Figure 9. After selection, click **Next Step**.
6. In **Configuration Summary** page, set the **Setup Frequency** field according to Table 7.

FIGURE 10. Step 6

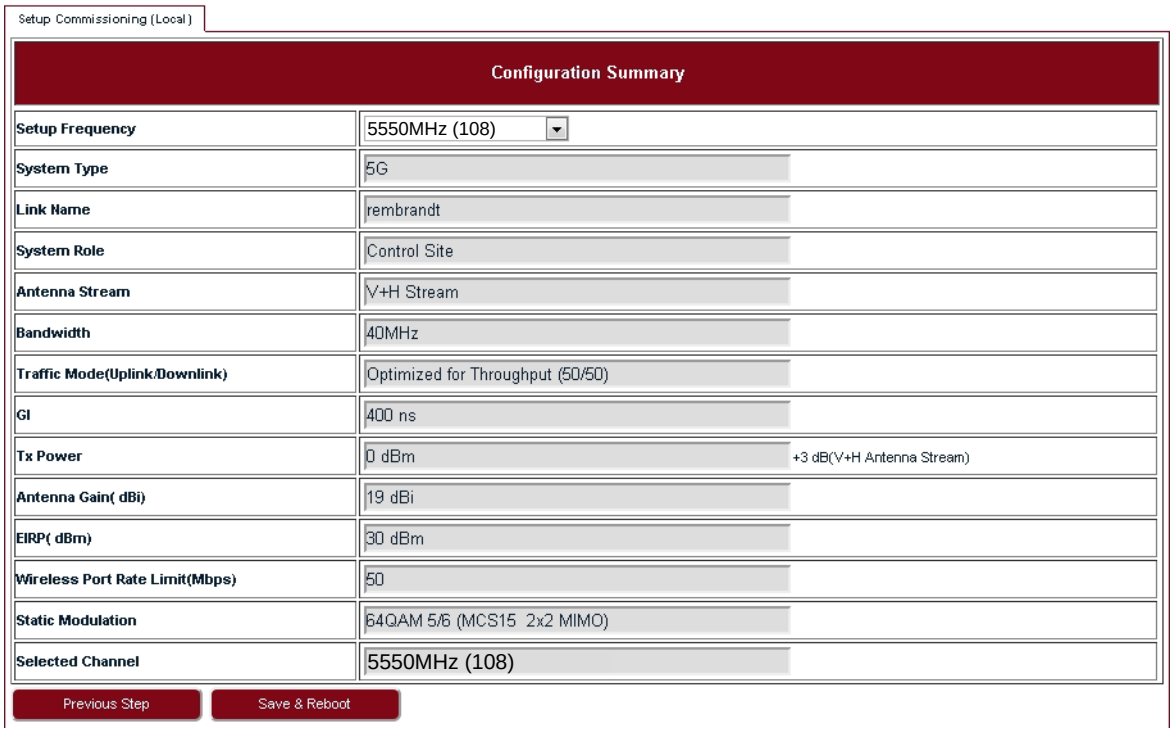


TABLE 7. Configuration Summary

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

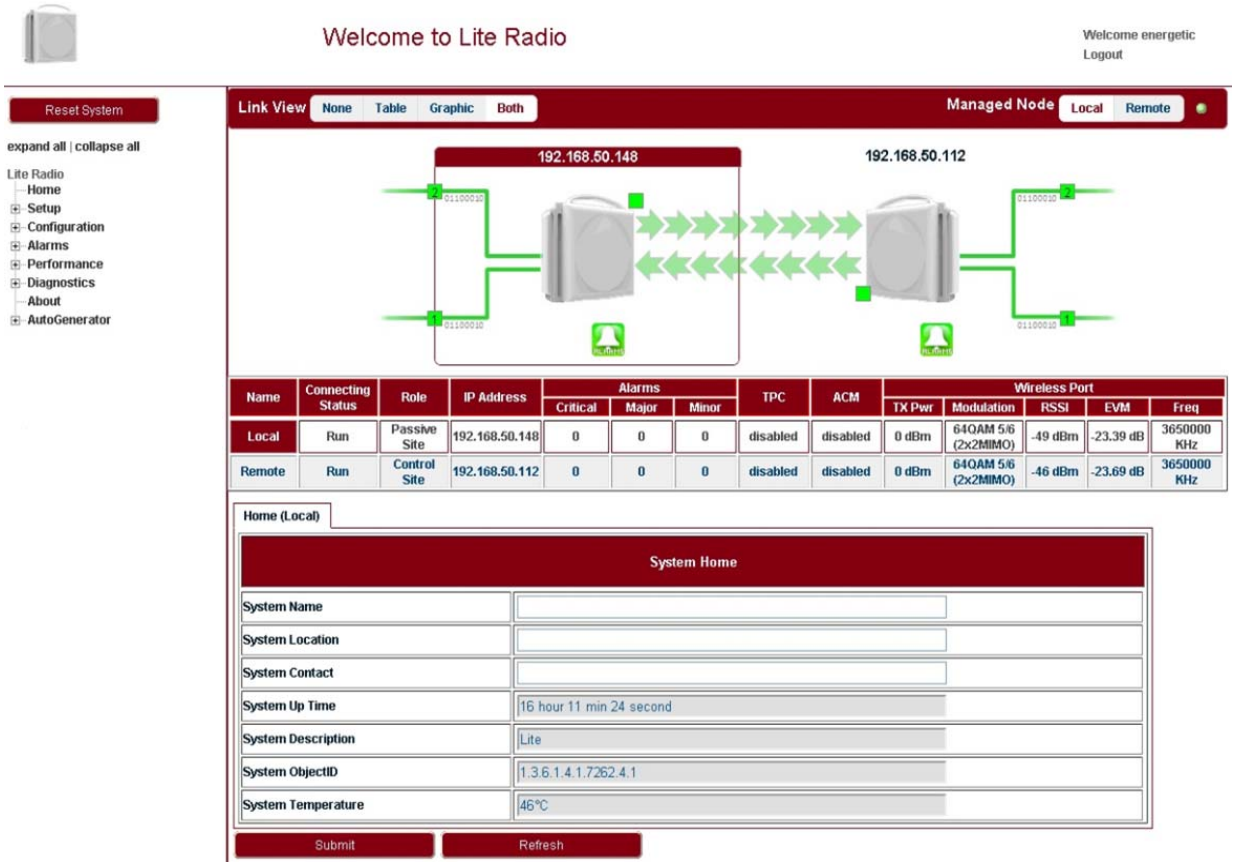
7. Check all the configurations in Figure 10 and click **Save & Reboot** so that LITE will restart and run under new configurations.

3 System configuration

3.1 System home

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

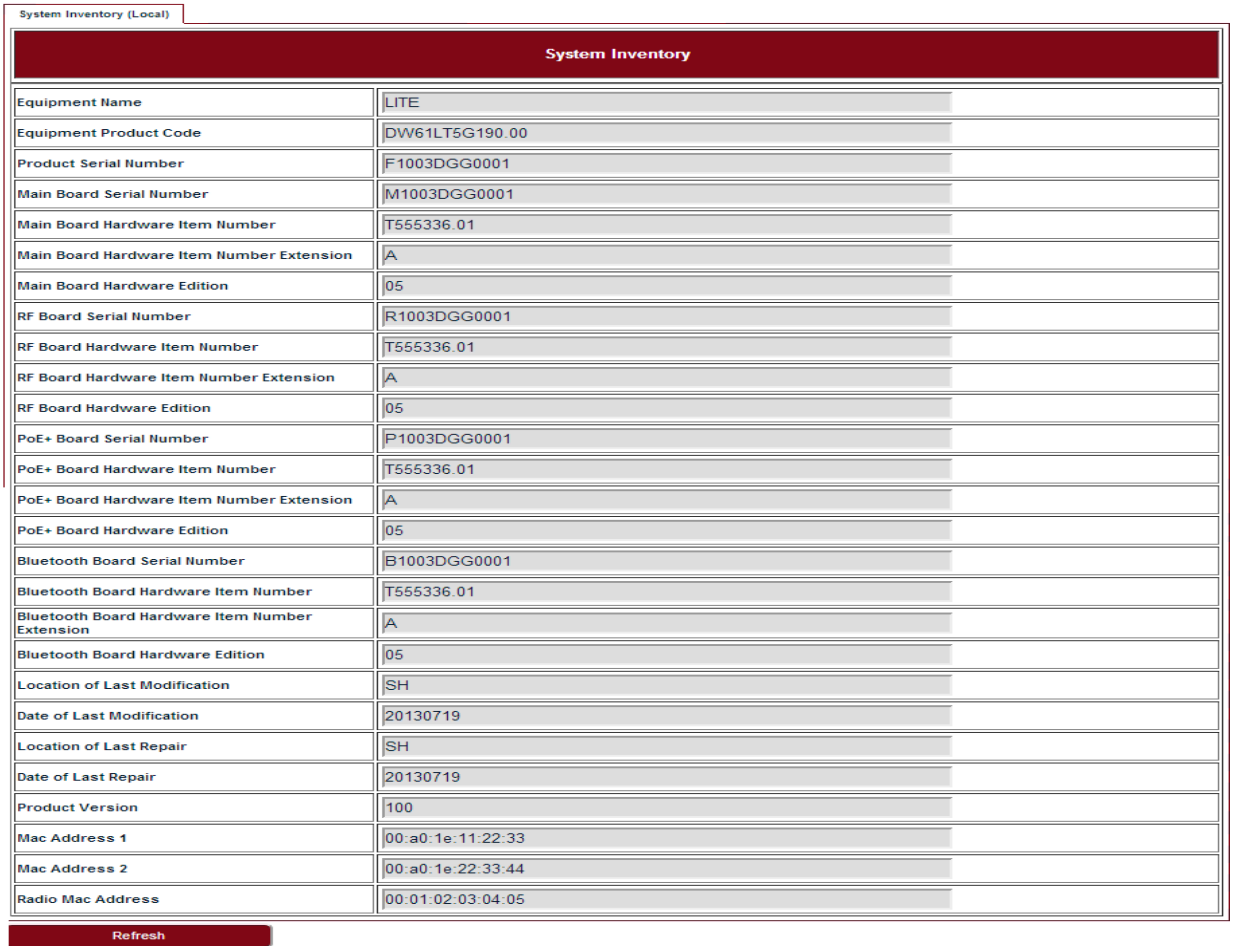
FIGURE 11. System Home



3.2 System inventory

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

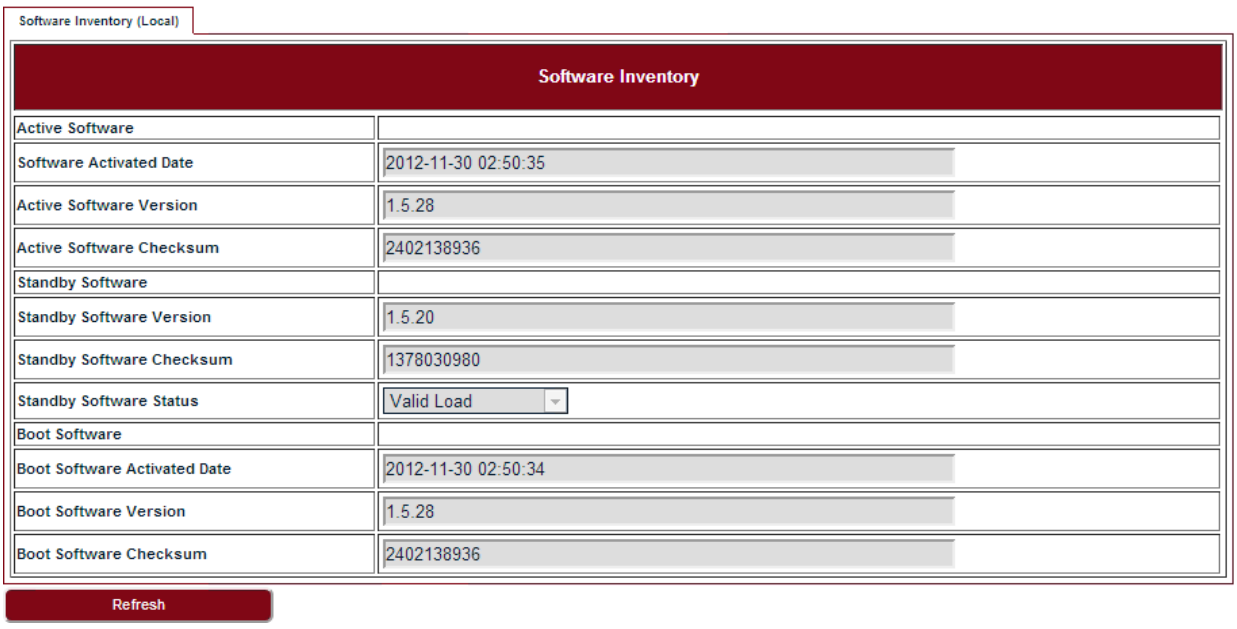
FIGURE 12. System inventory



3.3 Software inventory

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

FIGURE 13. Software inventory

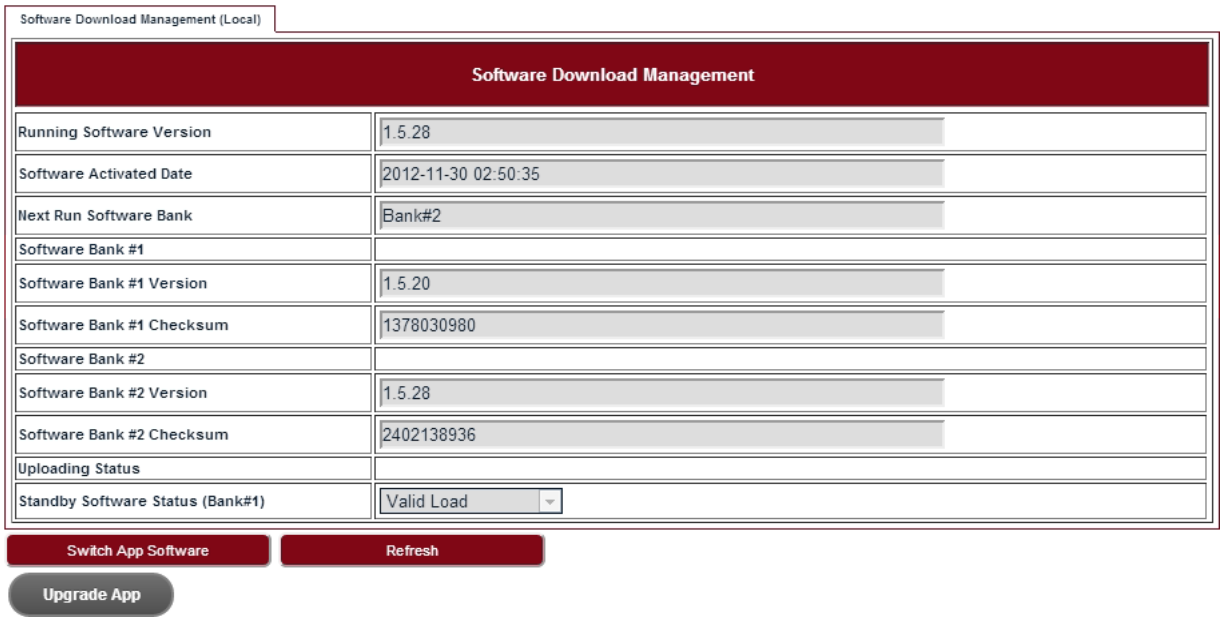


3.4 Software management

Steps

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

FIGURE 14. Software download management



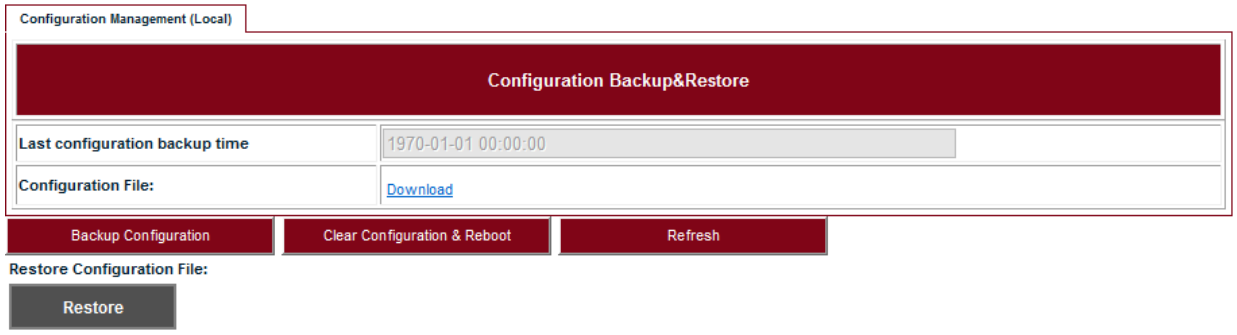
2. Click **Upgrade App** and go to the right folder path to open the target software.
3. Click **Switch App Software**, confirm the Next Run Software Bank is switched correctly.
4. Click **Reboot System.** After reboot, LITE would start up with the new software.

3.5 Configuration management

Steps

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

FIGURE 15. 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 16. P+E output configuration

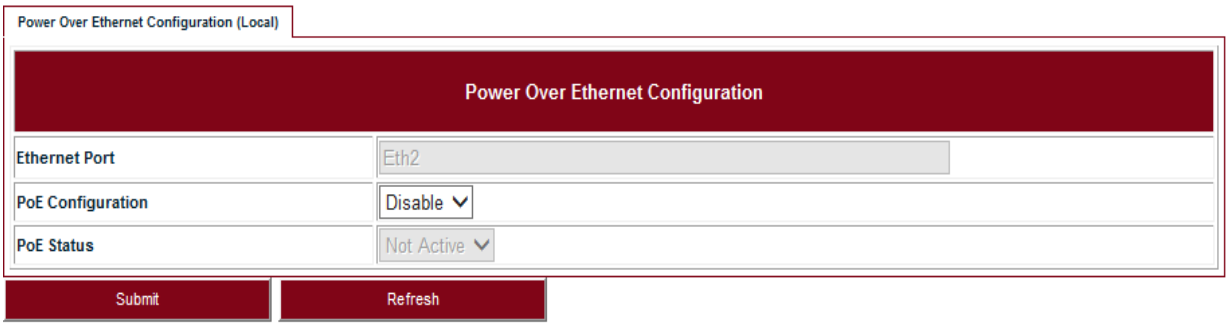


TABLE8. P+E output

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

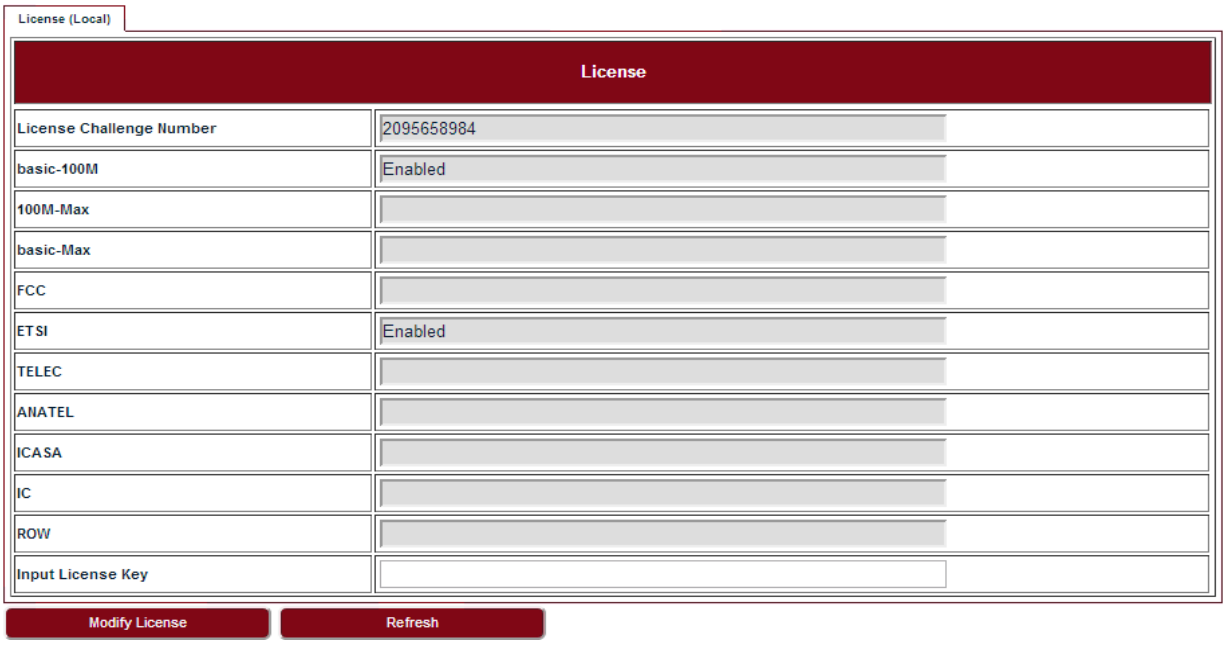
2. Click **Submit** to apply the configuration.

3.7 Licensing

Steps

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

FIGURE 17. License



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

3.8 SNTP

Steps

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

FIGURE 18. SNTP

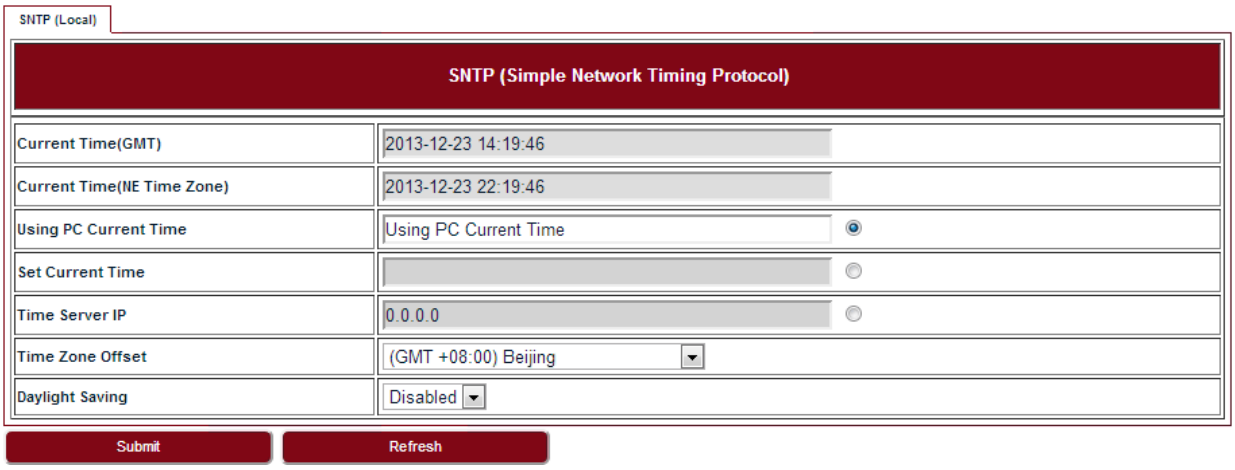


TABLE9. SNTP

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.

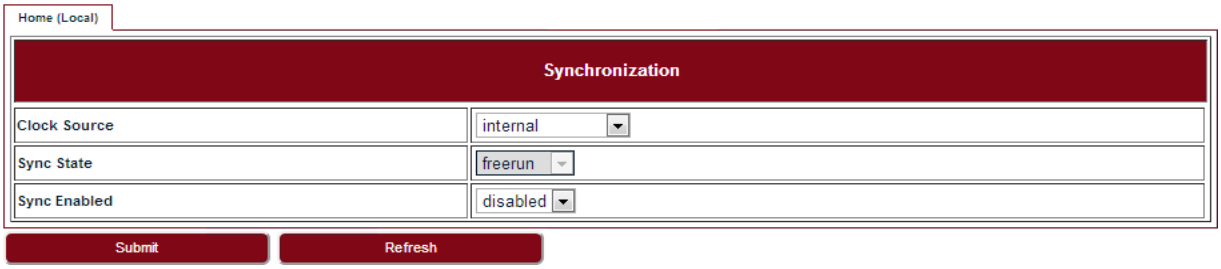
2. To set SNTP, fill out all the parameters and click **Submit.**

3.9 Synchronization

Steps

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

FIGURE 19. Synchronization



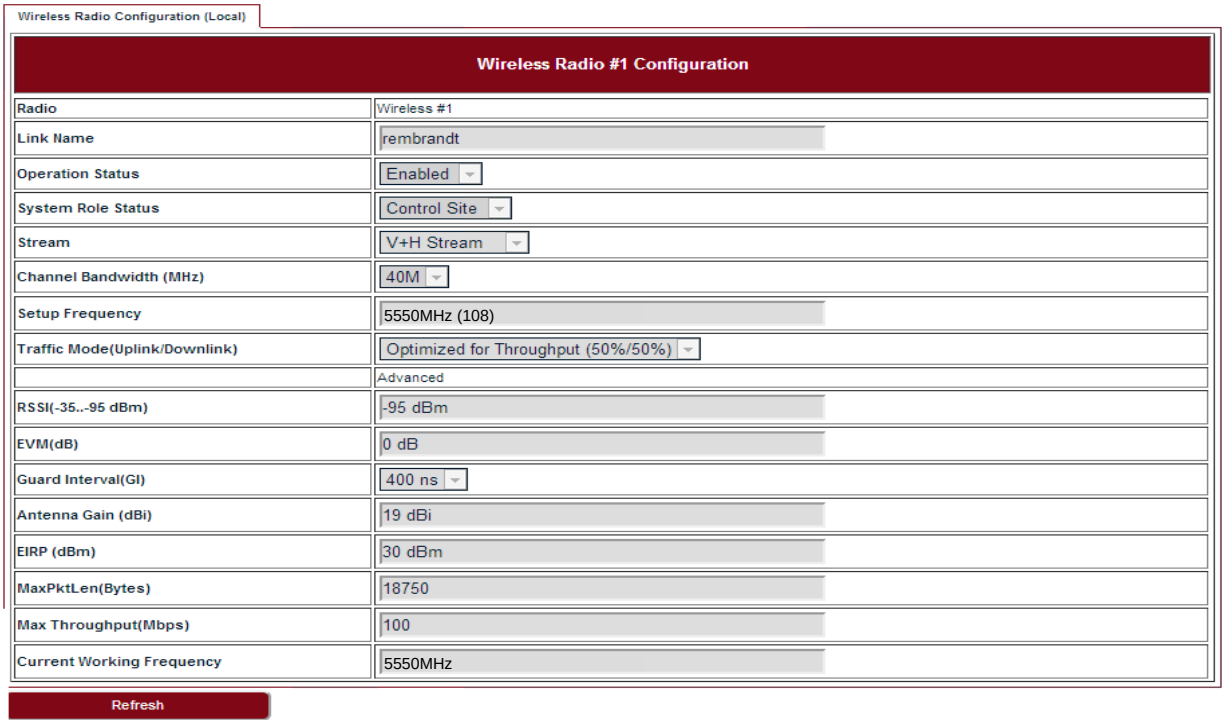
2. To set Synchronization, fill out all the parameters and click **Submit.**

4 Wireless radio configuration

4.1 Wireless radio #1 configuration

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

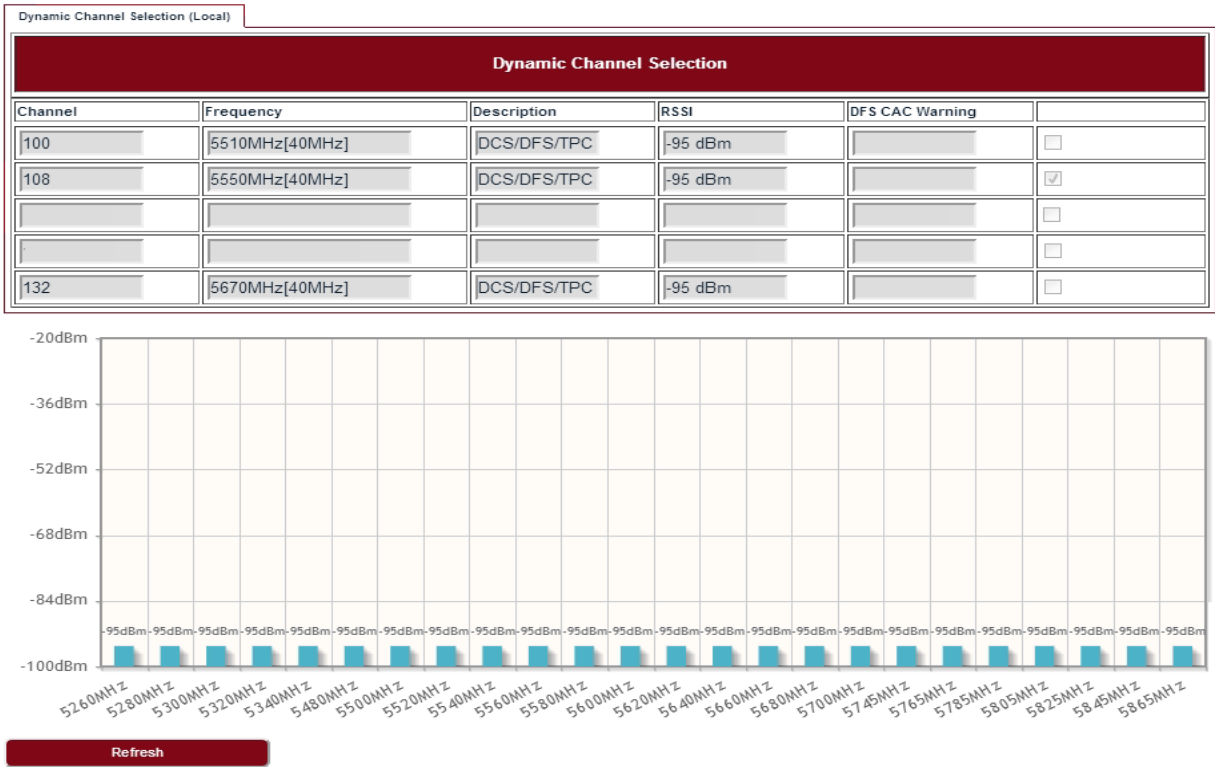
FIGURE 20. Wireless radio #1 configuration



4.2 Dynamic Channel Selection

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

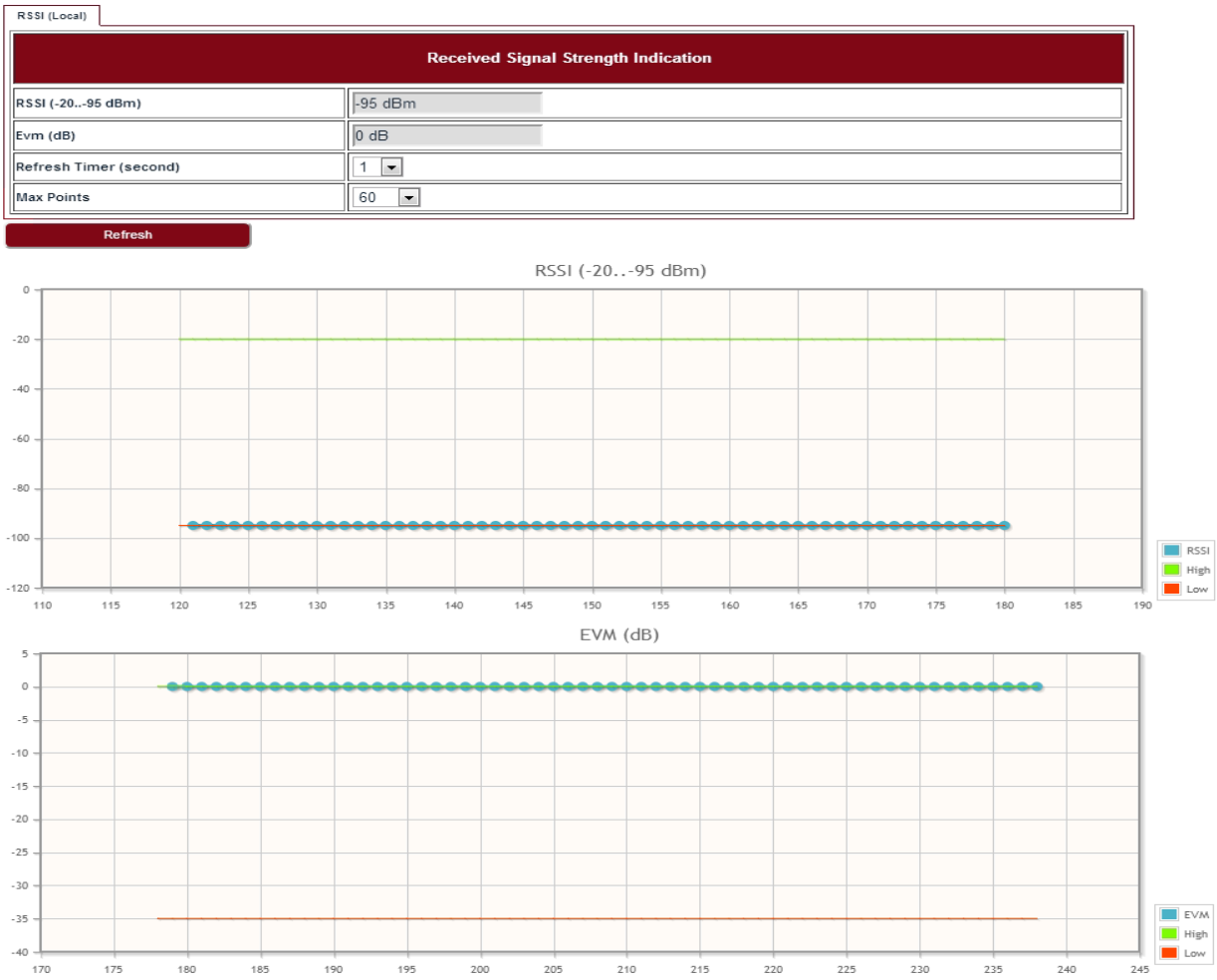
FIGURE 21. DCS



4.3 Received Signal Strength Indication

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

FIGURE 22. RSSI



4.4 Modulation and ACM

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

FIGURE 23. ACM

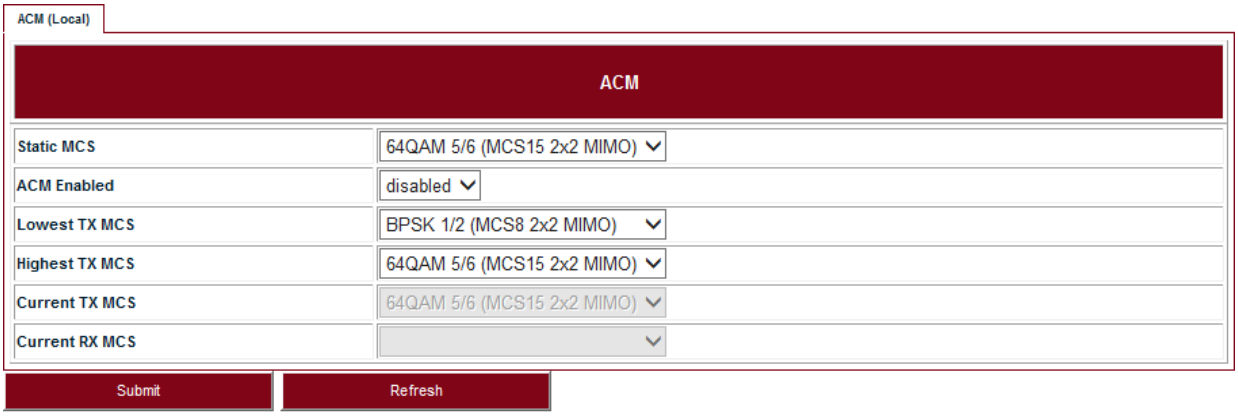


TABLE 10. ACM

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	

TABLE 11. Default ACM adjustment threshold value

MCS	Low (dB)	High (dB)
MCS15	-20.5	NA
MCS14	-19.5	-21.5
MCS13	-18.5	-20.5
MCS12	-14	-19.5
MCS11	-12	-15
MCS10	-10	-13
MCS9	-9	-11
MCS8	NA	-10

4.5 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 24. TPC

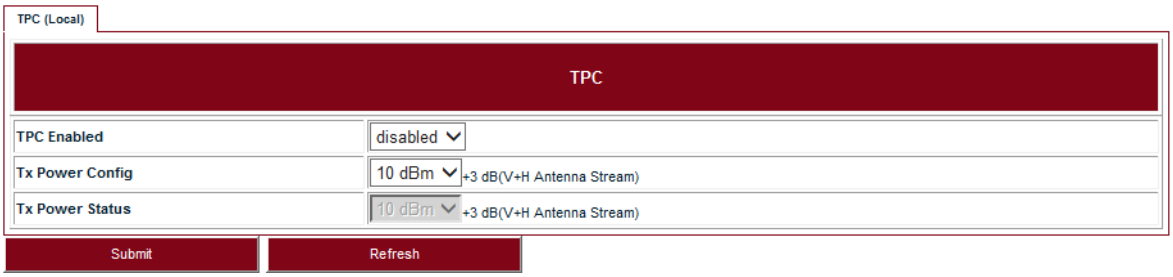


TABLE 12. TPC

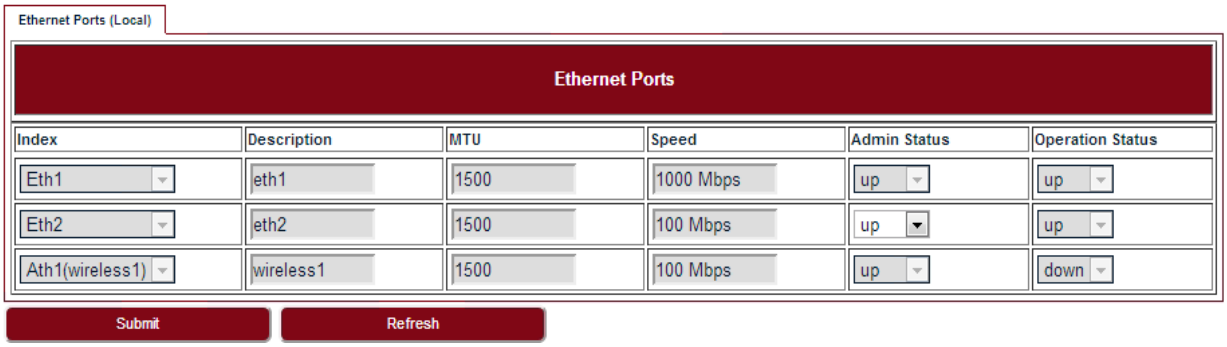
Parameter	Description
ATPC Enabled	*Enabled or Disabled*. Default: *Disabled*.
Tx Power Config	Set the Tx Power on each chain, it is limited by local regulations.

5 Ethernet configuration

5.1 Ports

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

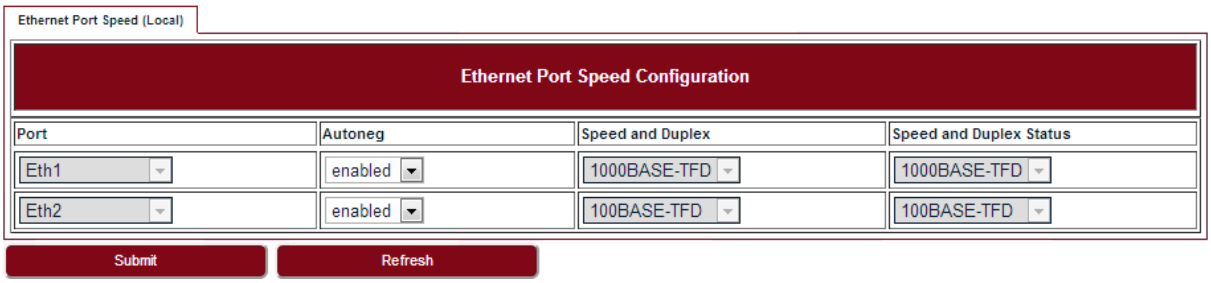
FIGURE 25. Ethernet ports



5.2 Speed

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

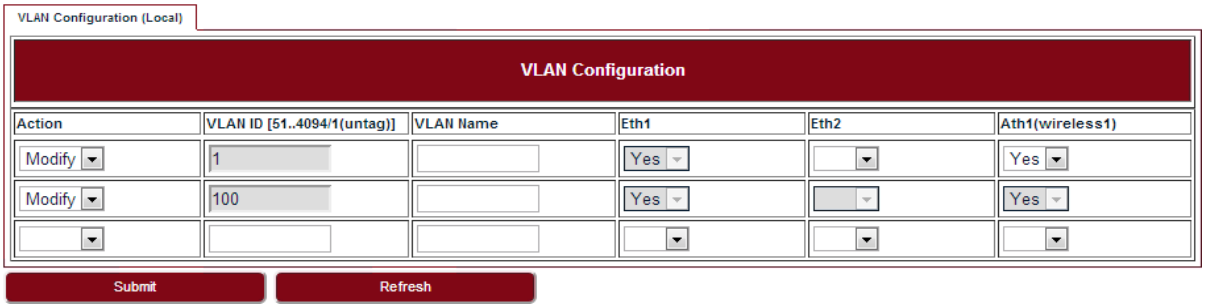
FIGURE 26. Ethernet port speed configuration



5.3 VLAN management

Go to **Configuration > Ethernet > VLAN > VLAN** tab.

FIGURE 27. VLAN configuration



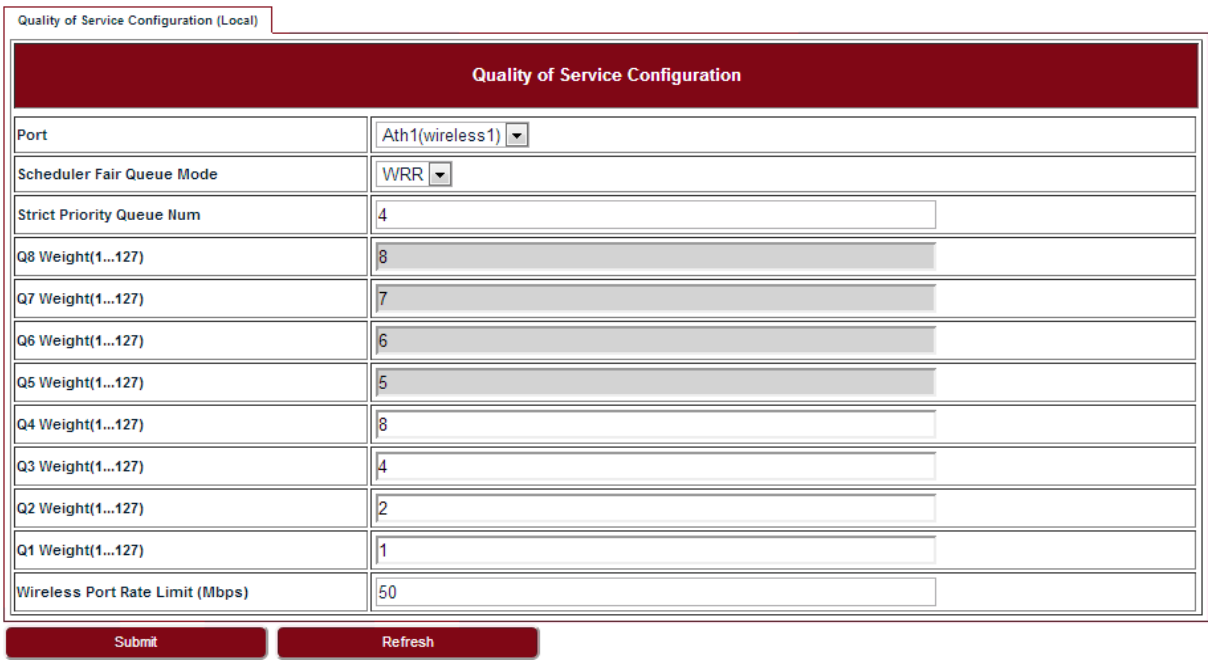
To create a VLAN, select *Create* in the **Action** drop-down list and fill out all the parameters and click **Submit**.

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.

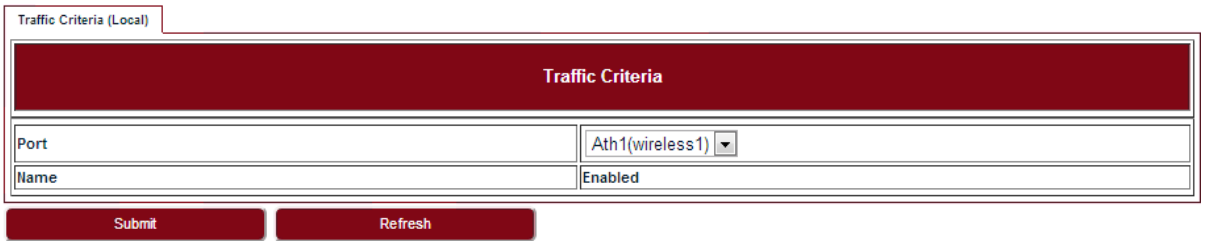
FIGURE 28. Quality of Service Configuration



5.5 Traffic criteria

Go to **Configuration > Ethernet > QoS > Traffic Criteria** page to set the traffic criteria.

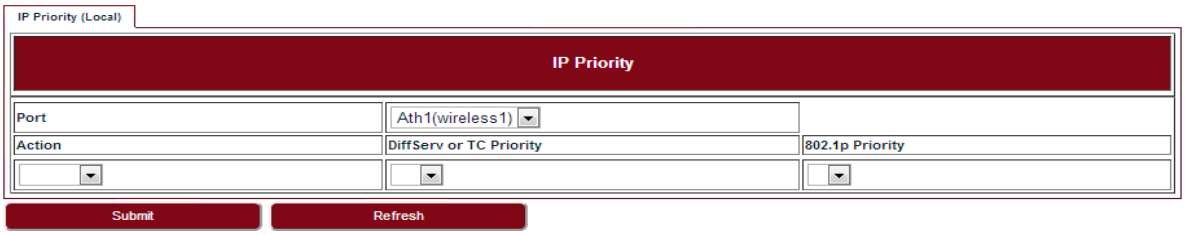
FIGURE 29. Traffic Criteria



5.6 IP priority

Go to **Configuration > Ethernet > QoS > IP Priority** page to set the IP priority.

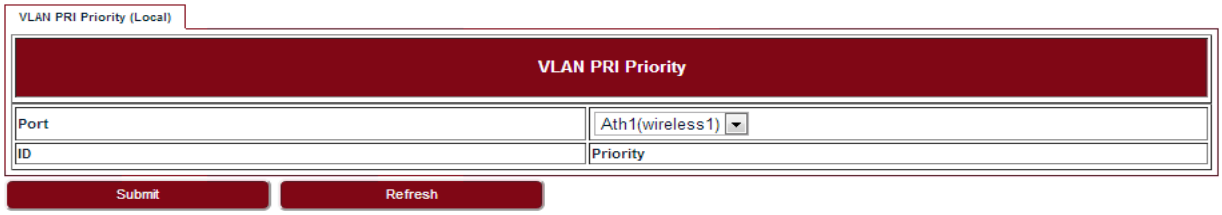
FIGURE 30. IP priority



5.7 VLAN PRI priority

Go to **Configuration > Ethernet > QoS > Vlan PRI Priority** page to set the VLAN PRI priority.

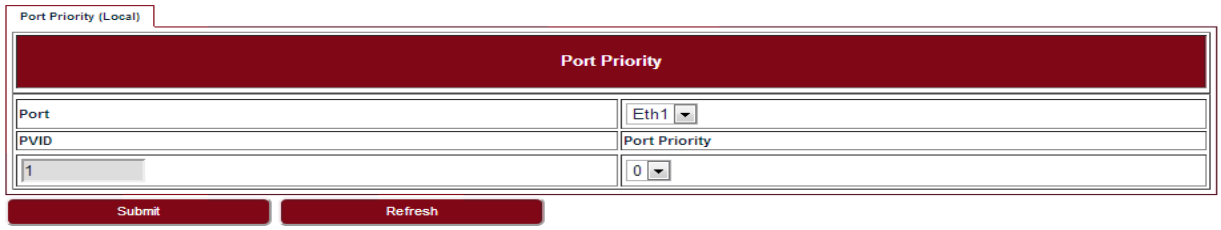
FIGURE 31. VLAN PRI priority



5.8 Port priority

Go to **Configuration > Ethernet > QoS > Port Priority** page to set the Port priority.

FIGURE 32. Port priority



5.9 Aging time

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

FIGURE 33. Aging time

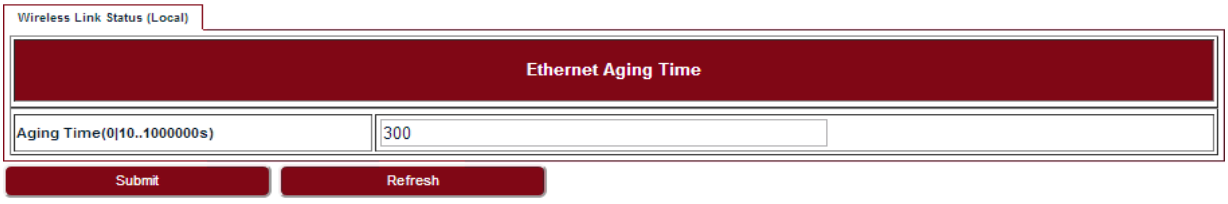


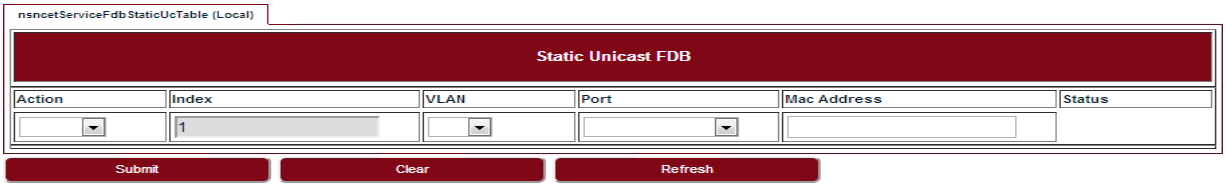
TABLE 13. Aging time

Parameter	Description
Aging Time	0 ~ 3825s with steps of 15s.

5.10 Static Unicast FDB

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

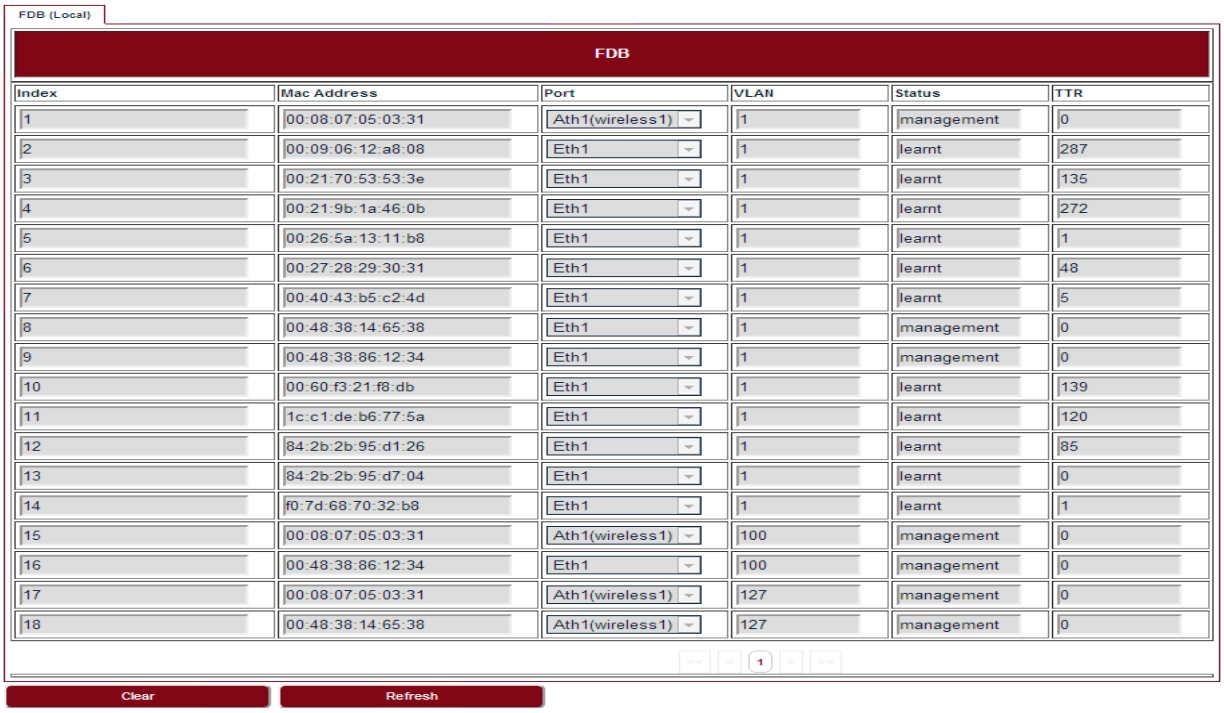
FIGURE 34. Static Unicast FDB



5.11 All FDB

Go to **Configuration > Ethernet > FDB > All FDB** page to see all FDB.

FIGURE 35. All FDB

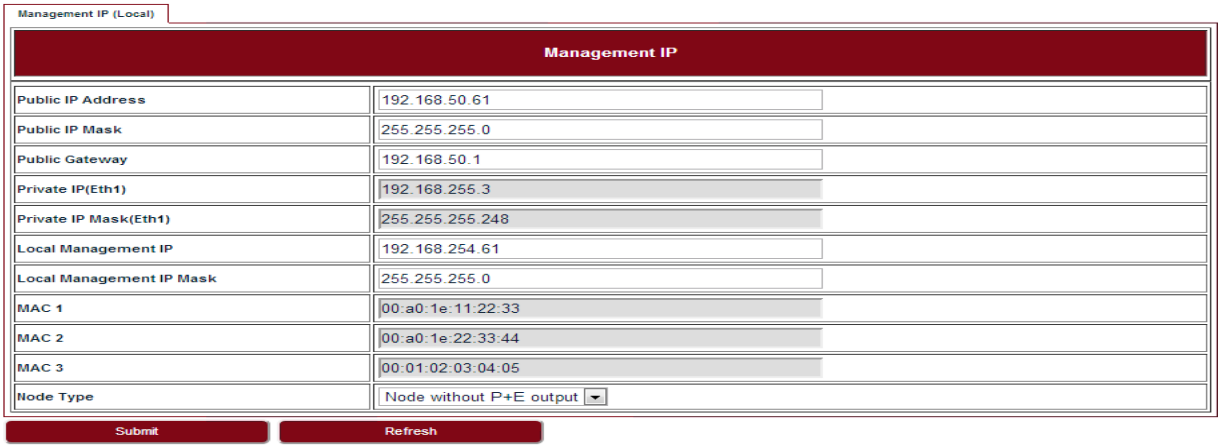


6 Management

6.1 IP

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

FIGURE 36. Management IP



6.2 Management VLAN

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

FIGURE 37. Management VLAN

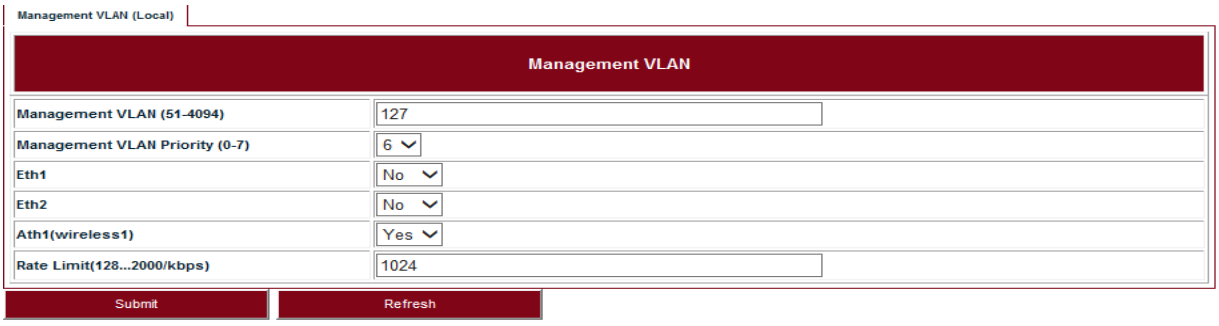


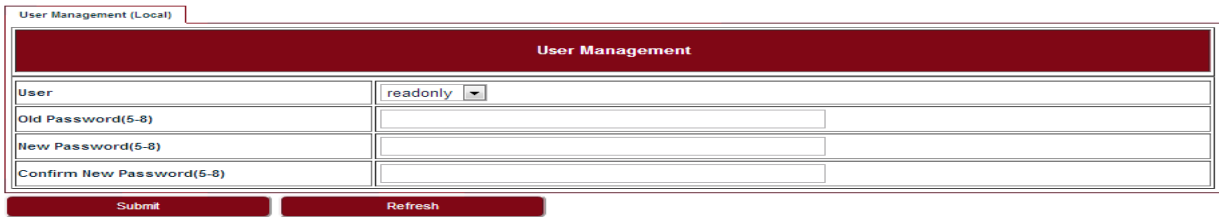
TABLE 14. Management VLAN

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: 256Kbps.

6.3 SNMP

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

FIGURE 38. User management



6.4 Trap

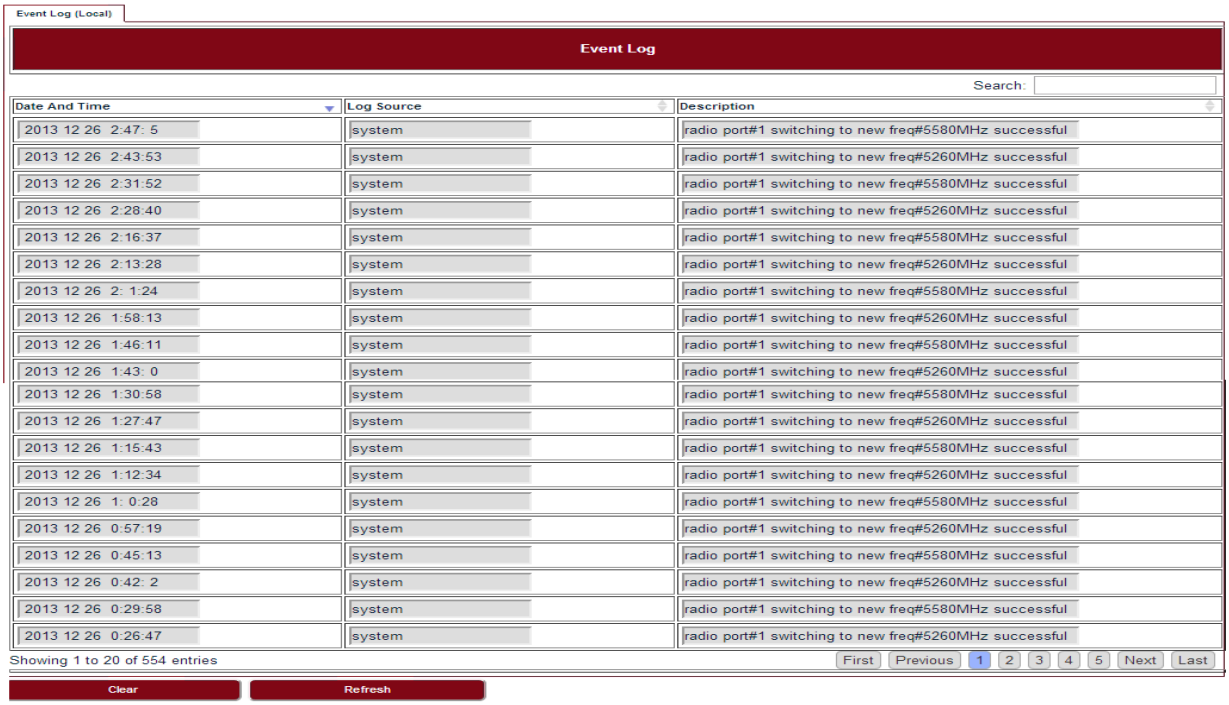
Go to **Configuration > Management > Trap** page to set the Trap Destination parameters.

FIGURE 39. Trap

6.5 Event log

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

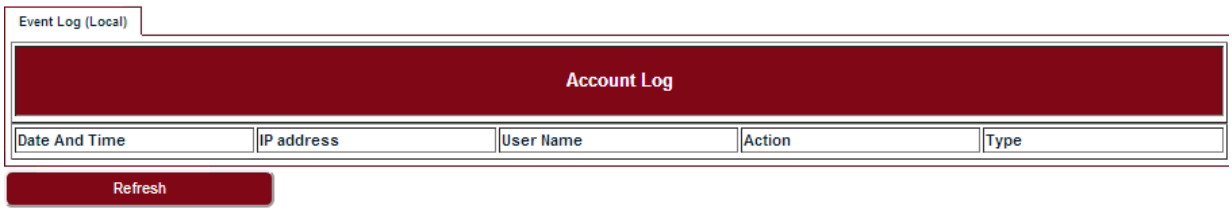
FIGURE 40. Event log



6.6 Account log

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

FIGURE 41. Account log

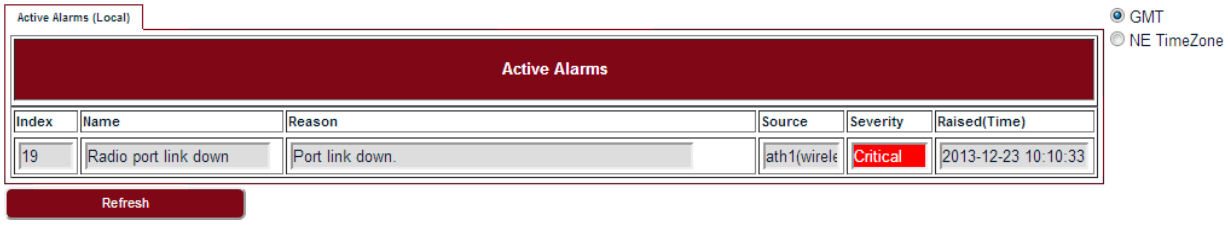


7 Alarms

7.1 Active alarms

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

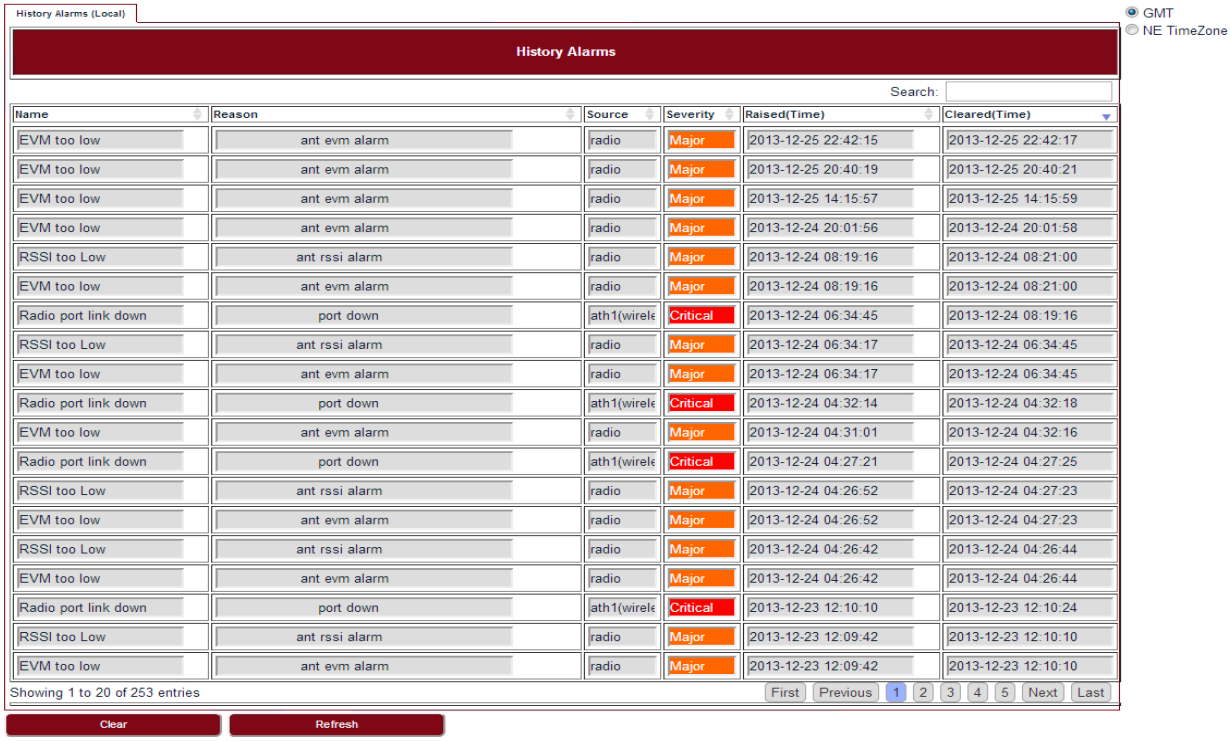
FIGURE 42. Active alarms



7.2 History alarms

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

FIGURE 43. History alarms

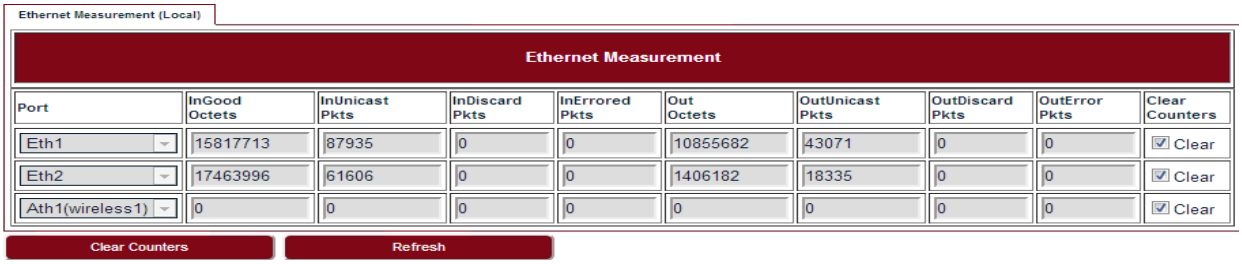


8 Performance

8.1 Ethernet

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

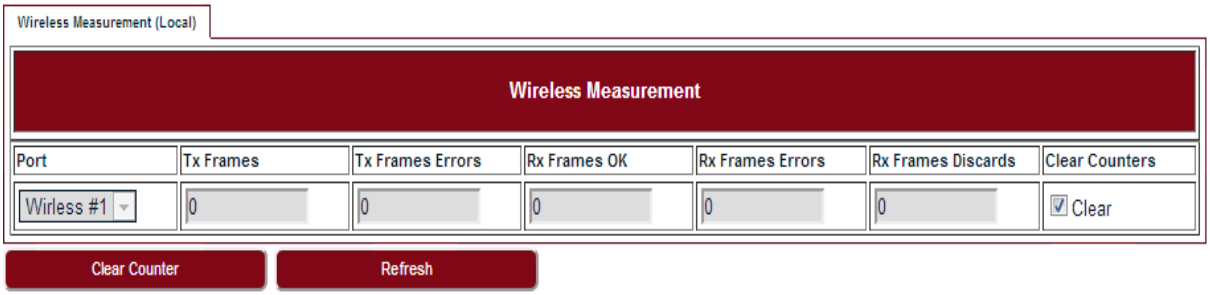
FIGURE 44. Ethernet



8.2 Wireless

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

FIGURE 45. Wireless



9 Diagnostics

9.1 Link status

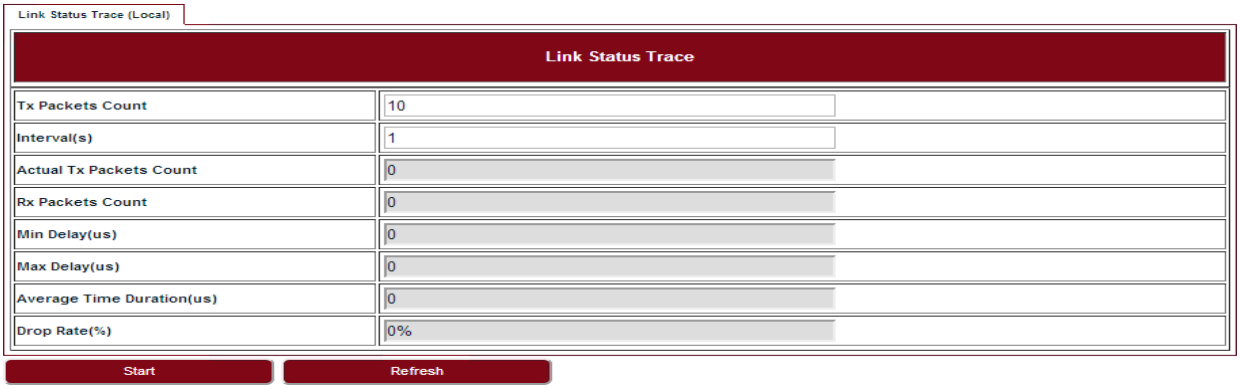
Go to **Diagnostics > Link Status** page to see the Wireless link status.

FIGURE 46. Link status

9.2 Link status trace

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

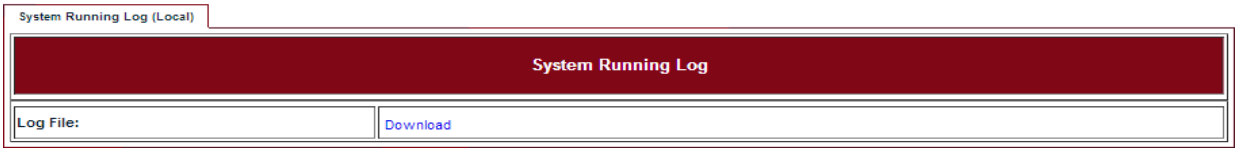
FIGURE 47. Link status trace



9.3 System running log

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

FIGURE 48. System running log



10 About

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

FIGURE 49. About Link Viewer

11 AutoGenerator

11.1 LiteDebug

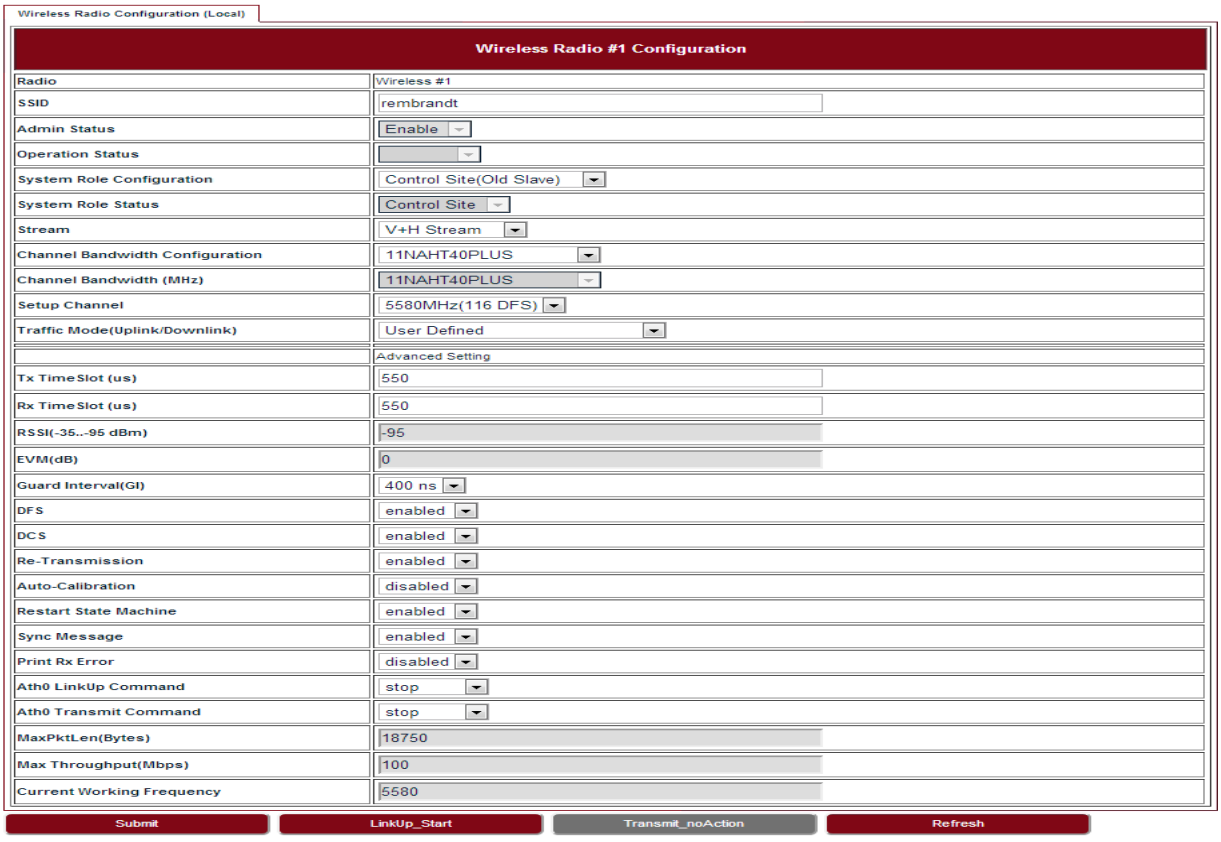
Go to **AutoGenerator > LiteDebug** page to set the Lite Debug parameters.

FIGURE 50. LiteDebug

11.2 Wireless

Go to **AutoGenerator > Wireless** page to set the Wireless radio configuration.

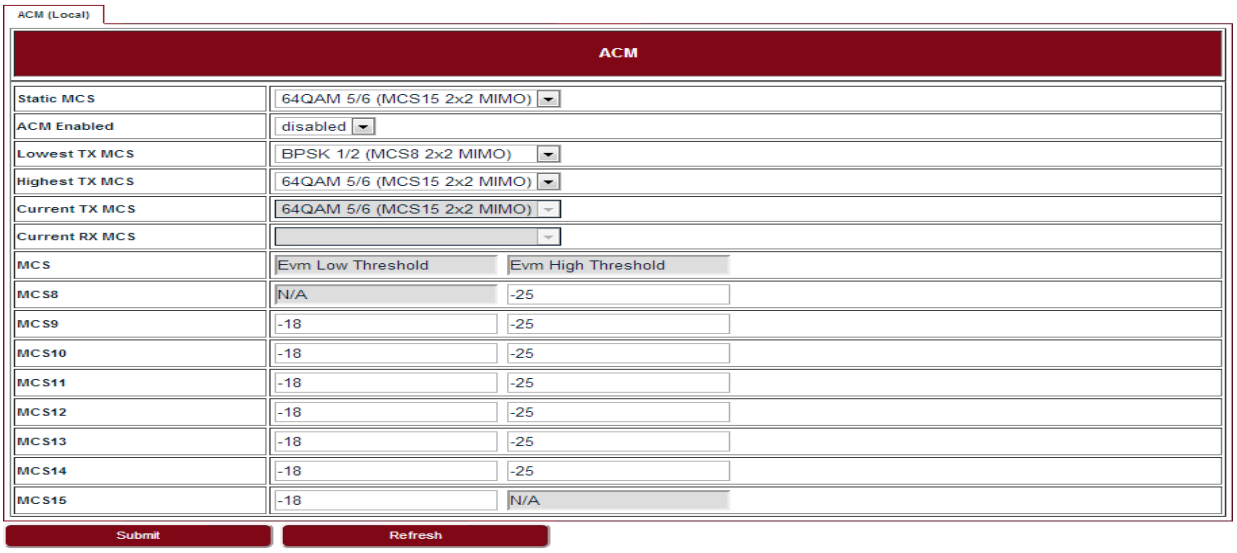
FIGURE 51. Wireless radio configuration



11.3 ACM

Go to **AutoGenerator > ACM** page to set the ACM parameters.

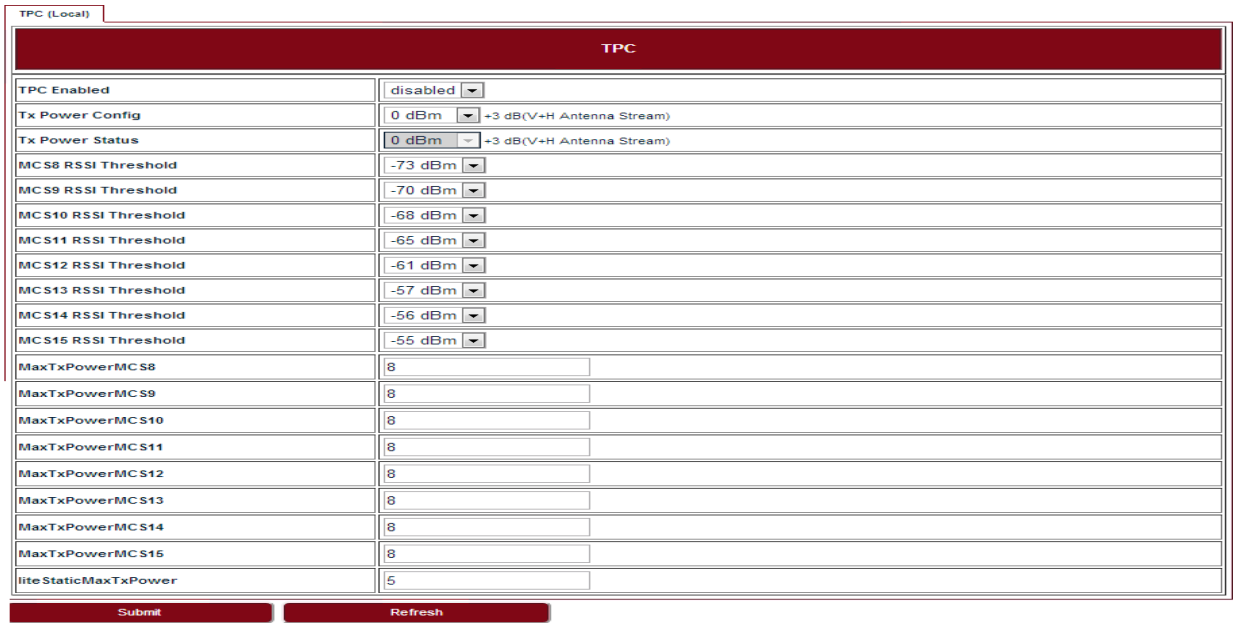
FIGURE 52. ACM



11.4 TPC

Go to **AutoGenerator > TPC** page to set the TPC parameters.

FIGURE 53. TPC



Operating Channel Declaration

Operating Channel List

Channels for 20MHz Channel Bandwidth

Channel	Frequency	Channel	Frequency	Channel	Frequency
52	5260 MHz	56	5280 MHz	60	5300 MHz
64	5320 MHz	100	5500 MHz	104	5520 MHz
108	5540 MHz	112	5560 MHz	116	5580 MHz
132	5660 MHz	136	5680 MHz	140	5700 MHz
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
54	5270 MHz	62	5310 MHz	102	5510 MHz
110	5550 MHz	134	5670 MHz	151	5755 MHz
159	5795 MHz	N/A	N/A	N/A	N/A

Note: The channels in TDWR band (5600-5660MHz) was prohibited.

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.

IC Radiation Exposure Statement for Canada

This device complies with Industry 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'Industrie Canada 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.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent is otropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste,ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.