Hardware Installation Manual

AudioCodes Family of Multi-Service Business Routers (MSBR)

Mediant™ 500 MSBR

audiocodes

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This document is subject to change without notice.

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WEEE EU Directive

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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.

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Abbreviations and Terminology

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

Throughout this manual, unless otherwise specified, the term *device* refers to Mediant 500 MSBR.

Related Documentation

Document Name
Release Notes
Mediant 500 MSBR SIP User's Manual
CLI Reference Guide

General Notes and Warnings, and Safety Information

Read and adhere to all warning statements in this document before installing the device.

Open-source software may have been added and/or amended for this product. For further information, contact your AudioCodes sales representative.

Warning: The device is an **INDOOR** unit and therefore, must be installed **only** indoors.

Caution Electrical Shock

Do not open or disassemble this device. The device carries high voltage and contact with internal components may expose you to electrical shock and bodily harm.

Warning: The device must be installed and serviced only by qualified service personnel.

Warning: For deployment in Finland, Sweden and Norway, the device must be installed **only** in restricted access locations that are compliant with ETS 300253 guidelines here equipotential bonding has been implemented.

Warning: Disconnect the device from the mains and Telephone Network Voltage (TNV) before servicing.

Document Revision Record

LTRT	Description
10331	Maximum FXS and FXO ports.
10332	FXO warning statement added.
10334	SHDSL LEDs added.
10335	A/VDSL and SHDSL LEDs updated.
10336	Power surge protection warnings.
10337	A/VDSL connector pinouts updated.
10338	AC power cable warning (Japanese).
10339	Wall-mounting added.
10760	19-inch rack mounting brackets supplied; fallback/lifeline upon no-ping removed.
10761	Logo updated; PSTN/Analog fallback updated.
10763	SFP module for WAN fiber-optic or WAN copper interface
10764	Wi-Fi removed; serial cable removed from supplied items;
10765	Figures updated; single USB

Documentation Feedback

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1   Introduction

This document provides a hardware description of the Mediant 500 MSBR (hereafter referred to as *device*) and step-by-step procedures for mounting and cabling the device.

The device supports the following interfaces:

- Multiple WAN:
  - Single Gigabit Ethernet copper (10/100/1000Base-T) unshielded twisted pair (UTP) interface port
  - Dual-mode of 1.25 Gbps Optical Fiber Small Form-Factor Pluggable (SFP)
  - ADSL2+ / VDSL2
  - SHDSL
- Telephony interfaces:
  - (Optional) One ISDN PRI (E1/T1) port
  - (Optional) Two BRI ports, supporting up to four voice channels and PSTN fallback
  - (Optional) three FXS ports and 1 FXO port
- Four Gigabit Ethernet (10/100/1000Base-T) LAN ports
- One USB port for USB storage
- Serial console port (RJ-45) for device management

> ℹ️
> - Hardware configurations may change without notice. Currently available hardware configurations are listed in AudioCodes Price Book. For further enquiries, please contact your AudioCodes sales representative.
> - The SFP module can be used for WAN fiber-optic interface or WAN copper interface.
> - For configuring the device, refer to the device's *User's Manual*.

2   Unpacking the Device

Follow the procedure below for unpacking the carton in which the device was shipped.

To unpack the device:

1.   Open the carton and carefully remove packing materials.

2.   Remove the chassis from the carton.

3.   Check that there is no equipment damage.

4.   Ensure that in addition to the chassis, the package contains the following items:

    • Four anti-slide bumpers for desktop installation

    • Two mounting brackets for 19-inch rack mounting

    • One AC power cable

    • (Optional) Wall-mounting kit

5.   Check, retain and process any documents.

If there are any damaged or missing items, notify your AudioCodes sales representative.

3   Physical Description

This section provides a physical description of the device.

3.1   Physical Dimensions

The device's physical dimensions and weight are listed in the table below:

Table 1: Physical Dimensions

Physical Specification	Value
Dimensions (H x W x D)	4.37 (1U) x 31.0 cm x 21.0 cm (1.72 x 12.2 x 8.3 in.)
Weight	2.0 kg (4.4 lbs.)

3.2   Front Panel Description

The front panel provides the telephony port interfaces, various networking ports, reset pinhole button, and LEDs.

3.2.1   Ports and Buttons

The device's front panel is shown in the figure below and described in the subsequent table.

Figure 1: Front Panel

> ℹ The figure above is used only as an example. The hardware configuration depends on the ordered model.

Table 2: Front Panel Description

Item #	Label	Description
1	**//**	Reset pinhole button for resetting the device and optionally, for restoring the device to factory defaults. To restore the device to factory defaults, do the following: With a paper clip or any other similar pointed object, press and hold down the pinhole button for **at least 12 seconds, but no longer than 25 seconds**
2	**CONSOLE**	RJ-45 port for RS-232 serial communication
3	**WAN**	WAN interface, which can be any of the following (depending on ordered configuration): ■ Copper GE ■ SFP module (single pair, supporting 1 GbE) ■ ADSL/2+ and VDSL2 ■ SHDSL **Note:** For available WAN configurations, contact your AudioCodes sales representative.
4	**LAN**	Up to four Gigabit Ethernet (10/100/1000Base-T) ports for connecting to LAN network (IP phones, computers, or switches). These ports support half- and full-duplex modes, auto-negotiation, and straight or crossover cable detection.
5	**PSTN**	Telephony interfaces, depending on ordered configuration: ■ ISDN PRI E1/T1 ■ ISDN BRI port interfaces (RJ-45) ■ FXS port interfaces (RJ-11) ■ FXO port interface (RJ-11)
6	**POWER / STATUS**	LEDs indicating the status of the power and reboot/initialization. For more information, see Section 3.2.2 on page 12.
7	**USB**	One USB 2.0 port, which can be used for an external USB hard drive or flash disk (disk on key) for USB storage

3.2.2   LEDs

The front panel provides various LEDs depending on the device's hardware configuration (e.g., the available telephony interfaces). These LEDs are described in the subsequent subsections.

3.2.2.1   WAN LEDs

3.2.2.1.1   GE WAN LED

The GE WAN port(s) provides a LED for indicating operating status, as described in the table below.

Table 3: GE WAN LED Description

LED Color	LED State	Description
Green	On	WAN link established.
	Flashing	Data is being received or transmitted.
-	Off	No WAN link or no power received by the device.

3.2.2.1.2   A/VDSL WAN LED

The A/VDSL WAN port provides a LED for indicating operating status, as described in the table below.

Table 4: A/VDSL WAN LED Description

LED Color	LED State	Description
Green	On	DSL link connected (trained) successfully with peer ("showtime").
	Fast Flashing	Training up (connection in progress) and negotiating with peer.
	Slow Flashing	DSL port is administratively up, but idle (not connected and no peer detected).
	Two Fast Flashes and then Idle Sequences	DSL port is initializing itself after being enabled or upon mode change.
-	Off	DSL port is administratively shutdown or not configured.

3.2.2.1.3 SHDSL WAN LED

The SHDSL WAN port provides a LED for indicating operating status, as described in the table below.

Table 5: SHDSL WAN LED Description

LED Color	LED State	Description
Green	On	At least one of the links is synchronized.
	Fast Flashing	At least one of the links is initializing.
	Slow Flashing	SHDSL firmware is running.
-	Off	No WAN link or no power received by the device.

3.2.2.1.4 SFP WAN LED

The **WAN SFP** LED indicates the status of the optical fiber WAN link, as described in the table below.

Table 6: WAN SFP LED Description

LED Color	LED State	Description
Green	On	WAN fiber link established.
	Flashing	Data is being received or transmitted.
-	Off	No WAN fiber link or power not received by the device.

3.2.2.2 LAN Interface LED

Each Ethernet port provides a LED for indicating LAN operating status, as described in the table below.

Table 7: LAN LED Description

LED Color	LED State	Description
Green	On	Ethernet link established.
	Flashing	Data is being received or transmitted.
-	Off	No Ethernet link.

3.2.2.3   E1/T1 LED

The trunk port provides a LED for indicating operating status, as described in the table below:

Table 8: E1/T1 LED Description

Color	State	Description
Green	On	Trunk is synchronized (normal operation).
Red	On	Loss due to any of the following signals: ■ LOS - Loss of Signal ■ LOF - Loss of Frame ■ AIS - Alarm Indication Signal (the Blue Alarm) ■ RAI - Remote Alarm Indication (the Yellow Alarm)
-	Off	Failure / disruption in the AC power supply or the power is currently not being supplied to the device through the AC power supply entry.

3.2.2.4   BRI LED

Each BRI port provides a LED for indicating operating status, as described in the table below:

Table 9: BRI LED Description

Color	State	Description
Green	On	Physical layer (Layer 1) is synchronized (normal operation).
Red	On	Physical layer (Layer 1) is not synchronized.
-	Off	Trunk is not active.

3.2.2.5   FXS LED

Each FXS port provides a LED for indicating operating status, as described in the table below.

Table 10: FXS LED Description

LED Color	LED State	Description
Green	On	Phone is in off-hook state.
	Flashing	Extension line ringing.
Red	On	■ Error - malfunction in line or out of service due to Serial Peripheral Interface (SPI) failure ■ Disabled port initiated by user (using the CLI command, `analog-port-enable`)
-	Off	Phone is in on-hook state.
-	Off	No power received by the device.

3.2.2.6   FXO LED

The FXO port provides a LED for indicating operating status, as described in the table below.

Table 11: FXO LED Description

LED Color	LED State	Description
Green	On	FXO line is off-hooked toward the PBX.
	Flashing	Ring signal detected from the PBX.
Red	On	■ Error - malfunction in line or out of service due to Serial Peripheral Interface (SPI) failure ■ Disabled port initiated by user (using the CLI command, `analog-port-enable`)
-	Off	Line is on hook or no power received by the device.

3.2.2.7   Operational Status LED

The **STATUS** LED indicates the operating status, as described in the table below.

Table 12: STATUS LED Description

LED Color	LED State	Description
Green	On	Device is operational.
	Flashing	■ Initial rebooting stage. ■ Software upgrade (.cmp file) in process (currently supported only in Software Version 6.8).
Red	On	Boot failure.
-	Off	Advanced rebooting stage.

3.2.2.8   Power LED

The **POWER** LED indicates the operating status, as described in the table below.

Table 13: POWER LED Description

LED Color	LED State	Description
Green	On	Power is received by the device.
-	Off	No power received by the device.

3.3   Rear Panel Description

The device's rear panel is shown in the figure below and described in the subsequent table.
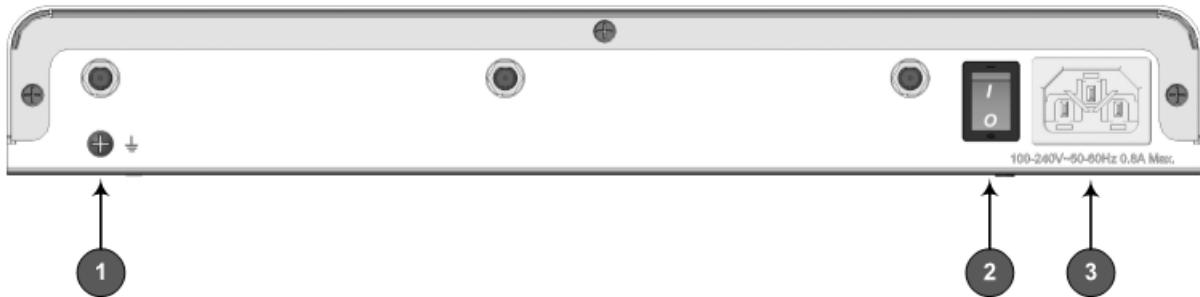
Figure 2: Rear Panel

Table 14: Rear Panel Description

Item #	Label	Description
1	⏚	Protective earthing screw.
2	**I / O**	Power switch (**O** - off; **I** - on).
3	**100-240V~50-60Hz 0.8A Max.**	Three-prong AC power supply entry.

4   Mounting the Device

The device can be mounted in one of the following ways:

■ Placed on a desktop – see Section 4.1 on page 17

■ Installed in a standard 19-inch rack – see Section 4.3 on page 23

> ⚠️ **Warning:** Do not place any equipment directly on top of the device or adjacent to its sides (at least 13-cm separation). In addition, if you are mounting the device in a 19-inch rack, ensure that at least a 3U separation is maintained between the device and other mounted devices or equipment.
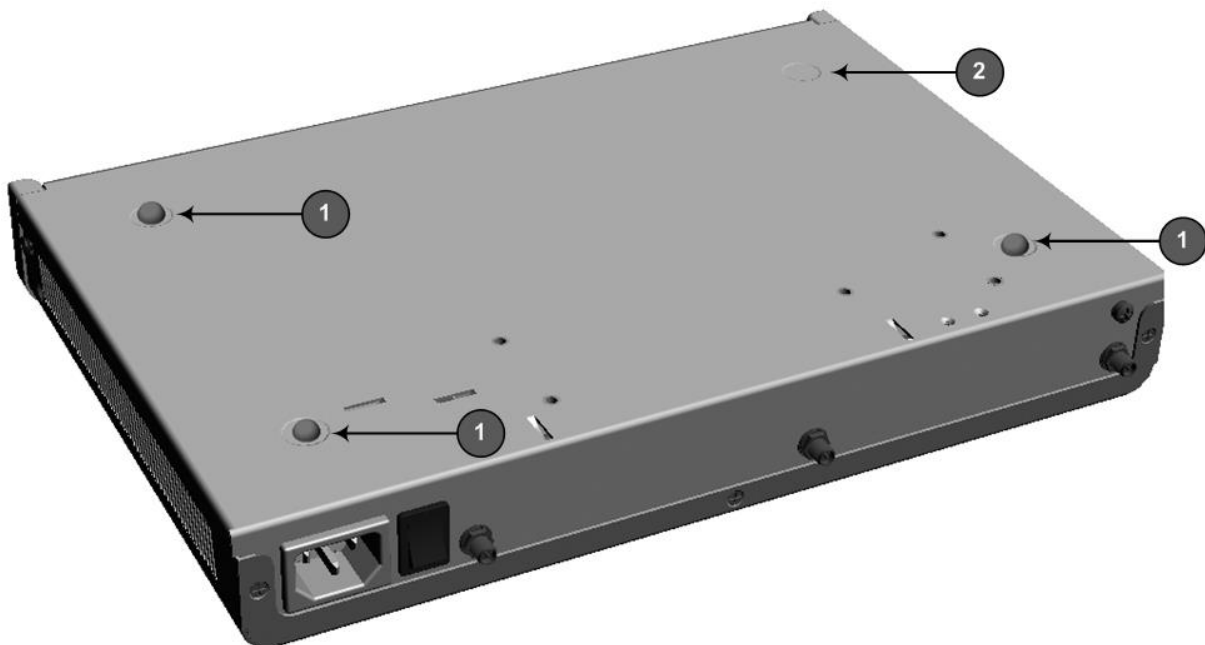
4.1   Desktop Mounting

The device can be placed on a desktop when its four anti-slide bumpers (supplied) are attached to the underside of the device.

To attach the anti-slide rubber bumpers to the device:

1. Flip the device over so that its underside faces up.

2. Locate the four anti-slide grooves on the underside - one in each corner.

3. Peel off the adhesive, anti-slide rubber feet and stick one in each anti-slide groove.

Figure 3: Location for Applying Rubber Foot

- 1 = Mounted anti-slide rubber feet
- 2 = Anti-slide groove

4. Flip the device over again so that it rests on the rubber feet and place it in the required position on a desktop.

4.2   Wall Mounting

You can mount the device on a wall, using a special wall-mounting bracket. The bracket enables you to hang the device in a horizontal (rear panel facing up) or vertical (rear panel facing right) position. The bracket is a customer-ordered item and is shipped in a kit of five wall-mounting brackets. The areas of the wall-mounting bracket are shown below:

Figure 4: Wall-Mounting Bracket Parts
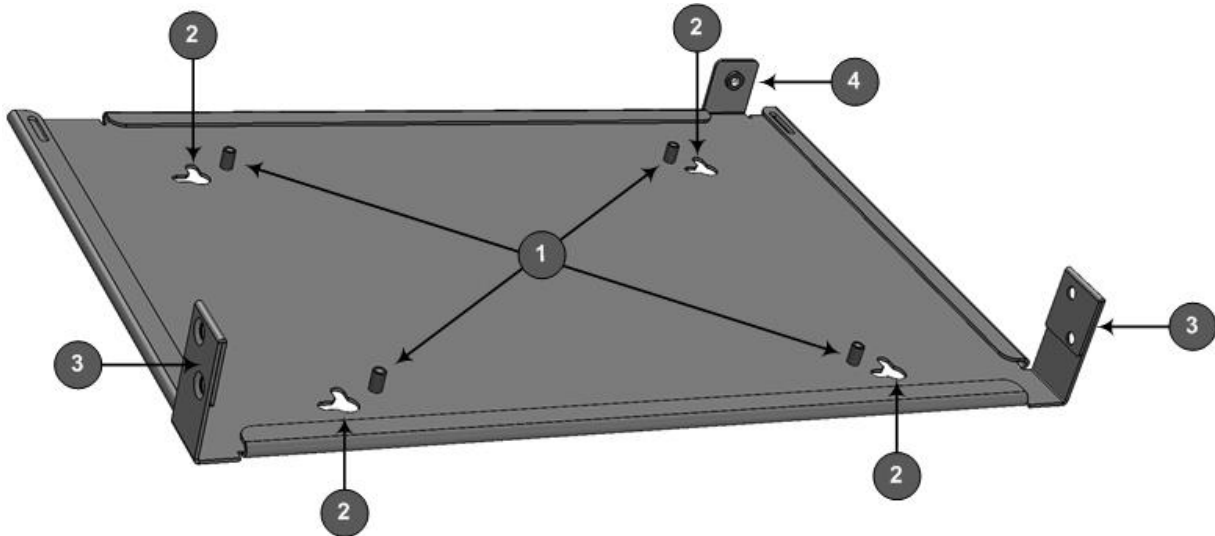
- 1 - Spacers to separate the device from the bracket.
- 2 - Keyholes for hanging the bracket on the wall.
- 3 - Screw-holes for attaching the bracket to the device's side panels
- 4 - Ground-screw hole for attaching the bracket to the device's grounding hole.

> ℹ️ When choosing the area on the wall to mount the device, make sure that sufficient space is available for attaching the cables on the front and rear panels.

To mount the device on a wall:

1. Mark the drilling locations of the four mounting holes on the wall. You can use the wall-mounting bracket as a template. Place the bracket flat against the wall in the desired hanging orientation - horizontal or vertical (see figures below). Make sure that the bracket is horizontal with the floor (you can use a level). With a pencil, stencil the keyholes on the wall.

The distances between the keyholes depend on the orientation in which you want to hang the device:
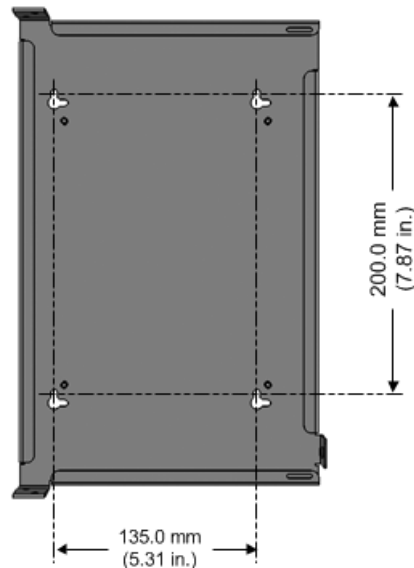
• **Horizontal position:** The horizontal distance between the keyholes is 200 mm (7.87 in.) and the vertical distance is 135 mm (5.31 in.):

**Figure 5: Keyhole Dimensions for Horizontal Wall-Mounting**
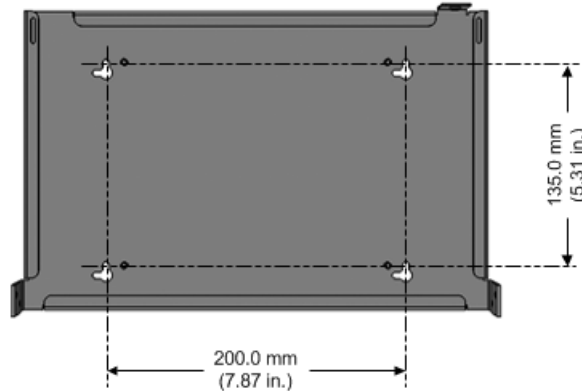
• **Vertical position:** The horizontal distance between the keyholes is 135 mm (5.31 in.) and the vertical distance is 200 mm (7.87 in.):

Figure 6: Keyhole Dimensions for Vertical Wall-Mounting

2. Drill holes in the wall where you marked the keyholes.

3. Insert wall anchors of appropriate size into each drilled hole.

4. Thread screws (not supplied) into each of the wall anchors. The recommended screw type is DIN 7982 3.5x25 Phillips flat head. Make sure that the heads of the screws extend sufficiently (about 4 mm or 0.157 in.) from the wall to allow you to hang the bracket's keyholes:

Figure 7: Protruded Screw Distance from Wall Surface

4 mm (0.157 in.)
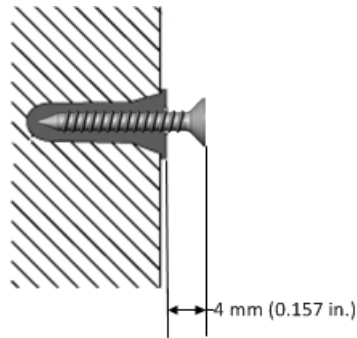
5. Using a Phillips-head screwdriver, remove the grounding-lug screw located on the rear panel (keep the screw in a safe place for later use):

Figure 8: Removing Ground Screw

6. Using a Phillips-head screwdriver, remove the two screws located on the left- and right-side panels (keep the screws in a safe place for later use):

Figure 9: Removing Side-Panel Screws

7. Place the bracket on a flat surface, and then with two hands, hold the device above the bracket so that its bottom panel faces the bracket and its rear panel is on the same side as the bracket's grounding-screw hole. Gently lower the device into the bracket until it snaps into place:
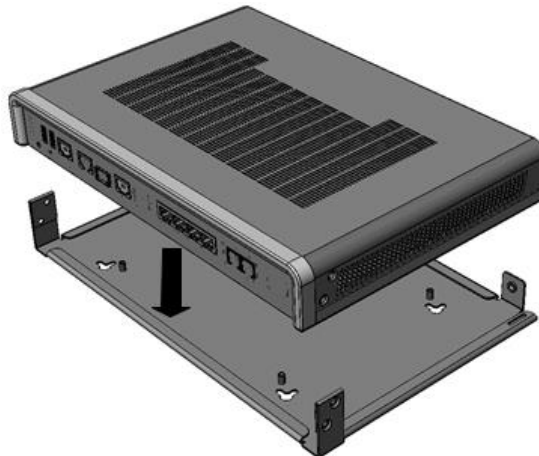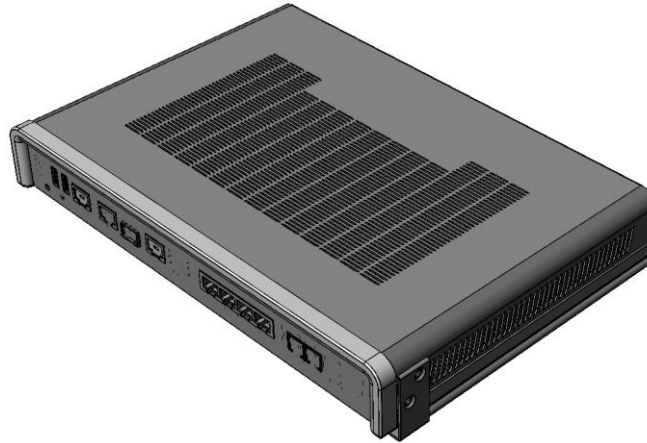
Figure 10: Lowering Device into Wall-Mounting Bracket

Figure 11: Device Inserted into Wall-Mounting Bracket

8. Using a Phillips-head screwdriver, attach the bracket to the rear panel, using the grounding-lug screw (which you removed in Step 65):

Figure 12: Attaching Bracket to Device using Grounding Screw

If you are grounding the device, attach the grounding lug at the same time:

Figure 13: Attaching Bracket to Device using Ground Screw with Grounding Lug

9. Using a Phillips-head screwdriver, attach the bracket to the left- and right-side panels, using two screws for each side (which you removed in Step 6):

Figure 4-14: Attaching Bracket to Device using Side-Panel Screws

10. With two hands, hold the device (attached to the bracket) so that the bracket's keyholes are facing the screw heads in the wall and that the device is orientated according to the desired hanging position (horizontal or vertical). Gently hang the device onto the screw heads, using the bracket's keyholes:

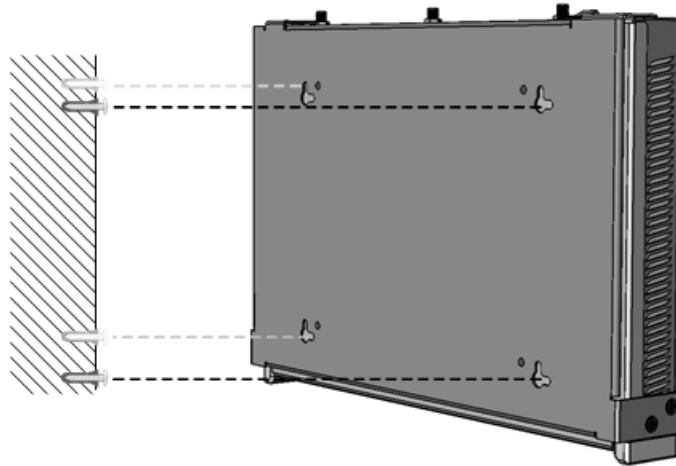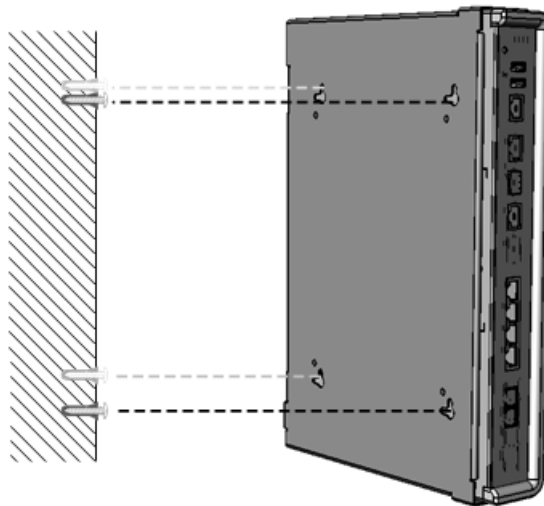**Figure 15: Hanging Device on Screw Heads for Horizontal Orientation**

Figure 16: Hanging Device on Screw Heads for Vertical Orientation

4.3   19-Inch Rack Mounting

The device can be installed in a standard 19-inch rack by implementing one of the following mounting methods:

■ Placing it on a pre-installed shelf in a 19-inch rack – see Section 4.3.1 on page 23

■ Attaching it directly to the rack's frame using the device's mounting brackets (supplied) that need to be attached to the chassis – see Section 4.3.2 on page 24

ⓘ   **Rack Mount Safety Instructions**

When installing the chassis in a rack, implement the following safety instructions:

■ **Elevated Operating Ambient Temperature:** If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, consideration should be given to installing the equipment in an environment with maximum ambient temperature (Tma) of 40°C (104°F).

■ **Reduced Air Flow:** Installation of the equipment in a rack should be such that the amount of air flow required for safe operation on the equipment is not compromised.

■ **Mechanical Loading:** Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

■ **Circuit Overloading:** Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

■ **Reliable Earthing:** Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g., use of power strips). For earthing the device, see Section 5.1 on page 26.

4.3.1   Using a Pre-Installed Rack Shelf

The procedure below describes how to place the device on a pre-installed shelf in a 19-inch rack.

To mount the device on a pre-installed shelf in the rack:

1. Before installing it in the rack, ensure that you have a pre-installed rack shelf on which the device can be placed.

2. Place the device on the pre-installed shelf in the rack.

4.3.2   Using Mounting Brackets

The procedure below describes how to mount the device in a 19-inch rack. Rack mounting involves placing the device on a pre-installed rack shelf and then attaching the device's mounting brackets to the device and rack frame. The purpose of the mounting brackets is to secure the device to the rack.
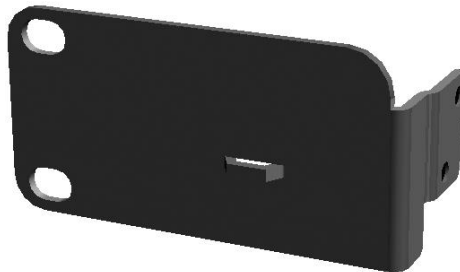
Two mounting brackets are provided:

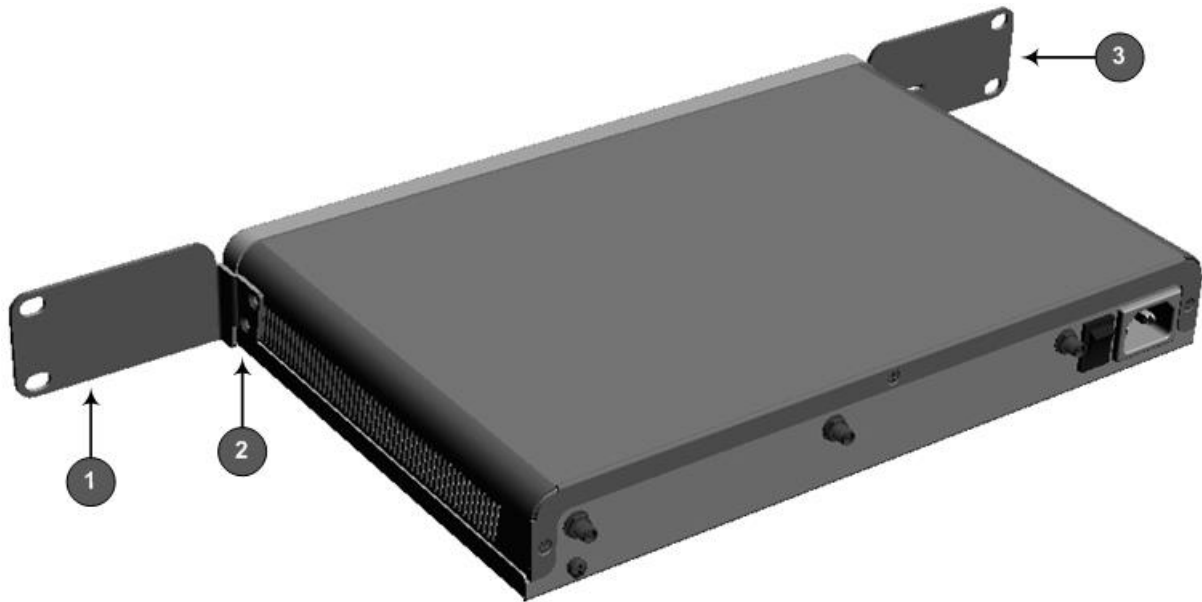■   Left mounting bracket:

Figure 17: Left Mounting Bracket
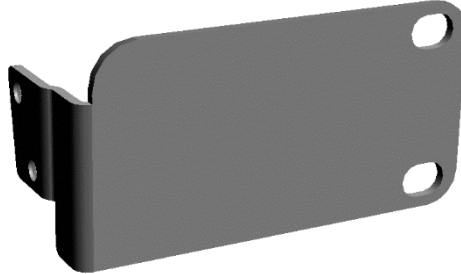
■   Right mounting bracket with hole for looping through an optional cable tie (not supplied) for securing cables:

Figure 18: Right Mounting Bracket

To mount the device in a 19-inch rack using mounting brackets:

1. Attach the two mounting brackets (supplied) to each side of the device's chassis, using the supplied screws, as shown in the figure below:

Figure 19: Attaching the Mounting Brackets

- • 1 = Left mounting bracket
- • 2 = Attached screws
- • 3 = Right mounting bracket

2. Place the device on a pre-installed shelf in the rack.

3. Attach the ends of the mounting brackets (that you installed in Step 1) to the vertical track of the rack's frame, using standard 19-inch rack bolts (not supplied).

5 Cabling the Device

This section describes the cabling of the device.

5.1 Grounding and Surge Protection

The device must be connected to earth (grounded) using an equipment-earthing conductor.

> **(i)** **Protective Earthing**
>
> - The equipment is classified as Class I EN 62368-1 and UL 62368-1 and must be earthed at all times.
> - **For Finland:** "Laite on liitettava suojamaadoituskoskettimilla varustettuun pistorasiaan."
> - **For Norway:** "Apparatet rna tilkoples jordet stikkontakt."
> - **For Sweden:** "Apparaten skall anslutas till jordat uttag."

> **(i)** **Grounding and Power Surge Protection**
>
> - The device must be installed only in telecommunication sites / centers in compliance with ETS 300-253 requirements "Earthing and Bonding of Telecommunication Equipment in Telecommunication Centers".
> - Prior to installation, earth loop impedance test must be performed by a certified electrician to ensure grounding suitability at the power outlet intended to feed the unit. It is essential that the impedance will be kept below 0.5 ohms!
> - Proper grounding is crucial to ensure the effectiveness of the lightning protection, connect the device permanently to ground (as described in the procedure below). The device's grounding screw must be connected to the equipotential grounding bus bar located in the Telecommunication rack or installation site, using a wire of 6 mm² surface wire. If the device is installed in a rack with other equipment, the rack must be connected to the equipotential grounding bus bar of the Telecommunication room, using a stranded cable with surface area of 25 mm². The length of this cable must be as short as possible (no longer than 3 meters).
> - The device does **not** include primary telecom protection**!** When the **FXO or DSL** telephone lines are routed **outside the building**, additional protection - usually a 350V three-electrode Gas Discharge Tube (GDT) as described in ITU-T K.44 - **must** be provided at the entry point of the telecom wires into the building (usually on the main distribution frame / MDF), in conjunction with proper grounding. The center pin of the GDT (MDF grounding bar) must be connected to the equipotential grounding bus bar of the Telecommunication room.
> - Failing to install primary surge protectors and failing to comply with the grounding instructions or any other installation instructions, may cause permanent damage to the device!
> - As most of the installation is the responsibility of the customer, AudioCodes can assume responsibility for damage only if the customer can establish that the device does not comply with the standards specified above (and the device is within the hardware warranty period).
> - The device complies with protection levels as required by EN 55024/EN 300386. Higher levels of surges may cause damage to the device.
> - To protect against electrical shock and fire, use a minimum of 26-AWG wire size to connect the FXO / DSL ports.

To earth the device:

1. Connect an electrically earthed strap of 16 AWG wire (minimum) to the chassis' earthing screw (located on the rear panel), using the supplied washer.

2. Connect the other end of the strap to a protective earthing. This should be in accordance with the regulations enforced in the country of installation.

Figure 20: Earthing the Device
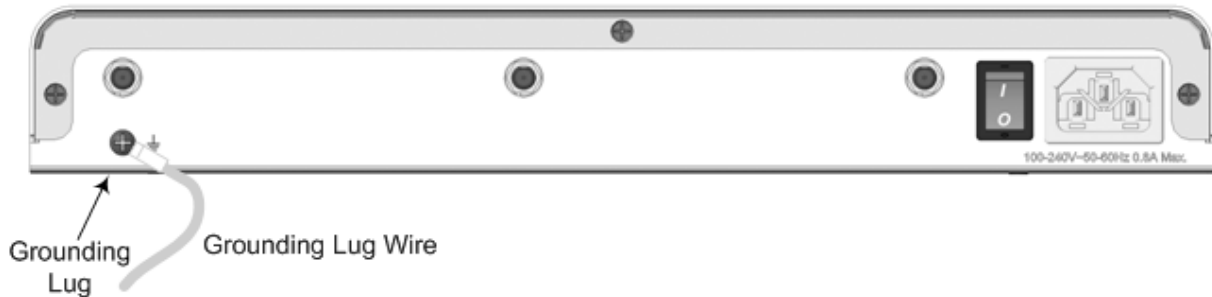
5.2 Connecting to WAN

This section provides a description on how to cable the WAN port. The cabling procedure depends on the ordered WAN interface:

■ Copper Gigabit Ethernet (GbE) – see Section 5.2.1 on page 28

■ Fiber-optic GbE – see Section 5.2.2 on page 29

■ ADSL/2+ and VDSL2 – see Section 5.2.3 on page 31

> ⓘ The device supports multiple WAN redundancies, where multiple WAN interfaces can serve as backups for the primary or a backup WAN interface. For example, if the main WAN interface is Copper GbE and it fails, the device switches over to the SHDSL WAN interface. For configuring WAN redundancy, refer to the *MSBR Series CLI Reference Guide*.

5.2.1   Copper Gigabit Ethernet Cabling

The procedure below describes how to connect the copper Gigabit Ethernet RJ-45 port to the WAN.

Cable specification:

- **Cable:** straight-through CAT-5 Ethernet cable
- **Connector:** RJ-45
- **Connector Pinouts:**

Table 15: RJ-45 Connector Pinouts for Copper GbE WAN

Pin	Signal Name
1	Ethernet signal pair
2	
3	Ethernet signal pair
6	
4	Ethernet signal pair
5	
7	Ethernet signal pair
8	
Shield	Chassis ground

To connect the WAN copper GbE port:

1. Connect one end of a straight-through RJ-45 Ethernet cable to the RJ-45 port labeled **S0 / WAN GE** (located on the front panel).

Figure 21: Cabling the WAN Copper GbE Port

2. Connect the other end of the cable to the WAN network (e.g., ADSL or Cable modem).

5.2.2   Fiber-Optic Gigabit Ethernet Cabling

The device supports up to two pairs of 1.25 Gbps optical small form-factor pluggable (SFP) transceiver modules. The SFP module can be used for fiber-optic or copper WAN interface.

> ### Caution Laser
>
> This device contains a Class 1 LED/Laser emitting device, as defined by 21CFR 1040 and IEC825. Do not stare directly into the beam or into fiber optic terminations as this can damage your eyesight.

> ### Care in Handling Fiber Optic Cabling:
>
> 1. Excessive bending of the Fiber Optic Cable can cause distortion and signal losses.
> 2. Ensure the minimum bending radius recommended by the Fiber Optic Cable supplier.
> 3. Incoming optic cabling from the network infrastructure can originate from the top of the rack or from another shelf within the rack. Preserve the minimum-bending ratio indicated by the cable manufacturer.
> 4. To ensure full high-availability capabilities, the configuration of the interface to the IP backbone must include certain redundant features from which two separate fiber optic cables are entering the device.

> - SFP modules and fiber-optic cables are not supplied. It is recommended that you purchase the SFP modules from AudioCodes. For a list of orderable SFP modules, see Appendix A on page 47, or contact your AudioCodes sales representative.
> - This AudioCodes device has been evaluated with the laser transceiver modules (SFP) listed in Appendix A on page 47. If other SFP modules are used, the person installing the device is solely responsible for the usage of correct SFP modules to comply with local, applicable laser safety requirements and certification. AudioCodes will not be held responsible for any damage to human body or equipment caused as a result from the usage of SFP modules that are not listed in Appendix A on page 47.
> - Fiber-optic interface is a customer ordered item.

Cable specifications:

- WAN fiber-optic interface: LC-type plug
- WAN copper interface: see Section 5.2.1 on page 28

To connect the fiber-optic WAN GbE port:

1. Remove the protective dust plug from the SFP transceiver module.

Figure 22: Removing Protective Dust Plug

2. Connect a cable with LC-type plugs to the SFP transceivers (labeled **GE SFP**).

Figure 23: Cabling the Fiber-Optic WAN GbE Port
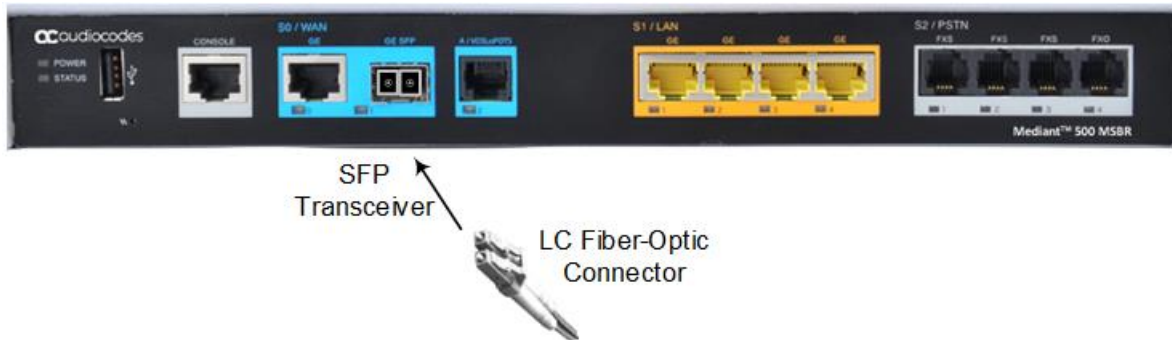
3. Connect the other end of the cable to the fiber network.

5.2.3   ADSL/2+ and VDSL2 WAN Cabling

The ADSL/2+ and VDSL2 (xDSL) WAN port provides a single xDSL interface through an RJ-11 port.

> ⚠️ **Warning:**
> - The device does **not** include primary telecom protection**!** When the **DSL** telephone lines are routed **outside the building**, additional protection - usually a 350V three-electrode Gas Discharge Tube (GDT) as described in ITU-T K.44 - **must** be provided at the entry point of the telecom wires into the building (usually on the main distribution frame / MDF), in conjunction with proper grounding. The center pin of the GDT (MDF grounding bar) must be connected to the equipotential grounding bus bar of the Telecommunication room.
> - To protect against electrical shock and fire, use a minimum 26-AWG wire to the connect DSL port to the network.

> ℹ️ A/VDSL interface is a customer ordered item.

The specifications of the xDSL interface include the following:

- ADSL/2+:
  - RFC 2684 in Routed (IPoA) and Bridged (ETHoA) modes, supporting LLC-SNAP and VC-Multiplexed encapsulations over AAL5
  - ATM UNI 4.1 compliant
  - UBR, CBR, VBR classes of service
  - RFC 2364 PPPoA
  - RFC 2516 PPPoE over ATM
  - Up to 8 PVCs
- VDSL2:
  - ITU G.991.2 Annex E for Ethernet, also known as EFM or 2Base-TL, as defined in IEEE 802.3ah
  - 802.1q VLANs over EFM
  - PPPoE

Cable specifications:

- **Cable:** 26-AWG min. wire
- **Connector:** RJ-11
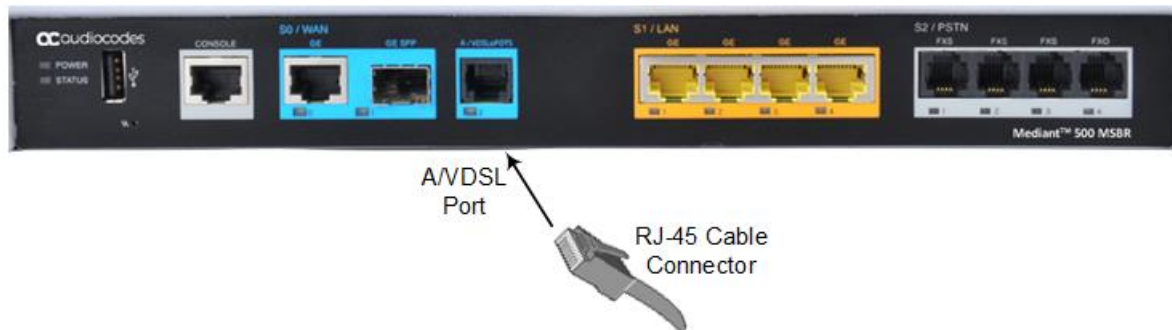- **Connector Pinouts:**

Table 16: RJ-11 Connector Pinouts for xDSL

Pin	Function
3	CH0 – P/TIP
4	CH0 – N/RING
1	Not connected
2	Not connected
5	Not connected
6	Not connected

To connect the WAN xDSL WAN port:

1. Connect an RJ-11 cable connector to the device's xDSL WAN port (labeled **V/ADSLoPOTS**).

Figure 24: Cabling the xDSL WAN Port

2. Connect the other end of the cable to the access point.

ⓘ   The xDSL filter/splitter should be provided by your service provider.

5.2.4   SHDSL WAN Cabling

The device provides support for SHDSL interfaces. The SHDSL interfaces are provided by two RJ-45 ports, where each physical port has four wire-pairs, supporting up to four SHDSL WAN ports.

> ⚠️ **Warning:**
> - The device does **not** include primary telecom protection**!** When the **DSL** telephone lines are routed **outside the building**, additional protection - usually a 350V three-electrode Gas Discharge Tube (GDT) as described in ITU-T K.44 - **must** be provided at the entry point of the telecom wires into the building (usually on the main distribution frame / MDF), in conjunction with proper grounding. The center pin of the GDT (MDF grounding bar) must be connected to the equipotential grounding bus bar of the Telecommunication room.
> - To protect against electrical shock and fire, use a minimum 26-AWG wire to the connect DSL port to the network.

> ℹ️ SHDSL interface is a customer ordered item.

SHDSL port specifications:

- Conforms to ITU G.991.2 Annexes A, B, E, F and G SHDSL
- Up to 5,696 Kbps over a single wire pair
- Up to 22,784 Kbps over four wire pairs bonding, according to SHDSL.bis (ITU G.991.2 Annexes F, G)
- EFM and ATM support
- Wetting current support on the CPE side, according to G991.2
- Supports both Central Office (CO) and CPE (wetting current on CO - excluded)
- TC-PAM 16/32 line code

Cable specifications:

- **Cable:** 26-AWG min. wire
- **Connector:** RJ-45
- **Connector Pinouts:**

Table 17: RJ-45 Connector Pinouts for SHDSL

Left RJ-45 Port		Right RJ-45 Port	
Pin	**Function**	**Pin**	**Function**
1	CH1-TIP	**1**	CH2-TIP
2	CH1-RING	**2**	CH2-RING
3	Not used	**3**	Not used
4	CH0-TIP	**4**	CH3-TIP
5	CH0-RING	**5**	CH3-RING
6	Not used	**6**	Not used
7	Not used	**7**	Not used
8	Not used	**8**	Not used

To connect the WAN SHDSL port:

1. Connect an RJ-45 SHDSL cable to the device's SHDSL WAN port (labeled **SHDSL**).

Figure 25: Cabling the SHDSL WAN Port
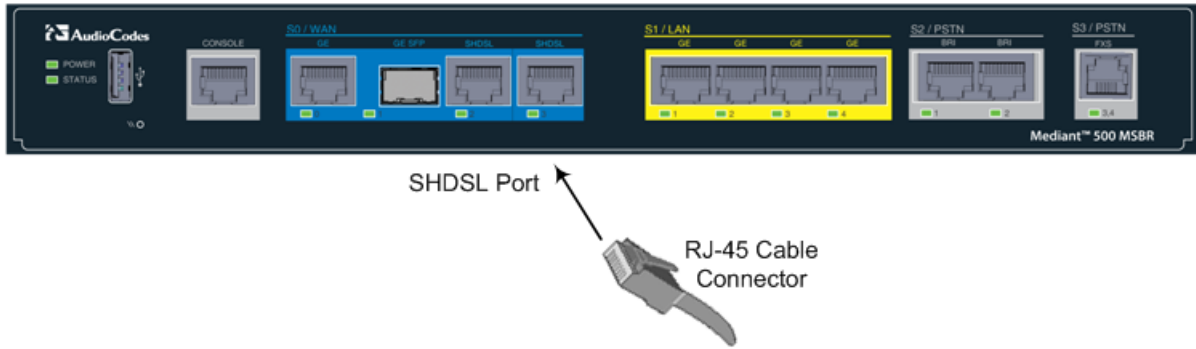
2. Connect the other end of the cable to the access point.

5.3   Connecting to LAN

The device provides up to four Gigabit Ethernet (10/100/1000Base-T) ports for connection to the LAN (e.g., computers, switches, and IP phones). These ports support half- and full-duplex modes, auto-negotiation, and straight or crossover cable detection.

Cable specification:

■   **Cable:** Straight-through Cat 5e or Cat 6 cable

■   **Connector:** RJ-45

■   **Connector Pinouts:**

Table 18: RJ-45 Connector Pinouts for GbE

Pin	Signal Name
1	Ethernet signal pair (10/100/1000Base-T)
2	
3	Ethernet signal pair (10/100/1000Base-T)
6	
4	Ethernet signal pair (1000Base-T)
5	
7	Ethernet signal pair (1000Base-T)
8	
Shield	Chassis ground

> **To connect the device to the LAN:**

1.   Connect one end of a straight-through RJ-45 Cat 5e or Cat 6 cable to the RJ-45 port labeled **S1 / LAN GE**.

Figure 26: Cabling the LAN Ports
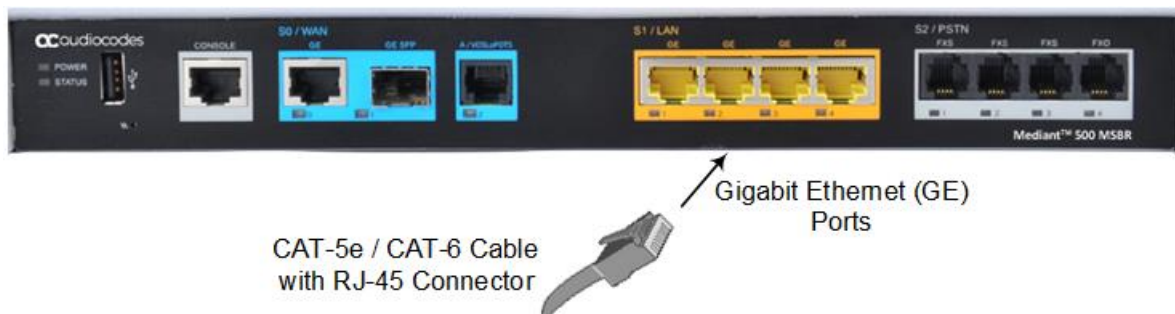
2.   Connect the other end of the cable to the Gigabit Ethernet network.

5.4   Connecting to ISDN PRI E1/T1 Trunks

The procedure below describes how to cable the device's E1/T1 trunk.

> ⚠️ **Warning:** To protect against electrical shock and fire, use a 26 AWG min. wire to connect E1 or T1 ports to the PSTN.
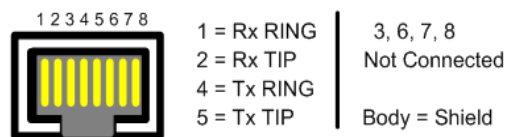
> ℹ️ ISDN PRI interface is a customer ordered item.

Cable specification:

■ **Cable:** 26 AWG min. wire cable

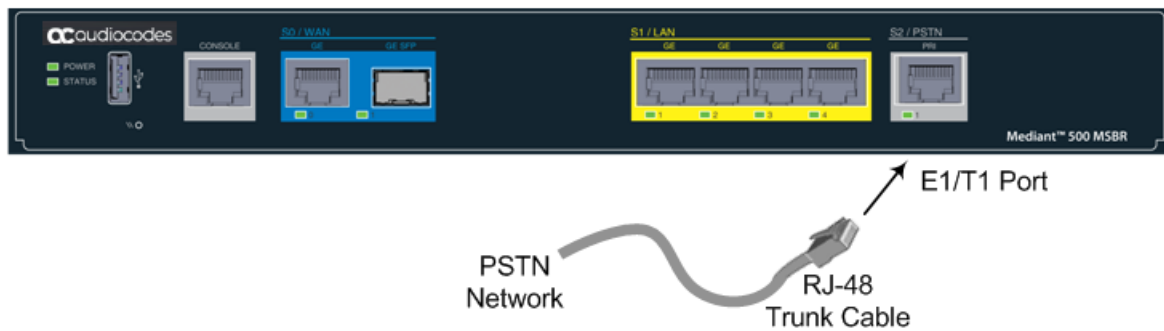■ **Connector:** RJ-48c

■ **Connector Pinouts:**

Figure 27: RJ-48c Connector Pinouts for E1/T1


```
1 2 3 4 5 6 7 8       1 = Rx RING      3, 6, 7, 8
                      2 = Rx TIP       Not Connected
                      4 = Tx RING
                      5 = Tx TIP       Body = Shield
```

To connect the E1/T1 trunk interface:

1. Connect the E1/T1 trunk cable to the device's E1/T1 port.

Figure 28: Cabling E1/T1 Ports

2. Connect the other end of the trunk cable to your PBX/PSTN switch.

5.5   ISDN BRI Interfaces

> ℹ️   BRI interface is a customer ordered item.

5.5.1   Connecting to BRI Lines

The device provides up to two BRI S/T ports, if ordered. These ports connect to ISDN terminal equipment such as ISDN telephones. Each BRI port can be configured either as termination equipment/user side (TE) or network termination/network side (NT). Up to eight terminal equipment (TE) devices can be connected per BRI S/T port, using an ISDN S-bus that provides eight ISDN ports. When configured as NT, the BRI port drives a nominal voltage of 38 V with limited current supply of up to 100 mA.

Cable specification:

■   **Cable:** 26 AWG min. wire cable

■   **Connector:** RJ-45

■   **Connector Pinouts:**

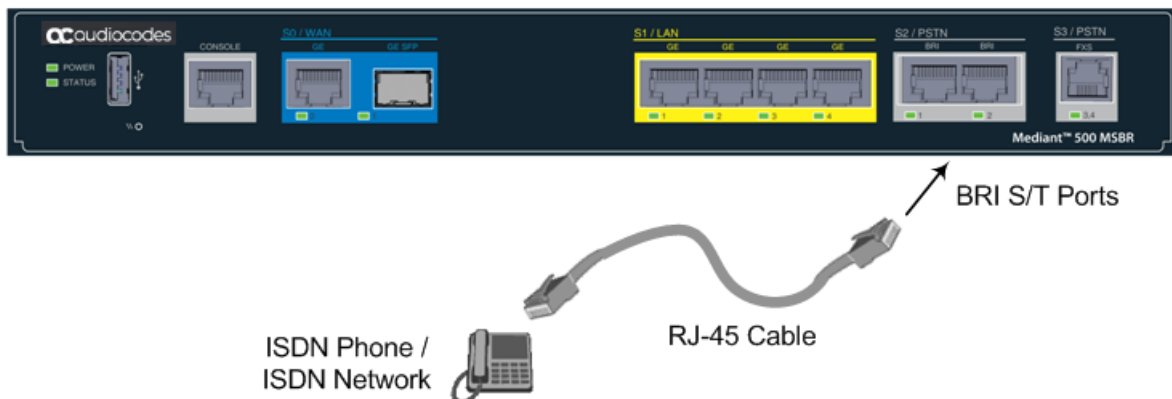**Figure 29: RJ-45 Connector Pinouts for BRI Ports**
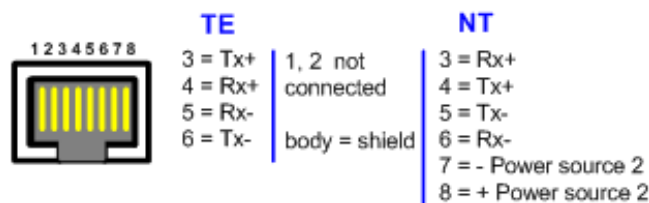
> ⚠️ **Warning:** To protect against electrical shock and fire, use a 26 AWG min wire to connect the BRI ports to the PSTN.

To connect the BRI ports:

1. Connect the BRI cable to the device's BRI RJ-45 port, labeled **S2 / PSTN BRI**.

Figure 30: Cabling BRI Ports

2. Connect the other end of the cable to your ISDN telephone or PBX/PSTN switch.

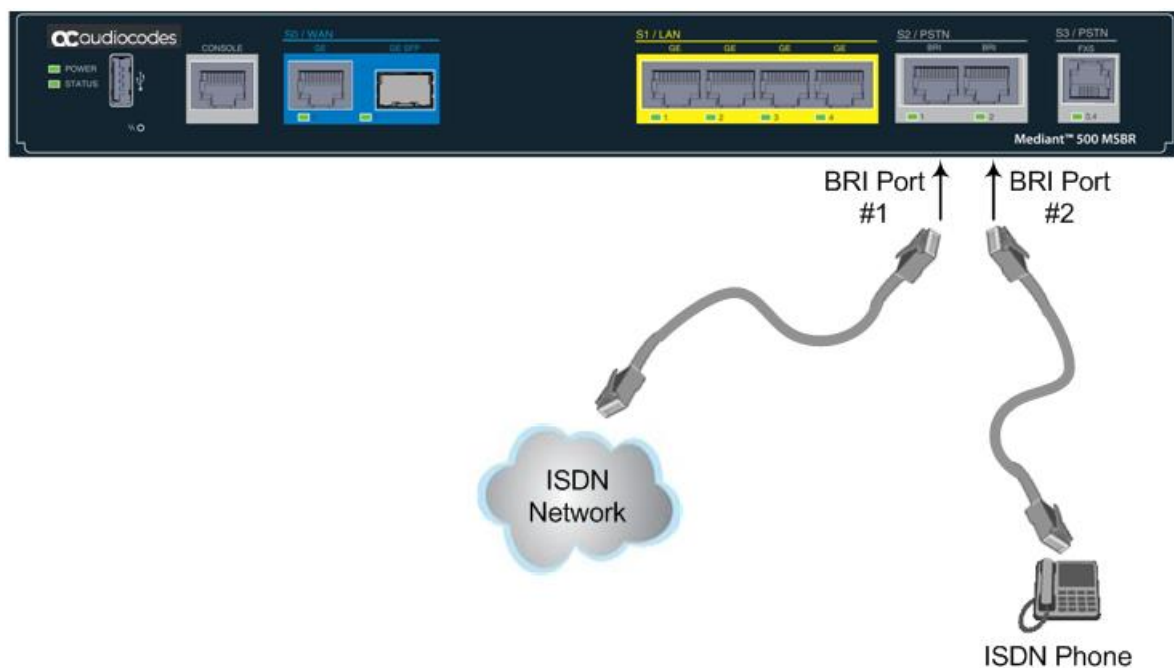## 5.5.2   Connecting the PSTN Fallback for BRI Lines

The device supports PSTN Fallback for BRI lines. If the device loses power, for example, due to a power outage or the unplugging of its power cable, it automatically routes calls from the Tel side to the PSTN (instead of the IP network).

In the event of a PSTN fallback, the BRI module's metallic relay switch automatically connects line Port 1 to Port 2. For example, if a PBX trunk is connected to Port 1 and the PSTN network is connected to Port 2, when PSTN Fallback is activated, calls from the PBX are routed directly to the PSTN through Port 2.

To connect the BRI line interfaces for 1+1 PSTN Fallback:

1.   Connect BRI line 1 (Port #**1**) to a PBX.
2.   Connect BRI line 2 (Port #**2**) to the ISDN network (PSTN).

Figure 31: Cabling (Ports 1 and 2) BRI PSTN Fallback

> ⓘ   This PSTN Fallback feature has no relation to the PSTN Fallback Software Upgrade Key.

5.6   Analog Interfaces

This section describes how to connect the device to analog equipment.

5.6.1   Connecting the FXS Interfaces

The procedure below describes how to cable the device's FXS interfaces.

> ⚠️ **Warning:**
> - The device is an **INDOOR** unit and thus, must be installed and located only indoors.
> - Ensure that the FXS ports are connected to the appropriate, external devices; otherwise, damage to the device may occur.
> - FXS ports are considered TNV-2.

> ℹ️
> - FXS interface is a customer ordered item.
> - The FXS/FXO interfaces support loop-start signaling (indoor only).
> - FXS is the interface replacing the Exchange (i.e., the CO or the PBX) and connects to analog telephones, dial-up modems, and fax machines. The FXS is designed to supply line voltage and ringing current to these telephone devices. An FXS VoIP device interfaces between the analog telephone devices and the Internet.

Cable specification:

- **Cable:** Straight-through RJ-11 standard telephone cable
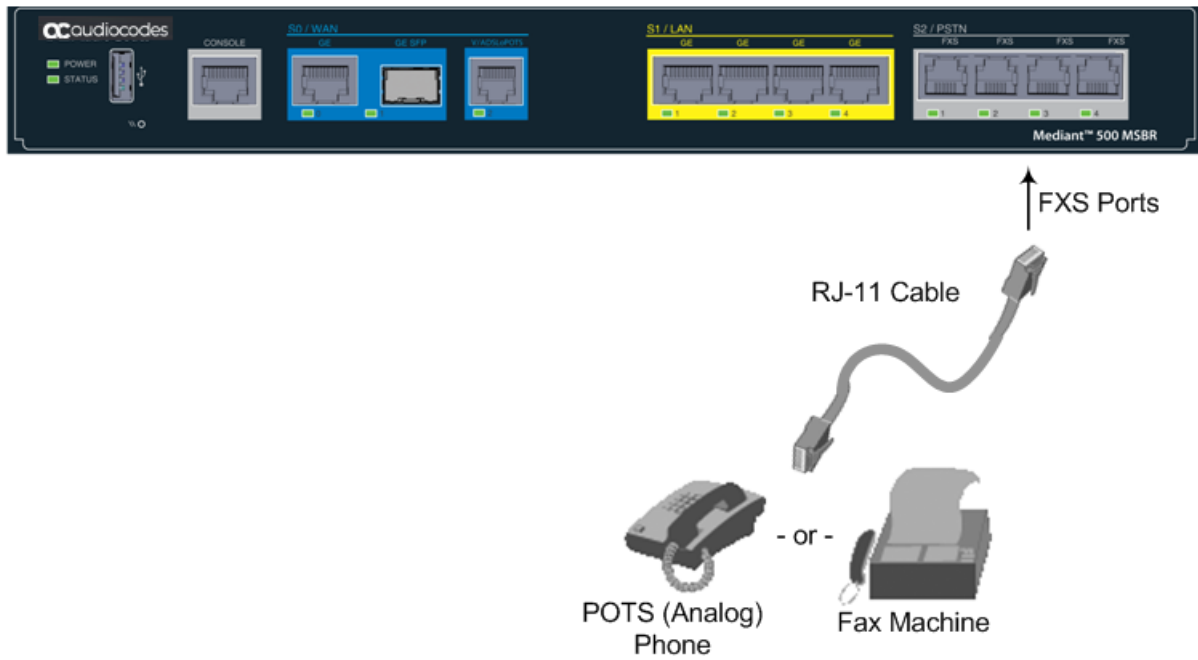
- **Connector:** RJ-11

- **Connector Pinouts:**

Figure 32: RJ-11 Connector Pinouts for FXS Interface
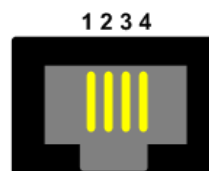
1 - Not connected
2 - Tip
3 - Ring
4 - Not connected

To connect the FXS interfaces:

1. Connect one end of an RJ-11 cable to an FXS port (labeled **FXS**).

Figure 33: Connecting FXS Interfaces

2. Connect the other end of the cable to the required telephone interface (e.g., fax machine, dial-up modem, or analog POTS telephone).

5.6.2   Connecting the FXO Interface

The procedure below describes how to cable the device's FXO interface.

> ⚠️ **Warning:**
> - The device does **not** include primary telecom protection**!** When the **FXO** telephone lines are routed **outside the building**, additional protection - usually a 350V three-electrode Gas Discharge Tube (GDT) as described in ITU-T K.44 - **must** be provided at the entry point of the telecom wires into the building (usually on the main distribution frame / MDF), in conjunction with proper grounding. The center pin of the GDT (MDF grounding bar) must be connected to the equipotential grounding bus bar of the Telecommunication room.
> - To protect against electrical shock and fire, use a minimum 26-AWG wire to the connect FXO port to the PSTN.
> - Ensure that the FXO port is connected to the appropriate, external device; otherwise, damage to the device may occur.
> - The FXO port is considered TNV-3.

> ℹ️
> - FXO interface is a customer-ordered item.
> - FXO is the interface replacing the analog telephone and connects to a Public Switched Telephone Network (PSTN) line from the Central Office (CO) or to a Private Branch Exchange (PBX). The FXO is designed to receive line voltage and ringing current, supplied from the CO or the PBX (similar to an analog telephone). An FXO VoIP device interfaces between the CO/PBX line and the Internet.

Cable specification:

- **Cable:** 26-AWG min. wire cable
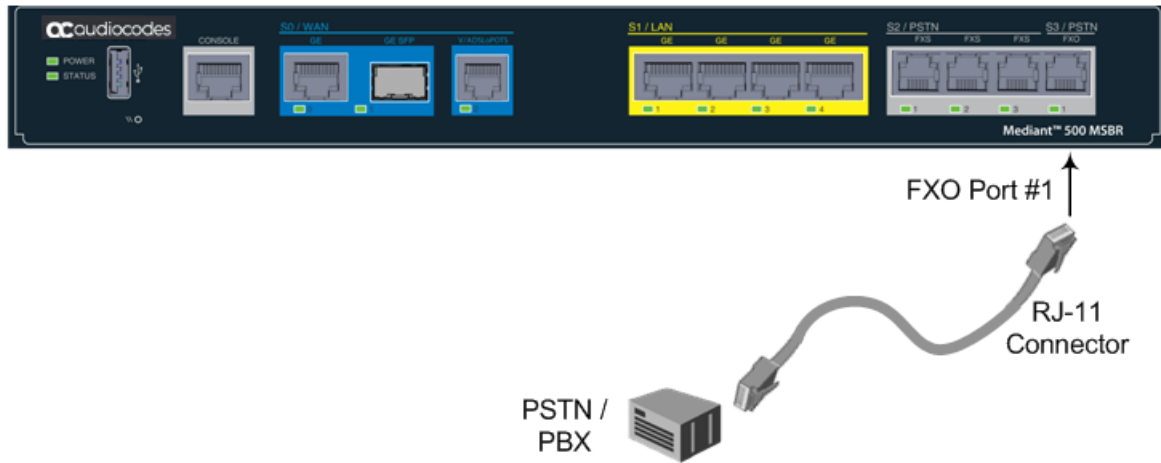- **Connector:** RJ-11
- **Connector Pinouts:**

Figure 34: RJ-11 Connector Pinouts for FXO Interface
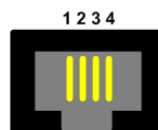

```
1 2 3 4          1 -  Not connected
                 2 -  Tip
                 3 -  Ring
                 4 -  Not connected
```

To connect the FXO interface:

1. Connect one end of an RJ-11 cable to the FXO port (labeled **FXO**).

Figure 35: Connecting FXO Interface

2. Connect the other end of the cable to the required telephone interface: (e.g., telephone exchange analog lines or PBX extensions).
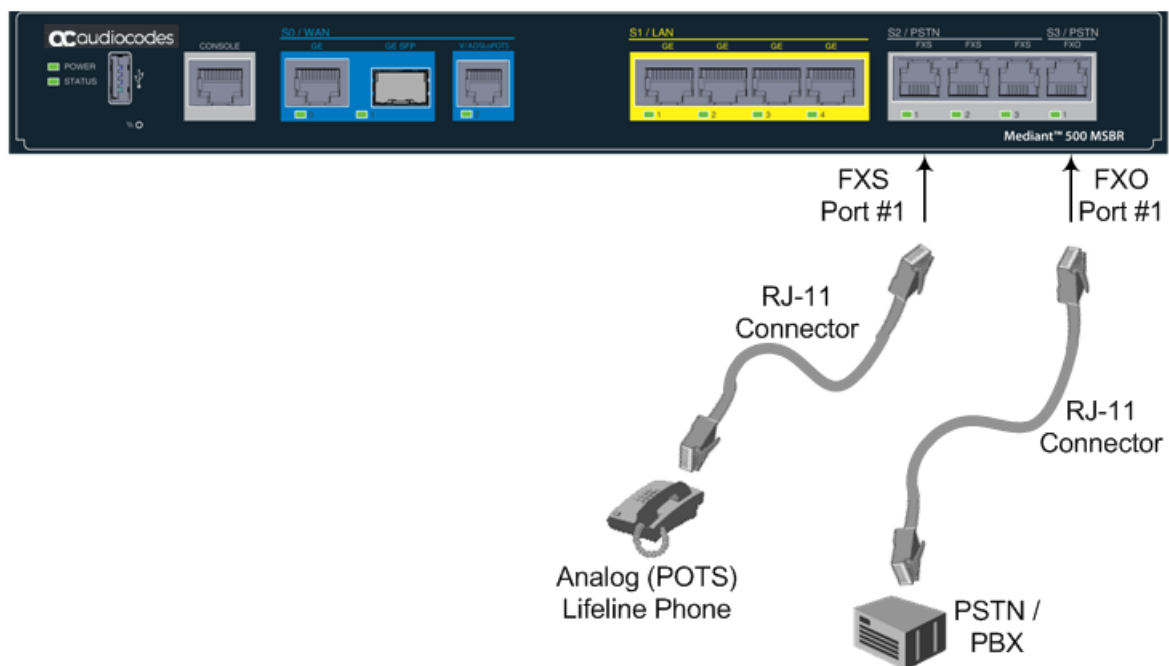
5.6.3   Connecting the FXS Analog Lifeline

The device supports Analog Lifeline. If the device loses power, for example, due to a power outage or the unplugging of its power cable, it automatically routes calls from a POTS telephone ("lifeline" phone), connected to an FXS port, to the PSTN (instead of the IP network).

The FXS Analog Lifeline is available on the single FXO port with three FXS ports hardware configuration. The analog Lifeline phone (POTS phone) connects to FXS Port #1; the PSTN/PBX connects to the FXO port. Once the Lifeline is activated, the FXS line automatically connects to the FXO line.

To cable the FXS Lifeline:

1.   Connect the analog Lifeline telephone to FXS Port #1.
2.   Connect an analog PSTN line to the FXO port, labeled **FXO**.

Figure 36: Cabling FXS Lifeline

> ⓘ   Analog Lifeline cabling is applicable only if the device is ordered with the combined hardware configuration of FXS and FXO interfaces.

5.7   Connecting the Serial Interface to a PC

The device provides an RS-232 serial interface port on its front panel. The serial cable adapter (not supplied) used for connecting the RS-232 interface is shown below:
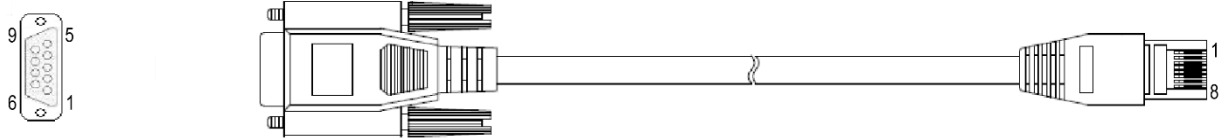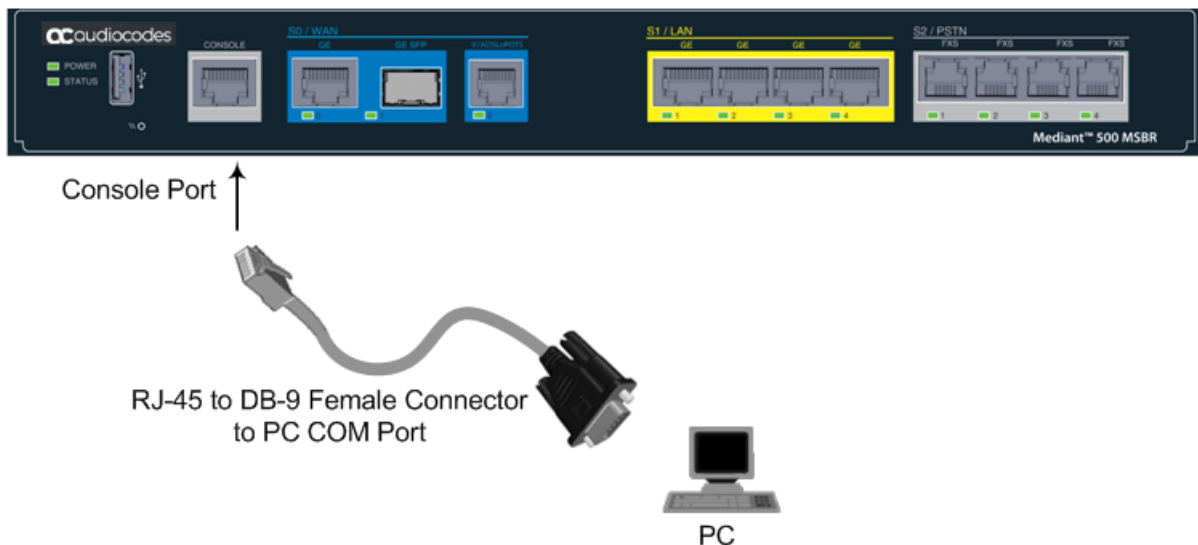
Figure 37: RS-232 Cable Adapter

Table 19: DB-9 to RJ-45 Serial Cable Connector Pinouts

DB-9 Female	RJ-45
8	1
6	2
2	3
5	4
5	5
3	6
4	7
7	8

To connect the device's serial interface port to a PC:

1.   Connect the end of the cable providing the RJ-45 connector to the device's serial port located on the front panel, labeled **CONSOLE**.

Figure 38: Cabling Serial Port

2.   Connect the other end of the cable providing the 9-pin DB connector to the COM RS-232 communication port on your computer.

5.8   Connecting a USB Storage Device

The device supports USB storage capabilities (formatted to FAT/FAT32), using an external USB hard drive or flash disk (disk on key) connected to the device's USB port. The storage capabilities are configured through CLI and include the following:

■ Saving network captures to the USB.

■ Upgrading the device's firmware from the USB.

■ Updating the device's configuration from the USB.

■ Saving the current configuration to the USB.

To connect the USB storage device:

■ Connect the USB storage device to the USB port located on the front panel.

Figure 39: Connecting USB Storage Device

5.9   Connecting to a Power Supply

The device receives power from a standard alternating current (AC) electrical outlet. The connection is made using the supplied AC power cord.

> ⚠️ **Warning:**
> - The device must be connected to a socket-outlet providing a protective earthing connection.
> - Use only the AC power cord that is supplied with the device.

> ℹ️ **ご注意**
> 本製品に添付の電源ケーブルは、Mediant 500 MSBR に専用設計されているため、汎用性がありません. 本電源ケーブルを他の機器に使用されないよう、ご注意ください.

To connect the device to the power supply:

1.   Connect the line socket of the AC power cord (supplied) to the device's AC power socket (labeled **100-240V~50-60 Hz 0.8A**), located on the rear panel.

Figure 40: Connecting to the Power Supply

2.   Connect the plug at the other end of the AC power cord to a standard electrical outlet.

3.   Press the power switch to on (**I**) position so that the device receives power; the **POWER** LED on the front panel is lit green (for more information, see Section 3.2.2.8 on page 15).

A   Approved Laser SFPs

The table below lists the recommended SFPs, which can be ordered from AudioCodes. For installing the SFPs and for fiber-optic WAN cabling, see Section .

Table 20: Approved SFP Modules

Object / Part No.	Manufacturer / Trademark	Optional Types / Models	Technical Data	Standard (Edition / Year)	Mark(s) of Conformity
Laser SFP Insert	Source Photonics	▪ SPL-35-03-EBX-CDFM ▪ SPL-53-03-EBX-CDFM ▪ SPL-35-03-EBX-CDFM ▪ SPL-34-GB-BX-CDFM ▪ SPL-43-GB-BX-CDFN ▪ SP-GB-LX-CDFN ▪ SP-GB-SX-CDFB	Class 1 ▪ 1310 nm ▪ 1550 nm ▪ 1850 nm ▪ 1490 nm	▪ EN60950-1:2006+A11 ▪ EN60825-1:2007, EN60825-2:2004+A1 ▪ UL60950-1	▪ UR ▪ TUV
Alternate Laser SFP Insert	Neo Photonics	▪ PT7320-51-1W+ ▪ PTB3350-3331W-LC/PC+ ▪ PTB3530-3331W-LC/PC+ ▪ PTB3370-553CW-LC/PC+ ▪ PTB3830-553CW-LC/PC+ ▪ PT7320-51-1W+	Class 1 ▪ 1310 nm ▪ 1550 nm ▪ 1850 nm ▪ 1490 nm	▪ EN60950-1:2006+A11 ▪ EN60825-1:2007 ▪ EN60825-2:2004+A1 ▪ UL60950-1	▪ UR ▪ TUV

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