



Terragraph Distribution Node

MLTG-360

User Manual

www.edge-core.com

User Manual

MLTG-360

Terragraph certified distribution node

How to Use This Guide

This guide includes detailed information on MLTG-360 software, including how to operate and use the management functions of the device. To deploy it as part of a Terragraph network or as a wireless bridge effectively and ensure trouble-free operation, you should first read the relevant sections in this guide so that you are familiar with all software features.

Who Should Read This Guide? This guide is for network administrators who are responsible for operating and maintaining network equipment. The guide assumes a basic working knowledge of LANs (Local Area Networks) and the Internet Protocol (IP).

How This Guide is Organized The organization of this guide is based on the MLTG-360's web management interface. An introduction and initial configuration information is also provided.

The guide includes these sections:

- ◆ Section I **"Getting Started"** — Includes an introduction to MLTG-360 management and initial configuration settings.
- ◆ Section II **"Web Configuration"** — Includes all management options available through the web browser interface.
- ◆ Section III **"Appendices"** — Includes information on specifications, configuration examples, and troubleshooting the device.

Related Documentation This guide focuses on the MLTG-360's software configuration, it does not cover hardware installation of the MLTG-360.

For information on how to install the MLTG-360 and all safety information and regulatory statements, see the following document:

Quick Start Guide

Conventions The following conventions are used throughout this guide to show information:



Note: Emphasizes important information or calls your attention to related features or instructions.



Caution: Alerts you to a potential hazard that could cause loss of data, or damage the system or equipment.



Warning: Alerts you to a potential hazard that could cause personal injury.

Contact If you have further questions, please submit a ticket at: <https://support.edge-core.com/hc/en-us> or send us an email: ecwifi@edge-core.com.

Revision History This section summarizes the changes in each revision of this guide.

April 2021 Revision

This is the first version of this guide. This guide is valid for software release v1.0.3

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Section I

Getting Started

This section provides an overview of the device, and introduces some basic concepts about Terragraph networks. It also describes the basic settings required to access the management interface.

This section includes these chapters:

- ◆ ["Introduction" on page 10](#)

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Introduction

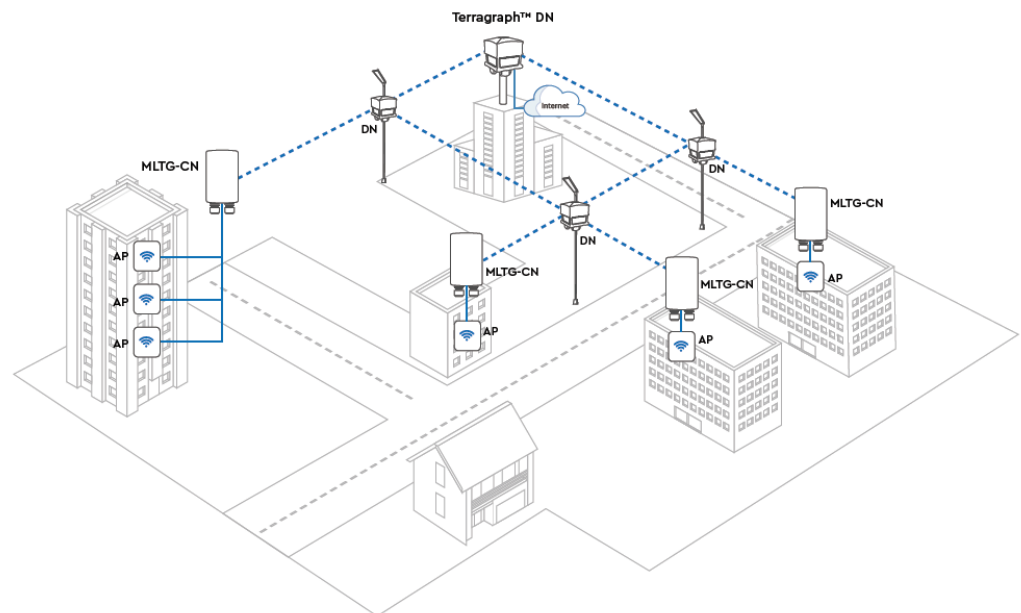
Terragraph Network

Terragraph is a 60GHz, multi-node wireless Software Defined Network (SDN) that enables high-speed Internet connectivity in multiple environments. The network operates best in Line-Of-Sight (LOS) conditions to maximize connectivity.

Terragraph is a distribution level network designed to augment and expand a fiber optic network. That is, Terragraph is a high-speed backbone network to which other networks are connected. When combined with fixed access connections or Wi-Fi access points, Terragraph is a simple and easy-to-install solution to achieve street-level coverage with high speeds.

A Terragraph network is composed of individual nodes. There are two types of nodes in a Terragraph network – Distribution Nodes (DNs), such as the MLTG-360 and Client Nodes (CNs), such as the MLTG-CN. DNs are the backbone of the Terragraph network that distribute Internet connectivity from one or more fiber optic Points of Presence (PoPs) over multiple hops to CNs. DNs and CNs are connection points for client networks, wireless access points, and other customer premise equipment (CPE) to connect to the Internet.

Figure 1: Example of a Terragraph Network



Each node in a Terragraph network is a Layer 3 (L3) router. Nodes route traffic within and between the Terragraph network and attached access networks using routing information provided by the Open/R protocol. The over-the-air link protocol between Terragraph nodes uses a modified version of the Directed Multi-Gigabit (DMG) physical layer (PHY) of the IEEE 802.11ay standard.

MLTG-360 has up to 4 radios, supporting 360 coverage. Each radio is equipped with a 256-element beamforming phased array antenna to form high-quality communication links between nodes supporting up to 1.8 Gbps bi-directional throughput using primarily LOS paths while also using reflection paths. Links between MLTG-360 devices can be formed at distances of up to 300 meters. The multiple propagation paths are called micro-routes, and each micro-route is a potential communication link between nodes. Each node selects the strongest communication link from the many possible propagation paths between the nodes. The phased array antenna allows Terragraph to establish links to mitigate co-channel interference that often prevails in dense urban environments.

A Distribution Node such as the MLTG-360 serves as the demarcation between the Terragraph network and the provider's backbone network. While Terragraph is a wireless technology, there must be at least one wired Terragraph PoP node that connects to an upstream IPv6-enabled network.

Connecting to the Web Interface

The MLTG-360 offers a user-friendly web-based management interface for the configuration of all the unit's features and network settings. Any PC directly attached to the unit can access the management interface using a web browser, such as Internet Explorer 9.x or later, Mozilla Firefox 32 or later, and Google Chrome 35 or later.

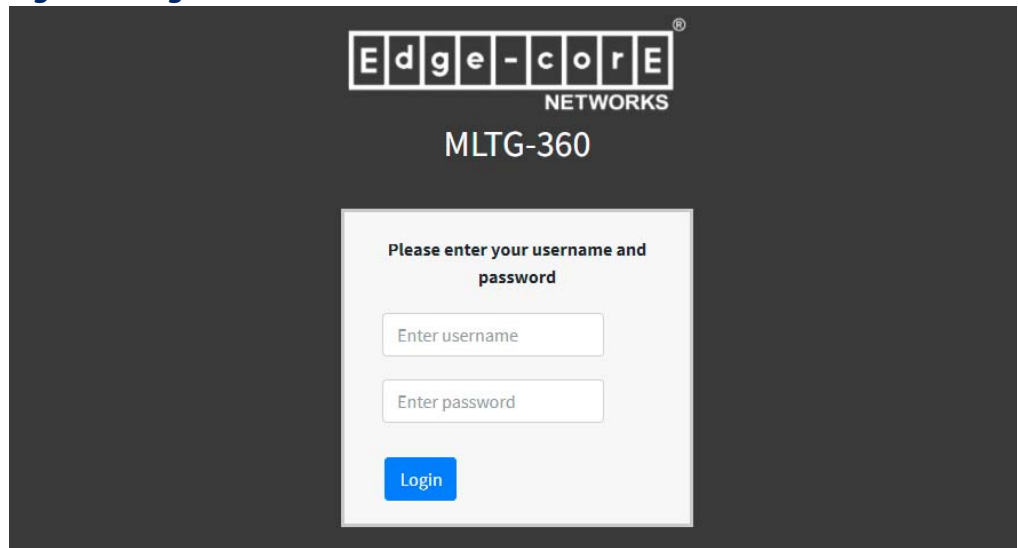
The web interface is accessible via the via the Management PoE In port. To access the MLTG-360's web interface follow these steps:

1. Connect a PC directly to the MLTG-360's MGMT PoE IN port.
2. The MLTG-360 is configured as a DHCP Client and will receive its IP dynamically. Check the DHCP Server on the PC for the assigned address. In case the DHCP server is unavailable, the MLTG-360 uses the fallback IP 192.168.1.20 and 255.255.255.0 as subnet mask.
3. Set the PC IP address to be on the same subnet as the MLTG-360 LAN port default IP address. The PC address must start 192.168.1.x with 255.255.255.0 as subnet mask.
4. Enter the MLTG-360's default IP address of 192.168.1.20 into the web browser address bar.

5. Log in to the web interface using default settings:

Username = admin
Password = admin

Figure 2: Login



Section II

Web Configuration

This section describes the basic MLTG-360 features, along with a detailed description of how to configure each feature via a web browser.

This section includes these chapters:

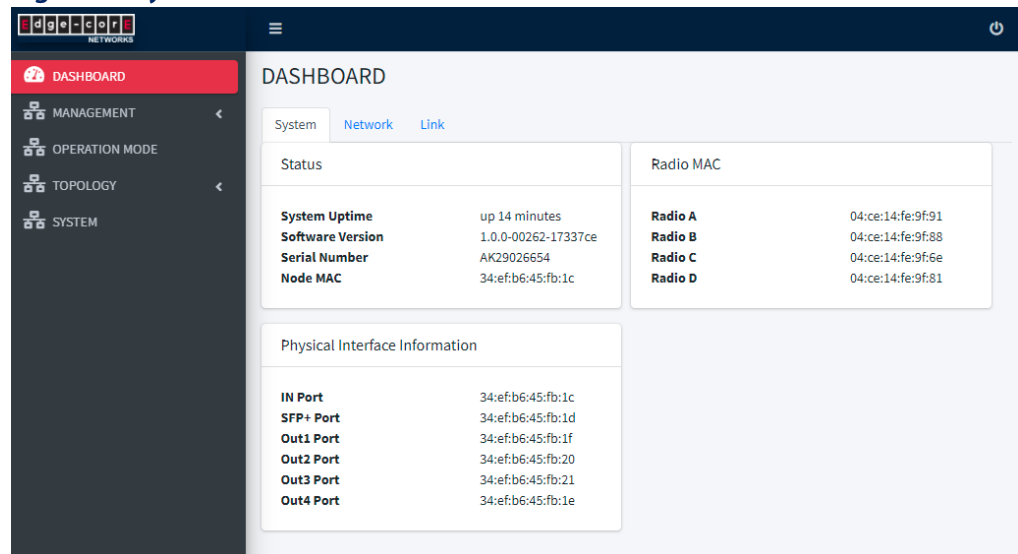
- ◆ ["Dashboard" on page 14](#)
- ◆ ["Management" on page 18](#)
- ◆ ["Operation Mode" on page 20](#)
- ◆ ["Topology" on page 23](#)
- ◆ ["System" on page 26](#)

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Dashboard

After logging in to the web interface, the Dashboard screen is displayed. The Dashboard shows basic settings and status of the device regarding system information, network, and links.

Figure 3: System Dashboard



System The following items are displayed in this section:

- ◆ Status:
 - Length of time the device has been up.
 - Software version number.
 - Device serial number.
 - MAC address of this node.
- ◆ Radio MAC:
 - MAC address of each radio. The number of radios and their position varies by model:

Figure 4: Position of Radios



Table 1: Product lineup

Product Name	Position of Radios
MLTG-360	A, B, C, D
MLTG-360-3	A, C, D
MLTG-360-2R	A, D
MLTG-360-2P	C, D
MLTG-360-1	A

◆ Physical Interface Information:

- Complete list of MAC addresses of the device and correspondent network interfaces: Management port, SFP+ port, and four PoE Out ports.

Network The following interface addresses are displayed in this section:

Figure 5: Network Dashboard

DASHBOARD

System **Network** Link

Interface IP

MANAGEMENT INTERFACE

IPv4 Address 10.71.5.190

IPv4 Mask 255.255.0.0

IPv4 Gateway 10.71.1.254

IPv6 Link-Local Address fe80::36ef:b6ff:fe45:f768/64

IPv6 Global Address 2001:b030:200b:5d1:36ef:b6ff:fe45:f768/64

UPLINK INTERFACE

IPv6 Link-Local Address fe80::36ef:b6ff:fe45:1268/64

IPv6 Global Address dd00:db80::36ef:b6ff:fe45:1268/64

LOOPBACK INTERFACE

IPv6 Address 2001:b030:200b:5b7::1/128

- ◆ Interface IP:
 - Management Interface: Binded to the PoE In port. The traffic is separated from the access network. Should be assigned to a subnet different to the uplink interface.
 - Uplink Interface: The logical interface connecting to the backbone network. When in Terragraph mode, only the PoP node has the uplink interface connected to the upstream backbone network. When in bridge mode, uplink interface connects to MLTG-360 devices within the layer 2 data network.
 - Loopback Interface: The logical routing interface in Terragraph networks. The loopback interface is only active in Terragraph mode.

Figure 6: Network Dashboard in Terragraph mode

Neighbor Nodes				
Node ID	From (Local)	To	Radio Link	Link Uptime
node-34.ef.b6.45.f7.68	terra16	terra16	fe80::6ce:14ff:feff:a3b3	34m2s
node-34.ef.b6.8a.0e.e6	terra48	terra48	fe80::6ce:14ff:feff:b414	33m28s

Route via terra		
Destination	via	Interface
::/0	fe80::6ce:14ff:feff:a3b3	vpp-terra16
2001:b030:200b:5b1::3/128	2001:b030:200b:5b1::3	TenGigabitEthernet0
2001:b030:200b:5b1::4/128	2001:b030:200b:5b1::4	TenGigabitEthernet2
2001:b030:200b:5b1::5/128	2001:b030:200b:5b1::5	TenGigabitEthernet3
2001:b030:200b:5b1::6/128	2001:b030:200b:5b1::6	TenGigabitEthernet4
2001:b030:200b:5b1::7/128	2001:b030:200b:5b1::7	TenGigabitEthernet1
2001:b030:200b:5b3::/64	fe80::6ce:14ff:feff:b414	vpp-terra48

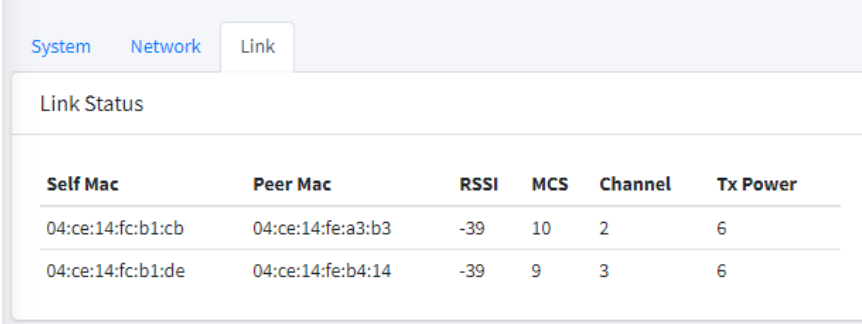
Neighbor Nodes and Route via terra are only available in Terragraph mode. The following neighbor node information and routing table based on Open/R are displayed in this section:

- ◆ Neighbor Nodes:
 - Node ID: Unique node ID defined for Open/R.
 - From (Local): Local interface connecting to a neighbor node.
 - To: Connected interface of the neighbor node.
 - Radio Link: Local address link of the neighbor node.
 - Link Uptime: Length of time the link has been up.

- ◆ Route via terra:
 - Destination: Destination IP address/subnet.
 - via: Next hop.
 - Interface: Output interface.

Link The following items are displayed under Link Status:

Figure 7: Link Dashboard



The screenshot shows a dashboard with three tabs: System, Network, and Link. The Link tab is active, displaying a 'Link Status' section. Below this section is a table with the following data:

Self Mac	Peer Mac	RSSI	MCS	Channel	Tx Power
04:ce:14:fc:b1:cb	04:ce:14:fe:a3:b3	-39	10	2	6
04:ce:14:fc:b1:de	04:ce:14:fe:b4:14	-39	9	3	6

- Self Mac: MAC address of the connected interface.
- Peer Mac: Radio MAC address of connected devices.
- RSSI: Received signal strength indication, this is an indicator of the received signal strength from the peer. Unit is decibels per milliwatt (dBm).
- MCS: Modulation and Coding Scheme (MCS) index values, indicating the transmission rate can be achieved.
- Channel: The working channel.
- Tx Power: Transmission power index for signal transmission.

3

Management

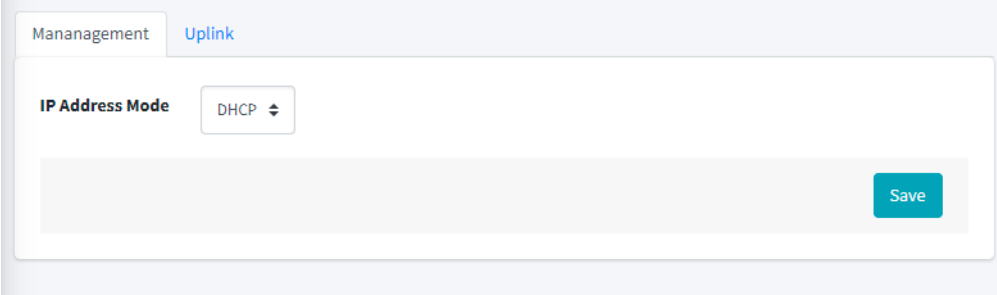
Network Configuration

The management interface is binded to the physical PoE In port. The management interface is separated from the access network. There are two modes for configuring the management interface: DHCP and Static.

Using DHCP mode, the management interface may receive an IPv4 address and an IPv6 address simultaneously, depending on the capability of the DHCP server. Using Static mode, only an IPv4 address can be configured.

Management The following options are displayed in this section:

Figure 8: Management IP Address Mode



- ◆ DHCP
- ◆ Static
 - IP Address
 - Subnet Mask
 - Default Gateway

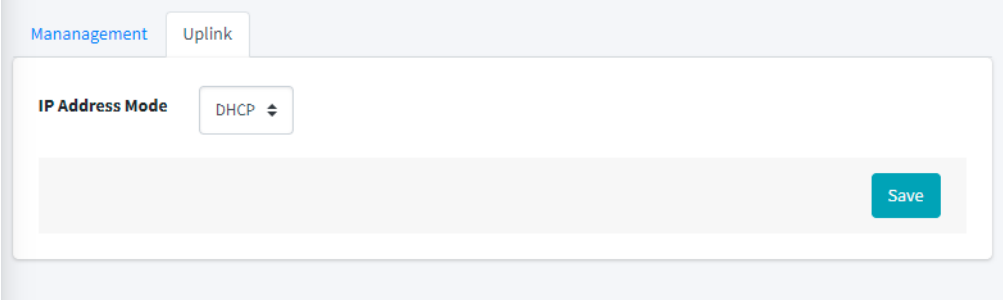
Configuration of the Uplink interface is only available in Bridge mode.

In Terragraph mode, except for the PoP node, the IP address for the access network is automatically configured by Open/R. Configuration of the IP mode on each MLTG-360 is not required. In Bridge mode, the Uplink interface can be configured with two modes: DHCP or static.

Using DHCP mode, the management interface may receive an IPv4 address and an IPv6 address simultaneously, depending on the capability of the DHCP server. Using Static mode, only an IPv4 address can be configured.

Uplink The following options are displayed in this section:

Figure 9: Uplink IP Address Mode

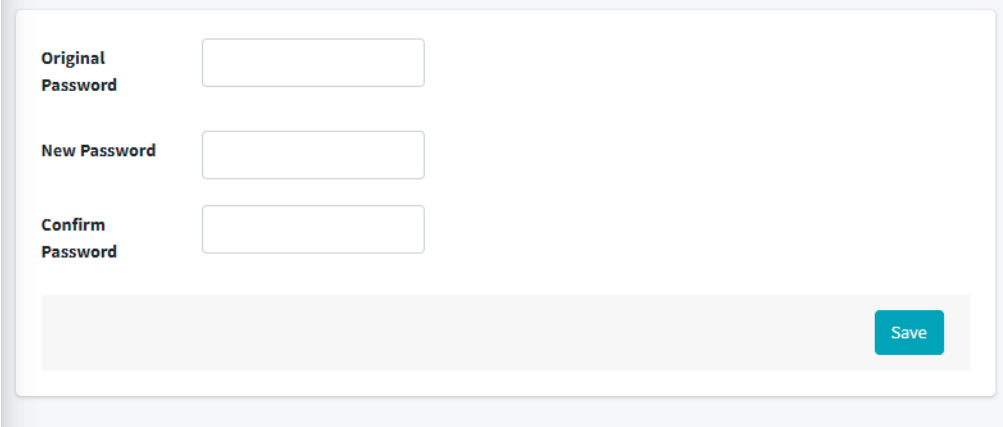


- ◆ DHCP
- ◆ Static
 - IP Address
 - Subnet Mask
 - Default Gateway

Admin Account

Password Configuration Change and confirm the device's password. (ASCII characters, case sensitive)

Figure 10: Admin Password Configuration



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Operation Mode

Operation Mode

There are two operation modes for MLTG-360: Terragraph mode and Bridge mode.

In Terragraph mode, the MLTG-360 works as a distribution node (DN) in a Terragraph network. It has the following key points:

- Mesh topology: Links can be established to form a mesh topology network to provide path redundancy and high availability.
- Layer 3 based: Each MLTG-360 works as a Layer 3 router. The traffic is transmitted based on routing information in the Terragraph network.
- Pure IPv6: All the nodes in a Terragraph network are based on IPv6 addressing and routing.

In Bridge mode, the MLTG-360 functions as a Layer 2 switch.

It is recommended that all MLTG-360 devices in the same network use the same operation mode.

Terragraph Mode The following items are displayed in this section:

Figure 11: Terragraph Operation Mode

Operation Mode	Terragraph Mode ↕
Enable GPS	<input type="checkbox"/>
Set as POP Node	<input checked="" type="checkbox"/>
Enable Local Controller	<input checked="" type="checkbox"/>
Open/R Network Address	2001:B030:200B:05B0::
Open/R Network Prefix	61
Gateway Address	2001:B030:200B:05A1::1
Uplink Interface	Uplink Port3 ↕
Uplink Address	2001:B030:200B:05A1::B1
VPP Address	2001:B030:200B:05A1::B1
Enable BGP	<input type="checkbox"/>

- ◆ **Enable GPS:** When enable this option, MLTG-360 will check whether the GPS information are synchronized while associating with the peer. Synchronized GPS information can help to optimize the TDMA algorithm in the mesh network. If your network is in a simple topology without mesh, you don't have to enable this option.
When this option is enabled, please make sure this MLTG-360 has good and stable GPS signal. If you are in indoor environment, please disable GPS sync.
- ◆ **Set as POP Node:** A PoP node connects the Terragraph network to the backbone network. When a MLTG-360 is configured as a PoP node, the following additional fields are required:
 - **Open/R Network Address:** Assign the IPv6 address of the entire Terragraph network.
 - **Open/R Network Prefix:** Open/R protocol assigns a subnet to each node in the Terragraph network as the network is established. Please note that for each node, a 64-bit IPv6 prefix will be assigned. Depending on the network size, you may have to assign a larger subnet to the PoP node.
 - **Gateway Address:** Default gateway from the PoP node to the backbone network.
 - **Uplink Interface:** Configure the PoP node on backbone network by selecting the physical interface and binding the uplink configurations.

- Uplink Address: IPv6 address for the PoP node on the backbone network.
- VPP Address

Figure 12: Enable BGP

Enable BGP

Local ASN

BGP Neighbors Add

Neighbor ASN	Neighbor IPv6	Action
<input type="text" value="99"/>	<input type="text" value="2002:ac13:65fd:100::99"/>	Delete

- ◆ Enable BGP: When supported, it automatically exchanges routing information between the Terragraph network and the backbone network. Configuration requires the following items:
 - Local ASN: Autonomous System Number (ASN) of the local Terragraph network.
 - Neighbor ASN: ASN of the neighbor network.
 - Neighbor IPv6: IPv6 address of the neighbor network.
 - Action: Delete neighbor entry.

Bridge Mode Select the Bridge Mode to use the MLTG-360 as a Layer 2 Switch.

Figure 13: Bridge Operation Mode

Operation Mode

Save

5

Topology

In Terragraph mode, the network connectivity and topology can be defined on the PoP node. After defining the topology, the PoP will find the nodes and setup the links automatically. In bridge mode, the links must be configured on one of its peers. To configure a topology, all nodes and links must be defined.

Node Setting

In node setting, you have to define all the nodes in the Terragraph network, including PoP, DN, and CN. For every node, you have to specify the node type, node MAC, and radio MAC addresses.

Figure 14: Node Setting

TOPOLOGY NODES

[Add](#)

Name	Type	Node MAC	Radio MACs	POP Node	Action
POP	DN	34:ef:b6:45:f7:68	Radio A 04:ce:14:fe:a3:ad Radio B 04:ce:14:fe:a3:b3 Radio C 04:ce:14:fe:a3:e1 Radio D 04:ce:14:fe:a4:32	<input checked="" type="checkbox"/>	Delete
DN2	DN	34:ef:b6:8a:0e:d4	Radio A 04:ce:14:fc:b1:c2 Radio B 04:ce:14:fc:b1:cb Radio C 04:ce:14:fc:c6:59 Radio D 04:ce:14:fc:b1:de	<input type="checkbox"/>	Delete
DN3	DN	34:ef:b6:8a:0e:e6	Radio A 04:ce:14:fe:b3:c6 Radio B 04:ce:14:fe:b4:35 Radio C 04:ce:14:fe:b3:9c Radio D 04:ce:14:fe:b4:14	<input type="checkbox"/>	Delete
DN4	DN	04:f8:f8:e7:5a:b2	Radio A 04:ce:14:fe:a4:41 Radio B 04:ce:14:fe:a8:4b Radio C 04:ce:14:fe:a3:d0 Radio D 04:ce:14:fe:a7:ad	<input type="checkbox"/>	Delete
CN5	CN	34:ef:b6:58:7f:99	Radio A 34:ef:b6:58:7f:9b	<input type="checkbox"/>	Delete
CN6	CN	34:ef:b6:58:7f:36	Radio A 34:ef:b6:58:7f:38	<input type="checkbox"/>	Delete

- ◆ **Name:** name of the node. It is defined automatically based on node type.
- ◆ **Type:** Set the node as Distribution Node (DN) or Client Node (CN).
- ◆ **Node MAC:** The system MAC address for the node. The system MAC address can be found on the device label or the Dashboard in web UI.
- ◆ **Radio MACs:** The MAC addresses of the radios. Please take care of the mapping for the radio name and MAC address.
- ◆ **POP Node:** Only one of the DNs can be POP node in a topology.
- ◆ **Action:** delete button to delete the node. Please note that a node cannot be deleted if there is a defined link on the node.

Link Setting

In link setting, you define the links inside the topology by selecting the peer nodes and the operating channel. Please note the following rules:

1. For each DN's radio, at most 2 links to any one DN can be established.
2. For each DN's radio, at most 15 links to different CNs can be established.
3. All the links on the same radio should be on the same channel.

Figure 15: Link Setting Terragraph Mode

TOPOLOGY LINKS

[Add](#)

Name	Peer	Channel	Action
link-DN2-DN3	Initiator DN3 ⇅ radioD - 04:ce:14:fe:b4:14 ⇅	3 ⇅	Delete
	Responder DN2 ⇅ radioD - 04:ce:14:fc:b1:de ⇅		
link-DN2-POP	Initiator POP ⇅ radioB - 04:ce:14:fe:a3:b3 ⇅	2 ⇅	Delete
	Responder DN2 ⇅ radioB - 04:ce:14:fc:b1:cb ⇅		
link-CN6-DN4	Initiator DN4 ⇅ radioD - 04:ce:14:fe:a7:ad ⇅	2 ⇅	Delete
	Responder CN6 ⇅ radioA - 34:ef:b6:58:7f:38 ⇅		
link-DN3-DN4	Initiator DN4 ⇅ radioB - 04:ce:14:fe:a8:4b ⇅	2 ⇅	Delete
	Responder DN3 ⇅ radioB - 04:ce:14:fe:b4:35 ⇅		

- ◆ Name: The name of the link. It will be set automatically based on the name of the peers.
- ◆ Peer: The two end points of the link. When establishing a link, there is an initiator for sending the request and a responder for receiving. Usually, we set the node closer to the PoP node as the initiator.
- ◆ Channel: Select the working channel. Channel 1 to channel 4 are available.
- ◆ Action: Delete button to delete corresponding link.

In Bridge mode, a link should be configured on one of the peer. Please note that do NOT configure a link on both peers.

For links between MLTG-360 and MLTG-CN, it is recommended to configure the link on the MLTG-360.

Figure 16: Link Setting Bridge Mode

The screenshot shows a web interface titled "LINK CONFIGURATION". At the top, there are four tabs: "Radio A", "Radio B", "Radio C", and "Radio D". The "Radio A" tab is selected. Below the tabs, there is a form for configuring a link. The form has a "Channel" dropdown menu currently set to "2". Below the channel, there is a teal "Add Peer" button. Underneath, there is a table with two columns: "Peer MAC" and "Action". The "Peer MAC" column has an empty input field, and the "Action" column has a teal "Delete" button. At the bottom right of the configuration area, there is a teal "Save" button.

- ◆ Radio (A-D): Select the radio to setup the link.
 - Channel (1-4): Select the working channel for the radio.
 - Peer MAC address: Enter the radio MAC address of the peer node.

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System

The System section includes General Settings, Time, and Firmware upgrade options.

Figure 17: System Settings

The screenshot displays the 'SYSTEM' settings page, which is organized into three main sections:

- General Settings:** This section includes a 'Country' dropdown menu currently set to 'US-FCC' with a 'Save' button next to it. Below this are three buttons: 'Download' for 'Download Diagnostics Log', 'Reboot' for 'Reboot the Device', and 'Reset' for 'Reset to Default'.
- Time:** This section features a 'Time zone' dropdown menu set to 'UTC' and an 'NTP Server' input field with a green plus icon to its right. A 'Save' button is located at the bottom right of this section.
- Firmware Upgrade:** This section has a 'Keep current settings' checkbox which is checked. Below it is a 'File Input' section with a 'Choose file' text box and a 'Browse' button.

- General Settings** ♦ Country: Select the installation region to automatically apply country-specific settings following local standards.

- ◆ Download Diagnostics Log: Click Download the log file to the management workstation. In Windows, a GNU Zip (*.tar.gz) file is stored in the Downloads folder. The diagnostics log file contains information that can help resolve technical issues with the device.
- ◆ Reboot the Device: Click to restart the device with one click.
- ◆ Reset to Default: Click to reset the device to the factory defaults. Note that all user configured information will be lost. You will have to re-enter the default user name and password to re-gain management access to this device.

- Time**
- ◆ Time zone: Select the appropriate timezone using the pair continent/capital city.
 - ◆ NTP server: Add the address of the network time protocol server used for time synchronization.

- Firmware Upgrade**
- ◆ Select an image file (.rom) to upgrade new software from a local file on the management workstation. New software may be provided periodically from Edgecore.

After a firmware upgrade, you must reboot the device to implement the changes. Until that happens, the device continues to operate using the previous software version. The device supports dual software images and if the new software image is corrupted, the device automatically uses the last working image on the next reboot.

Configuration settings are stored independently from the software image and the current settings are applied to new software versions unless you uncheck the respective box. Note that if the current configuration settings are corrupted, the system defaults will be used.

Section III

Appendices

This section provides additional information and includes these items:

- ◆ [“Specifications” on page 29](#)
- ◆ [“Examples” on page 30](#)
- ◆ [“Troubleshooting” on page 36](#)



Specifications

Specifications

Table 2: Hardware Specifications

Physical

60 GHz Radio	4 x antenna tiles per radio 64 antenna elements for each antenna tile 90 degrees azimuth scan range: -45° to 45° 50 degrees elevation scan range: -25° to 25°
Interfaces	1 x Gigabit Ethernet Port (PoE IN) 1 x 10 Gigabit SFP+ port 4 x Gigabit Ethernet Port (PoE OUT) 4 x 60GHz Radio
Environmental Conditions	Operating Temperature: -20° C (-4° F) to 55° C (131° F) IP66 Rating
Power	Passive PoE (Pins 1, 2, 4, 5 +; pins 3, 6, 7, 8 -; injector optional) 42.5 V ~ 59 V DC terminal block
Size (WxDxH)	19.9 x 19.9 x 20.0 cm (7.83 x 7.83 x 7.87 in)
Weight	3.9 kg (8.6 lb) with bracket
Certifications	FCC/CE

Performance

Range	Up to 200m for MCS12 Up to 300m for MCS9
RF Performance (TX)	EIRP 44dBm for each radio
RF Performance (RX)	-66 dBm @ MCS9 -61 dBm @ MCS12

B

Examples

MLTG-360 to MLTG-360 in Terragraph mode

This example uses one MLTG-360 as POP node (DN_1) linking to another MLTG-360 (DN_2) in Terragraph mode.

1. Connect both MLTG-360 to a DHCP server through the Management/PoE port.
2. Login to DN_2. On Dashboard > System, copy and save the Node MAC and Radio MAC addresses. This will be needed to configure links.

Figure 18: DN_2's MAC Addresses



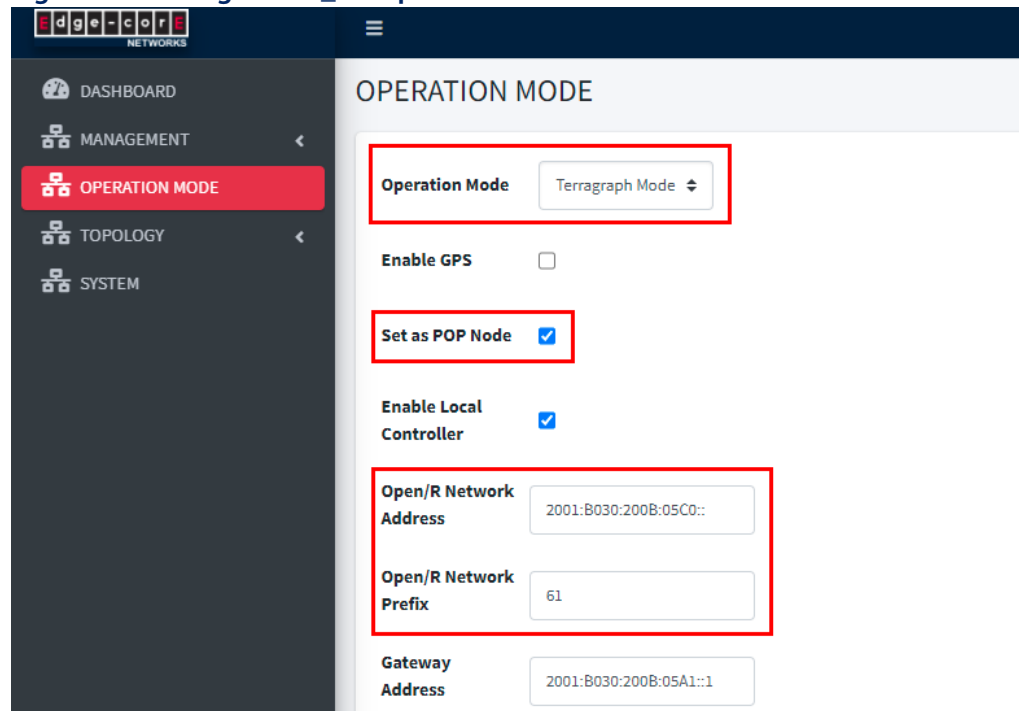
The screenshot shows the 'DASHBOARD' interface with tabs for 'System', 'Network', and 'Link'. The 'System' tab is active, displaying system status and radio MAC addresses. The 'Node MAC' and 'Radio A' values are highlighted with red boxes.

Status		Radio MAC	
System Uptime	up 1 day, 16 hours, 24 minutes	Radio A	04:ce:14:fc:b9:c1
Software Version	1.0.0-02598-ebf6204c	Radio B	04:ce:14:fc:b1:98
Serial Number	AK40008108	Radio C	04:ce:14:fe:c6:62
Node MAC	34:ef:b6:c6:e9:85	Radio D	04:ce:14:fe:c6:7a

3. Login to DN_1. On Operation Mode:

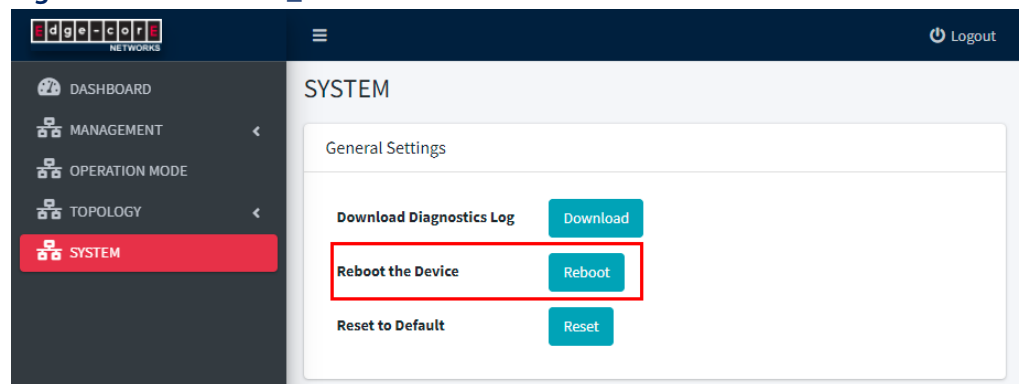
- Set as POP Node.
- Open/R Network Address: This is network prefix allocation in your Terragraph network assigned to all individual nodes (e.g., 2001:B030:200B:05C0::).
- Enter your network prefix in Open/R Network Prefix (e.g., 61).

Figure 19: Configure DN_1's Operation Mode



- Go to System and reboot the device.

Figure 20: Reboot DN_1



4. Proceed to Topology > Node Setting:
 - POP node should be automatically populated.
 - Click on Add to insert DN_2 information. Select type DN and enter the Node MAC and Radio MAC addresses from Step 2.
 - Click Save to Apply.

Figure 21: Node Setting

TOPOLOGY NODES

[Add](#)

Name	Type	Node MAC	Radio MACs	POP Node	Action
POP	DN	34:ef:b6:45:f7:68	Radio A 04:ce:14:fea3:ad Radio B 04:ce:14:fea3:b3 Radio C 04:ce:14:fea3:e1 Radio D 04:ce:14:fea4:32	<input checked="" type="checkbox"/>	Delete
DN2	DN	34:ef:b6:8a:0e:d4	Radio A 04:ce:14:fc:b1:c2 Radio B 04:ce:14:fc:b1:cb Radio C 04:ce:14:fec6:59 Radio D 04:ce:14:fc:b1:de	<input type="checkbox"/>	Delete

5. Proceed to Topology > Link setting:
 - Set POP node as the Initiator and DN_2 as the Responder. Select the radios that connect DN_1 to DN_2.
 - Select the channel.
 - Click Save to Apply.

Figure 22: Link Setting

Initiator 2 [Delete](#)

POP radioA - 04:ce:14:fea3:ad

Responder

DN2 radioA - 04:ce:14:fc:b1:c2

6. Check the Dashboard for the status of the link.

Figure 23: Link Status

DASHBOARD

System Network **Link**

Link Status

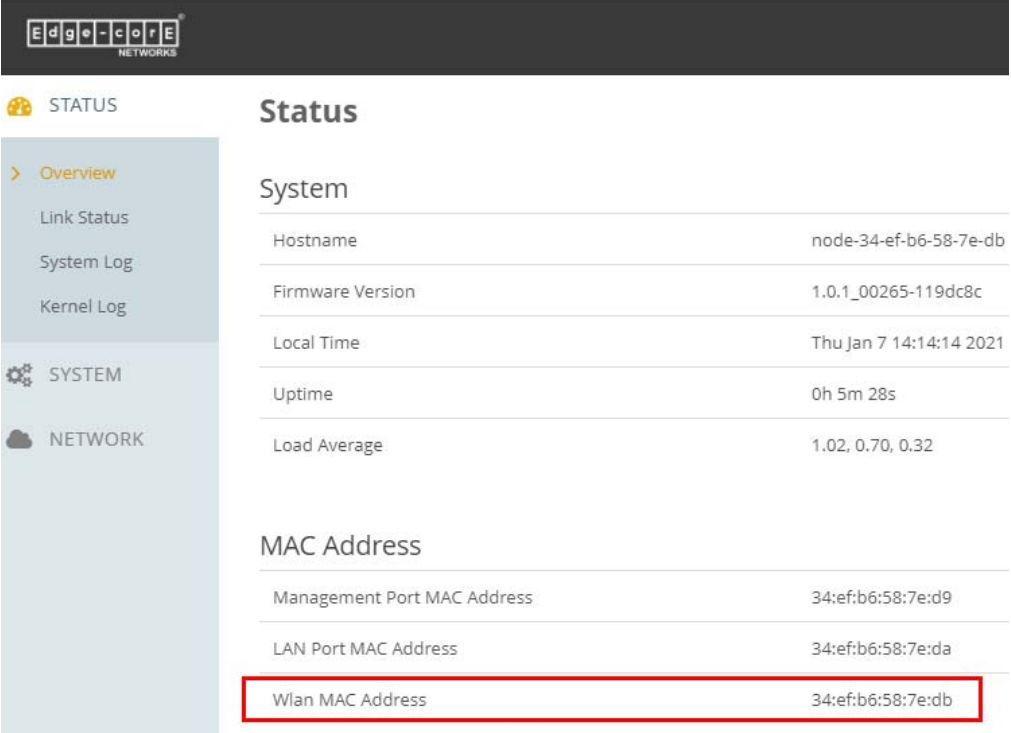
Self Mac	Peer Mac	RSSI	MCS	Channel	Tx Power
04:ce:14:fc:b9:c1	34:ef:b6:58:7e:96	-58	9	2	6

MLTG-360 to MLTG-CN in Bridge mode

This example uses one MLTG-360 as distribution node (DN) linking to a MLTG-CN (CN) in Bridge mode.

1. Login to the CN. On Status > Overview > MAC Address, copy and save the Wlan MAC Address. This will be needed to configure the link.

Figure 24: CN's Wlan MAC Address



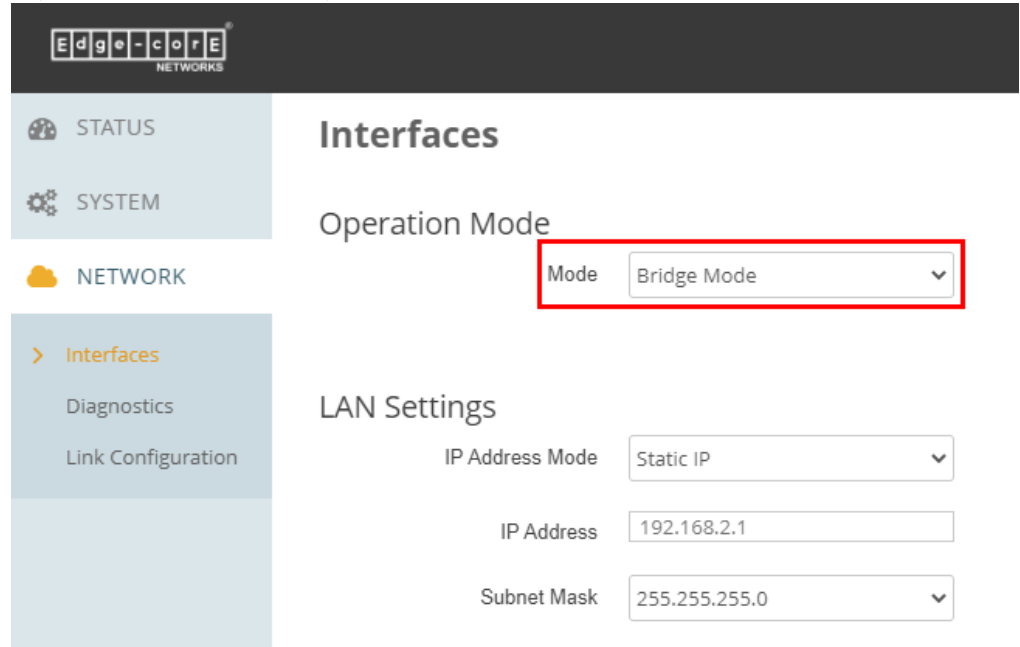
The screenshot shows the Edge-Core Networks web interface. The left sidebar contains navigation menus for STATUS, SYSTEM, and NETWORK. The main content area is titled 'Status' and is divided into two sections: 'System' and 'MAC Address'. The 'System' section lists various system parameters, and the 'MAC Address' section lists three MAC addresses. The 'Wlan MAC Address' is highlighted with a red border.

System	
Hostname	node-34-ef-b6-58-7e-db
Firmware Version	1.0.1_00265-119dc8c
Local Time	Thu Jan 7 14:14:14 2021
Uptime	0h 5m 28s
Load Average	1.02, 0.70, 0.32

MAC Address	
Management Port MAC Address	34:ef:b6:58:7e:d9
LAN Port MAC Address	34:ef:b6:58:7e:da
Wlan MAC Address	34:ef:b6:58:7e:db

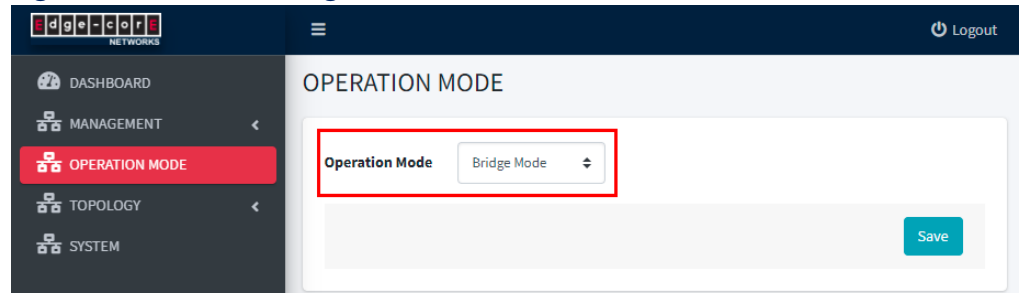
2. Proceed to Network > Interfaces and set the CN's Operation mode to Bridge Mode.

Figure 25: CN set to Bridge Mode



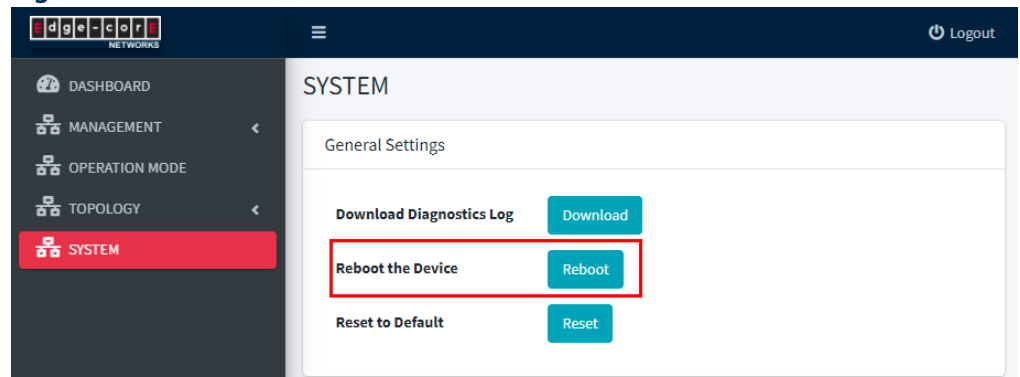
3. Login to the DN. On Operation Mode:
 - Set to Bridge Mode.

Figure 26: DN set to Bridge Mode



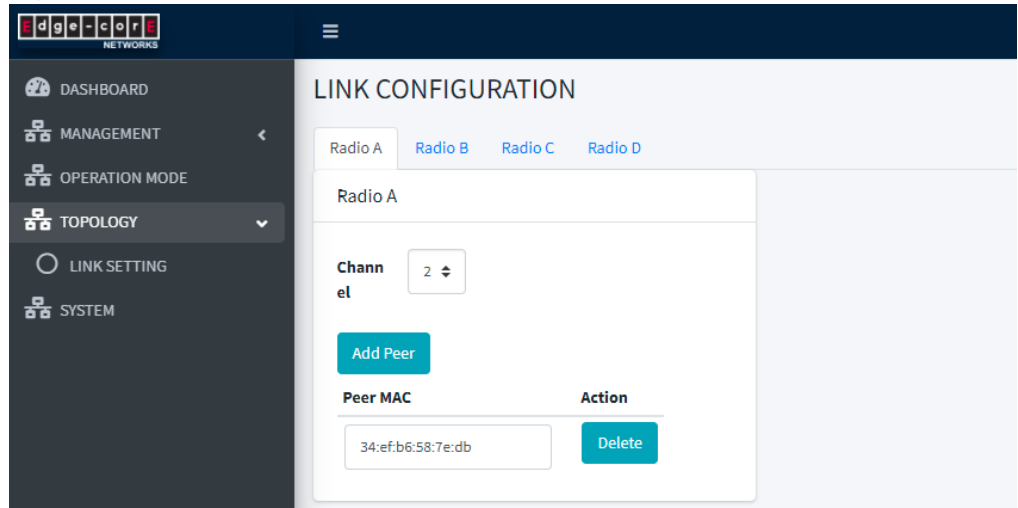
- Go to System and reboot the device.

Figure 27: Reboot DN



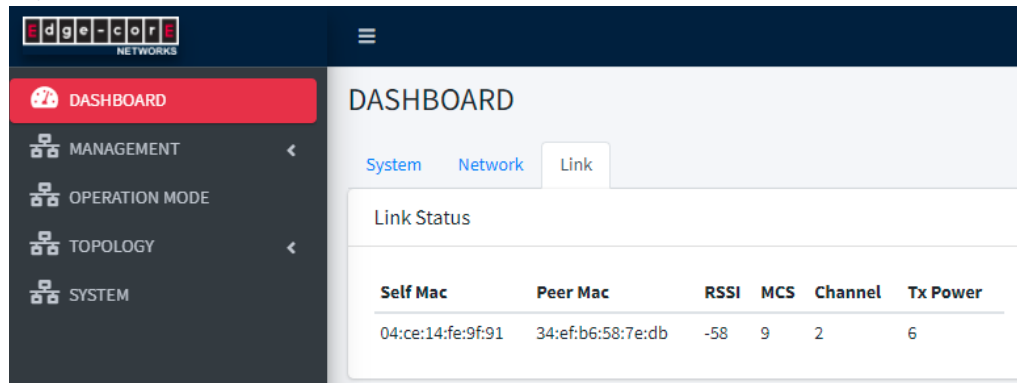
4. On the DN, proceed to Topology > Link setting:
 - Select the radio that connect the DN to the CN.
 - Click Add Peer and use the CN's Wlan MAC Address from Step 1.

Figure 28: Add Peer



5. Check the Dashboard > Link for the status of the link.

Figure 29: Link Status





Troubleshooting

Access and Operational Issues

Table 3: Troubleshooting Chart

Symptom	Action
No network connection	<p>If there is a wired/wireless connection, but no network connection available through the link:</p> <ul style="list-style-type: none">◆ Verify that the computers or devices used to test the connection are correctly configured.◆ Verify that the network interfaces are enabled.◆ Verify that the MTU size is set correctly for the L2 network.◆ Use diagnostic tools and packet captures between various devices to find where the connection fails.
Cannot connect using web browser	<ul style="list-style-type: none">◆ Be sure the MLTG-360 is powered up.◆ Check network cabling between the management station and the device.◆ Check that you have a valid network connection to the MLTG-360 and that intermediate switch ports have not been disabled.◆ Be sure you have configured the MLTG-360 with a valid IP address, subnet mask and default gateway.◆ Be sure the management station has an IP address in the same subnet as the MLTG-360's IP.◆ If you are trying to connect to the MLTG-360 using a tagged VLAN group, your management station, and the ports connecting intermediate switches in the network, must be configured with the appropriate tag.
Forgot or lost the password	<ul style="list-style-type: none">◆ Reset the device to factory defaults using the power sequence described under "General Settings".

