

CERIO Corporation

**CERIO MAN-MESH
Intelligent Software**

Quick Start Guide

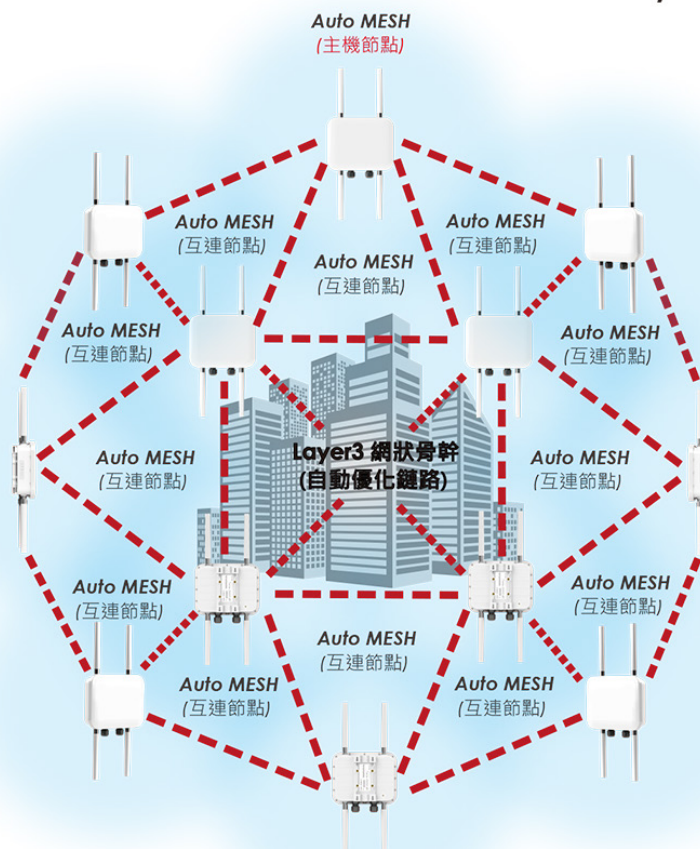
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1. Overview of MAN-MESH

1.1 Introduction

The CERIO MAN MESH Intelligent Core Software Mode provides Layer3 Mesh Backbone Auto Link Optimization, it's using simpler and smartest way to improve the connection quality of the wireless network which let a large number of users in the vast space can enjoy a stable quality wireless network. In addition, each node in the mesh wireless network system can be an independent, providing fast connection and a more stable wireless network. With Intelligent WiFi Mesh Topology, the wireless node will communicate with each other and can be set automatically, which greatly reduces the complicate setting procedure. The MAN-MESH Layer3 Mesh Backbone Auto Link Optimization also provides, when one of the wireless nodes fails or disconnected, the other wireless node in the mesh network can communicate with each other and recover the network connection automatically. Which is an excellent solution for infrastructure, surveillance, IOT and in-train backhaul. And for emergencies, rapidly deployable and robust communications between each member when emergencies are involved in difficult operations inside buildings, towers, hard-hit disaster areas or surrounded in forest fires.

Cerio MAN-MESH for Backbone Network Topology



1.2 MAN-MESH Intelligent Software Core Product Application

1. Wireless Man Mesh for Backbone Deployment

When using MAN-MESH equipment, In addition to the multi-radio AP Station (Access Point) that can be for more wireless clients. Also built-in the MAN-MESH Software Core provides Intelligent Mesh Backbone Auto Link Optimization Meshed APs self-configure and establish a high-performance, robust, and resilient network automatically. Provide a full-coverage wireless network without dead ends, no matter where you are, you can automatically and seamlessly connect to the optimal wireless signal at any time.

2. Wireless Man Mesh for Backbone with Access Point Deployment

In addition to the deployment of wireless backbone MESH AP network applications, it can also be used as an AP Station to connect wired or wireless devices to the terminal. For example, the CERIO OW-500 A3-MESH model supports four 5GHz external N-Type antenna connectors and a built-in 5dBi 2.4GHz high-gain antenna. The external N-Type outdoor antenna connector can be freely matched with Omni Antenna to meet the deployment of a full range of wireless backbone networks.

3. Wireless Man Mesh for Semi-Mobile Backhaul Deployment

The MAM-MESH Outdoor CPE/AP, It's the perfect solution for backhaul deployment of Semi-Mobile mesh network, such as data transmission of public transport system (ex. Railways, Ships, Bus, MRT, Gondola, etc.), through this smart wireless mesh network, which can collect and transmit information in real-time, so that control center can do security monitoring and management. This MAN-MESH equipment (ex. OW-408 A1-MESH which supports dual-radios with built in 8dBi wide range directional high gain antenna) can be connected to any Ethernet device to easily build short- or long-distance wireless mesh network applications at the edge site, such as Warehouse and factory incoming/outgoing vehicle, construction area safety monitor management and so on.

4. Wireless MAN-Mesh for Intersection monitor Backhaul Deployment

CERIO MAN-MESH Wireless Mesh Network (Mesh) is the best solution for mission-critical applications such as wireless video surveillance and backbone transmission of network services. It can completely solve any difficulties in the network architecture environment that needs to provide wired network nodes. When in certain large areas, such as intersections in streets or public video surveillance equipment which using distributed mesh wireless network for data transfer back application. By using the MAN-Mesh equipment (ex. OW-500 A1-MESH which supports Tri-radio with built in 18dBi directional high gain antenna) with a 5GHz high-gain Omnidirectional antenna to achieve single wireless or multiple wireless links in a long distance mesh topology, and using Mesh architecture for network planning which can easily achieve the mesh routing backup. Intelligent mesh network environment can provide multiple backhaul mechanism paths in each mesh node to achieve uninterrupted connection paths. That's when every 5GHz Mesh WiFi node and its wireless link are interrupted for no reason, they can seamlessly reconnect through different paths to resume fast data transmission. So it ensures the safety and reliability of wireless network transmission.

1.3 MAN-MESH with hardware support models

Supported models include:

Dual Radio Mesh Model : (Radio-0/2.4GHz and Radio-1/5GHz)

➤ **Mode :** OW-408 A1-MESH

Description : eXtreme Power Wave2 4X 2x2 +8dBi Dual-Band MAN-MESH
Outdoor CPE/AP

Tri Radio Mesh Models: (Radio-0/2.4GHz and Radio-1/5GHz and Radio-2/5GHz)

➤ **Mode :** OW-500 A1-MESH

Description : eXtreme Power Wave2 4X 2x2 +18dBi Tri-Band MAN-MESH
Outdoor Bridge/AP

➤ **Mode :** OW-500 A3-MESH

Description : eXtreme Power Wave2 4X 2x2 Tri-Band MAN-MESH Outdoor
Bridge/AP

Tri Radio Mesh Models : (Radio-0/2.4GHz and Radio-1/5GHz and Radio-2/5GHz)

➤ **Mode :** OW-500 A1 (MAN-Mesh upgrade by optional, Through by purchase of
SW-MESH to activation)

Description : eXtreme Power Wave2 4X 2x2 +18dBi Tri-Band Outdoor Bridge/AP

➤ **Mode :** OW-500 A3 (MAN-Mesh upgrade by optional, Through by purchase of
SW-MESH to activation)

Description : eXtreme Power Wave2 4X 2x2 Tri-Band Outdoor Bridge/AP

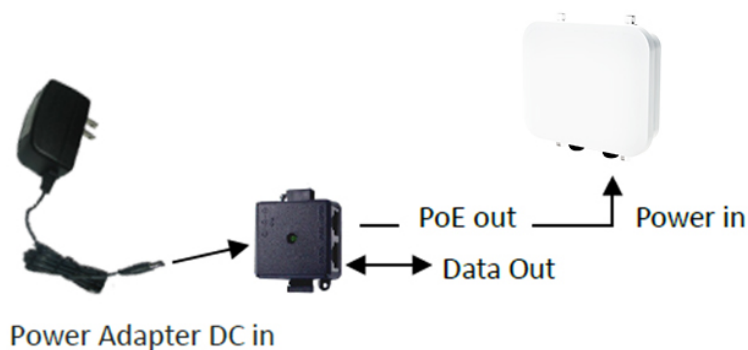
2. Software Configuration

2.1 Setup preparation of AP

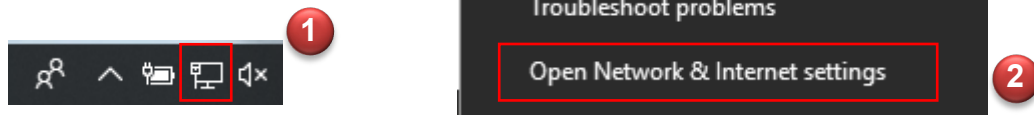
Please PC link to Device used cat5/6 Ethernet cable.

The following setup uses a Windows PC, user OS may vary

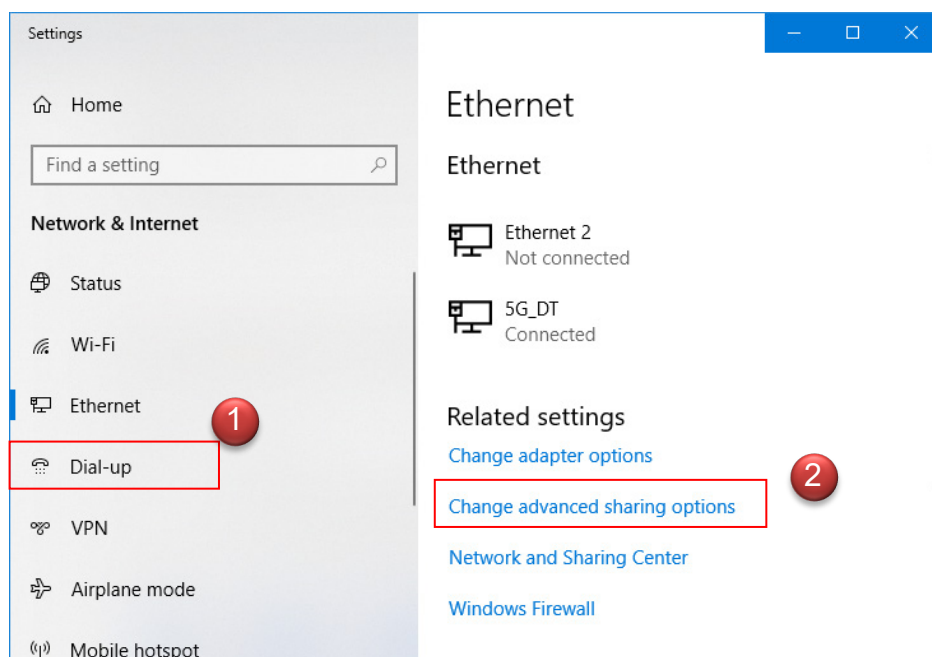
Basic connection diagram:



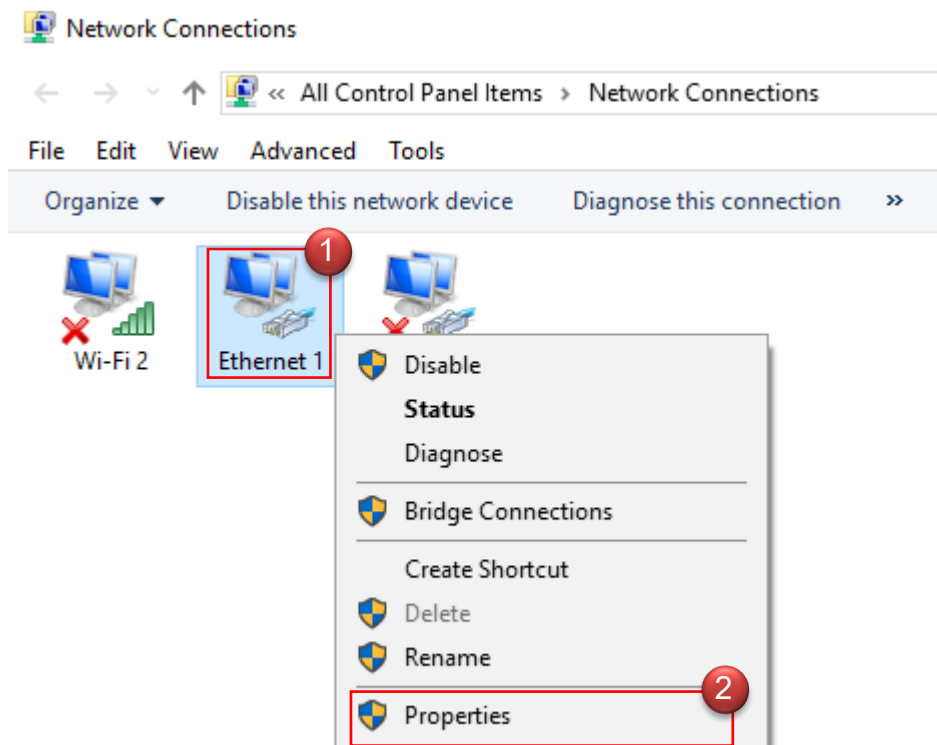
Step 1: Please click on the computer icon in the bottom right window, and click “Open Network and Internet settings”



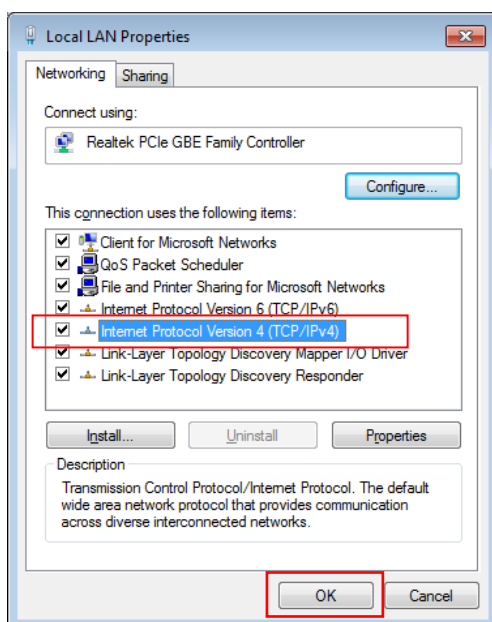
Step 2: After click left side "Ethernet" function, click on the right side “Change adapter options” again.



Step 3: In “Change adapter options” Page. Please find Ethernet (Local LAN) and Click the right button on the mouse and Click “Properties”



Step 4: In Properties page to setting IP address, please find “Internet Protocol Version 4 (TCP/IPv4)” and double click or click “OK” button.



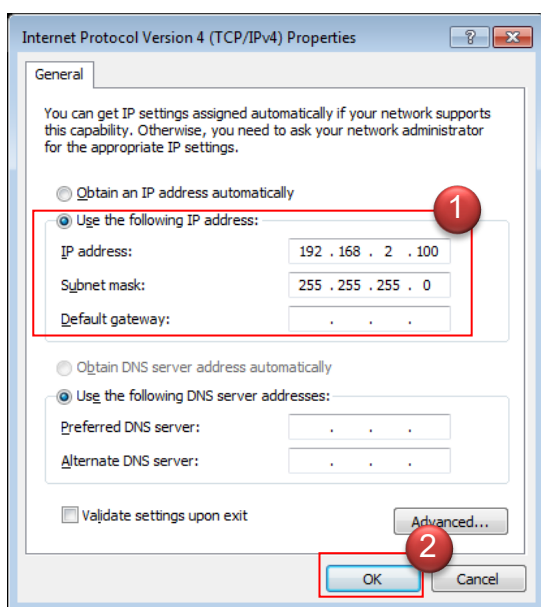
Step 5 :

Select **"Use the following IP address"**, and fix in IP Address : 192.168.2.#

ex. The # is any number by 1 to 253

Subnet mask : 255.255.255.0

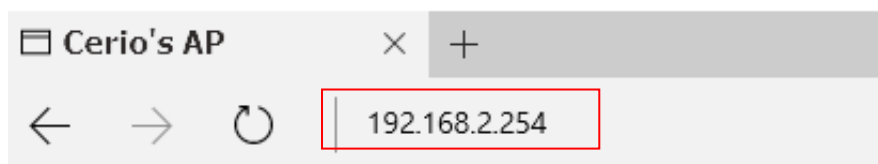
And Click **"OK"** to complete the fixed computer IP setting



2.2 Login Web Page

Launch Web Browser

Launch as web browser to access the web management interface of system by entering the default IP Address, <http://192.168.2.254>, in the URL field, and then press Enter.



System Login

Sign in

http://192.168.2.254

Your connection to this site is not private

Username

root

Password

default

Sign in

Cancel

Default login Usermane is “**root**”and Password is “**default**”

After login, the following screen will be displayed, the default screen will display the Overview status page of MAN-Mesh AP .

((The following overview status page shows the OW-500 A3-Mesh model as an example, and the other models are based on the actual model display)

Overview

Mode

Access Point Mode

System Name

OW-500_A3

System Time

2015/01/01 08:02:10

System Uptime

02:36

Firmware Version

Pme-CPE-IPQ40XX-CERIO V1.0.6

Firmware Date

2020/03/31 14:36:14

ETH0 MAC Address

8c:4d:ea:05:34:09

Wifi0 MAC Address

8c:4d:ea:05:34:0b

Wifi1 MAC Address

8c:4d:ea:05:34:0c

Wifi2 MAC Address

8c:4d:ea:05:34:0d

Gateway

192.168.2.1

DNS1

192.168.2.1

DNS2

Port Link

Information

CPU Usage

6%

Memory

49%

Wireless Client

0 People

Radio 0

Band Mode

802.11b/g/n

Channel

5

Rate

400.0 Mb/s

Radio 1

Band Mode

802.11ac

Channel

149

Rate

866.7 Mb/s

Radio 2

Band Mode

802.11ac

Channel

132

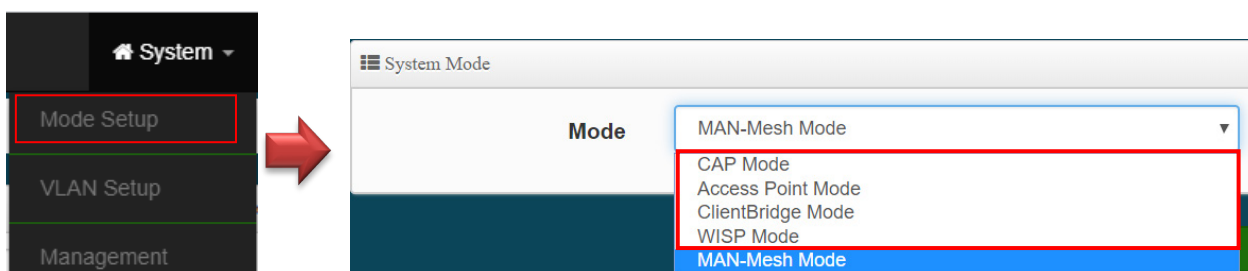
Rate

866.7 Mb/s

3. First Login - Web UI Settings

Change Other Setup modes

If the administrator needs to switch to other modes, click "System"-> " Mode Setup " to change other modes.



Please click "System " → "Setup Mode", select the MAN-Mesh mode, after confirmation, "press Save & Restart" button

Notice

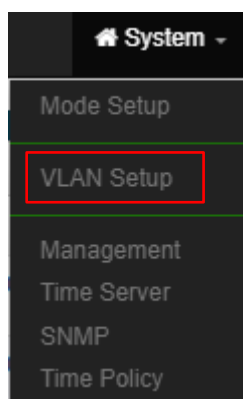
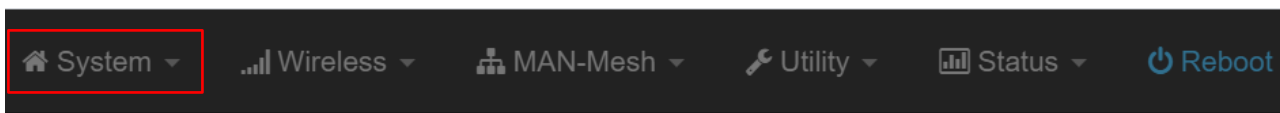
Please note that the LAN IP addresses in each mode are different from each other and will not continue. For the first time after switching modes, always perform access management on the LAN default IP address of 192.168.2.254

4. Basic Settings Before Starting

Setup1 :

Setting the AP's (LAN) IP address and other functions, please click "System " ->

☐ "VLAN Setup"



After confirmed, it will finish the setting of each virtual network function, gateway and DNS address of the local VLAN.

Notice

If you want to set the virtual network LAN IP address of multiple MAN-Mesh AP devices, please be noticed that the LAN IP addresses of these devices cannot be the same, otherwise IP conflicts will occur and the network will not be connected. The MAN-Mesh AP LAN IP default IP is 192.168.2.254

Setup 2 :

Base on your needs, it can use as the backbone MAN-Mesh AP host, you also set as a wireless AP Station (SSID AP station) for the wireless device access, please turn on or off the wireless radios base on your needs for Access Point 0 (2.4G), Access Point 1 (5G), and Access Point 2 (5G). If enable the AP station function under MAN-Mesh mode, it can be using the backbone network of MAN-Mesh AP and also be used as a AP Station (Wireless AP) at the same time. Allow the wireless users log in and access. That's MAN-Mesh AP+AP Station function. If you do not need this multiple function (SSID AP station), please skip this part of the setting (the default value is off).

Notice

MAN-Mesh AP hardware models have different of radio support, For the number of Radio hardware supported by different models ; etc.. Dual Band hardware models support two Radios; The " Web UI " will display Access Point 0 (2.4G), Access Point 1 (5G), Tri-Band hardware models support Three Radio; The " Web UI " will support the display of Access Point 0 (2.4G), Access Point 1 (5G), Access Point 2 (5G).

The screenshot displays the CERIO web interface with the following sections and settings:

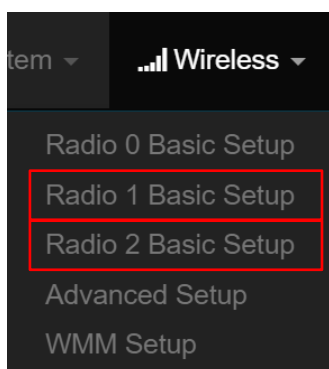
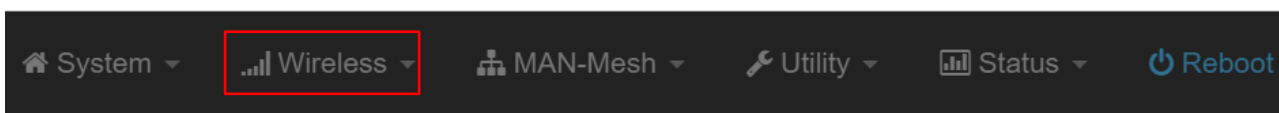
- VLAN Setup:** VLAN Mode is set to **Enable**.
- IP Setup:** IP Mode is set to **Enable**. The IP Address is 192.168.2.254 and the Netmask is 255.255.255.0. These fields are highlighted with a red box.
- Management:** Access Point 0, Access Point 1, and Access Point 2 are all set to **Enable**. These radio status fields are highlighted with a red box. Below them, 802.1d Spanning Tree is set to **Enable** and IAPP is set to **Disable**.
- ETH0 VLAN Tag Setup:** ETH0 is set to **Enable**. The VLAN TAG is set to 1-4096.

Setup 3 :

Click the “Wireless “ to set Radio 0 (2.4G), Radio 1 (5G), Radio 2 (5G) MAN-Mesh basic setup, click "Radio 0 or Radio 1 or Radio 2" or select the regional for settings, and select the " wireless operation mode" Priority auto-connected multi-channel tag selection in the MAN-Mesh network. Please save your setting after the installation is completed

For more setting, please refer to the relevant chapters in the user manual for detailed instructions. °

Click “**Save**” button to save your changes. Then click **Reboot** button to activate your changes.



Notice

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The following uses Radio 1 (5G), Radio 2 (5G) as the explanation of the MAN-MESH auto link setting;

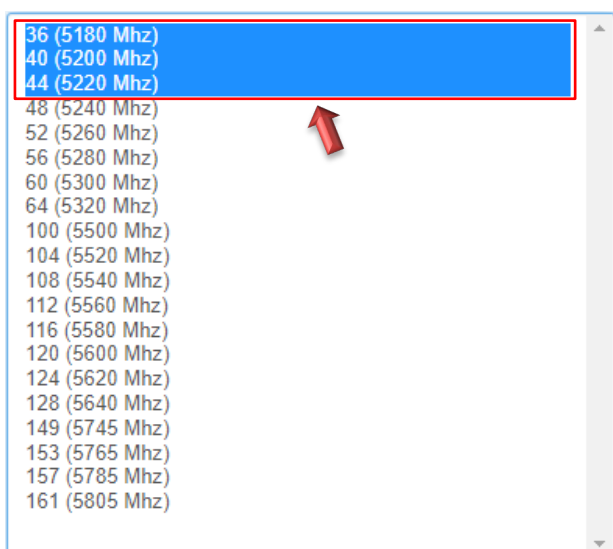
Notice

The MAN-Mesh AP provides intelligent and quickly automatic connections between multiple channels. When selected more channels then the search range becomes bigger then the longer time will be required. Appropriate channel selection will help to speed up MAN-Mesh APs to automatically connect to each other. It is recommended that the number of channels selected can be 3 to 5 channels.

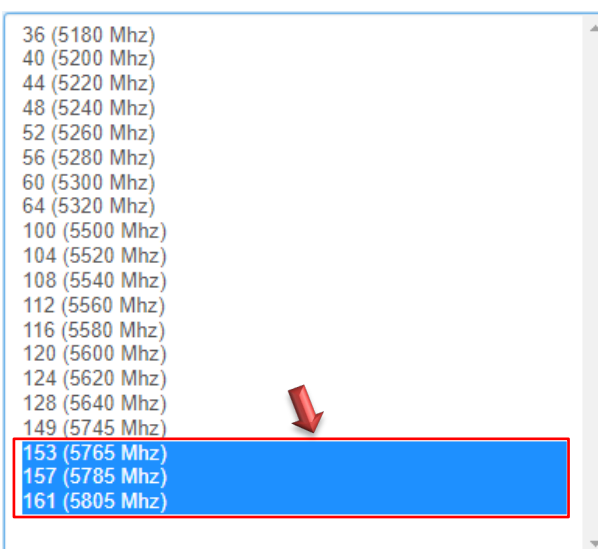
Notice

It is recommended to use the high, medium and low range (5G high frequency, 5G medium frequency, and 5G low frequency range) channel selection principles to select the plural channels to use. This will help the partitions to stagger the interference as far as possible from each other. If Radio 1 (5G) channel range uses the frequency band 36-44 (5G low frequency), then Radio 2 (5G) which is better use channel 153-161 (5G high frequency) to separate the channel range from Radio 1(5G). Base on channels in high, middle, and low frequencies selection will avoid poor performance due to channel interference.

5G Radio 1 Mark selection three low range
frequency channels



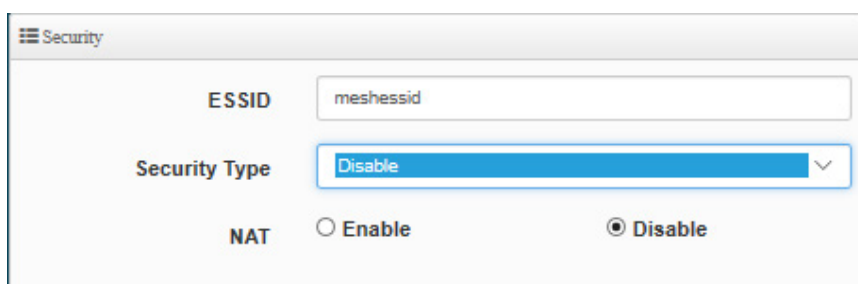
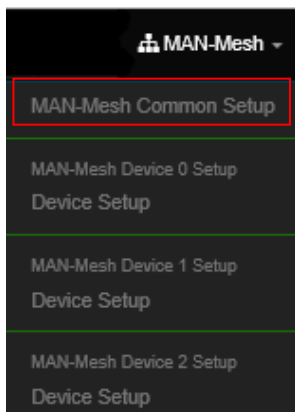
5G Radio 1 Mark selection three high range
frequency channels



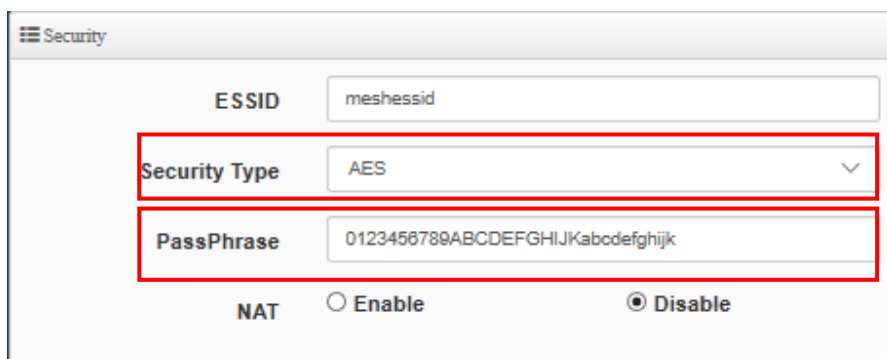
5. MAN-MESH Starts Setting

5.1 MAN-Mesh basic settings

Click "MAN-Mesh" → "MAN-Mesh Common Setup", setting MAN-Mesh AP SSID, MAN-Mesh AP Security Type, MAN-Mesh NAT setup, after completed please save your setting °



- **SSID** : In the same MAN-Mesh architecture, the SSID must be the same which can work properly. Please set a proprietary MAN-Mesh connection SSID for yourself. The default SSID of the MAN-Mesh AP is meshssid
- **Security Type** : Enable or Disable AES 128bit encryption function, AES encryption custom key can input 0 ~ 9 numbers or A ~ Z uppercase and lowercase English format, it can support 8 ~ 32 characters key encryption algorithm in each MAN-Mesh AP connecting each other with secure encrypted transmission.



Notice

When this encryption function is enabled, each MAN-Mesh AP device in the Mesh architecture environment needs to synchronize the same encryption settings. If disabled the Mesh connection encryption function, to avoid the possibility of connecting to other mesh groups that also use the default SSID (meshssid), it is strongly recommended to change your own Mesh AP SSID in the Mesh environment

- **NAT** : Enable or disable the NAT network address conversion function of the MAN-Mesh AP. The administrator can selectively enable this NAT function for a specific node in the environment when the Mesh is connected. The default value is disabled.

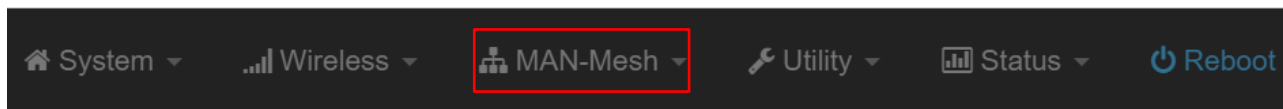
Notice

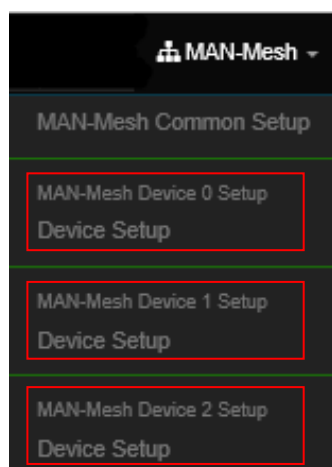
When the backbone mesh interconnection completed by the MAN-Mesh is completed. NAT applications can be performed on any MAN-Mesh host. More that do not enable for "None NAT" applications information, please refer to Chapter 8. LAN physical line "None NAT" application illustration

5.2 MAN-Mesh equipment-wireless base station settings

MAN-Mesh Device 0 / MAN-Mesh Device 1 / MAN-Mesh Device 2 Setting

Click "MAN-Mesh" → "MAN-Mesh Device 0 Setup" → Device Setup to set MAN-Mesh Device 0 / "MAN-Mesh Device 1 Setup" → Device Setup to set MAN-Mesh Device 1 / "MAN-Mesh Device 2 Setup" → "Device Setup to Set MAN-Mesh Device 2", enable or disable MAN-Mesh AP radio 0,1,2 , MAN-Mesh IPv4 / IPv6 setup , MAN-Mesh deployment method, MAN-Mesh mandatory MAC address, MAN-Mesh MAC address list: °





Notice

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- **MAN-Mesh Setup** : Enable or disable the radio of MAN-Mesh AP. Enable or disable this radio be used as the MAN-Mesh radio for mesh auto link . The default value is “Disable”.

MAN-Mesh Setup

MAN-Mesh

☒ Enable
 ☐ Disable

MAN-Mesh Setup

MAN-Mesh

☒ Enable
 ☐ Disable

MAN-Mesh IPv4 Setup

IPv4 Mode

☒ Enable
 ☐ Disable

IPv4 Address

10.0.0.2

Netmask

255.255.255.255

MAN-Mesh IPv6 Setup

Link-local address

FE80::8E4D:EAFF:FE05:3406

IPv6 Mode

☐ Enable
 ☒ Disable

IPv6 Address

2001:8E4D:EAFF:FE01:0000:0000:0000:0002

Subnet Prefix Length

64

MAN-Mesh Deployment

Multi-hop Layout

☐ Host Node
 ☒ Interlink Node

MAN-Mesh Force MAC Address

MAC Address

Add

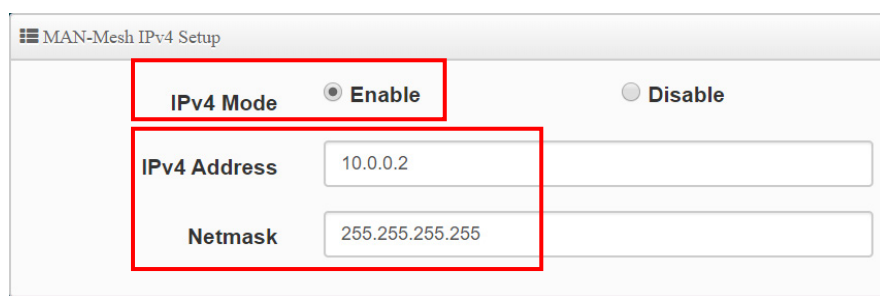
MAN-Mesh MAC Address List

#	MAC Address	Action	#	MAC Address	Action
-	-	-	-	-	-

Notice

When any Radio of MAN-Mesh AP is enabled, At the same time, you must set Mesh interface IP address of Mesh AP. The IP address of the MAN-Mesh AP can be set in both IPv4 and IPv6 formats. If you are not familiar with or do not have an IPv6 address, it is recommended using IPv4 mode to set the Mesh interface IP address of each MAN-Mesh AP. Please note that the Mesh AP's external DNS or Gateway address is set by the relevant of its wired LAN virtual IP address. (Remind: IPv6 format, IP usage acquisition , please contact your ISP provider)

MAN-Mesh IPv4 Setup



- **IPv4 Mode** : Enable or Disable for IPv4 mode
- **IPv4 Address**: In the Mesh architecture, the IP address used by the MAN-Mesh AP in the Mesh operating environment is different from the LAN IP address (virtual network IP address) selected in the environment when setting the Mesh IP address network segment. For example, if the default LAN IP is same address segment of 192.168.2.XXX, In the mesh environment, please select other virtual IP segments as Mesh IP address segments such as 172.16.2. XXX. The Mesh IP default values: 10.0.0.1, 10.0.1.1, 10.0.2.1.
- **Netmask** : Please input MAN-Mesh AP IPv4 Netmask

Notice

Note: Mesh interface IP is different from the LAN interface IP of the device. When each MAN-Mesh AP sets its own unique Mesh interface IP address, please be note when setting the IP address, it can't be the same as the IP address of other interfaces of it own or any interface of other MAN-Mesh APs in the environment

Notice

The IPv4 format is from 0.0.0.0 to 255.255.255.255. Except for the following private IP is not used by international ownership, The remaining IPs are real IPs that are owned or used internationally. To avoid the IP error occurs, please use the following recommended range to choose your own private IP :

- ✓ Private network Class A : 10.0.0.0~10.255.255.255
- ✓ Private network Class B : 172.16.0.0~172.31.255.255
- ✓ Private network Class C : 192.168.0.0~192.168.255.255

MAN-Mesh IPv6 Setup

MAN-Mesh IPv6 Setup

Link-local address: FE80::8E4D:EAFF:FE05:3406

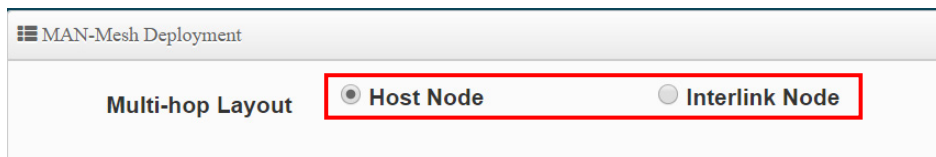
IPv6 Mode: ☒ Enable ☐ Disable

IPv6 Address: 2001:8E4D:EAFF:FE01:0000:0000:0000:0002

Subnet Prefix Length: 64

- **Link-Local address** : This section automatically displays the Link Local address of the local unique identification interface required by the IPv6 mode address operation specifications, for example, it is displayed as FE80 :: 8E4D: EAFF: FE05: 3406.
- **IPv6 Mode** : Enable or Disable for IPv6 mode
- **IPv6 Address** : This is the IP address used by the MAN-Mesh AP in the Mesh operating environment
Example of IPv6 input network range: 2001: 8E4D: EAFF: FE01: 0000: 0000: 0000: 0002 ~ FFFF: FFFF: FFFF: FFFE. (For IPv6 IP acquisition, please contact your ISP provider)
- **Sub Prefix Length** : the Sub Prefix Length of the IPv6 address of the MAN-Mesh AP device . The default value is 64

MAN-Mesh Deployment



MAN-Mesh Deployment

Multi-hop Layout ☒ Host Node ☐ Interlink Node

Multi-hop Layout : MAN-Mesh AP multi-hop layout role setting selection, you can choose the layout of the Host node or Interlink node

- ✓ **Host Node :** In the MAN-Mesh mesh network environment, it must deploy a unique "host node" so that the "interlink node" can automatically establish a connection with each other. The "host node" will always play the role of search multiple fixed and usable channels in the Mesh environment, in order to create and assist other "interlink node" can quickly and connect to each other to completed Mesh automatic connection architecture.

Notice

In a MAN-Mesh network environment, only needs to be set one "host node". If more than two "host node", it will cause MAN-Mesh AP to misjudge the role of "interlink node". then when the hosts are connected to each other, the automatic connection will fail.

- ✓ **Interlink Node :** In the Mesh environment, the MAN-Mesh AP of "interlink node" creates a pre-assisted layout according to the channel of the "host node", and can quickly connect with all the MAN-Mesh AP of "interlink nodes".

Notice

In a Mesh environment, you only need to take one MAN-Mesh AP host as the layout of the "host node" role. And all other MAN-Mesh AP hosts are set as the layout of the **"interlink nodes"** role

More detailed software function operation instructions, please refer to the product user manual.