HP MSR900 Routers

Installation Guide

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Contents

Product overview

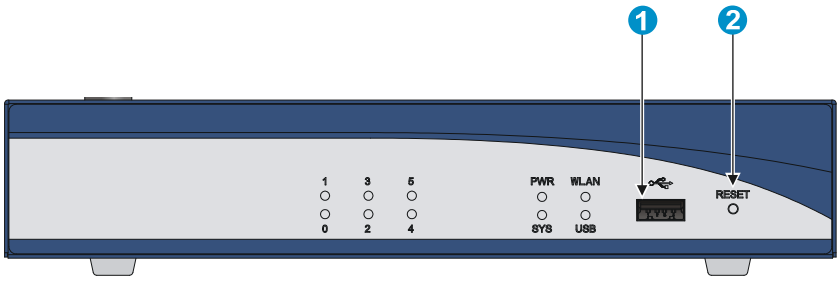
This chapter shows the chassis panels of the HP MSR900 Routers listed in Table 1. The chassis panel views shown may differ slightly from the actual panels.

Table 1 The HP MSR900 Routers includes the following models:

J#	Type
JF812A	MSR900
JF814A	MSR900-W
JG207A	MSR900-W(NA)
JF813A	MSR920
JF815A	MSR920-W
JG208A	MSR920-W(NA)

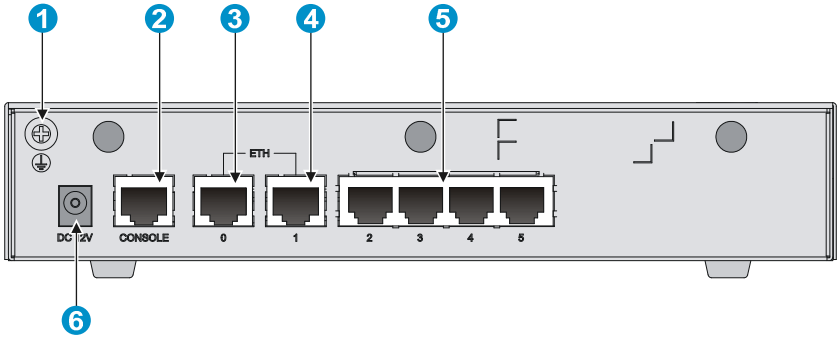
MSR900 panel views

Figure 1 MSR900 front panel



(1) USB port	(2) Reset button

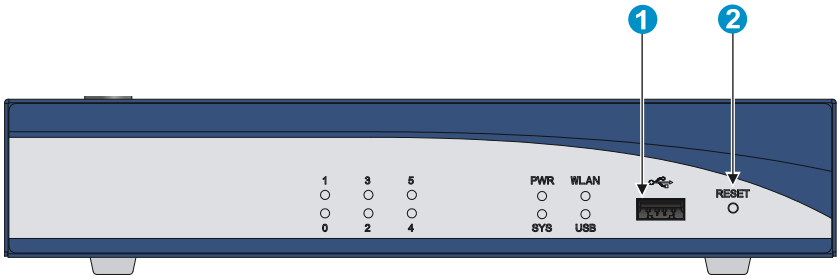
Figure 2 MSR900 rear panel



(1) Grounding screw	(2) Console port	(3) Ethernet WAN port ETH0
(4) Ethernet WAN port ETH1	(5) Ethernet LAN ports (ETH2 to ETH5)	(6) Power adapter port

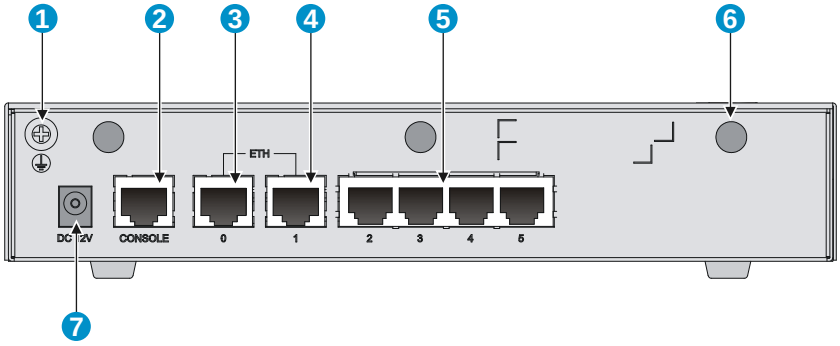
MSR900-W panel views

Figure 3 MSR900-W front panel



(1) USB port	(2) Reset button

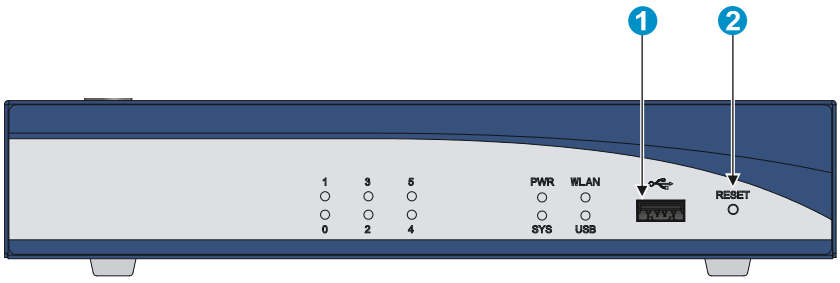
Figure 4 MSR900-W rear panel



(1) Grounding screw	(2) Console port	(3) Ethernet WAN port ETH0
(4) Ethernet WAN port ETH1	(5) Ethernet LAN ports (ETH2 to ETH5)	(6) Antenna port
(7) Power adapter port		

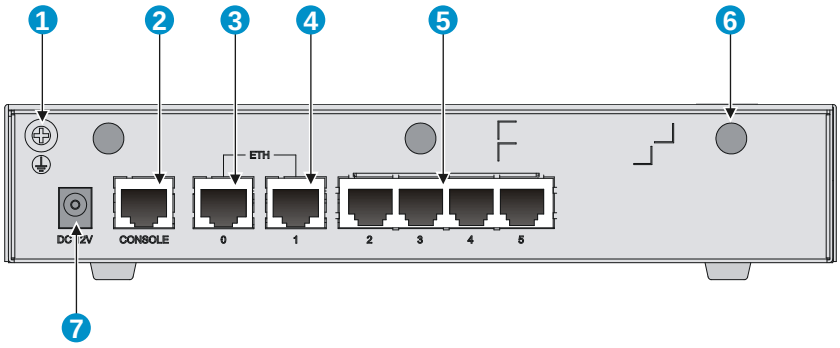
MSR900-W(NA) panel views

Figure 5 MSR900-W(NA) front panel



(1) USB port	(2) Reset button

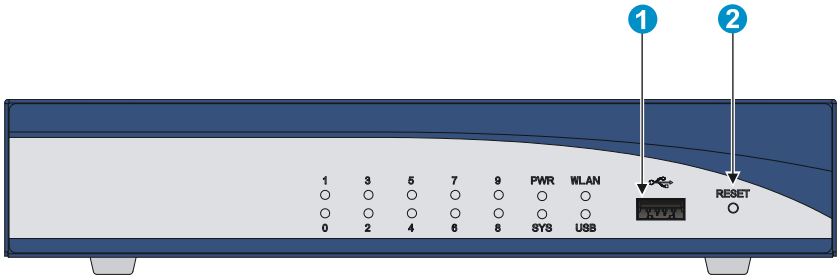
Figure 6 MSR900-W(NA) rear panel



(1) Grounding screw	(2) Console port	(3) Ethernet WAN port ETH0
(4) Ethernet WAN port ETH1	(5) Ethernet LAN ports (ETH2 to ETH5)	(6) Antenna port
(7) Power adapter port		

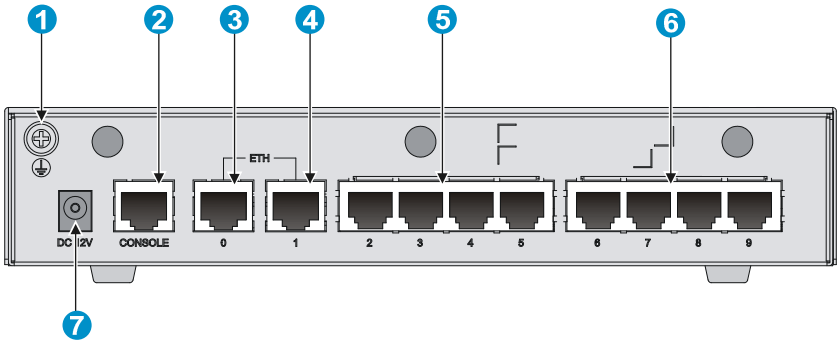
MSR920 panel views

Figure 7 MSR920 front panel



(1) USB port	(2) Reset button

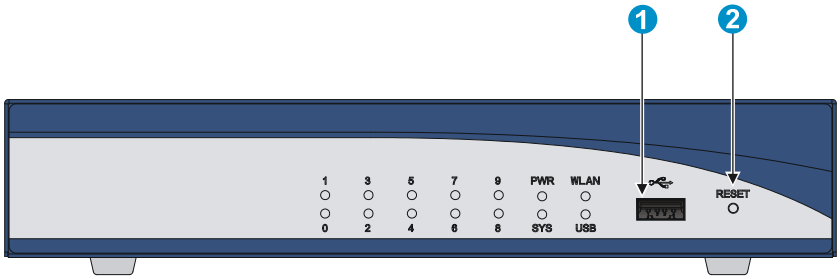
Figure 8 MSR920 rear panel



(1) Grounding screw	(2) Console port	(3) Ethernet WAN port ETH0
(4) Ethernet WAN port ETH1	(5) Ethernet LAN ports (ETH2 to ETH5)	(6) Ethernet LAN ports (ETH6 to ETH9)
(7) Power adapter port		

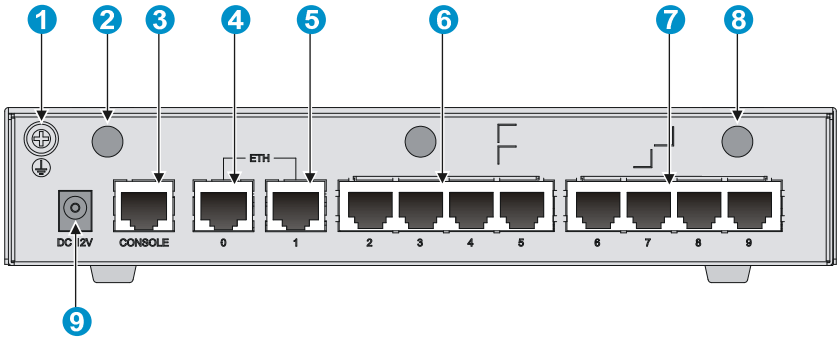
MSR920-W panel views

Figure 9 MSR920-W front panel



(1) USB port	(2) Reset button

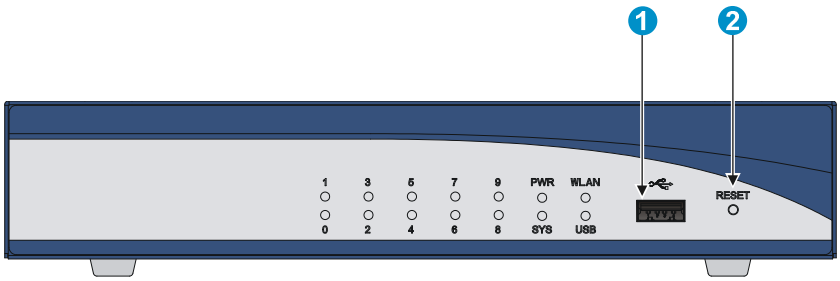
Figure 10 MSR920-W rear panel



(1) Grounding screw	(2) Antenna port	(3) Console port
(4) Ethernet WAN port ETH0	(5) Ethernet WAN port ETH1	(6) Ethernet LAN ports (ETH2 to ETH5)
(7) Ethernet LAN ports (ETH6 to ETH9)	(8) Antenna port	(9) Power adapter port

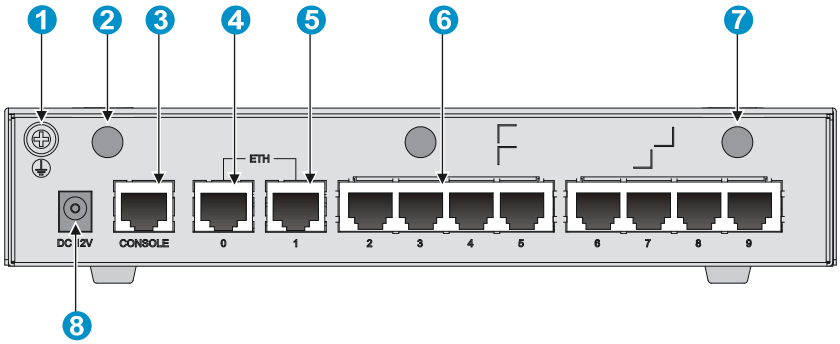
MSR920-W(NA) panel views

Figure 11 MSR920-W(NA) front panel



(1) USB port	(2) Reset button

Figure 12 MSR920-W(NA) rear panel



(1) Grounding screw	(2) Antenna port	(3) Console port
(4) Ethernet WAN port ETH0	(5) Ethernet WAN port ETH1	(6) Ethernet LAN ports (ETH2 to ETH5)
(7) Ethernet LAN ports (ETH6 to ETH9)	(8) Antenna port	(9) Power adapter port

Preparing for installation

Safety recommendations

⚠ WARNING!

Before installation and operation, read all of the safety instructions in the *Compliance and Safety Guide* supplied with your router.

General safety recommendations follow:

- Turn off all power and remove all power cables before opening the chassis.
- Unplug all power and external cables before moving the chassis.
- Before installation, locate the emergency power switch so that you can shut off power immediately if necessary.
- Always wear an ESD-preventive wrist strap when installing the device.
- Do not stare into an open optical interface. The light can cause permanent eye damage.
- Use a good grounding system. This is essential for reliable operation.
- Confirm that the resistance between the chassis and the ground is less than 1 ohm.

European Union Commission Regulation 1275/2008

The power data for affected products—including the power consumption of the product in networked standby if all wired network ports are connected and all wireless network ports are activated—is provided in section P14, "Additional information," of the product IT ECO Declaration available at http://www.hp.com/hpinfo/globalcitizenship/environment/productdata/iteconetworking.html.

Site requirements

The router can only be used indoors.

This section provides information about temperature, humidity, cleanness, and air quality requirements, as well as rack-mounting requirements and protection against damage from lightning and EMI.

Table 2 Temperature and humidity requirements

Temperature	Relative humidity
0°C to 45°C (32°F to 113°F)	5% to 90%

Table 3 Dust concentration limit in the equipment room

Substance	Concentration limit (particles/m^3)
Dust particles	≤ 3 x 10^4 (No visible dust on desk in three days)
NOTE: Dust particle diameter ≥ 5 μm	

Table 4 Harmful gas concentration limits

Gas	Max. (mg/m^3)
SO_2	0.2
H_2S	0.006
NH_3	0.05
Cl_2	0.01

To prevent overheating:

- Provide adequate clearance for air flow, including at least 10 cm [3.94 in] ventilation space around the router's air intake and outlet vents.
- Make sure the site has an adequate cooling system.

EMI

EMI from any source adversely affects the router.

To prevent EMI:

- Use electromagnetic shielding when necessary.
- Take measures against interference from the power grid.
- Position the router as far as possible from any power source's grounding equipment or lightning-prevention equipment.
- Position the router as far as possible from radio transmitters, radar, and all high-voltage or high-frequency equipment.

Lightning protection

To protect the router from lightning:

- Make sure the grounding cable of the chassis is grounded properly.
- Make sure the grounding terminal of the AC power receptacle is grounded properly.
- Install a lightning arrester at the input end of the power supply.
- Install a lightning arrester at the input end of outdoor signal lines (for example, E1/T1 line) to which the router's interface modules are connected.

Installation tools

Accessories provided with the router

- Power cord
- Console cable
- Grounding cable

User-supplied tools and equipment

- Phillips screwdriver P1 – 100 mm, P2 – 150 mm and P3 – 250 mm
- Plain screwdriver P4 – 75 mm
- Screws with various specifications
- Meters and equipment such as HUB, terminal, and multimeter
- ESD-preventive gloves or wrist strap, ESD-preventive mat, anti-static bags
- Electric drill (for wall-mounting the router)
- Hammer

Pre-installation checklist

Table 5 Pre-installation checklist

Item		Requirements	Yes	No
Installation site	Ventilation	• There is a minimum clearance of 10 cm (3.9 in) around the router chassis intake and exhaust vents for heat dissipation. • The installation site ventilation system is adequate.		
	Temperature	0°C to 45°C (32°F to 113°F)		
	Relative humidity	5% to 90% (noncondensing)		
	Cleanness	Dust concentration ≤ 3×10^4 particles/m^3		
	ESD prevention	• The equipment and floor are properly grounded. • The equipment room is dust-controlled. • Humidity and temperature are maintained at proper levels. • Wear an ESD-preventive wrist strap when inspecting or handling a circuit board. • Place any removed memory module, CF card, or interface module face-up on an antistatic workbench or in an antistatic bag. • Touch only the edges, not any electronic components, when inspecting or handling a memory module, CF card, or interface module.		
	EMI prevention	• Take measures to protect the power system from the power grid system. • Keep the protection ground of the router as far away from the grounding device or lightning protection grounding device as possible.		

Item		Requirements	Yes	No
		• Keep the router far away from radio transmitters, radar, and high-frequency or high-voltage devices. • Use electromagnetic shielding when necessary.		
	Lightning protection	• The grounding cable of the chassis is grounded properly. • The grounding terminal of the AC power receptacle is grounded properly. • A port lightning arrester is installed. (Optional) • A power lightning arrester is installed. (Optional) • A signal lightning arrester is installed at the input end of an external signal cable. (Optional)		
	Electricity safety	• Install a UPS. • In case of emergency during operation, switch off the external power switch.		
	Workbench	• The workbench is stable. • The workbench is grounded properly.		
Safety precautions		• The router is far away from any sources of heat or moisture. • The emergency power switch in the equipment room is identified and accessible.		
Tools		• Installation accessories supplied with the router are ready. • User-supplied tools are ready.		
Reference		• Documents shipped with the router are available. • Online documents are available.		

Installing the router

⚠ WARNING!

To avoid injury, do not touch bare wires, terminals, or parts with high-voltage hazard signs.

This chapter provides instructions for installing the router on a workbench or mounting it in a 19-inch rack.

Installation prerequisites

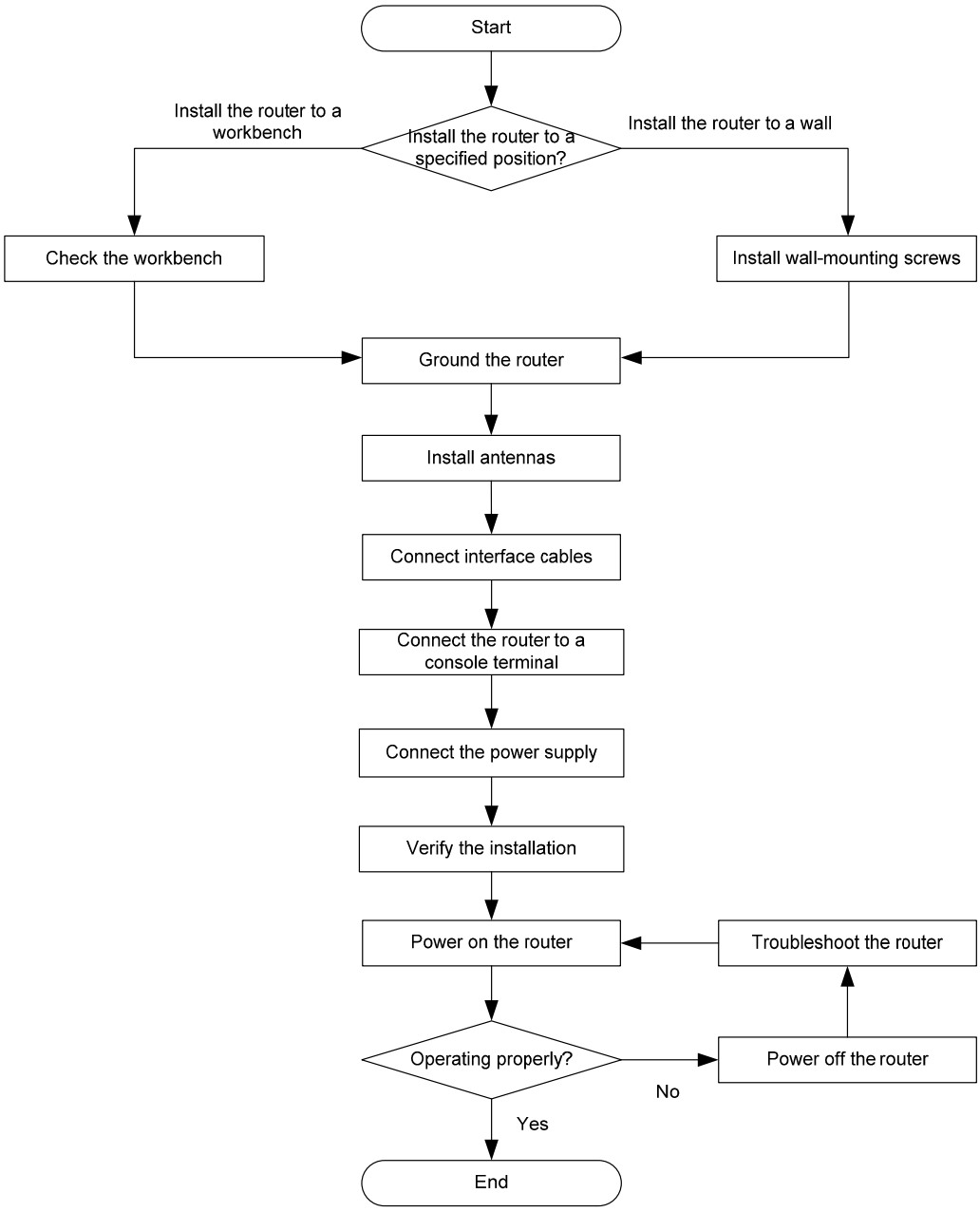
- You have read "Preparing for installation" carefully.
- All requirements in "Preparing for installation" are met.

Installation flowchart

To install the router, select one of the following installation methods, and follow the installation flowchart shown in Figure 13.

- Install the router on a workbench
- Install the router to a wall

Figure 13 MSR900 router installation flowchart



Installing the router

When installing the router:

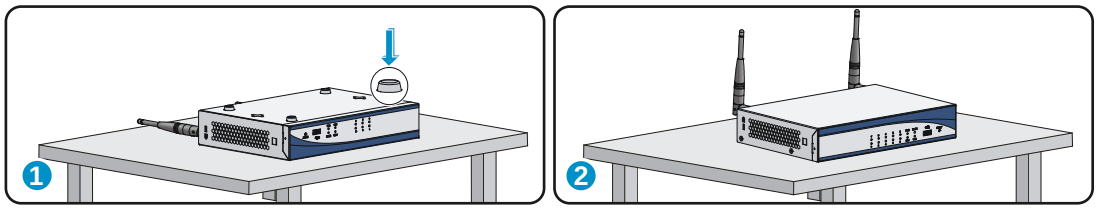
- Reserve a space of 10 cm (3.9 in) around the router for heat dissipation.
- Do not place heavy objects on the router.

Installing the router on a workbench

To install the router on a workbench, as shown in Figure 14:

1. Make sure the workbench is clean, stable, and properly grounded.
2. Place the router upside down on the workbench and attach the rubber feet to the four round holes in the chassis bottom.

Figure 14 Installing the router on a workbench



Installing the router on a wall

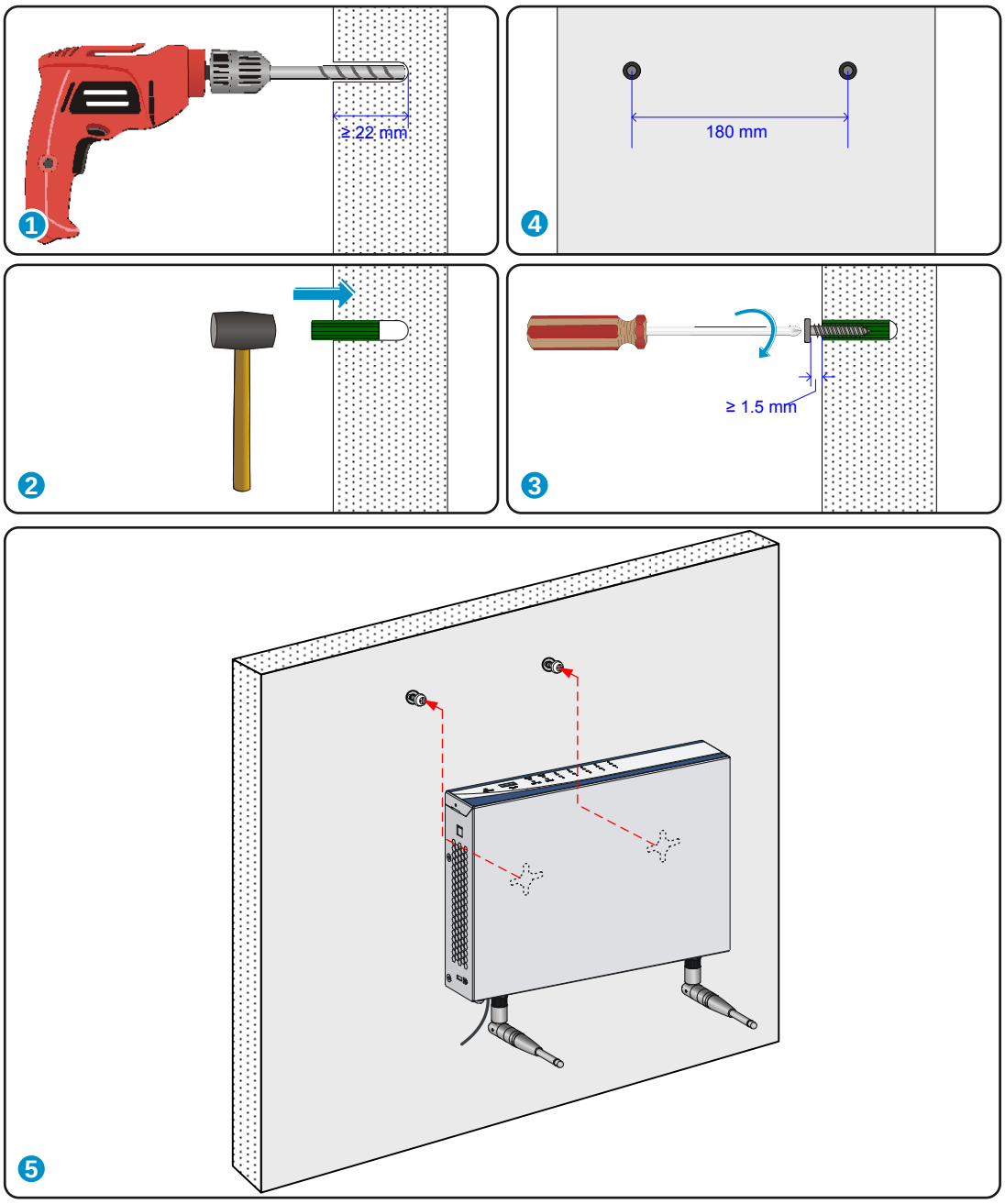
CAUTION:

When mounting the router on a wall, position the router so the network interfaces face down (toward the floor), and the sides with ventilation openings are perpendicular to the ground, as shown in Figure 15.

To mount the router on a wall, as shown in 4:

1. Mark the locations of the two mounting holes on the wall, 180 mm (7.09 in) apart. The holes must be level (on the same horizontal line.)
2. Drill two holes in the wall.
3. Following the marks, drill the two holes at least 22 mm (0.87 in) deep. Verify that the holes are level.
4. Insert an anchor into each hole so it is flush with the wall surface.
5. Drive a screw into each anchor, keeping the screw heads protruding at least 1.5 mm (0.06 in) from the wall.
6. Hang the router on the screws.

Figure 15 Wall-mounting the router



Grounding the router

WARNING!

Connecting the router grounding cable correctly is crucial for protecting the router from lightning and EMI.

The grounding resistance should be less than 5 ohms.

You can ground the router in one of the following ways, depending on the grounding conditions at the installation site:

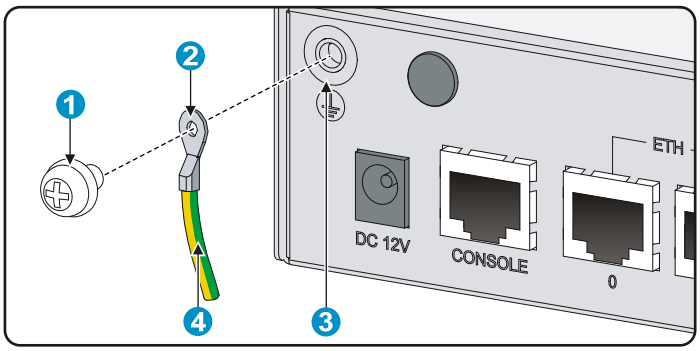
- Ground the router to a properly-grounded grounding strip.
- Ground the router to a grounding conductor buried in the earth.

Grounding the router with a grounding strip

To connect the grounding cable:

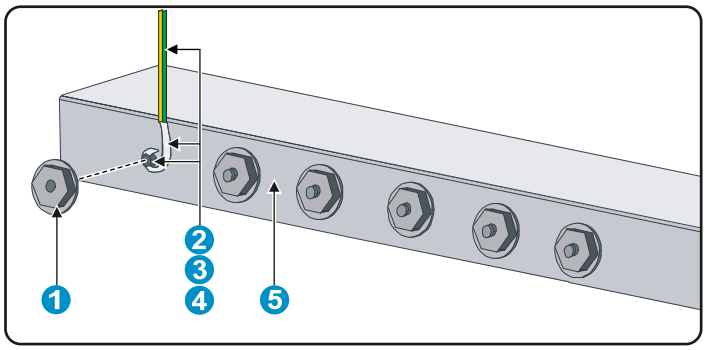
1. Remove the grounding screw from the rear panel of the router chassis.
2. Put the OT terminal of the supplied grounding cable on the grounding screw, as shown in Figure 16.
3. Use a screwdriver to fasten the grounding screw, with the grounding cable OT terminal attached, to the grounding screw hole.
4. Attach the other end of the grounding cable to the grounding strip, as shown in Figure 17.

Figure 16 Connecting the grounding cable to the router



(1) Grounding screw	(2) OT terminal
(3) Grounding hole	(4) Grounding cable

Figure 17 Connecting the grounding cable to a grounding strip

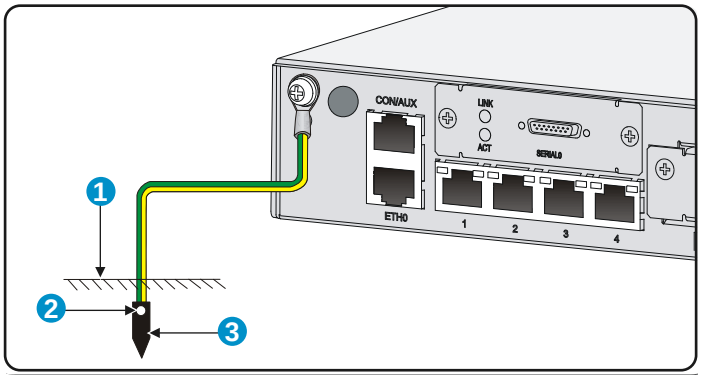


(1) Hex nut	(2) Grounding cable
(3) Naked metal part	(4) Grounding post
(5) Grounding strip	

Grounding the router to a buried grounding conductor

If the installation site has no grounding strips but offers the option of grounding to earth, hammer a 0.5 m (1.64 ft) or longer angle iron or steel tube into the earth to serve as a grounding conductor, as shown in Figure 18.

Figure 18 Grounding to a conductor buried in the earth



(1) Earth	(2) Joint	(3) Angle iron

Installing an antenna

CAUTION:

Do not touch the antenna top, especially after the antenna is connected with the grounding contact. Otherwise ESD may damage the router.

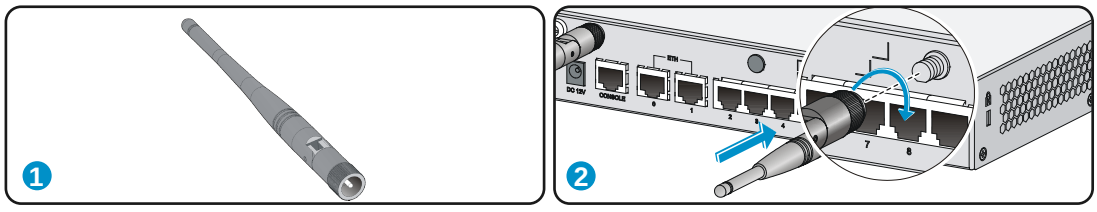
To ensure signal quality, use antennae supplied with the router.

To install an antenna:

1. Adjust the angle of the antenna to 180°.
2. Attach the antenna to the router, as shown in Figure 19. Avoid over-tightening.

   The antenna must be vertical to the ground or ceiling to achieve the optimal coverage.

Figure 19 Installing an antenna



Connecting interface cables

Before powering on the router, connect the router's interface cables.

Connecting an Ethernet cable

The router includes WAN and LAN Ethernet ports.

For a 10/100 Mbps copper Ethernet port that supports MDI/MDIX autosensing, you can use either a straight-through cable or a crossover cable to connect the port to a hub or LAN switch.

To connect an Ethernet cable:

1. Connect one end of the cable to an Ethernet port on the router, as shown in Figure 20 and Figure 21.
2. Connect the other end of the cable to the peer device.

Figure 20 Connecting an Ethernet cable to a WAN port

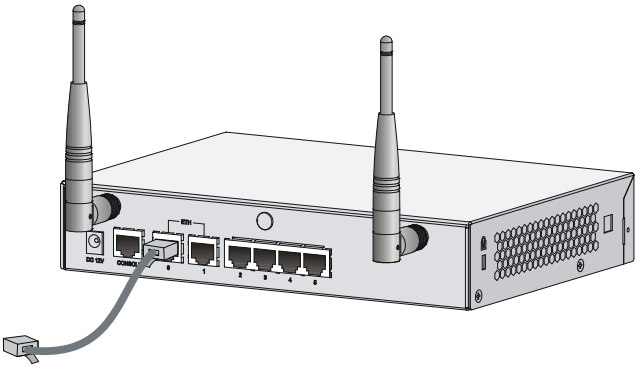
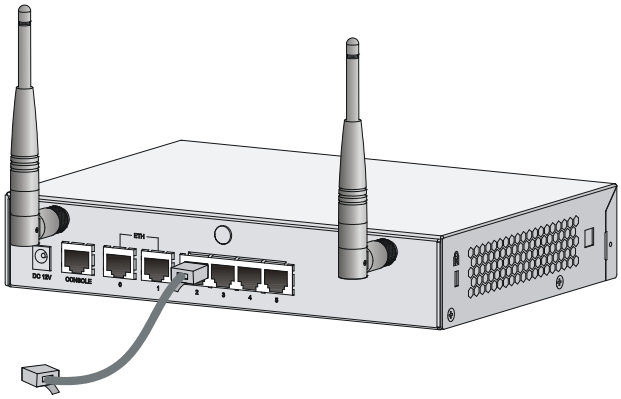


Figure 21 Connecting an Ethernet cable to a LAN port



Interface numbering

The router's fixed Ethernet ports are numbered as follows:

- The two fixed WAN ports are numbered Ethernet 0/0 and Ethernet 0/1.
- The four fixed Ethernet LAN ports are numbered Ethernet 0/1, Ethernet 0/2, Ethernet 0/3, and Ethernet 0/4.

This follows the router's numbering convention *interface-type X/Y*, where:

- *interface-type* is the type of interface, such as serial, asynchronous, or Ethernet.
- *X* is the number of the slot where the interface module is installed. All ports on an interface module have the same slot number.
- *Y* is the sequence number of an interface on an interface module. As you face the interface module, the module's interfaces are numbered from left to right in ascending order, starting at 0.

Connecting the console cable and setting terminal parameters

Connecting the console cable

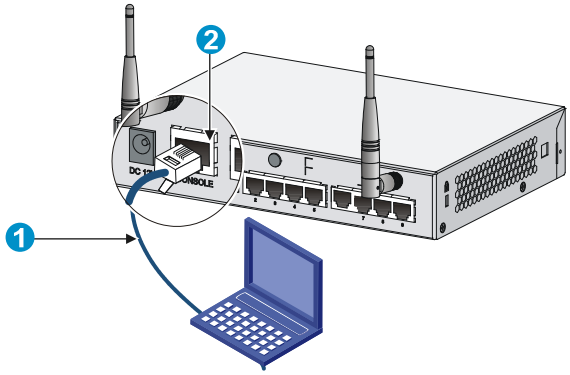
CAUTION:

When using a console cable to connect a PC to the router, first connect the DB-9 end of the console cable to the PC serial port, and then connect the RJ-45 connector of the console cable to the router console port.

To connect the console cable, as shown in Figure 22:

1. Select a console terminal, which can be an ASCII terminal with an RS232 serial port or a PC. (A PC is more commonly used.)
2. Connect the DB-9 connector (female) of the console cable to the RS-232 serial port of the console terminal and the RJ-45 connector to the console port of the router.

Figure 22 Connect the console cable



(1) Console cable	(2) Console port (CONSOLE)

Setting console terminal parameters

To set console terminal parameters:

1. Select **Start** > **All Programs** > **Accessories** > **Communications** > **HyperTerminal**.
2. In the **Connection Description** dialog box (Figure 23), enter the name of the new connection in the **Name** field and then click **OK**.

Figure 23 The Connection Description interface of HyperTerminal

3. In the **Connect To** dialog box (Figure 24) select the serial port to be used from the **Connect using** list, and then click **OK**.

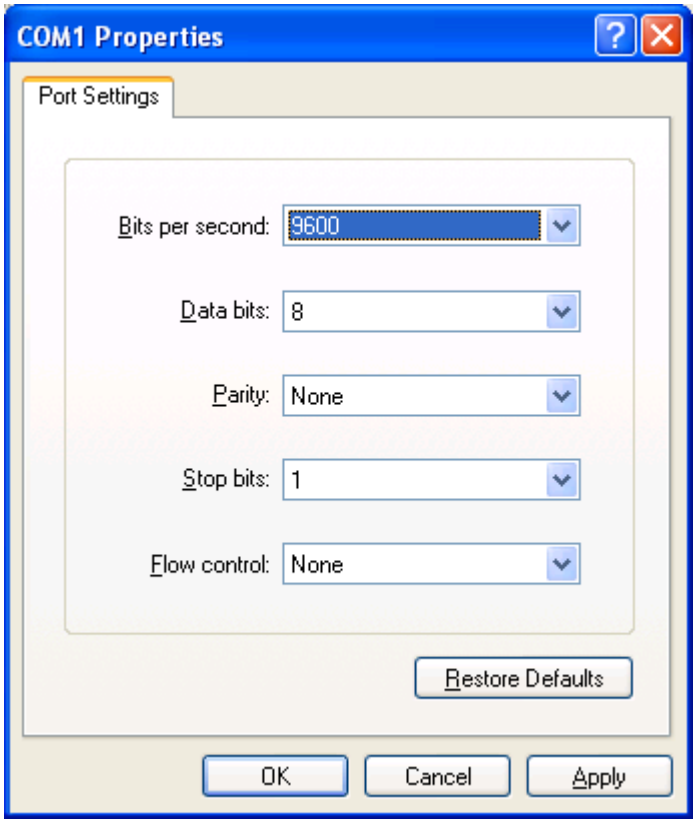
Figure 24 Selecting a port for the HyperTerminal connection

4. In the Properties dialog box (Figure 25), set **Bits per second** to **9600**, **Data bits** to **8**, **Parity** to **None**, **Stop bits** to **1**, and **Flow control** to **None**, and click **OK**.

NOTE:

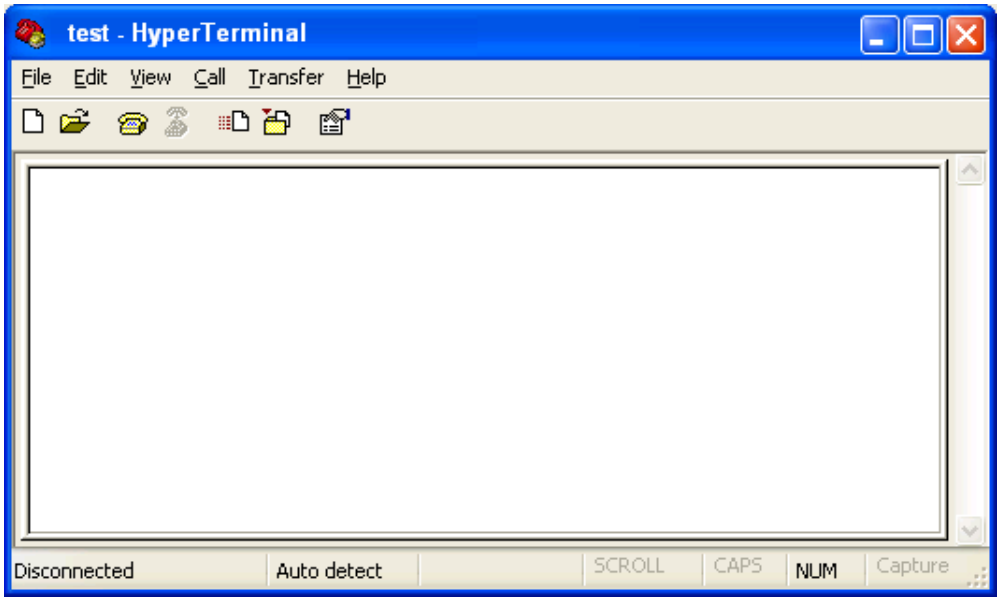
To restore the default settings, click **Restore Defaults**.

Figure 25 Setting serial port parameters



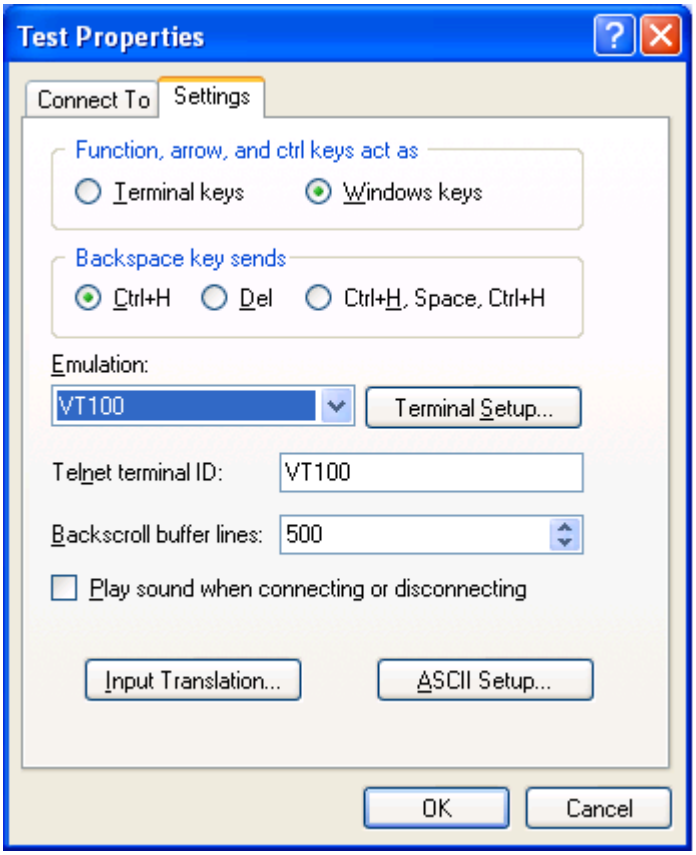
5. In the **HyperTerminal** window (Figure 26), Select **File** > **Properties**.

Figure 26 HyperTerminal window



6. In the **Test Properties** dialog box (Figure 27), click the **Settings** tab, set the emulation to **VT100** or **Auto Detect,** and click **OK**.

Figure 27 Set the terminal emulation parameters



Connecting the power adapter

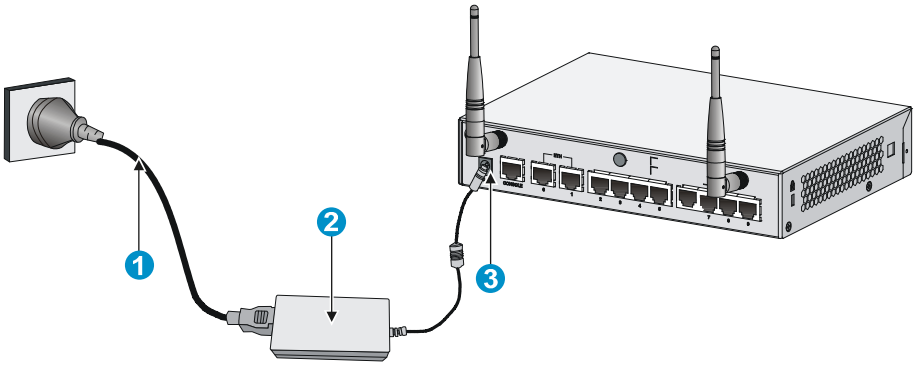
The router's power adapter converts AC power to DC power, as follows:

- AC rated voltage range: 100 VAC to 240 VAC, 50 Hz to 60 Hz
- DC Rated voltage: 12 VDC

To connect the power adapter, as shown in Figure 28:

1. Make sure the router is properly grounded. For more information, see Grounding the router.
2. Using the adapter's AC power cord, connect the power adapter to an AC power source.
3. Connect the DC power cord connector on the power adapter to the DC power receptacle on the router's rear panel.

Figure 28 Connect the power adapter



(1) AC power cord	(2) Power adapter
(3) DC power receptacle	

Verifying the installation

CAUTION:

It post-installation check is important to ensure proper operation of the router.

Before powering on the router, ensure that:

- There is enough space around the router for heat dissipation.
- The router is mounted securely on the wall or on a sturdy workbench.
- Antennae, USB devices, and interface modules are installed correctly.
- The router and power module are grounded properly.
- The power supply meets requirements.
- The router is connected correctly to the console terminal and other devices; parameters are configured correctly on the console terminal.

Before starting up the router, set up the console terminal as described in "Connecting the console cable and setting terminal parameters." Then, power on the router and perform initial configuration for the router.

Powering on the router

WARNING!

Before powering on the router, locate the power source switch so that you can cut off power promptly in case of an emergency.

- Switch on the power source
- Turn on the power switch on the router

Startup process

After power-on, the router initializes its memory, and then runs the extended BootWare. The console terminal screen displays the following:

```
System is starting...
Do you want to check SDRAM? [Y/N]
Booting Normal Extend BootWare........
The Extend BootWare is self-decompressing.....................
Done!

********************************************************************************
*                                                                              *
*                 HP MSR900  BootWare, Version 2.24                    *
*                                                                              *
********************************************************************************
Copyright (c) 2010-2011 Hewlett-Packard Development Company, L.P.

Compiled Date       : Feb 16 2011
CPU Type            : MPC8323E
CPU L1 Cache        : 16KB
CPU Clock Speed     : 266MHz
Memory Type         : DDR SDRAM
Memory Size         : 256MB
Memory Speed        : 132MHz
BootWare Size       : 1024KB
CPLD Version        : 1.0
PCB Version         : 3.0


BootWare Validating...
Press Ctrl+B to enter extended boot menu...

Starting to get the main application file--flash0:/mainmsr201x.bin!.............
................................................................................
................................................................................
....
The main application file is self-decompressing.............................
.......
Done!
System application is starting...

User interface con0 is available.



Press ENTER to get started.
```

Press **Enter** and the system displays the following prompt:

```
<HP>
```

This prompt indicates that the router has entered user view and is ready to configure.

Power-on check

After powering on the router, check the following items:

- The LEDs on the front panel are normal, as described in Table 6.

The following table describes normal LED status after the router is powered on.

Table 6 Normal LED status after the router is powered on

LED	Status	Description
PWR	Steady green	The power supply is working properly.
SYS	Flashing green slowly	The system is working properly.

- The console terminal displays information correctly. You can see the startup window on the local console terminal. For more information, see "Startup process."
- After completing the POST, the system prompts you to press **Enter**. When the command line prompt appears, the router is ready to configure.

Configuring basic settings for the router

After the router is powered on for the first time, configure basic settings for the router. For more information, see *HP MSR Router Series Fundamentals Configuration Guide* and *HP MSR Router Series Fundamentals Command Reference*.

Troubleshooting

This appendix provides information for troubleshooting the router.

NOTE:

- The barcode on the router chassis contains product information that must be provided to HP Support before returning a faulty router for service.
- The HP tamper-proof label attached to a mounting screw on the router chassis must be kept intact. Before opening the chassis cover, contact HP Support for authorization; if you do not, you take full responsibility for all operation and maintenance failures.

Power supply failure

Power LED is off

If the router cannot be powered on and the power LED on the front panel is off, it indicates that the power supply is faulty.

To troubleshoot the power supply:

1. Power off the router.
2. Verify that the router's power cords are connected firmly.
3. Verify that the power source is operating properly.
4. Determine if the power cord is damaged.

If the problem persists, contact HP Support.

System configuration problems

If the configuration environment setup is correct, the console terminal displays boot information when the router is powered on. If the setup is incorrect, the console terminal displays nothing or garbled text.

No terminal display

If the console terminal displays nothing when the router is powered on, follow these troubleshooting steps:

1. Check the following items:
   - The power supply system is working properly.
   - The console cable is connected properly.
   - The console cable is connected to the serial port that is configured for the console terminal.
   - The console terminal properties are set to the following: **Bits per second**: **9600**, **Data bits**: **8**, **Parity**: **None**, **Stop bits**: **1**, **Flow control**: **None**, and **Terminal Emulation**: **VT100**.
   - The console cable is working properly.

Garbled terminal display

If terminal display is garbled, make sure that the **Data bits** field for the console terminal is set to **8**. If the **Data bits** field is set to **5** or **6**, the console terminal will display garbled characters.

No response from the serial port

If the serial port does not respond, verify that the serial cable is in good condition and the serial port settings are correct.

Password loss

User password loss

If you lose your password, you cannot enter the system. In this case, you can boot the system by ignoring the system configuration.

To solve the user password loss:

1. Enter the main BootWare menu, and select **6** to boot the system by ignoring the system configuration.

The system prompts the following:

```
Flag Set Success.
```

The output shows that the setting succeeded.

2. When the main BootWare menu appears again, and select **0** to reboot the system.

```
System is rebooting now.
System start booting...
Booting Normal Extend BootWare....
```

3. Set a new password in system view after the system reboots. The console port uses password authentication, and the password is set to **123456** and stored in plain text.

```
<HP> system-view
[HP] user-interface console 0
[HP-ui-console0] authentication-mode password
[HP-ui-console0] set authentication password simple 123456
```

When you set the password by using the **set authentication password** { **cipher** | **simple** } *password* command, note the following:

- If you specify the **cipher** keyword, the password is stored in cipher text. You cannot view the password by using the **display current-configuration** command.
- If you specify the **simple** keyword, the password is stored in plain text. You can use the **display current-configuration** command to view the password in the current configuration.

4. After modifying the user password, save it by executing the **save** command. HP recommends saving the modifications as the default configuration file.

```
[HP] save
```

After reboot, the system uses the initial default configuration, but keeps the original configuration file in storage. You can restore the original configuration by using the **display**

saved-configuration command to display the configuration, and then copying and executing the configuration.

Super password loss

The super password provides access to four super levels, enabling you to perform higher-level operations.

To recover from super password loss:

1. On the main BootWare menu, select **8**.

   This setting (**Clear Super Password**) is valid only for the first reboot of the router. The super password is restored after the second reboot.

```
========================<EXTEND-BOOTWARE MENU>=========================
|<1> Boot System                                                      |
|<2> Enter Serial SubMenu                                             |
|<3> Enter Ethernet SubMenu                                           |
|<4> File Control                                                     |
|<5> Modify BootWare Password                                         |
|<6> Skip Current System Configuration                                |
|<7> BootWare Operation Menu                                          |
|<8> Clear Super Password                                             |
|<9> Storage Device Operation                                         |
|<0> Reboot                                                           |
======================================================================
Enter your choice(0-9):8
```

   The following output indicates that you have successfully cleared the super password.

```
Clear Application Password Success!
```

2. Exit the menu and reboot the router.

   The super password is cleared; you can enter system view.

Interface module, cable, and connection failure

When the LEDs on an interface module panel indicate abnormal operation:

1. Verify that the router supports the interface module.
2. Ensure that the interface module is installed in the correct slot and is configured correctly.
3. Verify that the interface cable is connected correctly.

Support and other resources

Contacting HP

For worldwide technical support information, see the HP support website:

http://www.hp.com/support

Before contacting HP, collect the following information:

- Product model names and numbers
- Technical support registration number (if applicable)
- Product serial numbers
- Error messages
- Operating system type and revision level
- Detailed questions

Subscription service

HP recommends that you register your product at the Subscriber's Choice for Business website:

http://www.hp.com/go/wwalerts

After registering, you will receive email notification of product enhancements, new driver versions, firmware updates, and other product resources.

Related information

Documents

To find related documents, browse to the Manuals page of the HP Business Support Center website:

http://www.hp.com/support/manuals

- For related documentation, navigate to the Networking section, and select a networking category.
- For a complete list of acronyms and their definitions, see *HP FlexNetwork Technology Acronyms*.

Websites

- HP.com http://www.hp.com
- HP Networking http://www.hp.com/go/networking
- HP manuals http://www.hp.com/support/manuals
- HP download drivers and software http://www.hp.com/support/downloads
- HP software depot http://www.software.hp.com

- HP Education http://www.hp.com/learn

Conventions

This section describes the conventions used in this documentation set.

Command conventions

Convention	Description
Boldface	**Bold** text represents commands and keywords that you enter literally as shown.
Italic	*Italic* text represents arguments that you replace with actual values.
[ ]	Square brackets enclose syntax choices (keywords or arguments) that are optional.
{ x | y | ... }	Braces enclose a set of required syntax choices separated by vertical bars, from which you select one.
[x | y | ...]	Square brackets enclose a set of optional syntax choices separated by vertical bars, from which you select one or none.
{ x | y | ... } *	Asterisk-marked braces enclose a set of required syntax choices separated by vertical bars, from which you select at least one.
[x | y | ...] *	Asterisk-marked square brackets enclose optional syntax choices separated by vertical bars, from which you select one choice, multiple choices, or none.
&<1-n>	The argument or keyword and argument combination before the ampersand (&) sign can be entered 1 to n times.
#	A line that starts with a pound (#) sign is comments.

GUI conventions

Convention	Description
Boldface	Window names, button names, field names, and menu items are in bold text. For example, the **New User** window appears; click **OK**.
>	Multi-level menus are separated by angle brackets. For example, **File** > **Create** > **Folder**.

Symbols

Convention	Description
WARNING	An alert that calls attention to important information that if not understood or followed can result in personal injury.
CAUTION	An alert that calls attention to important information that if not understood or followed can result in data loss, data corruption, or damage to hardware or software.
IMPORTANT	An alert that calls attention to essential information.
NOTE	An alert that contains additional or supplementary information.
TIP	An alert that provides helpful information.

Network topology icons

	Represents a generic network device, such as a router, switch, or firewall.
	Represents a routing-capable device, such as a router or Layer 3 switch.
	Represents a generic switch, such as a Layer 2 or Layer 3 switch, or a router that supports Layer 2 forwarding and other Layer 2 features.
	Represents an access controller, a unified wired-WLAN module, or the switching engine on a unified wired-WLAN switch.
	Represents an access point.
	Represents a mesh access point.
	Represents omnidirectional signals.
	Represents directional signals.
	Represents a security product, such as a firewall, UTM, multiservice security gateway, or load-balancing device.
	Represents a security card, such as a firewall, load-balancing, NetStream, SSL VPN, IPS, or ACG card.

Port numbering in examples

The port numbers in this document are for illustration only and might be unavailable on your device.

Appendix A Technical specifications

This appendix lists the router's technical specifications.

MSR900 specifications

Table 7 MSR900 specifications

Item	900	900-W	900-W(NA)	920	920-W	920-W(NA)
Console port	1					
USB port	1					
FE WAN port	2					
FE LAN port	4			8		
Built-in WLAN module	N/A	802.11 b/g	802.11b/g (NA)	N/A	802.11b/g	802.11b/g (NA)
Memory	256 MB DDR II SDRAM					
Flash	256 MB					
Dimensions (H × W × D) (excluding rubber feet and mounting brackets)	44.2 × 230 × 160 mm (1.74 × 9.06 × 6.30 in)					
Weight	1.8 kg (3.97 lb)					
AC power adapter	Rated input voltage: 100 VAC to 240 VAC; 50 Hz or 60 Hz					
Max AC power	15 W					
Operating temperature	0°C to 45°C (32°F to 113°F)					
Relative humidity (non-condensing)	5% to 90%					

NOTE:

MSR900-W(NA) and MSR920-W(NA) are North American models.

Antenna specifications

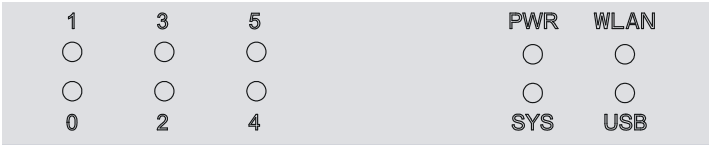
Table 8 Antenna specification

Item	Specification
Frequency range	2400 MHz to 2500 MHz
Voltage Standing Wave Ratio (VSWR)	≤2.0
Input impedance	50 ohms
Gain	2±1 dBi
Max power consumption	25 W
Input interface	Reverse-polarity SMA-J
Length	134 mm (5.28 in)
Color	Black
Weight	25 g (0.88 oz)
Operating temperature	–40°C to +60°C (–40°F to +140°F)

Appendix B LEDs

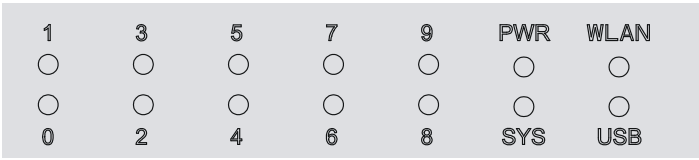
MSR900/MSR900-W/MSR900-W(NA)

Table 9 MSR900/MSR900-W/MSR900-W(NA) LED description

LED	Location	Status	Description
			
PWR	Front panel	Steady green	The power supply is connected.
		Off	The power supply is not connected.
SYS	Front panel	Fast flashing green	The system is starting up.
		Slow flashing green	The system is operating properly.
		Fast flashing yellow	A system problem has occurred.
		Off	The system has failed to operate properly.
WLAN	Front panel	Slow flashing green	The system is operating properly.
		Fast flashing green	The system is processing a large amount of traffic.
		Off	The system has failed to operate properly.
USB	Front panel	Off	The USB0 port is operating as a USB host.
		Steady green	The USB0 port is operating as a USB device.
0–5	Front panel	Steady green	An ETH link is present.
		Flashing green	Data is being transmitted or received on the ETH interface.
		Off	No ETH link is present.

MSR920/MSR920-W/MSR920-W(NA)

Table 10 MSR920/MSR920-W/MSR920-W(NA) LED description

LED	Location	Status	Description
			
PWR	Front panel	Steady green	The power supply is connected.
		Off	The power supply is not connected.
SYS	Front panel	Fast flashing green	The system is starting up.
		Slow flashing green	The system is operating properly.
		Fast flashing yellow	A system problem has occurred.
		Off	The system has failed to operate properly.
WLAN	Front panel	Slow flashing green	The system is operating properly.
		Fast flashing green	The system is processing a large amount of traffic.
		Off	The system has failed to operate properly.
USB	Front panel	Off	The USB0 port is operating as a USB host.
		Steady green	The USB0 port is operating as a USB device.
0–9	Front panel	Steady green	An ETH link is present.
		Flashing green	Data is being transmitted or received on the ETH interface.
		Off	No ETH link is present.

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