

Mediant™ 5G-EA / 5G-EA-G Cellular Modules



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Notice

Information contained in this document is believed to be accurate and reliable at the time of printing. However, due to ongoing product improvements and revisions, AudioCodes cannot guarantee accuracy of printed material after the Date Published nor can it accept responsibility for errors or omissions. Updates to this document can be downloaded from <https://www.audiocodes.com/library/technical-documents>.

This document is subject to change without notice.

Date Published: March-02-2025

Security Vulnerabilities

All security vulnerabilities should be reported to vulnerability@audiocodes.com.

WEEE EU Directive

Pursuant to the WEEE EU Directive, electronic and electrical waste must not be disposed of with unsorted waste. Please contact your local recycling authority for disposal of this product.

Customer Support

Customer technical support and services are provided by AudioCodes or by an authorized AudioCodes Service Partner. For more information on how to buy technical support for AudioCodes products and for contact information, please visit our website at <https://www.audiocodes.com/services-support/maintenance-and-support>.

Stay in the Loop with AudioCodes



Abbreviations and Terminology

Each abbreviation, unless widely used, is spelled out in full when first used.

Document Revision Record

LTRT	Description
13950	Initial document release.
13951	Hardware added; configuration per RFC 7278 added
13952	NSA or SA mode; dual APN;
13953	USB connection mandatory for PoE
13954	CLI command show data cellular status updated (firmware version); Web interface's Monitor page updated

LTRT	Description
13955	Mediant 5G-EA-G added; disabling integrated LTE; enabling SIM; scanning cellular network
13956	PoE injector height limit
13957	On/off power control (remote usb-controlled-poe)

Documentation Feedback

AudioCodes continually strives to produce high quality documentation. If you have any comments (suggestions or errors) regarding this document, please fill out the Documentation Feedback form on our website at <https://online.audiocodes.com/documentation-feedback>.

1 Introduction

This document describes the hardware installation of AudioCodes Mediant 5G-EA and Mediant 5G-EA-G cellular module (hereafter referred to as *cellular module*). It also describes the required cellular network configuration of AudioCodes Multi-Service Business Router device (hereafter referred to as *MSBR*).

1.1 Overview

The Mediant 5G-EA / Mediant 5G-EA-G is an Extension Access device that connects to any MSBR router to enable 5G WAN connectivity, transforming the customer's branch router into an all-in-one 5G router, combining multi-WAN access, data, voice, and security in a single device.

The cellular module provides highest throughput over 5G due to its outdoor IP65 capabilities, and best reception location thanks to 100-meter Ethernet cable connection to the MSBR.

The cellular module provides seven internal antennas for 4G (LTE Advanced) and 5G cellular data networking. It supports dual SIM cards, allowing the MSBR to connect to a secondary cellular network if connectivity to the primary cellular network fails.

The cellular module has an independent processing unit for cellular traffic, simply sending MSBR the Internet media traffic. Therefore, this eliminates the need for utilizing MSBR's CPU resources for cellular functionality.

The cellular module can be installed indoors or outdoors (IP65 compliant) for better reception. It can be mounted on a wall using the wall-mounting bracket or mounted on a pole using the pole-mounting clamps.

The cellular module can connect to MSBR's WAN GE port or any available LAN port.



- It is recommended to connect the cellular module to the MSBR's physical WAN Gigabit Ethernet port (e.g., gig 0/0) to preserve the role of the interface in the system.
- The cellular module can be used with any MSBR model.
- When using AudioCodes PoE injector, the USB port must be connected to the MSBR router. Without this USB connection, there will be no PoE functionality.

1.2 Specifications

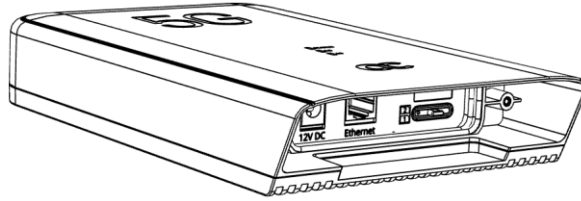
For specifications of the cellular module, refer to the [datasheet](#) on AudioCodes website.

2 Hardware Installation

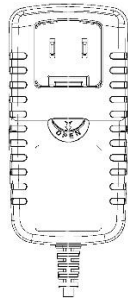
2.1 Shipped Items

Your shipped cellular module contains the following items:

Mediant 5G-EA / Mediant 5G-EA-G



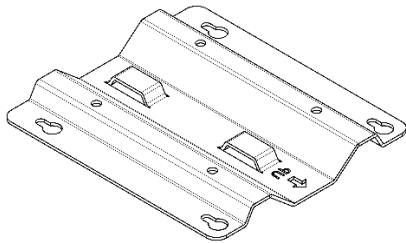
AC/DC Power Adaptor (12V/3A)



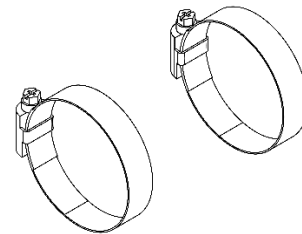
Pin for extracting SIM card tray



Wall-Mounting bracket kit

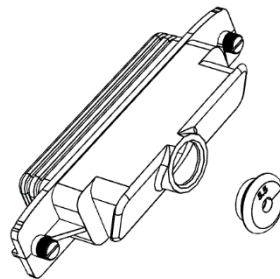


Adjustable clamps for pole mounting x 2



x 4

Rubber sealing grommet for Ethernet cable



2.2 Physical Dimensions and Operating Environment

The cellular module physical dimensions and operating environment details are provided in the following table.

Table 1: Physical Dimensions and Operating Environment

Dimensions (H x W x D)	45 x 147 x 252 mm (1.77 x 5.8 x 9.9 in.)
Weight	1.05 kg (2.3 lb)
Operating environment	-40 to 55°C (-40 to 131°F) Note: The cellular module must not be exposed to direct snow, rain, or sun.

2.3 Physical Description

2.3.1 Front Panel

The front panel provides LEDs, as described in [LED Descriptions](#) and shown in the figure below.

Figure 1: Front Panel



Table 2: Front Panel Description

Item #	Description
1	STATUS LED. For more information, see STATUS LED .
2	5G LED. For more information, see 5G LED .
3	4G LED. For more information, see 4G LED .

2.3.2 Side Panel

The side panel provides all the ports, as shown in the following figure.

Figure 2: Side Panel



Table 3: Side Panel Description

Item #	Description
1	Threaded inserts for accepting the screws that fasten the port cover to the cellular module.
2	Power inlet for connecting the AC/DC power supply. Note: Only use the power adaptor when the cellular module is installed indoors. Instead of using the power adaptor, you can use the Ethernet cable for powering the cellular module (i.e., Power over Ethernet), using a PoE injector.
3	RJ-45 Ethernet port. The port also supports Power-over-Ethernet (PoE).
4	SIM card slot, supporting up to two nano SIM cards.

2.3.3 Bottom Panel

The bottom panel provides four threaded inserts for accepting the screws that connect the mounting brackets for mounting the cellular module on a wall or pole.

Figure 3: Bottom Panel



2.4 LED Descriptions

The cellular module provides the following LEDs on its front panel:

- [STATUS](#) LED
- [5G](#) LED
- [4G](#) LED

2.4.1 STATUS LED

The **STATUS** LED indicates the general status of the cellular module, as described in the following table.

Table 4: STATUS LED Descriptions

LED State	Description
Steady red	Cellular module is undergoing initial boot process.
Blinking green	Boot process is complete and waiting for MSBR to connect.
Steady green	Cellular module has successfully established a connection to MSBR.

2.4.2 5G LED

The **5G** LED indicates the status of the 5G cellular network, as described in the following table.

Table 5: 5G LED Descriptions

LED State	Description
Steady red	Poor 5G cellular signal strength.
Steady orange	Moderate 5G cellular signal strength.
Steady green	Good 5G cellular signal strength.
Off	Cellular module is not registered to the 5G network.

2.4.3 4G LED

The **4G** LED indicates the status of the 4G/LTE Advanced cellular network, as described in the following table.

Table 6: 4G LED Descriptions

LED State	Description
Steady red	Poor 4G/LTE cellular signal strength.
Steady orange	Moderate 4G/LTE Advanced cellular signal strength.
Steady green	Good 4G/LTE Advanced cellular signal strength.
Off	Cellular module is not registered to the 4G network. Note: If the 5G LED is on, the cellular module could also be registered to 4G as part of the NSA configuration of the 5G network (non-standalone 5G network - mixed mode where modem “parks” on 4G while operating with 5G). For Restricting a mode, see Operating in NSA or SA Mode.

2.5 Power Supply

Power supply for the cellular module depends on location of installation:

- Outdoor installation
- Indoor installation

2.5.1 Outdoor Installation

For outdoor installations, the cellular module is powered from the Ethernet cable using Power over Ethernet (PoE). This is achieved by using a PoE injector, which you can order from AudioCodes or use your own.

The PoE injector connects between the cellular module's PoE-enabled Ethernet port and the MSBR's non-PoE LAN or WAN port.

If you are using AudioCodes PoE injector, you can control power (on or off) to the PoE injector and thus to the cellular module. For this you must connect the PoE injector's USB port to the MSBR's USB port, using a special USB cable (purchased from AudioCodes). Once connected, power is controlled using the following command, which functions together with the status of the cellular interface (shutdown or no shutdown):

```
(conf-cellular-0/0)# remote usb-controlled-poe
```

The following example powers off the PoE injector:

```
interface Cellular 0/0
 desc "WAN Cellular"
 remote mode m5g-ea-g
 remote underlying GigabitEthernet 0/0
 sim slot 1
 remote usb-controlled-poe
 remote mgmt-vlan 4051 data-vlan 4052 4053
 obscured-pin RXR3dnk=
 shutdown
exit
```



The PoE injector is suitable only for mounting heights of **2 meters** or less.

The power specifications of the PoE injector are listed in the following table.

Table 7: PoE Injector Power Specifications

Power	Values
Power In	100-240 VAC, 0.2A max., 50-60 Hz
Power Out	1x POE GbE (18W) for the cellular module

2.5.2 Indoor Installation

For indoor installations, the cellular module can be powered from an AC/DC power adaptor (supplied) or from PoE (like in outdoor installations). The power specifications of the power adaptor are listed below.

Table 8: Power Adaptor Specifications

Power	Values
Power Input	12V/3A DC jack



Only use the power adaptor that is supplied with your cellular module.

2.6 Mounting

You can mount the cellular module in several ways:

- [Wall mounting](#)
- [Pole mounting](#)



The cellular module is rated as IP65 compliant. However, it's recommended that when installing it outdoors, to locate it under a covered area so that it's not exposed to rain, snow, or direct sun rays.

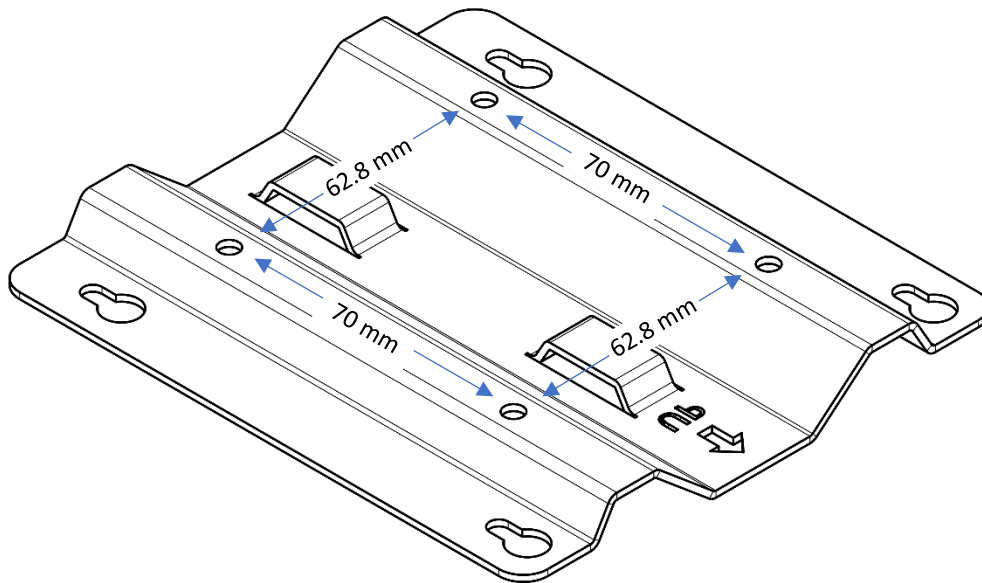
2.6.1 Wall Mounting

You can mount the cellular module on a wall by using the wall-mounting bracket.

To wall-mount the cellular module:

1. Mark the areas on the wall where you want to drill the holes for the four mounting screws. The distances between the holes should be as follows:
 - Horizontal distance between holes: 62.8 mm (2.47 in.)
 - Vertical distance between holes: 70 mm (2.75 in.)

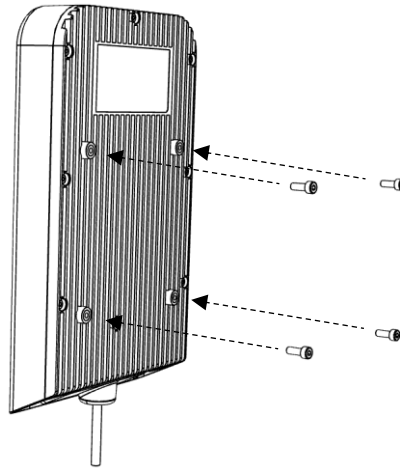
Figure 4: Wall-Mounting Template



2. Drill the holes into the wall and insert suitable wall anchors (not supplied).
3. Hold the bracket in the correct orientation according to the "UP" label on the bracket.
4. Align the bracket's holes with the drilled holes, and then fasten to the wall using four screws of 4.5-mm threaded diameter (not supplied).

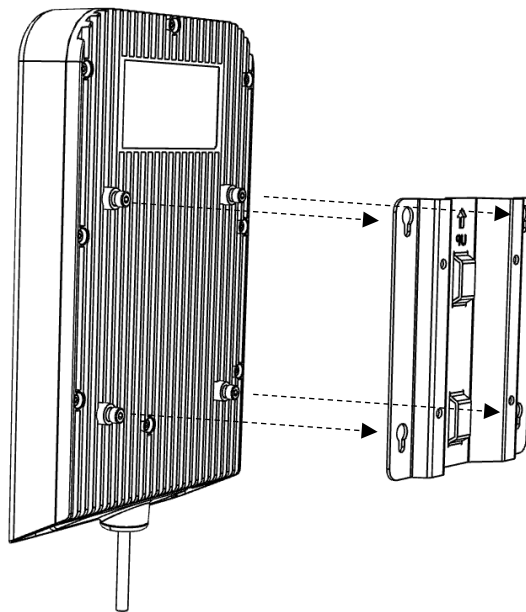
5. On the rear panel of the cellular module, using an Allen key, screw in the four mounting bracket screws (supplied):

Figure 5: Inserting Mounting Screwheads



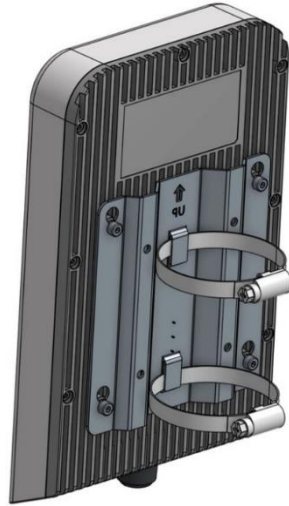
6. Hold the cellular module in the orientation so that its ports face downward.
7. Align the wall-mounting screw heads of the cellular module with the bracket's holes, push the unit forward so that the screw heads enter the bracket's holes, and then pull the unit gently down so that the screw heads slide down into the notches of the bracket's holes:

Figure 6: Attaching Cellular Module to Wall-Mounting Bracket



2.6.2 Pole Mounting

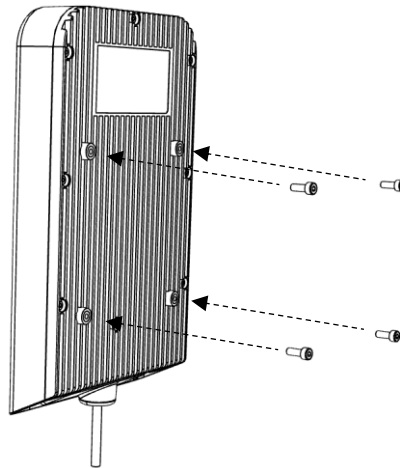
You can mount the cellular module on a pole, using the supplied adjustable pole-mounting clamps.



To pole-mount the cellular module:

1. Using an Allen key, insert the four mounting screws (supplied) into the holes on the rear panel of the cellular module:

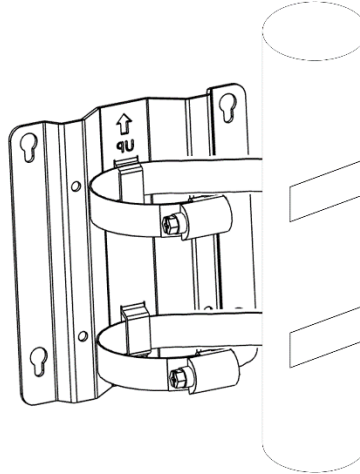
Figure 7: Inserting Mounting Screwheads



2. Using a flathead screwdriver, loosen the screws on both clamps, and then pull the belts out of the clamp lockets.
3. Thread the two clamp braces/belts through the slots of the wall-mounting bracket:

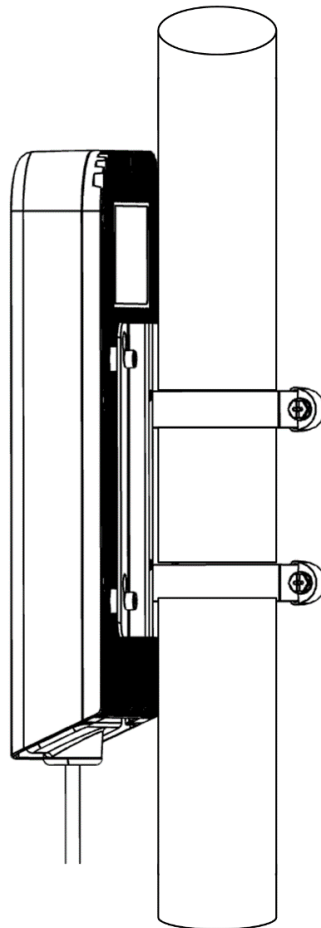
4. Wrap clamp belts around the desired pole and then thread their ends back into the clamp lock until there is no slack.

Figure 8: Wrapping Clamp Belts Around Pole



2. While holding the wall-mounting bracket with the clamps against the pole, tighten the clamps using the flathead screwdriver.
3. Hang the cellular module on the mounting bracket, by aligning the mounting screw heads of the cellular module with the bracket's holes, pushing the unit forward so that the screw heads enter the bracket's holes, and then pulling the unit gently down so that the screw heads slide down into the notches of the bracket's holes:

Figure 9: Pole-Mounting Brackets



2.7 Inserting SIM Cards

For Mediant 5G-EA, you can insert up to two nano-SIM cards, as described in the following procedure.

For Mediant 5G-EA-G, you can insert only one SIM card (in slot 1). Slot 2 is used for eSIM functionality.

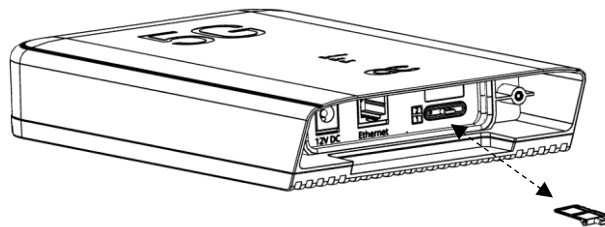


- When two SIM cards are used, the MSBR connects to only one cellular network. Only when the primary cellular network becomes unavailable, does it connect to the secondary cellular network.
- SIM card removal/replacement requires a hard reset of the cellular module.

To insert the SIM cards:

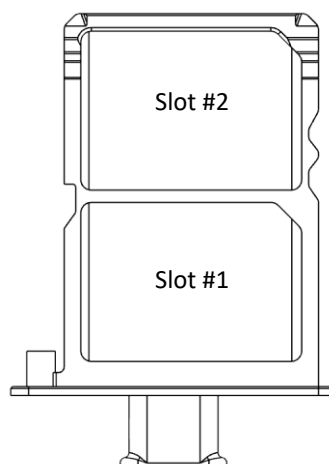
1. Make sure that the cellular module is not connected to power.
1. Insert the SIM-ejection pin tool (supplied) into the hole next to the SIM card slot and press it gently until the SIM card tray partially pops out. Don't apply too much pressure on the pin; otherwise, you may damage the SIM card ejection mechanism.
2. Pull out the SIM card tray from the SIM card slot.

Figure 10: SIM Card Tray Removed from SIM Card Slot



3. Place the SIM card on the tray according to the notch in the corner.

Figure 11: Location of SIM Cards in Tray



4. Gently insert the SIM card tray back into the SIM card slot, in the same orientation that you removed it.
5. Power on the cellular module.

2.8 Cabling

2.8.1 Cabling for Outdoor Installations

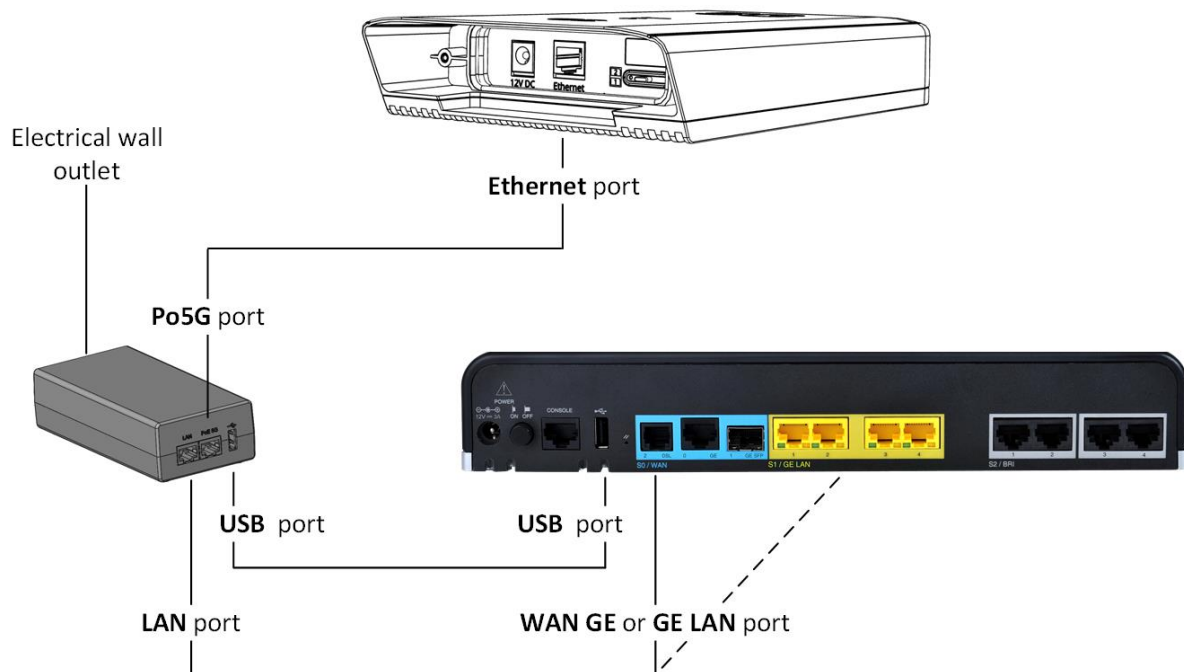
When installed outdoors, the cellular module is powered from the Ethernet cable (Power-over-Ethernet / PoE). A PoE Injector is required to stabilize the supplied power.



You can order a PoE injector from AudioCodes or use your own PoE injector.

The illustration below provides an overview of cabling for outdoor installation:

Figure 12: Cabling for Outdoor Installation



To cable the cellular module for outdoor installations:

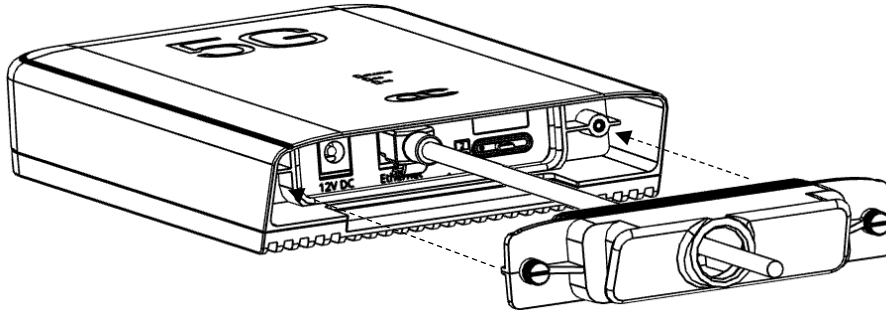
1. Insert your SIM card(s) into the cellular module, as described in Inserting SIM Cards.
2. Connect the PoE injector to the cellular module's Ethernet port and to the MSBR's LAN or WAN port, which is used as an underlying port.
3. (Optional) If you are using AudioCodes PoE injector and you want to implement power control (on / off) over the cellular module, connect the PoE injector's USB port to the MSBR's USB port, using a special USB cable ordered from AudioCodes. For power management commands, see Outdoor Installation.
4. Connect an Ethernet cable to either the WAN Gigabit Ethernet port labeled **WAN GE** or one of the LAN Ethernet ports on Mediant 500Li. Connect the other end of the Ethernet cable to the RJ-45 Ethernet port labeled **LAN** on the PoE injector.



You can connect the Ethernet cable to WAN GE or any LAN GE port. However, it's recommended to use the WAN port for optimal performance.

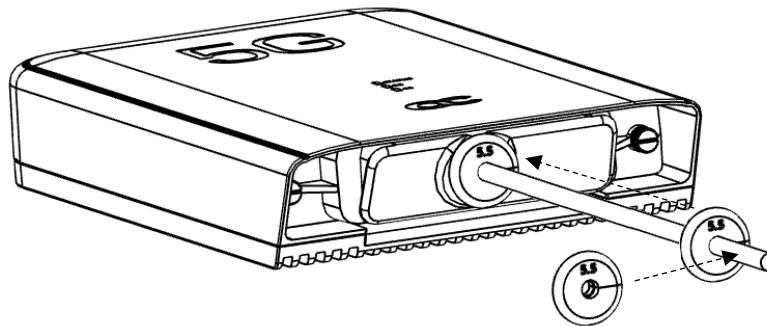
5. Connect another Ethernet cable to the RJ-45 Ethernet port labeled **PoE 5G** on the PoE injector. Feed the Ethernet cable through the opening in the rubber-sealing grommet (supplied), and then connect the RJ-45 connector at the end of the cable to the RJ-45 Ethernet port labeled **Ethernet** on the cellular module.
6. Attach the rubber sealing grommet:
 - a. Connect the grommet to the cellular module, using a flathead screwdriver to screw the two captive screws to it:

Figure 13: Connecting Grommet to Cellular Module



- b. Slip the rubber cap onto the Ethernet cable, and then secure it to the grommet to seal it:

Figure 14: Connecting Ethernet Cable Sealing Cap to Grommet



7. Connect the PoE Injector to power, using the AC/DC power adaptor. Make sure that you connect the to a standard electrical outlet.

2.8.2 Cabling for Indoor Installations

When installed indoors, the cellular module can be powered from an AC/DC power adaptor or alternatively, from PoE like in outdoor installations.

Figure 15: Cabling for Outdoor Installation



To cable the cellular module for indoor installation:

1. Insert your SIM card(s) into the cellular module, as described in Inserting SIM Cards.
2. Connect an Ethernet cable to either the WAN Gigabit Ethernet port labeled **WAN GE** or one of the LAN Ethernet ports on Mediant 500Li. Connect the RJ-45 connector at the other end of the cable to the RJ-45 Ethernet port labeled **Ethernet** on the cellular module.



- You can connect the Ethernet cable to the WAN GE or any LAN GE port. However, it's recommended to use the WAN port for best performance.
- The length of the Ethernet cable can be up to 100 m.

3. Connect the cellular module to power, using the AC/DC power adaptor (supplied). Make sure that you connect it to a grounded, standard electrical outlet.

3 Configuration

3.1 Disabling Integrated LTE Modem

For devices that have an integrated LTE modem, you must disable the modem to use the cellular module:

```
M500Li# configure system
M500Li (config-system)# hw
(hw)# disable-internal-lte-modem on
(hw)# activate
```

3.2 Enabling eSIM

If you are using an eSIM (instead of a SIM card), you need to enable it:

```
M500Li# configure data
M500Li(config-data)# interface cellular 0/0
M500Li(conf-cellular-0/0)# sim slot 2
M500Li(conf-cellular-0/0)# activate
```



eSIM functionality is supported only on Mediant 5G-EA-G.

3.3 Configuration Guidelines

1. If the “3G” option is not enabled in the MSBR feature-key, update a new key:

```
M500Li(conf-cellular-0/0)# do show system feature-key
Key features:
Board Type: M500Li
DSP Voice features:
DATA features: Routing FireWall&VPN WAN Advanced-Routing 3G
Enhanced-Performance=1G Advanced-Security
Channel Type: DspCh=30
Control Protocols: MGCP SIP
Default features:
Coders: G711 G726
```

2. Install the recommended image file on the MSBR which supports the cellular module.
3. Perform `write factory` to update the cellular module to the latest configuration.
4. Create the cellular interface:

```
M500Li# configure data
M500Li(config-data)# interface cellular 0/0
```



Cellular 0/0 interface acts as the “parent” for all the cellular data interfaces (Cellular 0/0/1 and Cellular 0/0/2), and holds configuration which is common to them in the physical level, like SIM slot, SIM pin code, etc.

5. To configure options related specifically to the cellular module under the Cellular 0/0 interface:

```
M500Li(conf-cellular-0/0)# remote
mode                               Work with remote M5G-EA or M5G-EA-G
underlying                         M5G underlying interface
restart                           Restart remote 5G unit
```

6. Configure the remote mode (to distinguish from the internal LTE modem):

```
M500Li(conf-cellular-0/0)# remote mode m5g-ea-g|m5g-ea
```

For Mediant 5G-EA, configure the command to **m5g-ea**; for Mediant 5G-EA-G, configure the command to **m5g-ea-g**.



Configuring the command to `remote mode` automatically sets it to the Mediant 5G-EA.

7. Configure an underlying interface which will be used to connect to the cellular module; it will invalid it in the configuration (and will not be shown).

```
M500L(conf-cellular-0/0)# remote underlying
fiber                               Fiber interface
gigabitethernet                    Gigabit Ethernet interface

M500L(conf-cellular-0/0)# remote underlying gigabitethernet
[slot/port]                        Gigabit Ethernet interface slot and
port

<cr>
M500Li(conf-cellular-0/0)# remote underlying gigabitethernet
0/0
```

8. Activate the interface:

```
M500Li(conf-cellular-0/0)# no shutdown
```



Make sure the PoE is disconnected from the cellular module before installing the SIM card.

9. Place the SIM card in the tray according to the following scheme. The MSBR waits for the cellular module to connect via the selected POE port.



- Mediant 5G-EA supports up to two physical SIM cards.
- Mediant 5G-EA-G supports only one SIM card and one eSIM. The physical SIM card is placed in slot 1; slot 2 is used for the eSIM.
- Only one SIM can be used at a time.
- SIM card removal/replacement always requires a hard reset of the cellular module.

10. Connect the Ethernet cable to the cellular module External Remote.

You can monitor the connection by typing the following command:

```
500Li# show data cellular status
Cellular 0/0/1 interface status:
      Administrative:      UP

Remote M5G:
~~~~~
Status: Connected.
M5G firmware version: 7.26A.356.479
SIM card slot #1: Detected ICCID: 8997207104151273224F
SIM card slot #2: Absent.
SIM card active slot: 1 (SIM PIN code required)

IMEI: 860736041485408
```



The displayed firmware is the device's (MSBR) software version with which the cellular module is compatible (and later).

11. The cellular module provides LEDs that indicate status of connection to the MSBR and the cellular network.

LED State	Description
Red	The cellular module is booting
Flashing Green	boot process completed, waiting for MSBR router to connect via the RJ-45 port.
Green	MSBR connected.
4g/5g off	Cellular network unavailable.
4g/5g red	Poor reception.
4g/5g orange	Moderate reception.
4g/5g green	Good reception.

The cellular module has an internal mechanism which monitors the connectivity to the MSBR, and in cases of forced disconnection (port shutdown on the MSBR side) or any reason that prevents the MSBR to connect, it will reset itself in cycles after 1 minute.

3.4 Configuring a Primary Data Call

To configure a primary data call:

1. Configure a primary data call:

```
M500Li# configure data
M500Li (config-data) # interface cellular 0/0/1
```

2. Configure the profile:

Normally, it is required to configure a profile for the data call (APN, username, and password). A data call might connect even without explicitly mentioning the APN (depending on the cellular operator).

```
M500Li (conf-cellular-0/0/1) # profile
M500Li (cell-profile-config) # apn uinternet
M500Li (cell-profile-config) # user myuser
M500Li (cell-profile-config) # password mypassword
M500Li (cell-profile-config) # exit
```



You can configure up to two APNs for the installed SIM card.

2. A default route can be configured to the internet (from DHCP options):

```
M500Li (conf-cellular-0/0/1) # ip dhcp-client default-route
```

3. Activate the data call:

```
M500Li (conf-cellular-0/0/1) # no shutdown
```

4. We now have a full configuration which looks like this for example:

```
M500L(cell-profile-config)# do show running-config data
interface cellular 0/0
  interface Cellular 0/0
    remote mode
    remote underlying GigabitEthernet 1/3
    sim slot 2
    obscured-pin RXR3dnk=
    no shutdown
  exit
```

```
M500L(cell-profile-config)# do show running-config data
interface cellular 0/0/1
  interface Cellular 0/0/1
    desc "WAN Cellular 1"
    profile
      apn uinternet
      user user
      obscured-pass 8oKSh4aBmIqd
    exit
  ip address auto
  ip dhcp-client default-route
  firewall enable
  napt
  mtu auto
  ipv6 enable
```

```
ipv6 address autoconfig
no shutdown
ip dns server auto
exit
```

The configuration of interface “Cellular 0/0/1” has different defaults related to networking (e.g., firewall, DNS). Usually, there is no need to change them. Once data call is activated, the module attempts to connect to the cellular network, and acquire an IP.

Connection Example:

```
M500L# show data cellular status
```

Cellular 0/0/1 interface status:

```
Modem status:      UP
Interface status:   UP
Signal strength:    -85 dBm
Signal level:       Great
IPv4:
  Address:          10.14.25.163
  Gateway:          10.14.25.164
  Subnet mask:      255.255.255.248
IPv6:
  Address:          2a02:6680:110d:3663:290:8fff:fe00:1
  Gateway:          2a02:6680:110d:3663:a536:222c:6271:d608
  Prefix length:    64
Technology:         NR5G
Roam status:         HOME
KB sent:             1
KB received:         3
Packets sent:        19
Packets received:    36
```

Remote M5G:

~~~~~

Status: Connected.

M5G firmware version: 7.26A.356.479

SIM card slot #1: Detected ICCID: 8997250400037912035E

SIM card slot #2: Absent.

SIM card active slot: 1

IMEI: 860736041041624

## 3.5 Configuring a Secondary Data Call

Depending on the service contract with the cellular operator, it is possible to connect a secondary data call and create a special route rule for it. A special (non-default) profile is used to differentiate the data call from the default internet one. Creating the “Cellular 0/0/2” interface is the same as creating it for the primary one:

### Example:

```
M500L# show data cellular status
```

```
Cellular 0/0/1 interface status:
```

```
Modem status:      UP
Interface status:   UP
Signal strength:    -85 dBm
Signal level:       Great
IPv4:
  Address:          10.95.47.171
  Gateway:          10.95.47.172
  Subnet mask:       255.255.255.248
IPv6:
  Address:          2a02:6680:110c:7050:290:8fff:fe00:1
  Gateway:          2a02:6680:110c:7050:ac6a:4e69:529a:f9c8
  Prefix length:    64
Technology:         NR5G
Roam status:         HOME
KB sent:             0
KB received:         1
Packets sent:        8
Packets received:    9
```

```
Cellular 0/0/2 interface status:
```

```
Modem status:      UP
Interface status:   UP
Signal strength:    -85 dBm
Signal level:       Great
IPv4:
  Address:          10.249.236.34
  Gateway:          10.249.236.33
  Subnet mask:       255.255.255.252
Technology:         NR5G
Roam status:         HOME
KB sent:             0
KB received:         0
Packets sent:        0
Packets received:    0
```

```
Remote M5G:
```

```
~~~~~
```

```
Status: Connected.
```

```

SIM card slot #1: Detected ICCID: 8997250400037912035E
SIM card slot #2: Absent.
SIM card active slot: 1

IMEI: 860736041041624

```

#### To view connection over time:

Type the command `show data cellular status history <min>`:

```
M500L# show data cellular status history 1
```

```

| Time | Date | Radio | Signal (dBm) | Interface Name | IPv4 Address | IPv6 Address |

08:28:02 03/01/2020 Cellular 0/0/1 0.0.0.0
08:28:02 03/01/2020 Cellular 0/0/2 0.0.0.0
08:29:03 03/01/2020 NR5G -111 Cellular 0/0/1 10.222.21.121 2a02:6680:2108:9529:290:8fff:fe00:1
08:29:03 03/01/2020 NR5G -111 Cellular 0/0/2 10.222.33.144

```

#### To view utilization information of the cellular module:

```
M500Li# show data cellular utilization
```

```

Remote M5G:
CPUs utilization: 6.74%
Memory utilization: 92.03%
SOC temperature: 30.50C
System Time 09:25:58

```

#### To view utilization of the cellular module over history of 1 min, 1 hour, 72 hours:

```
M500L# show data cellular history
```

```

memory Cellular interface history memory
temperature Cellular interface history
temperature
util Cellular interface history util

```

```
M500L# show data cellular history memory
```

```

M5G memory in last 72 hours
+-----
123456789111111111222222222233333333334444444444555555555566666666
666777

012345678901234567890123456789012345678901234567890123456789012

M5G memory in last 60 minutes

999999999996
000000000007
|
|
+-----

```

1234567891111111111222222222233333333333444444444455555555556  
012345678901234567890123456789012345678901234567890

M5G memory in last 60 seconds

[illegible]

```

+-----+
1234567891111111111222222222233333333333444444444455555555556
0123456789012345678901234567890123456789012345678901234567890

```

### 3.6 Operating in NSA or SA Mode

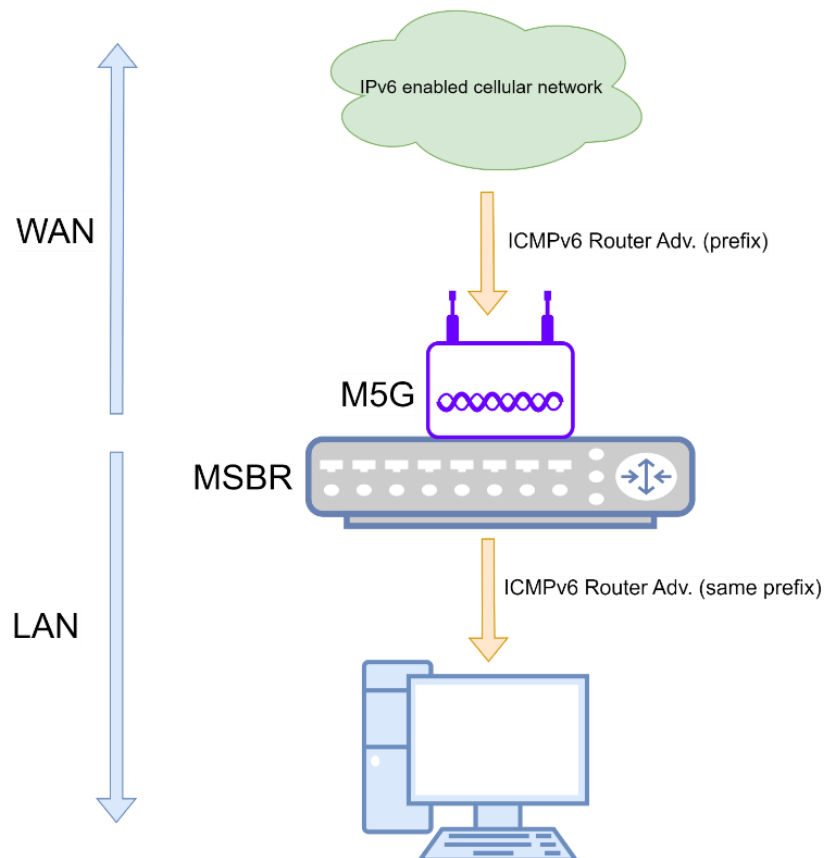
By default, the cellular module can operate in both 5G Non-Standalone (NSA) and 5G Standalone (SA) modes; the module automatically chooses a mode according to the cellular network.

However, you can configure MSBR to operate in only one specific mode, by disabling the mode that you don't want it to operate in. This is done using the following command:

```
M500Li# configure data
M500Li(config-data)# interface cellular 0/0
(conf-cellular-0/0)# sim disable-nr5g-mode {nsa|sa}
```

### 3.7 Using Prefixes from RA ICMPv6 for SLAAC on LAN

Per RFC 7278, the MSBR supports using prefixes received in Router Advertisement ICMPv6 message, for SLAAC on its LAN side as-is. This means that the 64-bit prefix that is received on its WAN interface is used as-is for SLAAC on the LAN.



Once configured, the MSBR does the following:

- Generates an IPv6 address `addr1` using EUI64 (and MAC address of Cellular 0/0/1 interface) and installs `<addr1>/128` on its cellular 0/0/1 interface, which creates a native connected route on this subnet (128).
- Generates an IPv6 address "`addr2`" using EUI64 (and MAC address of LAN interface) and installs `<addr2>/64` on the LAN interface, which creates a native connected route on this subnet (64).
- Sets the default gateway to the source address of the original Router Advertisement ICMPv6 message on which the prefix was received on the WAN (cellular network).
- Sends RA on the LAN interface with the prefix received on the Router Advertisement message received on the WAN (cellular network). The prefix has both its flags of onlink and autoconf turned on ("1").

Any host connecting to the MSBR on its LAN can either set its Ipv6 address as "automatic", which uses the prefix along with the EUI64 to generate a Global Unicast address for the host itself, or configure a static address based on the prefix that the RA includes.

**To configure RFC 7278 support:**

1. Enable the feature:

```
M500Li (conf-cellular-0/0/1) #
 ipv6 enable
 ipv6 address autoconfig extnd-prfx-lan
 ipv6 nd autoconfig default-route
```

2. On any LAN interface:

```
 ipv6 enable
 ipv6 nd ra interval 15 10
 ipv6 nd pd Cellular 0/0/1 ::/64
 no ipv6 nd ra suppress
```

## 3.8 Scanning Surrounding Cellular Networks

You can use the following CLI command to scan for cellular networks in the vicinity in which the Mediant 5G-EA module has been installed. The scan result also displays the signal strength of each network provider. This can help you position the antenna for the best possible reception to achieve the best possible throughput through the 5G network.

```
M500Li# show data cellular network-scan 4g
```



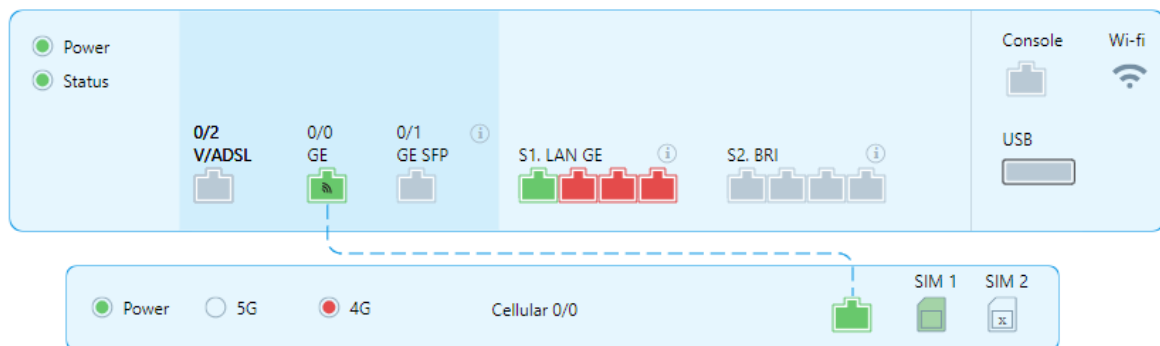
### 3.9 Viewing Status through Web Interface

The Web interface displays the cellular module on the Monitor page (**Monitor** menu > **Monitor** tab > **Monitor**). The module is displayed below the graphical representation of the MSBR.

The Monitor page displays the status of the cellular functionality:

- **SIM 1 or SIM 2:**
  - **Green:** Active SIM card
  - **Gray:** SIM card not selected
  - **"x":** If the SIM card is not inserted in the slot
- Cellular reception type and strength (**5G** or **4G**):
  - **Red:** Poor reception
  - **Orange:** Moderate reception
  - **Green:** Good reception
  - **Off:** The cellular module isn't registered to the cellular network
- Underlying interface (e.g., Cellular 0/0).
  - Connectivity between MSBR and the cellular module (Ethernet icon is always **green** when connected).

**Figure 16: Status of Cellular Module in MSBR Web Interface**



## 3.10 Troubleshooting

Here is a list of common troubleshooting technics in case things are not working as expected:

### 3.10.1 Cellular Module Connected but Cellular Interface is "Down"

There can be several reasons for this:

**Table 9: Cellular Module Connected but Cellular Interface Down**

| Cause                                      | Correction                                                                                                                     |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| SIM failure (not activated, bad)           | Verify SIM is working fine by inserting it to another device like a USB dongle or a phone.                                     |
| SIM is PIN protected                       | Verify SIM is not locked, or PIN code is not configured in CLI.                                                                |
| Configured SIM slot is not the correct one | SIM slot #1 is the one closer to the plastic cover.                                                                            |
| Incorrect profile                          | Special accounts require accurate APN, username, password to be configured, verify with the operator the proper configuration. |

### 3.10.2 Data Call has Valid IP Address but Traffic to Internet Fails

There can be several reasons for this:

**Table 10: Data Call has Valid IP Address but Traffic to Internet Fails**

| Cause                       | Correction                                                                                                             |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------|
| Routing table is inaccurate | Verify route table is accurate, i.e., default route is not shadowed by another route.                                  |
| Complex routing             | If primary and secondary data calls are configured, routing might be complex. try to reduce it to a primary call only. |

### 3.10.3 Data Call "Up" and Successful Ping but Low Performance

There can be several reasons for this:

**Table 11: Data Call "Up" and Successful Ping but Low Performance**

| Cause                                             | Correction                                                                     |
|---------------------------------------------------|--------------------------------------------------------------------------------|
| Low reception                                     | Verify signal strength is good, and technology is at least LTE.                |
| Cellular package has reached the data usage limit | Compare performance with another device like a cellular phone or a USB dongle. |

### 3.10.4 For Other Problems

Contact AudioCodes support with the following procedure:

1. Activate syslog server and point the MSBR to it.
2. Activate data domain logs using “debug data-syslog”
3. Reproduce the problem.
4. Add remote logs

```
M500Li# debug cellular remote logcat rg_proxy
M500Li# debug cellular remote dmesg
```

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Document #: **LTRT-13957**

