



EOC655

User Manual

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Safety and Regulatory Information

This section describes important safety and regulatory guidelines that must be observed by personnel installing or operating EOC655 Series equipment.

About this Guide

Purpose

This document provides information related to configuration and management of the EnGenius EOC655 Series radios. It is intended to be used by the system administrator.

Definitions, Acronyms and Abbreviations

The following typographic conventions and symbols are used throughout this document.



Important information that should be observed.



Important Note



Quick Start Instructions

Bold

Menu commands buttons input fields configuration keys are displayed in bold.

Bold Italic

Navigation of the menu

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FCC User Information

Federal Communication Commission Interference Statement

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.

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 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.

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. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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 a minimum distance of 250cm between the radiator and your body.

Product Overview

EOC655 Series of products were tailored for Wireless Internet service providers (WISP's) who wish to deliver uninterrupted wireless connectivity to Enterprise, Campuses, Public Wi-Fi, Smart Cities, Educational institutions, Industrial Security or just about any demanding wireless broadband connectivity.

Product Key Features

- Proprietary polling protocol supporting real time priority-based scheduler.
- Dual 5GHz Radio's with 2 spatial streams for improved transmission speed and coverage that delivers up to 2.4 Gbps data rate.
- Supports IEEE802.11ax wireless standards with up to 2040 Mbps Data rate.
- Support Wave 2 MU-MIMO function on Radio1 and Radio2
- Perform 1024-QAM to enhance data rate.
- Flexible RF planning with 20,40,80 and 160MHz channel size
- Up to 23 dBm transmits power enabling long range connectivity.
- Support Tx Beam forming to enlarge the transmitting distance.
- Robust housing with IP67 enclosure rated to deploy at extreme weather.
- Superior QoS with Application aware traffic shaping capability
- AES 256 Encryption provides the most secure outdoor wireless communication even in the unlicensed frequency spectrum.

Professional Antenna Installation Instructions

Installation Personal

This product is designed for specific applications and needs to be installed by a qualified personal who has RF and related rule knowledge. The general user shall not attempt to install or change the setting. For complete RF test reports and regulatory power limits, please see documents under FCC-ID: A8J-EOC655

Installation Location

The product shall be installed at a location where the radiating antenna can be kept 250cm from a nearby person in normal operation condition to meet regulatory RF exposure requirement.

External Antenna

Use only the antennas which have been approved in section Certified Antennas. The non-approved antenna(s) may produce unwanted spurious or excessive RF transmitting power which may lead to the violation of FCC limit and is prohibited.

WARNING



Please carefully select the installation position and make sure that the final output power does not exceed the limit set force in relevant rules. The violation of the rule could lead to serious federal penalties.

In FCC, there is restriction on total power so we have limit parameter called as Max EIRP which will reduce the radio power to adjust to the configured limit.

It is the responsibility of the grantee and installer to ensure that when configuring the radio in the United States (or where FCC rules apply), the Tx power is set according to the values for which the product is certified. The use of Tx power values other than those for which the product is certified, is expressly forbidden by FCC rules 47 CFR part 15.204.

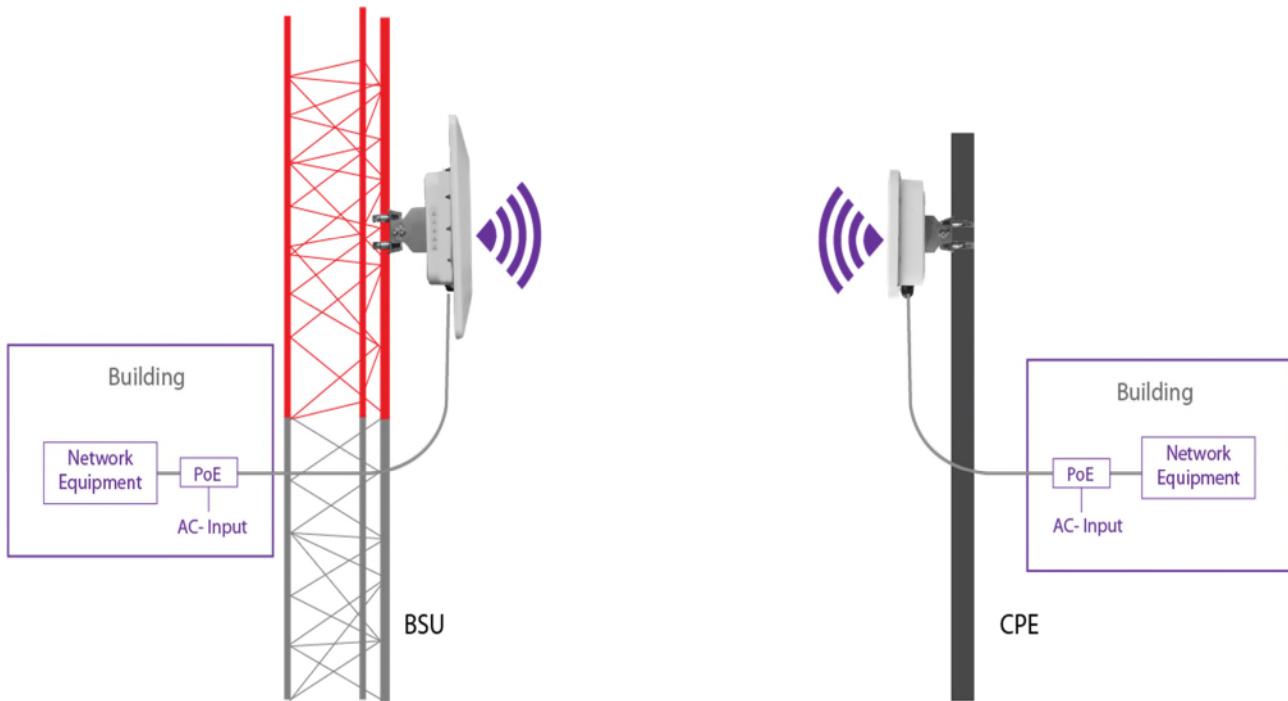
It is the responsibility of the installer to ensure that when using the outdoor antenna kits in the United States (or where FCC rules apply), only those antennas certified with the product are used. The use of any antenna other than those certified with the product is expressly forbidden by FCC rules 47 CFR part 15.204.

Outdoor Installation of Radios

EnGenius EOC655 Series products are all outdoor radios installed in one of the following methods:

1. Pole/Tower Mount: Radio installation kit includes two metal hose clamps to support pole sizes from 30mm to 60mm diameter.
2. Wall Mount: With optional wall mount kit, radios can be installed on the side of the building or a structure without any obstruction to the radio antenna.

Typical Deployment.



Certified Antenna Gain & Tx Power Values

Antennas shown in the table below are approved for EOC655 series Radio deployments.

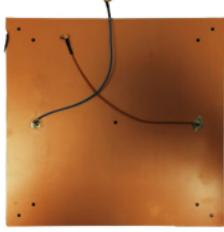
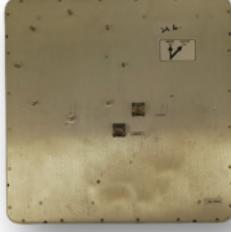
Model Name	Spruce (5G-1)	Pine (5G-2)	Tx Power Per Chain (dBm) UNII-1 / UNII-2A / UNII-2C / UNII-3	
			R1	R2
Main Model: EOC655	1. 23 dBi N-type panel ant. (MT465039/NVH) 2. Omni 10 dBi ant. (DFS)	1. Sector 18 dBi ant. (MT055S17VHN) 2. 2 foot 30 dBi Dish ant. (TM55L-DPDISH-30) 3. Omni 10 dBi ant (MT- 463036/NVH)	1. 12/0/0/12 2. 12/0/0/12	1. 12/6/6/17 2. 17/-6/-6/19 3. 20/14/14/25
Series model: EOC655-C23	23 dBi MMCX panel ant. (MT- 465039/CVH/F)		12/0/0/12	
Series model: EOC655-C18	18 dBi Embedded panel ant. (C18, same antenna type as 23 dBi ant.)		12/0/0/12	
Series model: EOC655-B18	23 dBi N-type panel ant. (MT- 465039/NVH)	Sector 18 dBi ant. (MT055S17VHN)	12/0/0/12	12/0/0/12

Operating Frequency Band 5150 – 5850 MHz

It is the responsibility of the installer to ensure that radios operating in the band 5150-5850 MHz are installed so that they do not exceed 21 dBm EIRP at any elevation angle above 30 degrees as measured from the horizon, as specified in FCC rule 47 CFR Part 15.407 (a)(1)(i).

This compliance can be achieved through proper selection of radio with antenna, angle of elevation, and Tx power control to provide reasonable protection for co-channel NGSO/MSS operations.

As shown in the typical deployment above, the highest antenna gains from the horizon above 30 degrees for antenna model 1 & 2 is below. For more detailed information, please refer to antenna specifications.

S.No	Antenna Model	Antenna Gain (dBi)	Antenna Install Degree/Images
1	18 dBi Embedded Panel Antenna	4.67	
2	23dBi N-type Panel Antenna	4.34	
3	Omni 10 dBi Antenna	- 0.04	
4	Sector 18 dBi Antenna	- 2.77	
5	2 foot 30 dBi Dish Antenna	7.63	

The formula used for the calculation of the Transmit Power is given below:

Tx-Power = EIRP – Ga – Gm

EIRP → Equivalent Isotopically Radiated Power

Ga → Antenna Gain at 30° in Elevation plane.

Gm → Gain for Multi Input Multi Output

NOTE:

To mitigate potential interference between two EOC655 devices, it is recommended to maintain a minimum distance of at least 1 meter between them. This spatial separation helps ensure optimal performance and prevents signal overlap, thereby enhancing the overall reliability and efficiency of the EOC655 devices. The specified distance serves as a practical measure to safeguard against potential electromagnetic interference and maintain the integrity of the communication between the devices

Safety Precautions & Notices

- Read, follow, and keep these instructions.
- Read all warnings.
- Use attachments or accessories specified by the manufacturer only.



WARNING: Do not use this product in a location that can be submerged by water.

Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightning.

Electrical Safety Information

- Compliance is required with respect to voltage, frequency, and current requirements indicated on the manufacturer's label. Connection to a different power source than those specified may result in improper operation, damage to the equipment, or pose a fire hazard if the limitations are not followed.
- There are no operator serviceable parts inside this equipment. Service should be provided only by a qualified service technician.

- This equipment is provided with a detachable power cord, which has an integral safety ground wire intended for connection to a grounded safety outlet.
- Do not substitute the power cord with one that is not the provided approved type. Never use an adapter plug to connect to a 2-wire outlet as this will defeat the continuity of the grounding wire.
- The equipment requires the use of the ground wire as a part of the safety certification, modification or misuse can provide a shock hazard that can result in serious injury or death.
- Contact a qualified electrician or the manufacturer if there are questions about the installation prior to connecting the equipment.
- Protective Earthling is provided by Listed AC adapter. Building installation shall provide appropriate short-circuit backup protection.
- Protective bonding must be installed in accordance with local national wiring rules and regulations.

Device Operation – Point to Point Protocol

EOC655 series implements Point to Point protocol designed for Outdoor deployments. The protocol is a polling protocol where the data exchange between BSU and SU is controlled by the BSU. BSU allocates poll slots to the registered subscribers for data exchange. The details of the protocol are mentioned below:

Protocol Operations

- Registration (or) Network Join
- Termination (or) Network Exit
- Data Exchange

Registration (or) Network Join

- BSU will be sending beacons every beacon interval.
- SU will scan all the supported channels for the configured country.
- SU will select best SNR BSU [BSU Information available in Site Survey Tab]
- SU will register with BSU and generates an event log confirming the registration in both BSU and SU

Termination (or) Network Exit

- BSU or SU link disconnection will happen in below scenarios:
 - User disconnecting the link from WEB.
 - Link Timeout due to inactivity or no data exchange.
 - Soft reset [Configuration Change]
 - Soft Reboot [User rebooting the device manually]
 - Hard Reboot [Power On/Off] [Dying Gasp Message]
- BSU or SU will send the termination packet to other partners to disconnect the link.

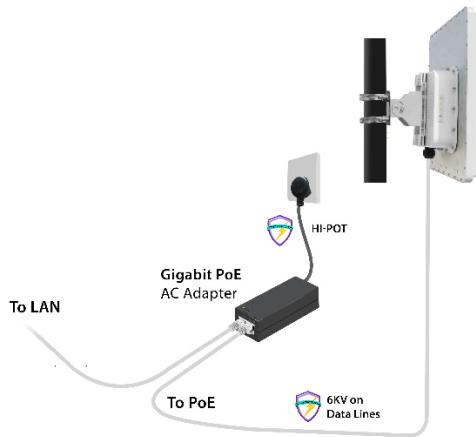
Data Exchange

- **Classification & Queuing**
 - The packets received on the ethernet interface are bridged to the wireless interfaces.
 - The packets received on the wireless interfaces are classified and queued in the respective data queues.
- **Scheduling**
 - The protocol supports round robin and priority-based scheduler where the packets in the respective data queues will be exchanged between BSU and SU.

Device Configuration

Power On-Device

- Connect the PoE Injector to AC power socket using a power cord.
- Now connect **PoE In** to PC and **PoE Out** to the device.



WARNING:

Based on the power measured, the MPE will pass only if the operating distance is over 250 cm.

PC Configuration

Local PC IP Configuration

- Connect the Ethernet LAN cable to the Desktop/Laptop.
- Go to Control Panel> Network and Internet settings> Set up a new connection.
- Configure the Desktop/Laptop with a static IP address of **192.168.1.125** and a subnet mask of 255.255.255.0



The Desktop/Laptop accessing the device must be in the same subnet as that of the device.

Device Access Types

The Device can be accessed in the following ways:

Access through Ethernet

During initial setup, use a Wired Ethernet connection from the computer to the device using a PoE.

Access through 2.4GHz Radio Interface

After the basic network configuration, scan for wireless devices that are available on the network, default SSID is EOC655<last 2 digits of ethernet MAC> with a passphrase as **eoc@1234**

The device can also be accessed using EnGenius Network Mobile App or using any laptop wireless connection.

Access remotely over a network

Once the wireless connection is established, the device can be accessed through a link (PTP or PTMP) within the network.

Login Process

Launch any web browser on the PC that is connected to the device.

- In the URL type 192.168.1.1 and enter the default credentials as
- *username: admin* and *password: admin*
- Login and access the device settings.

A Network administrator can use the following interfaces to configure, manage and monitor the device:

- HTTP
- SNMP
- Telnet
- SSH

HTTP

The Web interface HTTP provides easy access to configure settings and network statistics from any computer on the network. The Web interface can be accessed, through LAN, the Internet, or with an Ethernet cable connected directly to the computer's Ethernet port.

SNMP

The device can also be configured, managed, and monitored by using Simple Network Management Protocol (SNMP). SNMP is a networking management protocol used to monitor network-attached devices, which will also collect errors and user statistics.

SSH - admin

The device can be accessed through CLI by using **ssh-admin**, through LAN, or even with an Ethernet cable connected directly to the computer's Ethernet port.

To log on to the device using telnet:

- Confirm that your computer has IP connectivity with the device.
- Use SSH client with username as **admin**.
- Log on by entering username and password. The default login credentials are Username: **admin** Password: **admin**
- It is recommended to change default passwords after your first login to the device. To change the password.
- Click Management > Services > HTTP > Admin password/ Root Password.
- Note that only an admin has a right to change the password.
- The username and password are case-sensitive. If you enter an incorrect password, then a message is displayed stating that the password is incorrect.

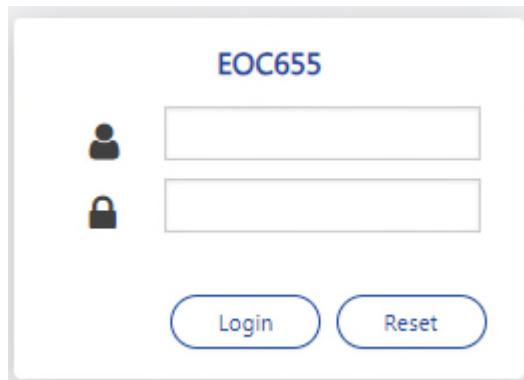
SSH - root

Enable Secure Shell (SSH) to make secure, encrypted connections in the network. Secure Shell is a network protocol that allows data to be exchanged using a secure channel between two network devices. The administrators are required to provide a username, password, port number combination for authentication.

User Credentials and Roles

The network operator can configure, manage and monitor the device using HTTP/SNMP/Telnet/SSH protocols.

The **root** users have full access to all the parameters in the settings of the device, this further prevents unauthorized changes in settings.



Please refer *Devices Access Types* or use your Ethernet port or wireless network to access the AP/ SU and proceed.

After connecting via any one of the three-device access methods, the GUI will prompt you to login with a password. The default username and password are "admin" and should be changed immediately after login to protect your network since it gives the user read - write privileges.

The password can be changed.

Click Management > Services > HTTP > Admin password/ Root Password.

Graphical User Interface Overview

Power on the Radio to access the Graphical User Interface (GUI). After a successful login, the user notices a title bar on the top, a navigation pane on the left, and a content pane in the center. The default page shown in the content pane is the "Summary".

Home: Click Home to return to the summary page, which displays all the key performance parameters such as System, Network, Wireless, and Throughput.

Apply: Click Apply to save all changes made to the configuration parameters

Reboot: Click to restart the device.

Logout: Click Logout, when necessary, make sure to click Apply to save the most recent updates. Again, the login page pops-out after a successful logout.



Summary

The Summary page shows the complete overall status of the device showing the details of System, Network, Performance, Wireless. The summary page will appear once the user logs in to the device page.

The image shows the 'SUMMARY' page of the EnGenius EOC655. It features three main sections: 'System', 'Performance', and 'Network'.

- System:** Displays device details like Model (EOC655), Hardware Version (-), Bootloader Version (1.0), Local Time (Sun Dec 24 01:13:30 2023), Temperature (45.5 °C), GPS (--), Elevation (-), and CPU / Memory (98.82 / 31 %).
- Performance:** Shows throughput in Mbps for Radio 1 (Tx: 0.00, Rx: 0.00), Radio 2 (Tx: 0.25, Rx: 0.75), 2.4 GHz (Tx: 0.00, Rx: 0.00), LAN1 (Tx: 0.00, Rx: 0.00), and LAN2 (Tx: 0.00, Rx: 0.00).
- Network:** Lists IP Address (192.168.1.151), Subnet Mask (255.255.255.0), Gateway (192.168.1.151), and VLAN Status (Enabled). It also shows LAN1 and LAN2 status with MAC addresses (4c:13:65:88:88:00 and 4c:13:65:88:88:01) and Speed / Duplex (Up 1000 Mbps - full and Down).

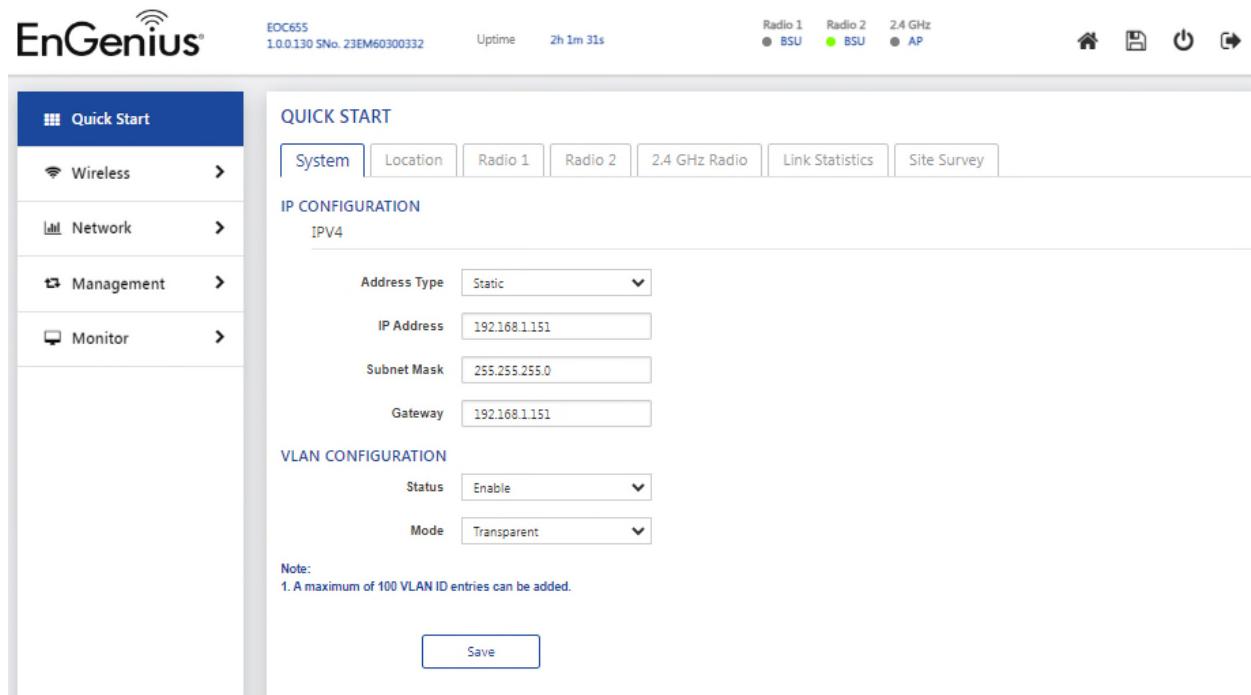
Quick Start

This section will show you how to do a quick configuration for both the outdoor Access Point and Subscriber Units using a web-based configuration interface.

System

IP configuration

To configure the IP Configuration, Click Quick Start> System



Address Type: Dynamic / Static

- If **Static** is selected, the user should manually configure the network parameters.
- If **Dynamic** is selected, the device obtains the IPv4 parameters from a DHCP server automatically. According to the current software release, only IPv4 format is supported.

IP Address: 192.168.1.1

- Represents the IP Address of the Ethernet interface.
- By default, the **Static IP address** is set to 192.168.1.1
- When the **Address Type** is set to **Dynamic**, this parameter is read-only and displays the device IP Address obtained from the DHCP server.

Subnet Mask: 255.255.255.0

- Subnet Mask Represents the subnet mask of the Ethernet interface.
- By default, the subnet mask is 255.255.255.0.
- When the address type is set to **Dynamic**, this parameter is read-only and displays the device current subnet mask obtained from the DHCP server.
- The subnet mask will fall back to 255.255.255.0 if the device cannot obtain the subnet mask from the DHCP server.

Gateway IP

- Specifies the IP address of the device gateway.
- When Address Type is set to **Dynamic**, this parameter is read-only and displays the IP address of the device gateway. The device will be set to the Default Gateway IP address 192.168.1.1 if it cannot obtain the Gateway IP address from a DHCP server.
- If the Address Type is set to **Static**, then you must enter manually the Gateway IP address.

VLAN Configuration

Virtual Local Area Networks (VLANs) are logical groupings of network hosts. Defined by software settings, other VLAN members or resources appear (to connected hosts) to be on the same physical segment, no matter where they are attached on the logical LAN or WAN segment. They simplify traffic flow between clients and their frequently used or restricted resources.

A device can communicate across a VLAN-capable switch that analyses VLAN tagged frames and directs traffic to the appropriate units. The purpose of this network is to provide an easy way of modifying logical groups in the dynamic environment.

*To configure the VLAN, Click **Quick Start> System***

VLAN Status: Enable/ Disable

VLAN Mode: By default, VLAN Mode is Transparent in AP/SU. In case of SU, VLAN Mode can be any mode among the following: *Transparent / Trunk / Access*

Transparent

*To configure the VLAN Transparent Mode in AP or SU, Click **Quick Start> System***

- Transparent Mode is available for the Ethernet and Wireless interfaces for both AP and SU. It is equivalent to NO VLAN support and is the default mode.
- An interface in transparent mode forwards both tagged and untagged frames.

Trunk

*To configure the VLAN Trunk Mode in SU, Click **Quick Start> System***

- Trunk mode is configurable only in SU.
- When an interface is in Trunk mode, it forwards only those tagged frames whose VLAN ID matches with a VLAN ID present in trunk table. All other frames will be dropped.

Access

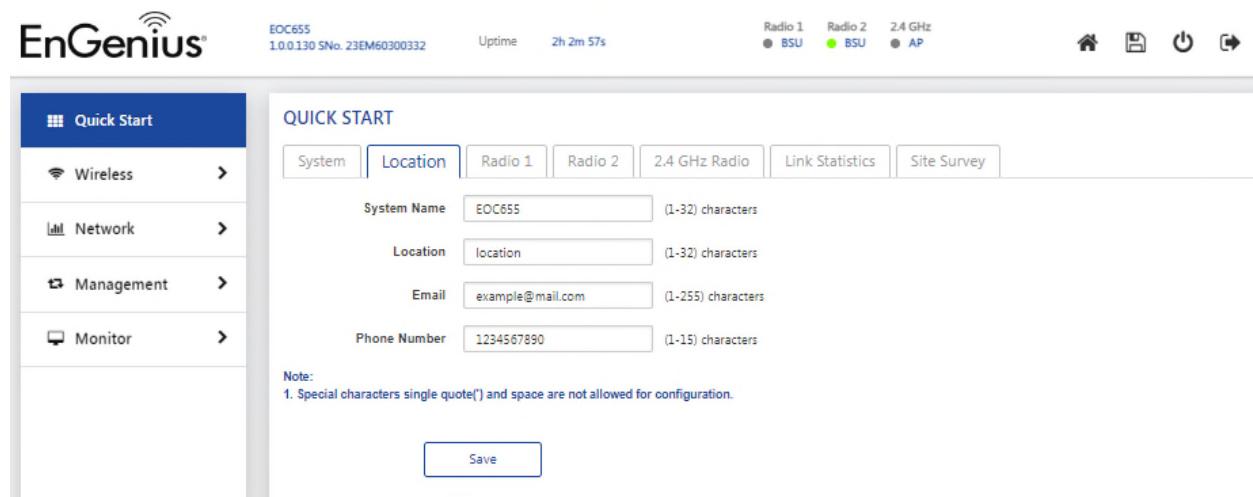
*To configure the VLAN Access Mode in SU, Click **Quick Start> System***

- Access mode is available only on the Ethernet interface of SU.
- In access mode, tagged frames with specified Access VLAN ID are going out of the device through the Ethernet interface were untagged and forwarded.
- The untagged frames coming into the device through the Ethernet interface are tagged with specified Access VLAN ID and forwarded.

Location

To configure the Location, Click Quick Start> Location

This section consists of the basic profile information of customer's device, such as **System Name**, **Customer Location**, **Customer Email** and **Customer Phone Number**.



Radio 1/ Radio 2

To configure the Radios, Click Quick Start> Radio 1 or Quick Start> Radio 2

Link Type

Link type is a mode of selecting a wireless connection between AP and SU radios. A Link type here can be a PTP/ PTMP. Few mandatory parameters are customized in AP than in SU.

Radio Mode

BSU / SU

- If the Radio Mode is BSU, it is considered as AP.
- If the Radio Mode is SU, it is considered as SU.

Service Set Identifier (SSID)

SSID is simply the technical term for a network name. The SSID is a string with 32 characters, supports configuration of alpha-numeric and special characters. An SSID is publicly visible. Within those rules, the SSID can be anything for quick identification of the network.

Country: US 5 GHz All

Band1: 5170 - 5250 MHz

Band2: 5250- 5330 MHz

Band3: 5490 - 5710 MHz

Band4: 5735- 5835 MHz

Operational Mode: 11AX

Bandwidth: 20/40/80/160MHz

Given the above options, the admin has the flexibility to select the bandwidth. In general, 2.4GHz radio can have a bandwidth of 20 MHz i.e., for short distances. 5GHz radio can have 40 MHz/ 80MHz bandwidth. Advantages of a 5 GHz with 40 MHz/ 80MHz and 160MHz bandwidth are; it is tuned for faster speed; more data can be transferred and less signal interference.

Channel: A channel refers either to a physical transmission medium such as a wire, or to a logical connection over a multiplexed medium such as a wireless radio channel through which a message is sent to its intended receiver. Several Wi-Fi Channels and their numbers were pre-defined to achieve the best performance.



- The default channel is 36 (5180 MHz) when BSU is selected as radio mode. The SU after scanning should be updated automatically with the same parameters as AP, this is possible only when SSID and Country parameters are same in both AP and SU.

2.4 GHz Radio

To configure the 2.4 GHz Radio, *Click Quick Start> 2.4 GHz Radio*

The screenshot shows the EnGenius EOC655 web interface. At the top, there is a header with the device name 'EOC655', version '1.0.0.130 S/N: 23EM60300332', and an 'Uptime' of '2h 5m 2s'. On the right, there are icons for Home, File, Power, and Refresh. Below the header, a 'Quick Start' sidebar lists 'Wireless', 'Network', 'Management', and 'Monitor' options. The main content area is titled 'QUICK START' and has tabs for 'System', 'Location', 'Radio 1', 'Radio 2', '2.4 GHz Radio' (which is selected), 'Link Statistics', and 'Site Survey'. The '2.4 GHz Radio' tab contains the following configuration fields:

- Radio Mode:** AP
- SSID:** EOC65500 (1-32 characters)
- Country:** US
- Bandwidth:** 20 MHz
- Configured Channel:** Auto
- Active Channel:** 1 (2412 MHz)

Below these fields is a note: '1. Special characters single quote(') and space are not allowed for configuration. 2. Change in Bandwidth reset the Configured channel to default.' At the bottom of the form is a 'Save' button.

Radio Mode: Access point

Service Set Identifier (SSID): SSID is simply the technical term for a network name.

Country: US

Operational Mode: 11NG

Bandwidth: 20MHz. In general, 2.4 GHz radio can have a bandwidth of 20 MHz i.e., for short distances.

Channel: Auto

When Auto is selected, the best Wi-Fi Channel is selected to achieve the performance.

Site Survey

To configure the Site Survey, Click Quick Start> Site Survey

- Site Survey tab is created for Radio 1 and Radio 2 where it can scan and join the AP with the same SSID.
- Once the Access Point parameters are configured, the subscriber unit will scan and get parameters updated from the AP. This way SU's basic configuration will be updated and further needs to be monitored.



- Once the System and Location Tabs are configured in both AP and SU.

- Go to SU web interface.

- Quick Start> Site Survey tab> Join AP

-

- To verify whether the SU is linked to AP or not go to the home button in the AP/SU and see the Remote partners value. If greater than or equal to 1, successfully linked.

Link Statistics

To configure Link Statistics, Click Quick Start> Link Statistics

EOC655
1.0.130 SNo. 23EM60300332 Uptime 2h 5m 54s Radio 1 Radio 2 2.4 GHz
BSU BSU AP

QUICK START

System Location Radio 1 Radio 2 2.4 GHz Radio **Link Statistics** Site Survey

Radio 1

Index	System Name	IP Address	Uptime	Distance	Local SNR (dB)	Remote SNR (dB)	Rate (Mbps)	Throughput (Mbps)				
			(dd:hh:mm:ss)	(miles)	A1	A2	A1	A2	Tx	Rx	Out	In
No Links...												

Radio 2

Index	System Name	IP Address	Uptime	Distance	Local SNR (dB)	Remote SNR (dB)	Rate (Mbps)	Throughput (Mbps)				
			(dd:hh:mm:ss)	(miles)	A1	A2	A1	A2	Tx	Rx	Out	In
4	EOC655	192.168.1.152	00:00:05:00	-	54	61	64	48	51	130	1.27	0.99

Note:
1. A1: Vertical Polarization, A2: Horizontal Polarization

Note: This is only for Radio 1 and Radio 2

Wireless PTP and PTMP link parameters are summarized in this tab. Click on any entry redirects to another window with detail statistics where you can find a disconnect option and to conduct a link test.

Performance Test

Performance test in Radios

Navigate to Quick Start> Link Statistics> Click on Any Link

*Need to keep the mode as **Server** on one side and **Client** on other side.*

PERFORMANCE TEST

Mode **Server**

EOC655
1.0.130 SNo. 23EM60300332
Uptime 2h 7m 52s
Radio 1 Radio 2 2.4 GHz
● BSU ● BSU ● AP

DETAILED STATISTICS

Throughput (Mbps)

RTX Percentage (%)

Time

Time

Local Remote Total

PERFORMANCE TEST

Mode Client Duration 10 (1-86400) Sec Bidirection Bandwidth 5 (0-500) Mbps Start Client

Note: Bandwidth Value zero : utilizes maximum of 2 Mbps bandwidth

	Local	Remote
IP Address	192.168.1.151	192.168.1.152
MAC Address	02:03:7f:12:98:98	00:03:7f:12:30:30
System Name	EOC655	EOC655
GPS	-	
SNR A1 (dB)	53	64
SNR A2 (dB)	61	49
Signal A1 (dB)	-43	-32
Signal A2 (dB)	-35	-47
Noise (dB)	-96	-96

	Local	Remote
Tx Power (dBm)	23	23
Rate (Mbps)	51	130
Throughput (Mbps)	1.34	1.98
Total Tx Packets	386119	384757
Total Rx Packets	386146	385522
Retries	2755	74184
Dropped	0	0
RTX Percentage (%)	1	1

Here the Link test can be between AP to SU (or) SU to AP either single directional or bi-directional, also input the bandwidth and duration before starting the test. The results of various parameters are displayed in the same screen.

PERFORMANCE TEST

Mode Client Duration 10 (1-86400) Sec Bidirection Bandwidth 5 (0-500) Mbps Start Client

Note: Bandwidth Value zero : utilizes maximum of 2 Mbps bandwidth

Wireless

EOC655 Series devices are Dual-Band radio's that support 5GHz and 2.4GHz operating frequencies.

Radio 1/Radio 2 Configuration

To configure Radio 1 or Radio 2 Configuration,
Click Wireless > Radio 1/Radio 2 Configuration> Properties

Properties

Status – Enable/Disable the Radio.

Link Type - *Link Type* is a mode of choosing a wireless connection between AP and SU radios. A

Link type here can be a PTP/ PTMP

Radio Mode: BSU / SU

- If the Radio Mode is BSU, it is considered as AP.
- If the Radio Mode is SU, is selected then it is a SU.

Service Set Identifier (SSID)

SSID is simply the technical term for a network name.

Country: US 5 GHz

Band1: 5170 - 5250 MHz

Band2: 5250- 5330 MHz

Band3: 5490 - 5710 MHz

Band4: 5735- 5835 MHz

Operational Mode: 11AX

Bandwidth: 20/40/80/160MHz

Given the above options, the admin has the flexibility to select the bandwidth. In general, 2.4 GHz radio can have a bandwidth of 20 MHz i.e., for short distances. A 5GHz radio can have 40 MHz/ 80MHz bandwidth. Advantages of a 5 GHz with 40 MHz/ 80MHz and 160MHz bandwidth are; it is tuned for faster speed; more data can be transferred and less signal interference. This option is available only in Access Point, but not in Subscriber Unit.

Channel

A channel refers either to a physical transmission medium such as a wire, or to a logical connection over a multiplexed medium such as a wireless radio channel through which a message is sent to its intended receiver. Several Wi-Fi Channels and their numbers are predefined to achieve the best performance.

Traffic Shaping

By default, traffic shaping is disabled, the operator can create shaping policies if required to limit traffic and then enable the traffic shaping and configure the uplink/downlink limit values.

Uplink Limit

The administrator can set this limit only when traffic shaping is enabled, and the limit range is (64-867000) Kbps that is from SU to AP.

Downlink Limit

The administrator can set this limit only when traffic shaping is enabled, and the limit range is (64-867000) Kbps that is from AP to SU.

Max SUs

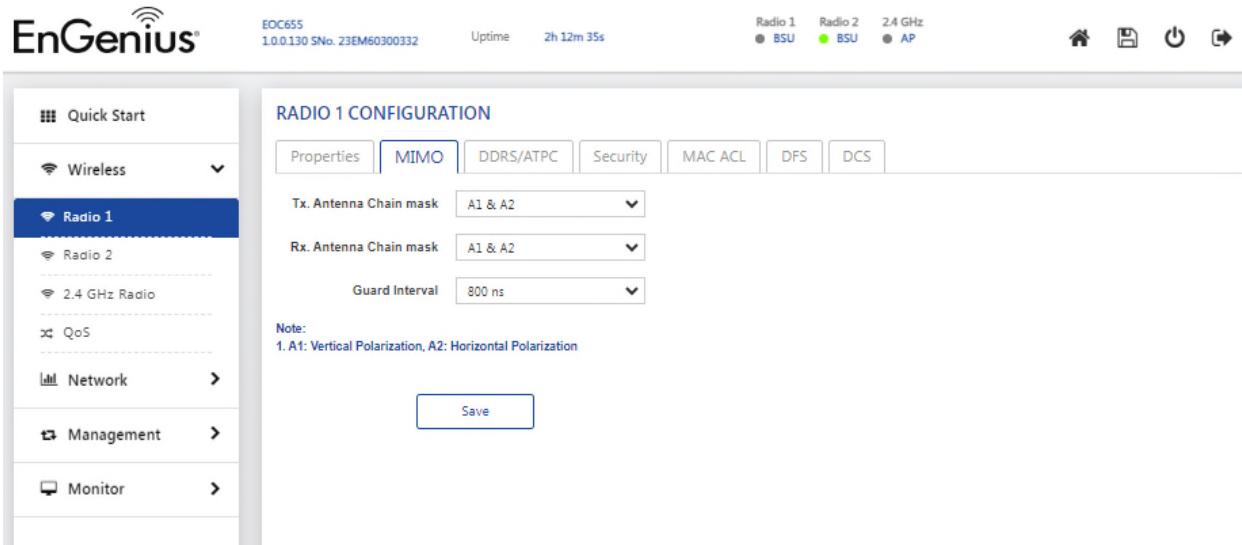
This parameter is configurable only in AP and allows value from 1-32.

Retries

This can be configured to allow a packet to be re-transmitted in specified attempts.

MIMO

To configure MIMO, Click Wireless> Radio 1 or Radio 2 Configuration > MIMO



EOC655 Series devices support Multiple-Input-Multiple-Output (**MIMO**) antenna technology that uses multiple antennas at both the transmitting end and receiving end to improve communication performance.

The transmitting antenna uses multiple radio Tx chains and signal paths to simultaneously transmit different data streams, whereas the receiver combines the Rx signals resulting in higher throughput. By increasing the number of receiving and transmitting antennas, the throughput of the channel increases linearly resulting in high spectral efficiency.

DDRS

To configure DDSR/ATPC, Click Wireless> Radio 1 or Radio 2 Configuration > DDSR/ATPC

Dynamic Data Rate Selection (DDRS) feature adjusts the transmission data rate to an optimal value and provides the best possible throughput according to the current communication conditions and link quality.

Select the Spatial stream as either Auto, Single, or Dual.

Dual Stream: Select Dual for higher throughput.

Single Stream: Select Single for reliability and longer range.

Auto Stream: When you select Auto, DDRS decides the stream modes based on the environmental conditions.

 **Note:** The data rate can be varied from min to max based on SNR and Retransmission percentage.

ATPC

To configure ATPC, *Click Wireless> Radio 1 or Radio 2 Configuration > ATPC*

When you enable the Adaptive Transmit Power Control (ATPC), the device automatically adjusts the transmit power to avoid saturation of remote receiver which could cause data errors leading to lower throughput and link outage. When you disable the ATPC, manually adjust the transmit power. The range should be between (1-26) dBm

Security

The Wireless Security feature helps to configure security mechanisms between AP and SU.

To configure Security, Click Wireless> Radio 1 or Radio 2 Configuration > Security

Encryption Type: Select AES-256

Key: Select any desired key considering the note below.

 **Note:** If the encryption type is selected as none, then there exists any security to the data frames transmitted over the wireless medium

MAC-ACL

MAC Access Control List is an additional security mechanism in a wireless network.

To configure MAC ACL in AP (5GHz), Click **Wireless> Radio 1 or Radio 2 Configuration > MAC ACL**

This section has MAC status: **Allow/ Deny/Disable** and a MAC ACL table: MAC Address

Disable: By, default MAC ACL is disabled in AP (5GHz) Configuration, i.e., all SU's are linked to AP

Allow: If Allow is selected, the MAC ACL feature allows only the authenticated SU's to access the wireless network of AP by adding their MAC addresses

Deny: If Deny is selected, only a particular SU is restricted.



The maximum number of SU's that can be added to the MAC ACL table is 32.

MAC ACL feature is applicable only in AP with 5 GHz

EOC655
1.0.0.130 SNo. 23EM60300332 Uptime: 2h 17m 10s Radio 1: BSU Radio 2: BSU 2.4 GHz: AP

Quick Start

Wireless Radio 1 Radio 2 2.4 GHz Radio QoS Network Management Monitor

RADIO 1 CONFIGURATION

Properties MIMO DDRS/APTC Security **MAC ACL** DFS DCS

Wireless Interface MAC Access Control List (MAC ACL) to allow/deny association.

MAC ACL Status: **Allow**

MAC ACL TABLE

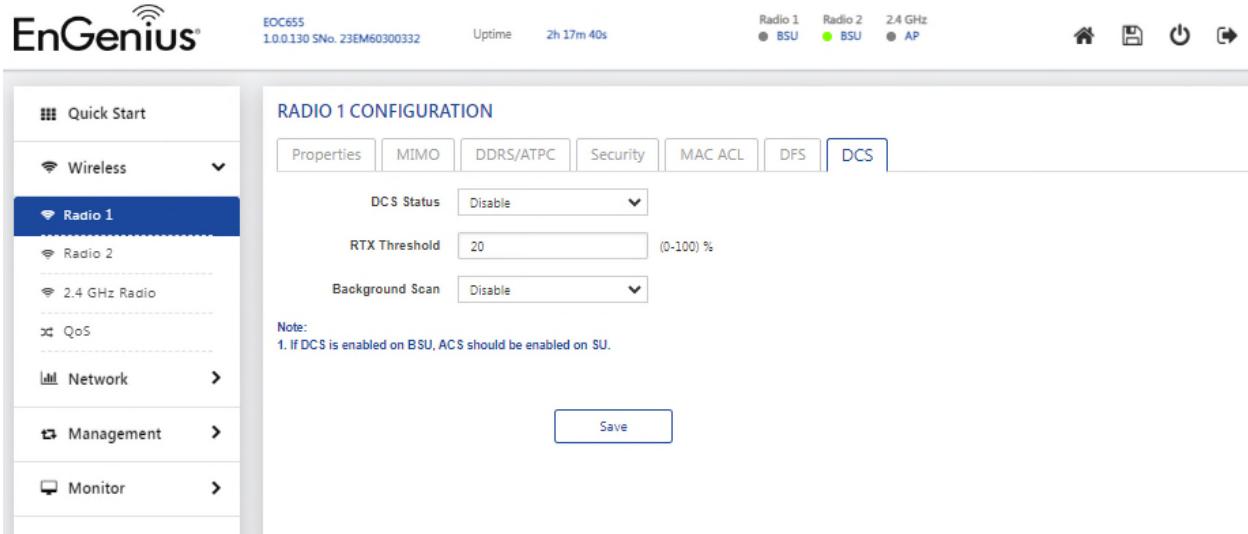
S.No.	MAC Address	Delete
1	00:03:7f:12:5f:5f	Delete
2	00:03:7f:12:5f:5f	Delete
3	00:03:7f:12:5f:5f	Delete

Note:
1. A maximum of 32 entries can be added.
2. If both MAC ACL and RADIUS Authentication is enabled, RADIUS Authentication has priority.

Save

DCS (Dynamic Channel Selection)

To enable DCS, *Click Wireless> 5 GHz Radio Configuration> DCS*



The DCS parameter allows an AP to monitor the retransmissions of packets transmitted to the associated SU on the current operating channel. When the average Local RTx percentage of associated SU crosses user configured DCS threshold value, before switching to new channel, AP evaluates local RTx percentage for 30 sec and triggers Spectrum Analyzer to scan the medium.

The Spectrum Analyzer scans for less interference channel and associates with SU to the best channel available.

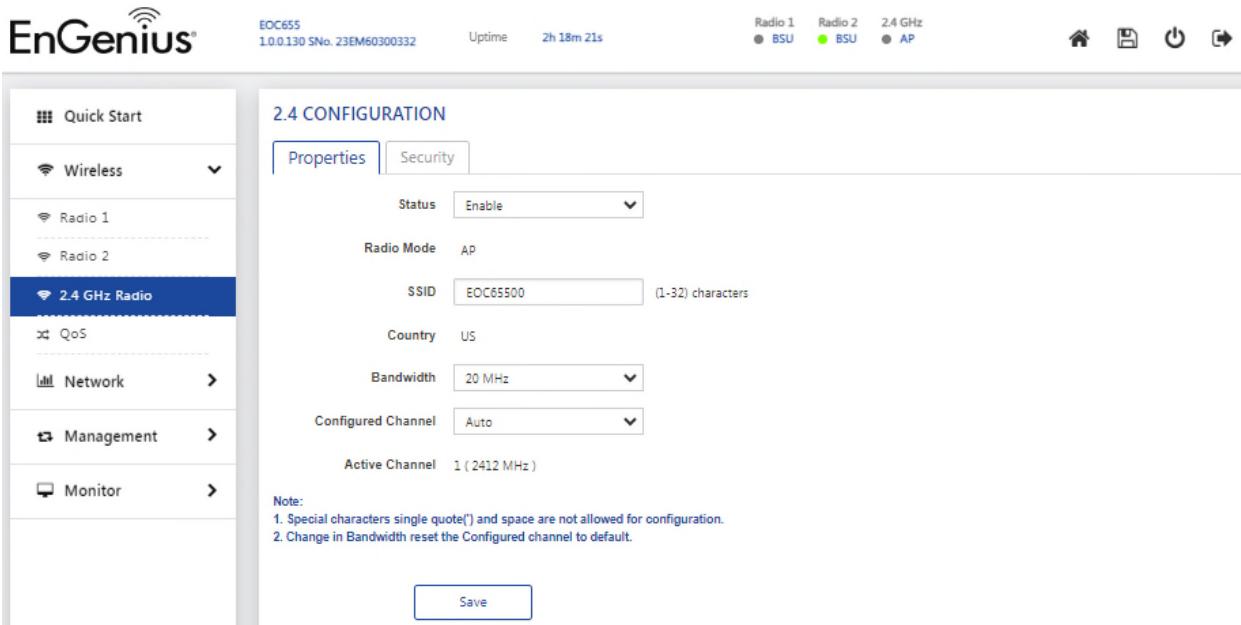
- *This feature is available only in AP with 5GHz.*
- *The DCS threshold is user selectable range (0-100) % and is activated only when DCS is enabled.*
- *The default chosen DCS threshold is 20%, when this percentage limit exceeds, the AP activates spectrum analyzer.*
- *Respective logs will be generated under Monitor> Link Statistics > Logs> Wireless section for example: <time stamp>: DCS triggered (when SU request AP) <Time stamp>: DCS selected best channel (When AP assigns new channel to SU)*



2.4GHz Radio Configurations

Properties

To configure properties, Click Wireless > 2.4 GHz Radio Configuration> Properties



Radio Mode: Access Point

Radio Status: Enable/ Disable

Service Set Identifier (SSID)

SSID is simply the technical term for a network name.

Country: US 2.4GHz

Operational Mode: 11NG

Bandwidth: 20MHz

In general, 2.4 GHz radio can have a bandwidth of 20 MHz i.e., for short distances.

Channel: Auto

When Auto is selected, the best Wi-Fi Channel is selected to achieve the performance.

Disable Legacy: Enable/ Disable

Security

The Wireless Security feature helps to configure security mechanisms between AP and SU.

To configure Security, Click Wireless> 2.4 GHz Radio Configuration > Security

Encryption Type: Select WPA2-PSK

Key: Select any desired key considering the note below.

Note: If the encryption type is selected as none, then there doesn't exist any security to the data frames transmitted over the wireless medium

Mobile App: Mobile App is used to configure the radio.

Network

IP Configuration in AP/SU

To configure the IP Configuration, *Click Network > IP Configuration*

Address Type *Static*

A static IP address is simply an address that does not change until the device is decommissioned or your network architecture changes

Address Type *Dynamic*

Dynamic addresses are assigned, as needed, by Dynamic Host Configuration Protocol (DHCP) servers and are subjected to change periodically.

IP Address

An IP address (internet protocol address) is a numerical representation that uniquely identifies a specific interface on the network.

Subnet Mask

The subnet mask number helps to define the relationship between the host (computers, routers, switches, etc.) and the rest of the network.

Gateway IP

A gateway IP refers to a device on a network which sends local network traffic to other networks.

Fallback IP

The Administrative Web Interface is available via the fallback IP address when there is no DHCP server. A Static IP address can be configured when in fallback mode.

In Fallback IP Select the Status **Enable/Disable**, and enter the **IP Address**, **Subnet Mask**, **Gateway** **Enable**: The administrative can access radio web interface via the fallback IP address in any case.

VLAN

To configure VLAN, **Click Network>VLAN> VLAN Configuration**

VLAN Status Enable/Disable

To enable or disable the VLAN functionality.

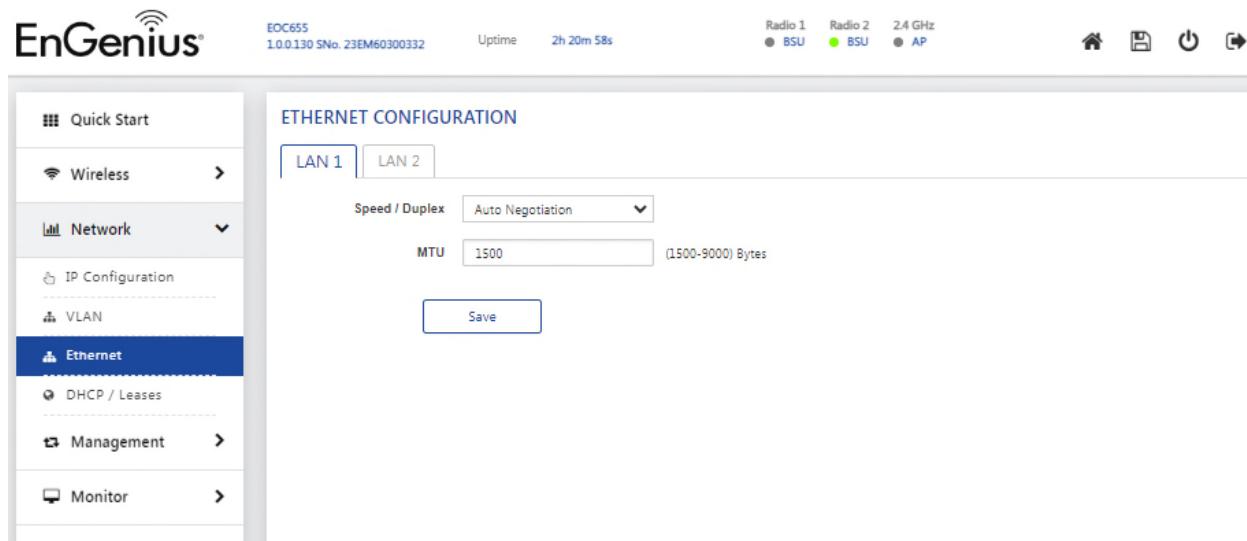
VLAN Mode Transparent

Virtual LAN is a custom network created from one or more existing LANs. It enables groups of devices from multiple networks (both wired and wireless) to be combined into a single logical network. Transparent mode allows to pass tag traffic.

Ethernet

To configure Ethernet, **Click Networks > Ethernet > Ethernet Configuration**

Ethernet Configuration can be done for both LAN1 and LAN2



Ethernet Speed

- **Auto Negotiation**

When this option is chosen in AP/SU, the Ethernet configuration tries to auto negotiate. Based on connected switch/router to send the optimal mode for speed connection.

- **Specific Ethernet Negotiation Speed**

Allows two-way transmission simultaneously.

LAN 1: Supports 100 Mbps- Full or 1000 Mbps-Full Ethernet transmission mode.

LAN 2: Supports 100 Mbps- Full, 1000 Mbps-Full or 2500 Mbps –Full Ethernet transmission mode.

Ethernet MTU

This parameter determines the limit of transmission allowed for a data packet sent or received on the wireless interface. The MTU size varies from 1500 to 9000 bytes.

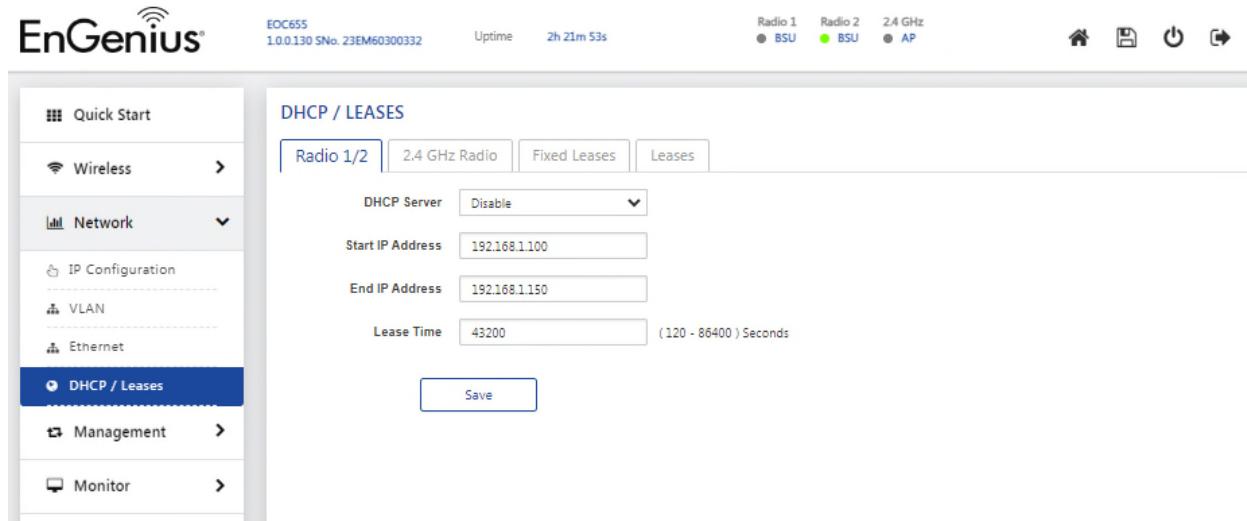
DHCP Server

Dynamic Host Configuration Protocol (DHCP) is a network protocol that enables a server to assign an IP address to the DHCP client from a defined range of IP addresses configured for a given network. Allocating IP addresses from a central location simplifies the process of configuring IP addresses to individual DHCP clients and avoids IP conflicts.

If DHCP Server is enabled, it picks automatically the IP addresses from the specific interface address and assigns them to the respective DHCP clients.

Radio 1/2

To configure the parameters, Click Network > DHCP / Leases > Radio 1/2



DHCP Server Enable/Disable

DHCP Server is a network server that automatically provides and assigns IP addresses, default gateways and other network parameters to client devices.

Start IP Address/End IP Address

Range of IP address to be used by DHCP server to assign.

Lease Time

DHCP Lease Time is the amount of time in minutes or seconds a network device can use an IP Address in a network.

2.4 GHz Radio

To configure the 2.4GHz parameters, Click Network > DHCP Server > 2.4 GHz Radio

IP Address

An IP address (internet protocol address) is a numerical representation that uniquely identifies a specific interface on the network.

Subnet Mask

The subnet mask number helps to define the relationship between the host (computers, routers, switches, etc.) and the rest of the network.

DHCP Server

A DHCP server is configured with a pool of available IP addresses and assigns one of them to the DHCP client.

Start and End IP Address

Range of IP address to be used by DHCP server to assign.

Lease Time

Specifies the maximum lease time for which the DHCP client can use the IP address provided by the DHCP Server. The value ranges from 120 - 86400 seconds

DHCP Fixed Leases

To configure the DHCP Fixed Leases parameters, Click Network > DHCP Server > DHCP Fixed Leases

The screenshot shows the EnGenius EOC655 web interface. The top bar displays the device model (EOC655), serial number (1.0.0130 SNo. 23EM60300332), uptime (2h 23m 31s), and radio status (Radio 1: BSU, Radio 2: BSU, 2.4 GHz: AP). The left sidebar menu includes 'Quick Start', 'Wireless', 'Network' (with sub-options: IP Configuration, VLAN, Ethernet), 'DHCP / Leases' (selected), 'Management', and 'Monitor'. The main content area is titled 'DHCP / LEASES' and shows tabs for 'Radio 1/2', '2.4 GHz Radio', 'Fixed Leases' (selected), and 'Leases'. A table header for 'Fixed Leases' includes columns for S.No., Host Name, MAC Address, IP Address, and Delete. A note below the table states: '1. A maximum of 35 entries can be added. 2. Special characters ' - = and space are not allowed to configure Host Name.' Below the table are 'Save' and 'Add' buttons. A modal window titled 'DHCP FIXED LEASE ADD ENTRY' is open, showing fields for Host Name (Test), MAC Address (00:dc:97:1f:e2:20), and IP Address (192.168.1.111). A note below the fields states: '1. Special characters ' - = and space are not allowed to configure Host Name.' At the bottom of the modal are 'Add' and 'Back' buttons.

By clicking the ADD user redirected to new window to add the entry of hostname Mac Address, IP Address. Here the MAC address and IP address are banded and listed down.

Leases

To configure the Leases parameters, Click Network > DHCP Server> Leases

The screenshot shows the EnGenius EOC655 web interface. The top bar displays the device model (EOC655), serial number (1.0.0130 SNo. 23EM60300332), uptime (2h 32m 19s), and radio status (Radio 1: BSU, Radio 2: BSU, 2.4 GHz: AP). The left sidebar menu includes 'Quick Start', 'Wireless', 'Network' (with sub-options: IP Configuration, VLAN, Ethernet), 'DHCP / Leases' (selected), 'Management', and 'Monitor'. The main content area is titled 'DHCP / LEASES' and shows tabs for 'Radio 1/2', '2.4 GHz Radio', 'Fixed Leases', and 'Leases' (selected). A sub-modal window titled 'DHCP Leases' is open, showing a table with columns: Hostname, IPv4-Address, MAC-Address, and Leasetime remaining. The table displays the message: 'There are no active leases.'

DHCP Leases

DHCP Leases displays the list of IP addresses assigned by a DHCP server.

Management

This chapter provides information on how to manage the device by using a Web interface. It contains information on the following:

To configure General, Click Management > System > System Configuration> General

S.No.	Servers	Delete
1	time.google.com	Delete
2	0.openwrt.pool.ntp.org	Delete
3	1.openwrt.pool.ntp.org	Delete
4	2.openwrt.pool.ntp.org	Delete

Note:
1. A maximum of 4 entries can be added.

Sync with browser Save

General

Local Time

Display the current time of the radio.

NTP

This option allows the user to Enable or Disable NTP feature. If enabled, the user must configure the NTP server. The device will synchronize its local time with NTP server.

Enable NTP

Enable NTP, will sync the radio time with the NTP server time.

NTP Server

A server to provide the reference time to radio for sync up.

Logging

To configure logging, Click Management > System > System Configuration> logging

System log

System logs can be stored in external syslog server on PC.

Log Server IP

Configure the PC IP Address on which syslog server is running.

Log Server Port

The port on which the current log server is operating.

Temperature log

Temperature Log feature is used to log the internal temperature of the device for the configured temperature logging interval (By default, it is 30 minutes). For every 30 min, a new log is generated with temperature in °C.

- *Enable Temperature Log*
- *Temperature log interval* (0- 60) minutes

Location

To configure location, Click Management > System > System Configuration> location

System Name

This will help in identifying the SU name.

Location

This will help in identifying the location of the SU.

Email

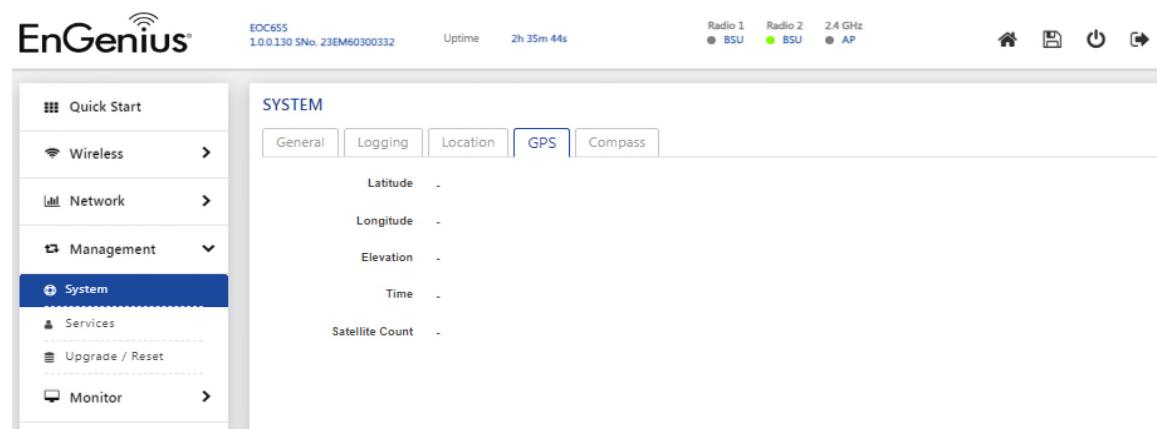
This will help in identifying and contacting the customer through email.

Phone Number

This will help in identifying and contacting the customer through phone.

GPS

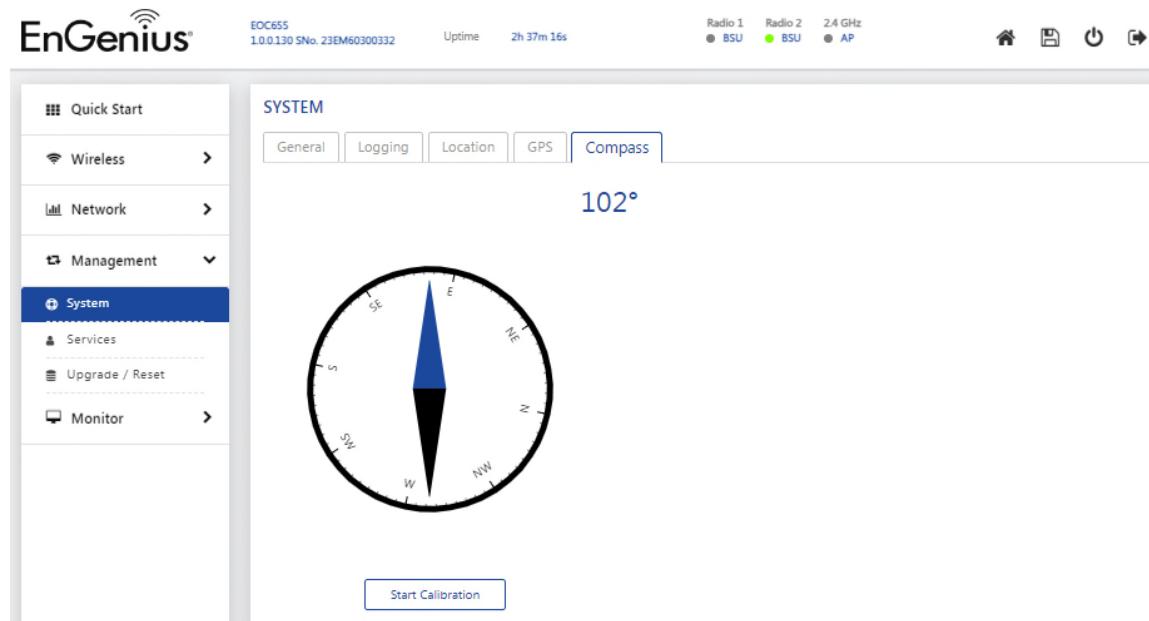
To see GPS Data, **Click Management > System > System Configuration > GPS**. This section shows details like Latitude, Longitude, Elevation, Time and Satellite Count.



Compass

To see Compass Data, **Click Management > System > System Configuration > Compass**

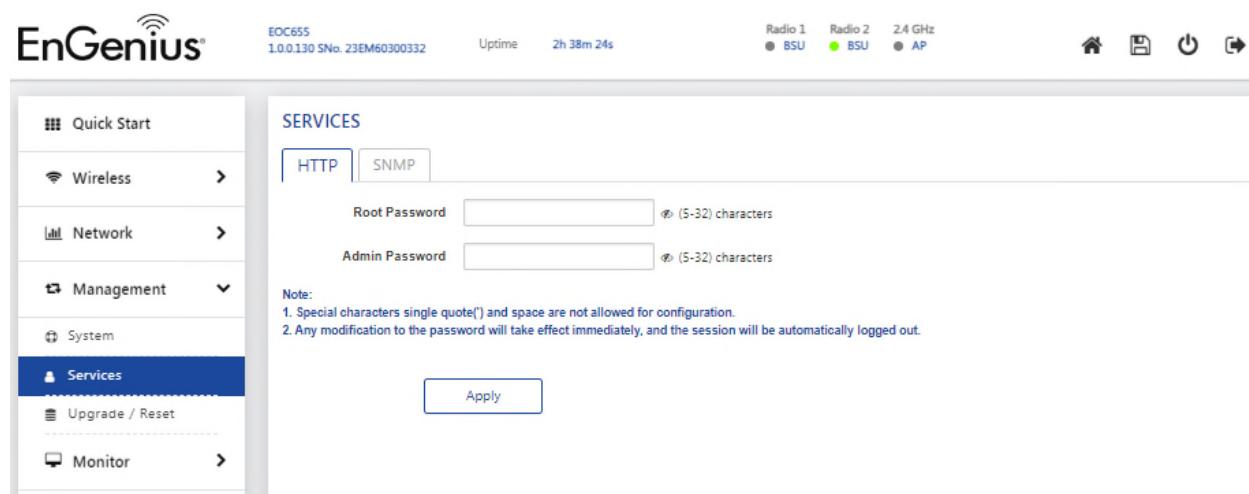
It shows the compass readings to help in alignment of the device w.r.t to the poles.



Services

The device can be managed using different management protocols. The supported protocols are HTTP, SSH, SNMP.

HTTP



To configure the HTTP, *Click Management > Services >>HTTP*

Passwords setting, or modification can be done in this section.

SNMP

To configure the SNMP, *Click Management > Services >>SNMP*

Enable SNMP

- **SNMP version:** SNMP v1, SNMPv1-v2, SNMP v3
- **SNMP Read /Read-Write Password:** Here Read and Read Write password are available to read the configuration from the SNMP.
- **SNMP Trap Host IP Address:** Here the IP address of a Trap Server is specified.
- **SNMP Trap Host Password:** The password is set to secure the Trap sent.

Upgrade/Reset

HTTP

Backup & Restore

To configure Backup & Restore, *Click Management > Upgrade/Reset> HTTP > Backup & Restore*

- This back-up option allows the user to download the device configuration locally.
- The restore option allows the user to restore the device configuration to the uploaded configuration file.
- Restoring the config file to the device will take 30 sec approx.
- After uploading the configuration file, the device will load with the new configuration.

Upgrade Firmware

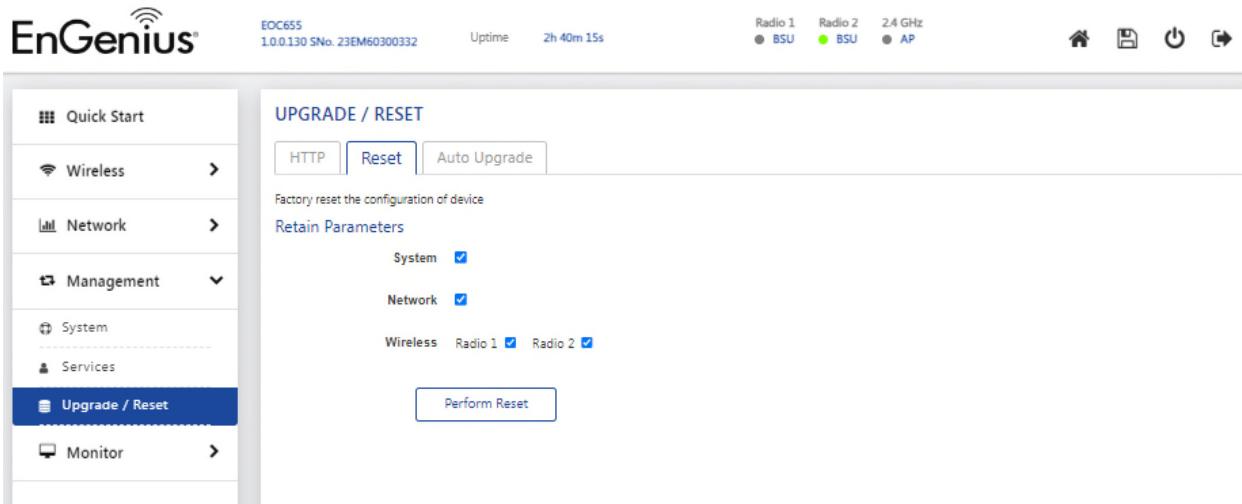
To configure Upgrade Firmware, **Click Management > Upgrade/Reset > HTTP > Upgrade Firmware**

The firmware upgrade process happens in four phases:

- Upload: Select firmware to be uploaded
- Verification: Verify the firmware to validate the checksum
- Upgrade: Write the new firmware into flash memory
- Reboot: Once the flash write process is completed, then automatically reboot the device.
- The whole firmware upgrade process takes around 6.30 minutes to complete.
- When the upgrade process starts, all the existing links will be disconnected until it reboots with new firmware.
 - Due to the above fact, it is recommended to upgrade all remote devices and then upgrade the local device.

Reset

To Reset, **Click Management > Upgrade/Reset> Reset**



This option allows the user to reset all device configuration to factory defaults.

After reset, the device must be accessed using the LAN interface locally and must be re-configured to allow the device to join into the network again.

Retain Parameters:

System – Retains the System Configuration (System Name, Location, Email, Phone Number).

Network – Retains the IP Configuration (IP Address, Mask, Gateway).

Wireless – Retains the Wireless Configuration (all link parameters) for both Radio 1 and Radio 2.

Auto Upgrade

To Reset, Click Management > Upgrade/Reset> Auto Upgrade

Auto Upgrade functionality allows the user to upgrade new firmware automatically to all the available SU.

To use this, the admin needs to configure BSU in Server Mode and Upload the latest firmware package.

In SU side, configure the mode as Client and firmware check time (when the SU will check for new firmware) and Firmware Upgrade Time (At what time exactly the firmware upgrade will happen).

Monitor

Radio 1 / Radio 2 Statistics

The objective of the statistics page is to allow an administrator to view the state of wired and wireless interfaces. These statistics assist the network administrator to troubleshoot the devices.

You can view the details of associated devices connected to either Radio 1 or Radio 2.

*To view the Radio 1 or Radio 2 Statistics,
click Monitor > Radio 1 Statistics/ Radio 2 Statistics > Link*

EnGenius

EOC655
1.0.0.130 SNo. 23EM60300332 Uptime 2h 43m 15s Radio 1 Radio 2 2.4 GHz
● BSU ● BSU ● AP

Quick Start

Wireless >

Network >

Management >

Monitor >

Radio 1 Statistics

Radio 2 Statistics

2.4 GHz Statistics

Ethernet Statistics

Learn Table

System Logs

Tools

RADIO 2 STATISTICS

Link RTX Interface Logs

[View Receive Sensitivity Table](#)

Index	System Name	IP Address	Uptime	Distance	Local SNR (dB)	Remote SNR (dB)	Rate (Mbps)	Throughput (Mbps)	Tx	Rx	Out	In
4	EOC655	192.168.1.152	00:00:13:45	-	50	57	61	47	51	286	0.67	0.47

Note:
1. A1: Vertical Polarization, A2: Horizontal Polarization

EnGenius

EOC655
1.0.0.130 SNo. 23EM60300332 Uptime 2h 44m 13s Radio 1 Radio 2 2.4 GHz
● BSU ● BSU ● AP

Quick Start

Wireless >

Network >

Management >

Monitor >

Radio 1 Statistics

Radio 2 Statistics

2.4 GHz Statistics

Ethernet Statistics

Learn Table

System Logs

Tools

DETAILED STATISTICS

Throughput (Mbps)

RTX Percentage (%)

Time

RTX

Local Remote Total

Back Clear Disconnect

PERFORMANCE TEST

Mode Client Duration 10 (1-86400) Sec Bidirection Bandwidth 5 (0-500) Mbps Start Client

Note: Bandwidth Value zero : utilizes maximum of 2 Mbps bandwidth

	Local	Remote
IP Address	192.168.1.151	192.168.1.152
MAC Address	02:03:7f:12:98:98	00:03:7f:12:20:20
System Name	EOC655	EOC655
GPS	-	
SNR A1 (dB)	51	62
SNR A2 (dB)	57	47
Signal A1 (dB)	-45	-34
Signal A2 (dB)	-39	-49
Noise (dB)	-96	-96

	Local	Remote
Tx Power (dBm)	22	26
Rate (Mbps)	51	286
Throughput (Mbps)	0.77	0.53
Total Tx Packets	510384	508917
Total Rx Packets	509708	510285
Retries	15849	177073
Dropped	0	0
RTX Percentage (%)	4	48

Detailed Statistics

- MAC Address: Displays the MAC address of the linked remote device.
- IPv4-Address: Displays the IP address of the remote device.
- Link Id: Displays the link Id of remote device.
- Distance (Km): Displays the distance between the AP and SU.
- Local Signal (dB): Displays the local signal strength.

- **Remote Signal (dB):** Displays the Signal strength of the remote device.
- **Rate (Mbps):** Displays the Transmit (Tx) and Receive (Rx) rate of a device.
- **Throughput (Mbps):** Displays the current Input and Output bandwidth.

Interface Statistics

To view the Radio 1 or Radio 2 Interface Statistics,
click **Monitor > Radio 1 Statistics/ Radio 2 Statistics/ 2.4GHz Statistics > Interface**

RADIO 2 STATISTICS

Data

	Tx	Rx
Total Packets	5692054	5679301
Broadcast Packets	1084	844
Multicast Packets	1289	902
Unicast Packets	5689681	5677555
PPS Count	484	484

Management

Tx Packets	93	Authentication Result Last	success
Rx Packets	110	Association Requests Received	6
Beacons Transmitted	79846	Association Rejects	0
Authentication Requests Received	6	Association Confirms	6
Authentication Confirms	6	Disassociation Requests Received	1
Authentication Rejects	0	Association Result Last	not available
Deauthentication Requests Sent	0		

Errors

CRC Errors	391
Frame Errors	17
RTX Percentage	3

Interface Statistics will show all the statistics for radio interface.

Display Wireless Advance Statistics

- **Data:** Specifies the total number of packets, broadcast packets, multicast packets, unicast packets of both Tx and Rx.
- **Management:** Device Management features are summarized
- **Errors:** Displays CRC and Frame Errors
- **CRC Errors:** Specifies the number of received packets with invalid CRC.
- **Frame Errors:** Too many frame errors cause network connection to slow down.

Logs

To view the Radio 1/Radio 2 or 2.4GHz Logs,
click Monitor > Radio 1 Statistics/ Radio 2 Statistics/ 2.4GHz Statistics > Logs

The user can see all the logs related to the respective radio (Connection/Disconnection/DFS, DCS etc.)

Here are some of the wireless event entries displayed. Different types of Logs are generated:

a) **Associated Log:** When an AP is connected to an SU or vice versa, a log is generated which is called Associated log. This log consists of MAC Addresses of the remote device.

For example:

Sat Oct 13 07:15:46 2023: BSU established link with SU
(00:d0:41:e0:1c:1c/192.168.1.2/EOC655) SNR (A1: 50 dB A2: 51 dB)

b) **Disassociated log:** When an AP is disconnected with an SU or vice versa due to a reboot/soft reset/ a manual disconnect then a log is generated which is called a disassociated log. This log consists of MAC Addresses and a reason for disconnection of the device.

For example:

Sat Oct 13 07:15:46 2023: Disassociated (MAC: 00:d0:41:e0:1c:1c) in SU/
Remote Device

Reasons that are displayed in the log are:

Locally terminated: If an AP is a local device and loses SU link or vice versa due to a reboot/soft reset/ a manual disconnect, then the termination reason is said to be locally terminated.

Remote terminated: If SU is unable to connect to an AP, due to a reboot/soft reset/ a manual disconnect, then the termination reason is said to be Remote terminated.

Power Off: (Remote Device): If there is a power failure either in an AP or SU. The termination reason is said to be Power off.

- c) **Wireless Inactivity:** This parameter is configured only in SU, if there is no activity on wireless interface of SU in a specified time interval, reset the wireless interface. The value should be configured in minutes. An event log is generated when wireless inactivity triggers and this is visible in wireless events log.
- d) **Link Inactivity:** If there is no activity on Wireless link on SU in a specified time, reset the wireless interface. The value should be configured in minutes. An event log is generated when Link inactivity triggers and this is visible in wireless events log.
- e) **DCS logs:**
 - This feature is available only in AP with 5GHz.
 - The default chosen DCS threshold is 20%, when this percentage limit exceeds, then a log is triggered, and the AP activates spectrum analyzer and assigns best channel to the desired SU.

There are two types of logs generated:

 - DCS Triggered log.
 - DCS best channel selection

t for example: <time stamp>: DCS triggered
<Time stamp>: DCS selected best channel

- f) **Spectrum Analyzer:** has a start log and end log.

Ethernet Statistics

You can view information about wired Ethernet network traffic.

*To view the Ethernet Statistics, click **Monitor> Ethernet Statistics***

ETHERNET STATISTICS

LAN 1 **LAN 2**

Interface Statistics Events

	Tx	Rx
Total Packets	112687	101261
Total Bytes	47081882	8064208
Unicast packets	110807	100310
Broadcast packets	975	357
Multi packets	905	594
PPS	0	1
Throughput(Mbps)	0.00	0.00
Dropped	0	0
Errors	0	0
RX FCS Errors	-	1

Log Type

- **Display Ethernet Advance statistics:** Displays a summary of Tx, Rx, Errors, L2, L3-Multicast& Broadcast drop count.
- **Display Ethernet statistics:** A summary of basic Ethernet statistics (Tx, Rx, collisions etc.)
- **Network statistics for all Interfaces:** A summary of all wired and wireless interfaces

Learn Table

To view the LAN Table Statistics, **click Monitor > Learn Table**

Bridge

Learn Table:

Learn Table is used to view all the MAC addresses of a device on both wired and wireless interfaces. The Learn Table displays the information of Port no, MAC addresses, whether the type of interface is local interface or not and finally the ageing timer as shown.

- Click Refresh to get the updated or latest Learn Table.
- Click Clear to delete all entries of the Learn Table.

LEARN TABLE

Bridge **ARP**

MAC LEARN TABLE

Interface **All**

Interface	MAC Address	Local	Ageing timer
Wireless1	00:03:7f:12:72:72	yes	0.00
Wireless2	02:03:7f:12:98:98	yes	0.00
Wireless2	0c:b6:53:21:8a:40	no	51.65
Ethernet1	4c:13:65:88:88:00	yes	0.00
Ethernet2	4c:13:65:88:88:01	yes	0.00
Ethernet1	54:e1:ad:a1:23:ca	no	0.54
Wireless2	8c:ae:4c:dd:6d:bf	no	0.21

LEARN TABLE

Bridge **ARP**

ARP TABLE

Interface

Interface	MAC Address	IP Address
Bridge	8c:ae:4c:dd:6d:bf	192.168.1.101
Bridge	00:00:00:00:00:00	192.168.1.151
Bridge	8c:ae:4c:dd:6d:bf	192.168.1.135
Bridge	00:00:00:00:00:00	192.168.1.1
Bridge	54:e1:ad:a1:23:ca	192.168.1.131
Bridge	8c:ae:4c:dd:6d:bf	192.168.1.160
Bridge	00:00:00:00:00:00	192.168.1.100

ARP

This section displays the mapping of the IP and MAC addresses of all nodes in the network. This information is based upon the Address Resolution Protocol (ARP). ARP is a L2 neighboring protocol which converts the IP address into a physical address on the Ethernet network.

Click Refresh to get the updated or latest ARP Table.

Click Clear to delete all entries of the ARP Table.

System Logs

To view the System, click Monitor > System Logs

EOC655
1.0.130 SNo. 23EM60300332 Uptime 2h 49m 32s Radio 1 BSU Radio 2 BSU 2.4 GHz

LOGS

Config Device Temperature

Refresh

```

Sat Dec 23 23:53:31 2023 [CONSOLE] wireless.wifi2.htmemode = HT20
Sat Dec 23 23:53:31 2023 [CONSOLE] ftp.tftp.opstatus = 3
Sat Dec 23 23:53:31 2023 [CONSOLE] ftp.tftp.opstatus = 2
Sat Dec 23 23:52:26 2023 [CONSOLE] wireless.wifi2.htmemode = HT80
Sat Dec 23 23:52:26 2023 [CONSOLE] ftp.tftp.opstatus = 3
Sat Dec 23 23:52:26 2023 [CONSOLE] ftp.tftp.opstatus = 2
Sat Dec 23 23:52:26 2023 [CONSOLE] advwireless.ath2.channel = 149
Sat Dec 23 23:47:31 2023 [CONSOLE] xparam.ath1.ddrstatus = 20
Sat Dec 23 23:47:31 2023 [CONSOLE] ftp.tftp.opstatus = 3
Sat Dec 23 23:47:31 2023 [CONSOLE] ftp.tftp.opstatus = 2
Sat Dec 23 23:25:43 2023 [192.168.1.135:HTTP] advwireless.ath1.channel = 36
Sat Dec 23 23:17:40 2023 [192.168.1.135:HTTP] ethernet.ether0.speed = 0
Sat Dec 23 23:17:16 2023 [192.168.1.135:HTTP] advwireless.ath2.channel = 36
Sat Dec 23 23:15:00 2023 [192.168.1.135:HTTP] advwireless.ath1.channel = 140
Sat Dec 23 23:05:50 2023 [192.168.1.135:HTTP] wireless.wifi1.distance = 25
Sat Dec 23 23:04:32 2023 [192.168.1.135:HTTP] xparam.ath1.ddrstatus = 23
Sat Dec 23 22:58:20 2023 [CONSOLE] wireless.wifi2.htmemode = HT20
Sat Dec 23 22:58:20 2023 [CONSOLE] ftp.tftp.opstatus = 3
Sat Dec 23 22:58:20 2023 [CONSOLE] ftp.tftp.opstatus = 2
Sat Dec 23 22:58:20 2023 [CONSOLE] advwireless.ath2.channel = 149
Sat Dec 23 22:51:51 2023 [CONSOLE] xparam.ath1.ddrstatus = 11
Sat Dec 23 22:51:51 2023 [CONSOLE] ftp.tftp.opstatus = 3

```

Any recent changes in the device configuration are reflected here.

All the device logs like Reboot, Init, Reset are displayed under Device Logs.



Temperature logs are recorded only after a certain temperature login interval.

EOC655
1.0.130 SNo. 23EM60300332 Uptime 2h 50m 37s Radio 1 BSU Radio 2 BSU 2.4 GHz

LOGS

Config Device Temperature

Refresh

```

Sun Dec 24 01:57:28 2023 - Temperature : 46.0 °C
Sun Dec 24 01:27:28 2023 - Temperature : 45.0 °C
Sun Dec 24 00:57:28 2023 - Temperature : 44.0 °C
Sun Dec 24 00:27:28 2023 - Temperature : 46.0 °C
Sat Dec 23 23:57:28 2023 - Temperature : 44.0 °C
Sat Dec 23 23:27:28 2023 - Temperature : 38.0 °C

```

Tools

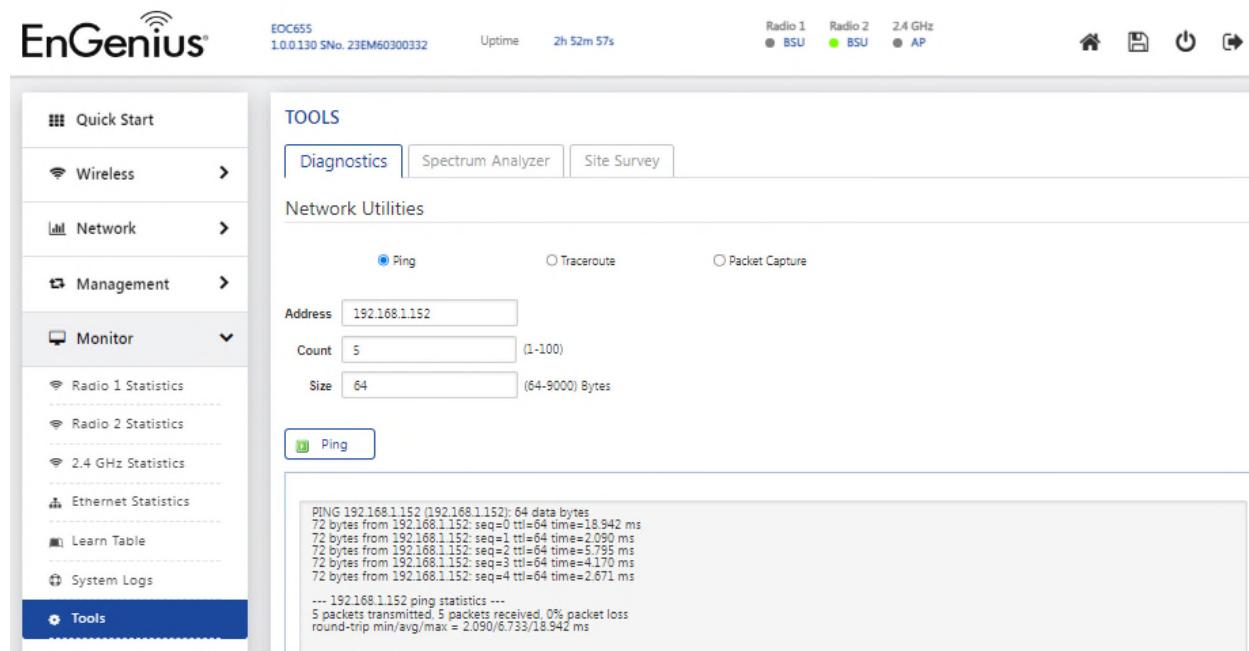
To view the Tools, click **Monitor> Statistics > Tools**

Diagnostics

Few popular network utilities are used to determine the network connections.

Ping

The main purpose of using this command is to verify whether the device can connect over the network to another device or not.



Traceroute

Traceroute determines that the packet has reached the destination by including a port number that is outside the normal range. When it is reached, the Port Unreachable message is sent in return, which defines the time length of the final hop. Trace route provides you with the information hop by hop. Each hop is determined three times. When a website is unreachable or slow, trace route allows you to see where the connection fails or has delays.

Packet Capture

Packet Capture refers to the action of capturing Internet Protocol (IP) packets for review or analysis. The term can also be used to describe the files that packet capture tools output, which are often saved in the pcap format.

Spectrum Analyzer

To view the Spectrum Analyzer, click Monitor> Tools > Spectrum Analyzer



Same can be started for either of the Radios.

This is available only in AP.

- Scans all the frequencies from the configured start frequency to end frequency for a scan time of 2sec on each frequency.
- Click the Start button and the results will be displayed in a graph.

Signal

This shows the max Signal of received packets at each frequency in dBm.

Utilization

This shows the max utilization of the medium at each frequency in percentage.

Site Survey

To view the Site Survey, click Monitor> Tools > Site Survey

TOOLS

Site Survey

Radio 1

Sort by SNR (dB)

Index	SSID	MAC Address	Channel	Frequency (MHz)	SNR (dB)	Utility	Security	Type	Join
1	msk-test	1c:82:59:b1:35:05	36	5180	11	10	Yes	KeyWest	-
2	hahahaha	88:dc:07:1fe1:d2	36	5180	22	10	Yes	EnGenius	-
3	EOC655_R19	88:dc:07:1fe1:72	36	5180	4	10	Yes	EnGenius	-
4	EOC655_R1_NMSTEST	1c:82:59:b1:34:ff	36	5180	4	10	Yes	KeyWest	-

Site Survey is for 5GHz Radio where it can scan and join the AP with the same SSID.

Once the Access Point parameters are configured, the subscriber unit will scan and get parameters updated from the AP. This way SU's basic configuration will be updated and further needs to be monitored.

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