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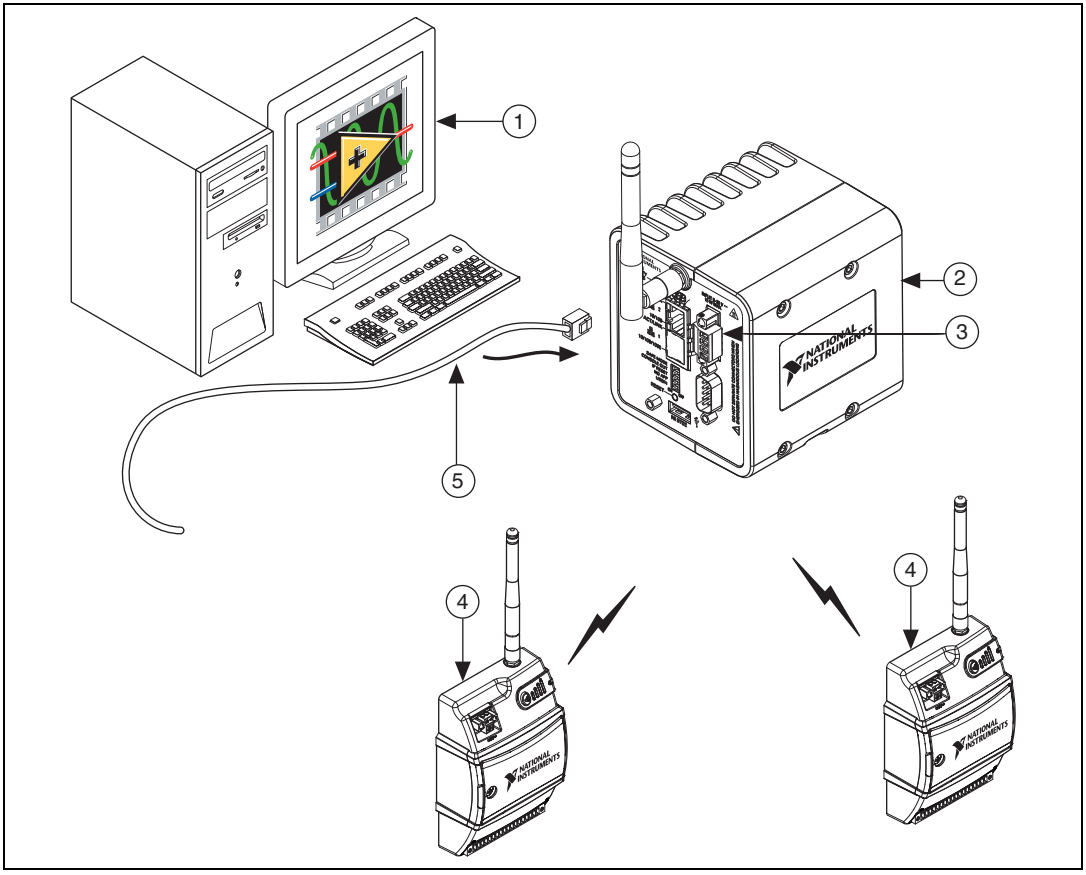
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Find the *National Instruments NI 9792* at our website: ***Click HERE***

USER GUIDE AND SPECIFICATIONS

NI 9792 WSN Real-Time Gateway

This user guide describes how to use the NI 9792 Wireless Sensor Network Real-Time Gateway and lists specifications. The NI 9792 WSN Real-Time Gateway combines with NI WSN-32*xx* nodes to form a wireless sensor network. Figure 1 shows the NI WSN system components.



1	PC or NI Real-Time Hardware Running Application Software	3	9–35 VDC Power Supply Connection
2	NI 9792 WSN Real-Time Gateway	4	NI WSN-32*xx* Nodes
		5	Ethernet Cable/Connection

Figure 1. NI WSN System Components

NATIONAL INSTRUMENTS

The NI 9792 WSN Real-Time Gateway is shown in Figure 2.

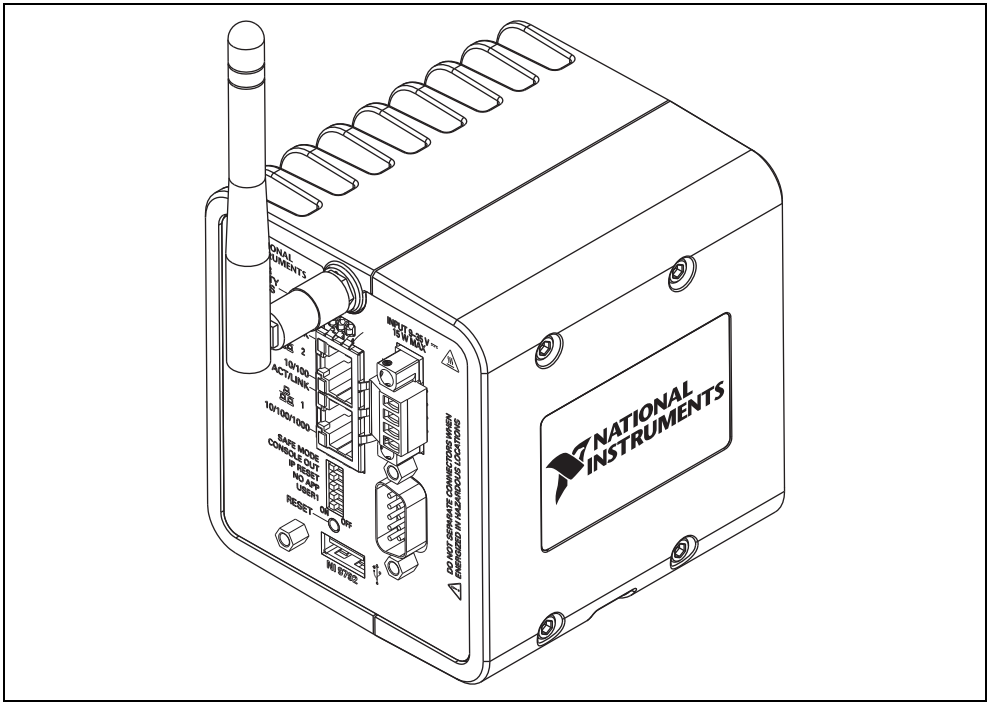


Figure 2. NI 9792 WSN Real-Time Gateway

Dimensions

Figure 3 shows the NI 9792 WSN Real-Time Gateway device dimensions.

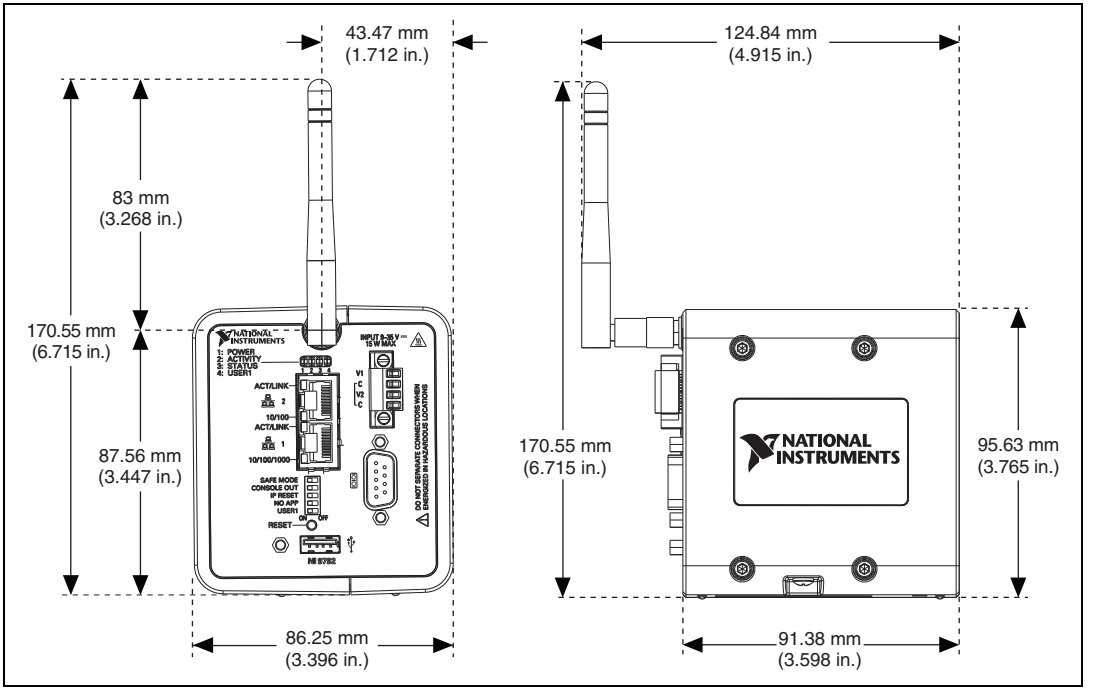


Figure 3. NI 9792 WSN Real-Time Gateway Device Dimensions

Safety Guidelines

Operate the NI 9792 WSN Real-Time Gateway only as described in this user guide.

Hot Surface This icon denotes that the component may be hot. Touching this component may result in bodily injury.

NI WSN Safety Information

The following section contains important safety information that you *must* follow when installing and using NI WSN products.

Caution Do *not* substitute parts or modify the NI WSN product. Use the product only with the devices, accessories, and cables specified in the installation instructions.

Caution Do *not* operate a NI WSN products in an explosive atmosphere or where there may be flammable gases or fumes. If you need to operate NI WSN products in such an environment, the NI WSN products *must* be in a suitably rated enclosure.

Caution If you need to clean a NI WSN product, use a dry towel. The product *must* be completely dry and free from contaminants before you return it to service.

Caution Operate the product only at or below Pollution Degree 2. Pollution is foreign matter in a solid, liquid, or gaseous state that can reduce dielectric strength or surface resistivity. The following is a description of pollution degrees:

- Pollution Degree 1 means no pollution or only dry, nonconductive pollution occurs. The pollution has no influence.
- Pollution Degree 2 means that only nonconductive pollution occurs in most cases. Occasionally, however, a temporary conductivity caused by condensation must be expected.
- Pollution Degree 3 means that conductive pollution occurs, or dry, nonconductive pollution occurs which becomes conductive due to condensation.

Caution You *must* insulate signal connections for the maximum voltage for which the NI WSN product is rated. Do *not* exceed the maximum ratings for the product. Do *not* install wiring while the product is live with electrical signals. Do *not* remove or add connector blocks when power is connected to the NI WSN system. Avoid contact between your body and the connector block signal wiring when hot-swapping devices.

Operate NI WSN products at or below the *installation category*[1] marked on the hardware label. Measurement circuits are subjected to *working voltages*[2] and transient stresses (overvoltage) from the circuit to which they are connected during measurement or test. Installation categories establish standard impulse withstand voltage levels that commonly occur in electrical distribution systems. The following is a description of installation categories:

- Installation Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS[3] voltage. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.
- Installation Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet (for example, 115 V for U.S. or 230 V for Europe). Examples of Installation Category II are measurements performed on household appliances, portable tools, and similar products.
- Installation Category III is for measurements performed in the building installation at the distribution level. This category refers to measurements on hard-wired equipment such as equipment in fixed installations, distribution boards, and circuit breakers. Other examples are wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and stationary motors with permanent connections to fixed installations.
- Installation Category IV is for measurements performed at the primary electrical supply installation (<1,000 V). Examples include electricity meters and measurements on primary overcurrent protection devices and on ripple control units.

Safety Guidelines for Hazardous Locations

The NI 9792 is suitable for use in Class I, Division 2, Groups A, B, C, D, T4 hazardous locations; Class I, Zone 2, AEx nC IIC T4 and Ex nA IIC T4 hazardous locations; and nonhazardous locations only. Not following these guidelines may result in serious injury or death.

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[1] Installation categories, also referred to as *measurement categories*, are defined in electrical safety standard IEC 61010-1.

[2] Working voltage is the highest rms value of an AC or DC voltage that can occur across any particular insulation.

[3] MAINS is defined as a hazardous live electrical supply system that powers equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

Caution Do *not* disconnect the power supply wires and connectors from the controller unless power has been switched off.

Caution Do *not* install or remove the controller unless power has been switched off.

Caution Substitution of components may impair suitability for Class I, Division 2.

Caution For Zone 2 applications, install the WSN system in an enclosure rated to at least IP 54 as defined by IEC 60529 and EN 60529.

Special Conditions for Hazardous Locations Use in Europe

The NI 9792 has been evaluated as Ex nA nL IIC T4 equipment under DEMKO Certificate No. 07 ATEX 0626664X. Each controller is marked II 3G and is suitable for use in Zone 2 hazardous locations, in ambient temperatures of –40 °C ≤ Ta ≤ 70 °C.

Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) as stated in the product specifications. These requirements and limits are designed to provide reasonable protection against harmful interference when the product is operated in its intended operational electromagnetic environment.

This product is intended for use in industrial locations. There is no guarantee that harmful interference will not occur in a particular installation, when the product is connected to a test object, or if the product is used in residential areas. To minimize the potential for the product to cause interference to radio and television reception or to experience unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

The following statements contain important EMC information needed before installing and using this product:

Caution This product is intended for use in industrial locations. As a result, this product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Caution Changes or modifications not expressly approved by National Instruments could void the your authority to operate the hardware under the local regulatory rules.

Caution Operate this product only with shielded cables and accessories.

Related Documentation

Check `ni.com/manuals` for the most recent hardware documentation. For a complete list of documentation related to the NI WSN system, refer to `ni.com/info` and enter `rdwsnrd`.

In addition to this guide, the following documents may be useful when configuring your NI WSN system.

- *NI Wireless Sensor Network Getting Started Guide*
- *NI WSN-32xx User Guide and Specifications*

- *Configuring WSN in MAX*, available by selecting **Start»All Programs»National Instruments»NI-WSN**
- The *NI-WSN* book on the Contents tab of the *LabVIEW Help* available by selecting **Help»Search the LabVIEW Help** in LabVIEW
- *NI-WSN Readme*, available on the software installation disc included with your device.

Training Courses

If you need more help getting started developing an application with NI products, NI offers training courses. To enroll in a course or obtain a detailed course outline, refer to `ni.com/training`.

Technical Support on the Web

For additional support, refer to `ni.com/support` or `zone.ni.com`.

Software Overview

Note Refer to the *NI WSN Readme*, available on the software installation disc included with your device, for NI software application version support.

The NI-WSN software includes NI Measurement and Automation Explorer (MAX) as well as server and driver software for easy integration into application software packages. These software components manage the low-level communications and hardware details, simplifying programmatic access to I/O channels. The NI-WSN software is on the software installation disc included with your NI 9792 WSN gateway device. The NI-WSN software is supported by Windows 7/Vista/XP and contains the following components:

- NI MAX
- NI-WSN software

You can download a current version of the NI-WSN software from `ni.com/support`. Using your Web browser, go to `ni.com/support` and select **Drivers and Updates»Distributed I/O»Wireless Sensor Networks**, and then select the latest version of NI-WSN software. If you are using other software, refer to the installation instructions that accompany your software.

What You Need to Get Started

To set up and use NI LabVIEW Real-Time with the NI 9792 WSN Real-Time Gateway, you need the following:

- NI 9792 WSN Real-Time Gateway device(s), with 9–35 V power supply
- NI WSN-32*xx* node devices, 9–30 V power supply, or four 1.5 V AA batteries for each node
- Mounting hardware (DIN rail or panel-mount)
- Ethernet cable/connection
- 1/8 in. flathead and number 1 Phillips screwdrivers
- NI-WSN 1.1 software or later
- Host PC running Windows 7/Vista/XP
- NI LabVIEW 2009 SP1 (32-bit) or later
- NI LabVIEW Real-Time 2009 SP1 (32-bit) or later
- Related hardware and software documentation

- Optional accessories
  - DIN rail terminal blocks
  - I/O cables and sensors
  - Mounting accessory

Unpack the Devices and Install the Antenna

Remove the devices from the package and inspect them. Contact NI if the devices appear damaged. Do *not* install a damaged device.

Caution The device is static sensitive. Always properly ground yourself and the equipment when handling or connecting to the device.

To attach the antenna, align it with the mount, as shown in Figure 4, and screw it on.

Caution The antenna must be attached to the NI WSN device in order for the NI WSN device to function correctly.

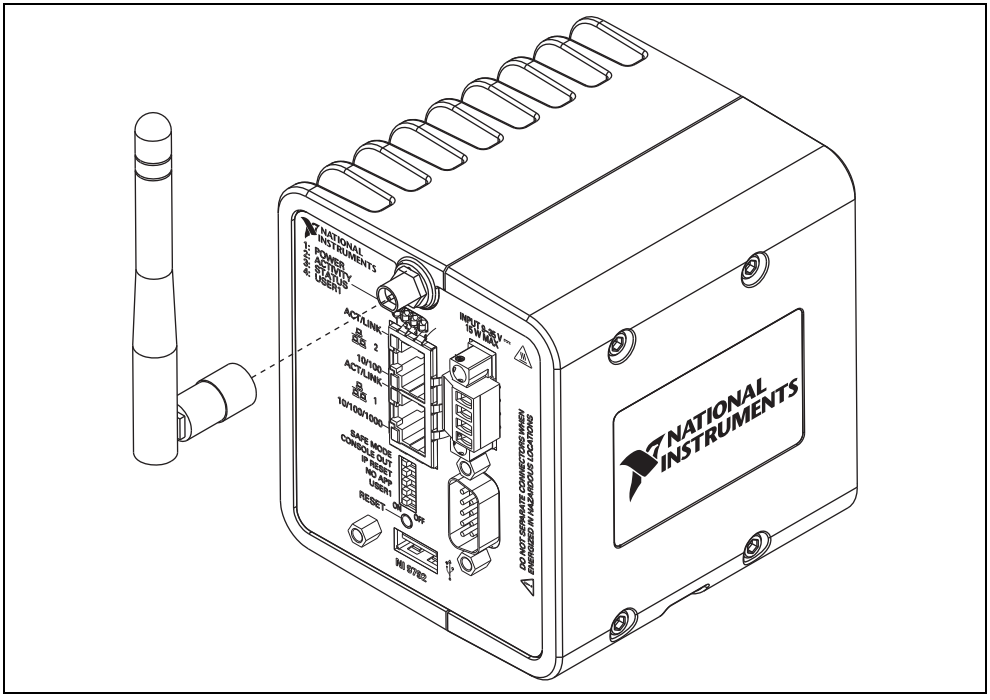


Figure 4. Attach Antenna to Device

Mounting the NI 9792 Device

You can mount the NI 9792 device on a panel, a 35 mm DIN rail, in an enclosure, or on a desktop. Use the DIN-Rail mounting method if you already have a DIN rail configuration or if you need to be able to quickly remove the device. Use the panel mount method for high shock and vibration applications. Use an enclosure for harsh, dirty, or wet environments. For kit accessory ordering information, refer to the accessory section of the NI WSN product page at `ni.com`.

Caution If the ambient temperature is above 60 °C, you must mount the NI 9792 on a thermally conductive material. Measure the ambient temperature at each side of the NI 9792, 63.5 mm (2.5 in.) from the side, and 25.4 mm (1 in.) from the back of the system.

Caution Your installation must meet the following requirements:

- Allows 25.4 mm (1 in.) of clearance above and below the NI 9792 device for air circulation.
- Allows 50.8 mm (2 in.) of clearance in front of the device for common connector cabling, such as the 4-position detachable screw terminal connector.

Note Figure 5 is an actual size template. You can print it out and use it to determine screw hole placement for panel mounting.

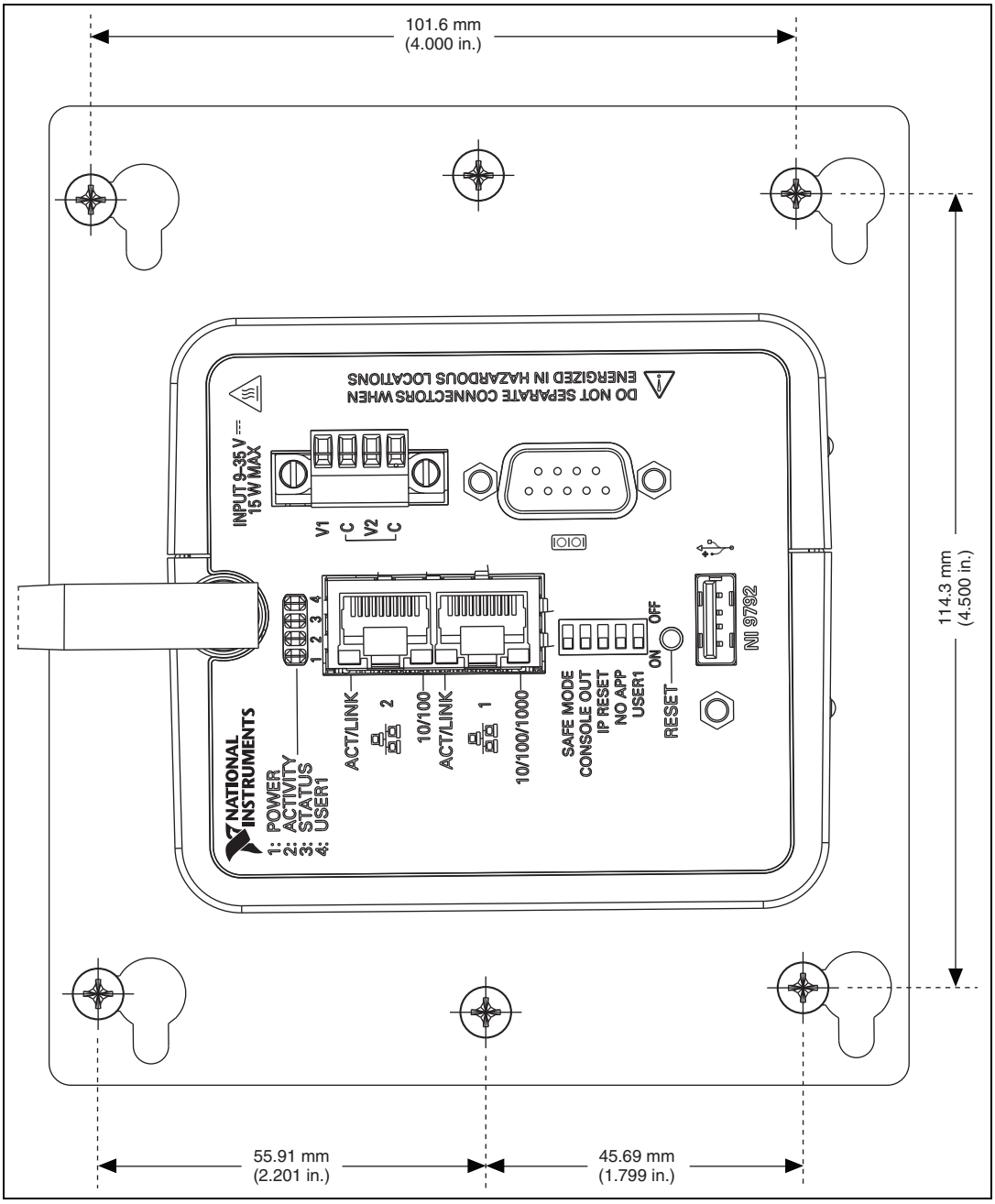


Figure 5. NI 9792 Panel Mount Dimensions Template

Attaching to the NI WSN-3282 DIN Rail

Caution Power off the device before mounting it to the DIN rail.

The NI WSN-3282 DIN rail kit, NI part number 781074-01, contains one clip for mounting the device on a standard 35 mm DIN rail. To mount the device on a DIN rail, complete the following steps:

1. Fasten the DIN rail clip to the device using a number 1 Phillips screwdriver and four 4-40 machine screws. The screws are included in the DIN rail kit.
2. Make sure the DIN rail kit is installed as shown in Figure 6, with the larger lip of the DIN rail positioned up.

Note Use 4-40 (finer thread) screw to affix the DIN rail clip to the device.

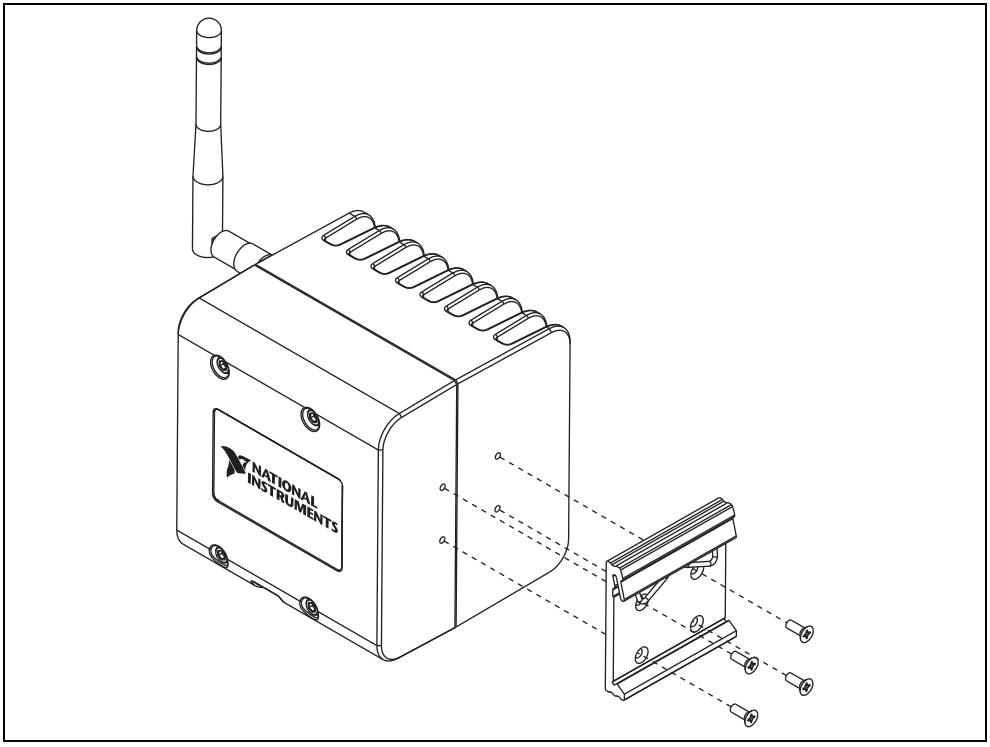


Figure 6. NI 9792 DIN Rail Installation

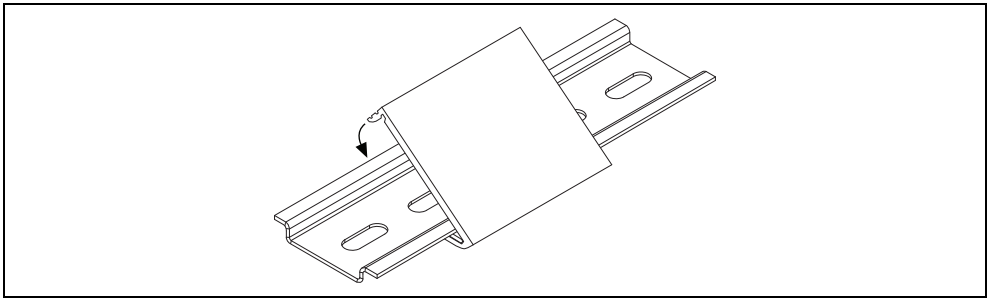


Figure 7. DIN Rail Installation Shown without the NI 9792

Attaching the NI WSN-3283 Panel Mount Plate

The NI WSN-3283 panel mount kit, NI part number 781075-01, contains a plate for mounting the device to a panel. To mount the device, complete the following steps:

1. Fasten the plate to the device using a number 1 Phillips screwdriver and 4-40 machine screws, as shown in Figure 8. The screws are included in the NI WSN-3283 panel mount kit.

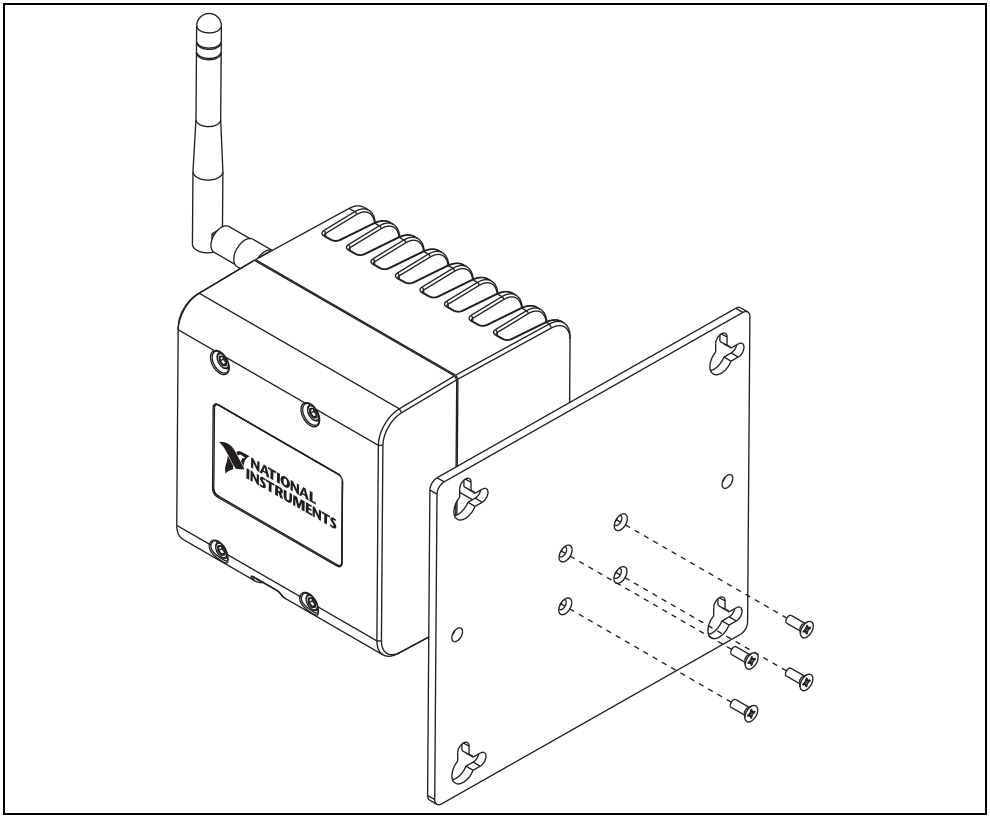


Figure 8. Mounting the NI 9792 to the Panel Mount Plate

2. Attach the device and attached plate to a wall or other surface using four to six number 8 or M4 screws. Refer to Figure 5 for the mounting hole template.

Setting Up the NI 9792 Device

Complete the following steps to prepare the NI 9792 device for use:

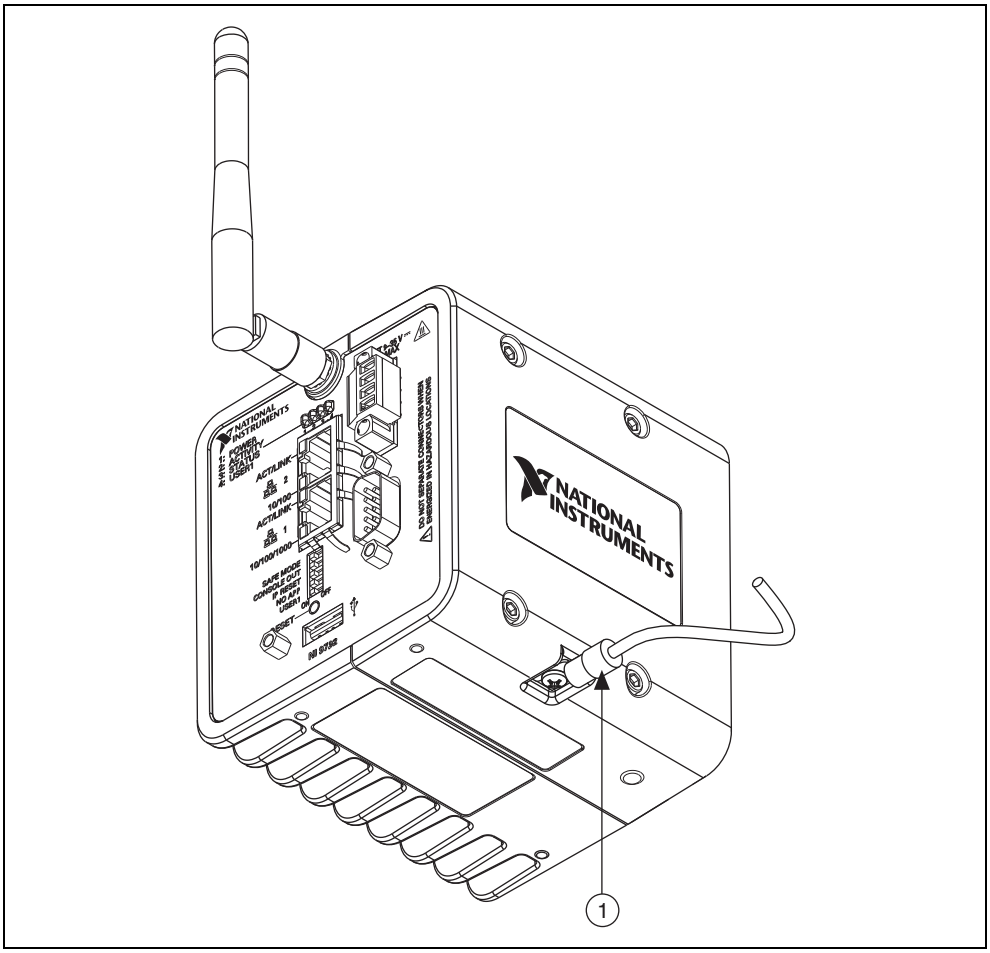
1. Before connecting the hardware, install NI LabVIEW and the NI-WSN driver software. You must be an Administrator to install NI software and devices on your computer. The NI-WSN driver software is on the software installation disc included with your device and is available for download at `ni.com/support`. You must have NI LabVIEW 2009 SP1 (32-bit) or later, NI LabVIEW Real-Time 2009 SP1 (32-bit) or later, and NI-WSN 1.1 and NI MAX installed to use the NI 9792. Refer to the instructions included with your NI LabVIEW software to install NI LabVIEW. Once NI LabVIEW is installed, complete the following steps:
2. Close all other applications.

3. Insert the NI-WSN software installation disc into the drive on your computer.
4. Follow the onscreen instructions to install the NI-WSN software and NI MAX.

Note The *NI Wireless Sensor Network Getting Started Guide* is available after installation from **Start»All Programs»National Instruments»NI-WSN**.

Make sure the NI 9792 device power is disconnected.

5. Attach a ring lug, as shown in Figure 9, to a 14 AWG (1.6 mm) wire. Connect the ring lug to the ground terminal on the bottom of the device using the ground screw. Attach the other end of the wire to the system ground.



1 Ring Lug Attached to the Ground Screw with Cable Attached

Figure 9. Ring Lug Attached to the Ground Screw

Connecting the NI 9792 to a Network

Using a standard Category 5 (CAT-5) or better Ethernet cable, connect the NI 9792 to an Ethernet network using the Ethernet port 1 on the NI 9792.

Caution To prevent data loss and to maintain the integrity of your Ethernet installation, do *not* use a cable longer than 100 m. If you are using 100 Mbps Ethernet, National Instruments recommends using a CAT-5 or better shielded twisted-pair Ethernet cable.

Note You will configure the IP settings and install software on the NI 9792, as described in the *Configuring IP Settings and Installing Software on the NI 9792* section, after connecting power and powering the NI 9792 on.

The host computer communicates with the NI 9792 over a standard Ethernet connection. If the host computer is on a network, you must configure the NI 9792 on the same subnet as the host computer. If neither the host computer nor the NI 9792 is connected to a network, you can connect the two directly.

If you want to use the NI 9792 on a subnet other than the one the host computer is on, first connect the NI 9792 on the same subnet as the host computer. Use DHCP to assign an IP address or reassign a static IP address for the subnet where you want it to be and physically move it to the other subnet. The first time you configure the NI 9792, you must also install software on it. Contact your network administrator if you need assistance configuring the host computer and NI 9792 on the same subnet.

Note You must connect Ethernet port 1 to configure the NI 9792. You cannot configure the NI 9792 through Ethernet port 2.

In order to use Ethernet port 2, you must assign a static IP address to the port using MAX. The IP address must be on a different subnet than the IP address of Ethernet port 1. You cannot use DHCP with Ethernet port 2. For more information about using Ethernet port 2, go to `ni.com/info` and enter the info code `dualenet`.

Wiring Power to the NI 9792

Caution You *must* use a UL Listed ITE power supply marked LPS with the NI 9792. The power supply must also meet any safety and compliance requirements for the country of use.

Caution You *must* install the NI 9792 and tighten the captive screws before you apply power to the NI 9792. Installing the NI 9792 while power is applied to it can cause damage to the device.

1. Install the ferrite shipped with the NI 9792 across the negative and positive leads of the power supply, approximately 50–75 mm (2–3 in.) from the ends of the leads near the NI 9792, as shown in Figure 10.

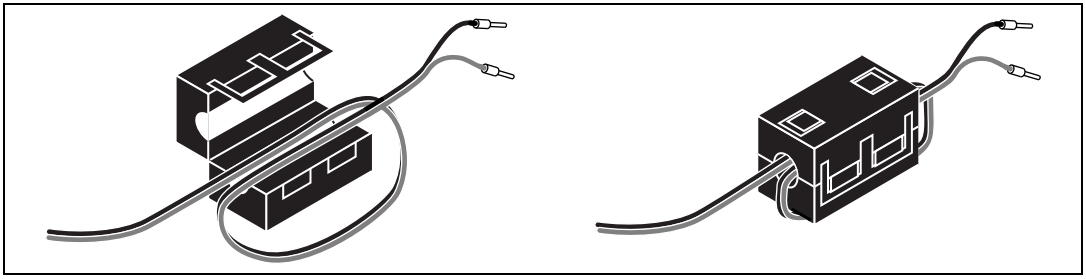


Figure 10. Wiring Power to the NI 9792

2. Connect the positive lead of the power supply to the V1 or V2 terminal and the negative lead to one of the C terminals.
3. Optionally, you can connect the positive lead of another power supply to the other V terminal and the negative lead to one of the C terminals. You must install the ferrite across both pairs of wires.

Note If you connect power to both V1 and V2, you must ensure that the voltage difference between the two power inputs, measured at the NI 9792 power connector, is at least 500 mV.

Note The NI 9792 draws power from *either* V1 or V2, depending on which terminal has a higher voltage. It does not draw power from both terminals. The NI 9792 switches between V1 and V2 without affecting operation.

Caution The C terminals are internally connected to each other. If you use two power supplies, make sure they share a common ground.

Caution The C terminals are internally connected to the NI WSN 9792 chassis to prevent a faulty ground connection from causing the chassis ground to float. If you reverse the input voltage, the positive input voltage is connected directly to the chassis. The NI 9792 has built-in reversed-voltage protection, but reversed voltage can damage connected peripherals if the chassis ground is not reliably connected to earth ground.

Caution Do *not* tighten or loosen the terminal screws on the power connector while the power connector is plugged into the NI 9792 or while the power supply is on.

Powering On the NI 9792

Turn on each power supply to the NI 9792 system. The NI 9792 runs a power-on self test (POST). During the POST, the POWER and STATUS LEDs turn on. When the STATUS LED turns off, the POST is complete. If the LEDs do not behave in this way when the NI 9792 powers on, refer to the *Device Interface* section.

Configuring IP Settings and Installing Software on the NI 9792

When you power on the NI 9792 for the first time, it boots into safe mode because there is no software installed on it. This section describes how to configure the IP settings and install software on the NI 9792.

Complete the following steps:

1. Launch MAX on the host computer and expand **Remote Systems** in the MAX configuration tree. MAX lists the NI 9792 as the model name of the NI 9792 followed by the serial number, for example, **NI-NI9792-0146793C**.

Tip If you cannot find the NI 9792 under Remote Systems, refer to the *CONSOLE OUT Switch* section for information about using a serial connection and a terminal program for troubleshooting.

The NI 9792 automatically attempts to connect to the network using DHCP. If DHCP is not available, the NI 9792 connects to the network with a link-local IP address with the form `169.254.x.x`.

2. Select the NI 9792 under **Remote Systems** to see the **Network Settings** tab in the middle pane of MAX.
3. Enter a name for the RT target in the **Name** field.
4. (Optional) Enter a valid SNTP time server for the RT target in the **Additional Configuration** section.
5. Select settings for the RT target in the **IP Settings** section, and click **Apply**.

Note For information about configuring network settings, refer to the *Configuring Network Settings* book of the *MAX Remote Systems Help*. In MAX, click **Help»Help Topics»Remote Systems**. On the **Contents** tab, browse to **LabVIEW Real-Time Target Configuration»Configuring Network Settings**.

6. Click **Apply**, and then click **Yes** at the prompt to reboot the NI 9792. You can also reboot the NI 9792 by right-clicking the name under **Remote Systems** and selecting **Reboot**.
7. After rebooting, the NI 9792 appears under **Remote Systems** with the assigned name. Expand the NI 9792 and select **Software**.
8. Click **Add/Remove Software** in the toolbar to launch the LabVIEW Real-Time Software Wizard.
9. Install LabVIEW Real-Time software and device drivers on the NI 9792.

After software installation, the NI 9792 automatically reboots. You can now program it using LabVIEW Real-Time. For information about configuring the NI 9792 to launch an embedded stand-alone application at startup, refer to the *LabVIEW Help*.

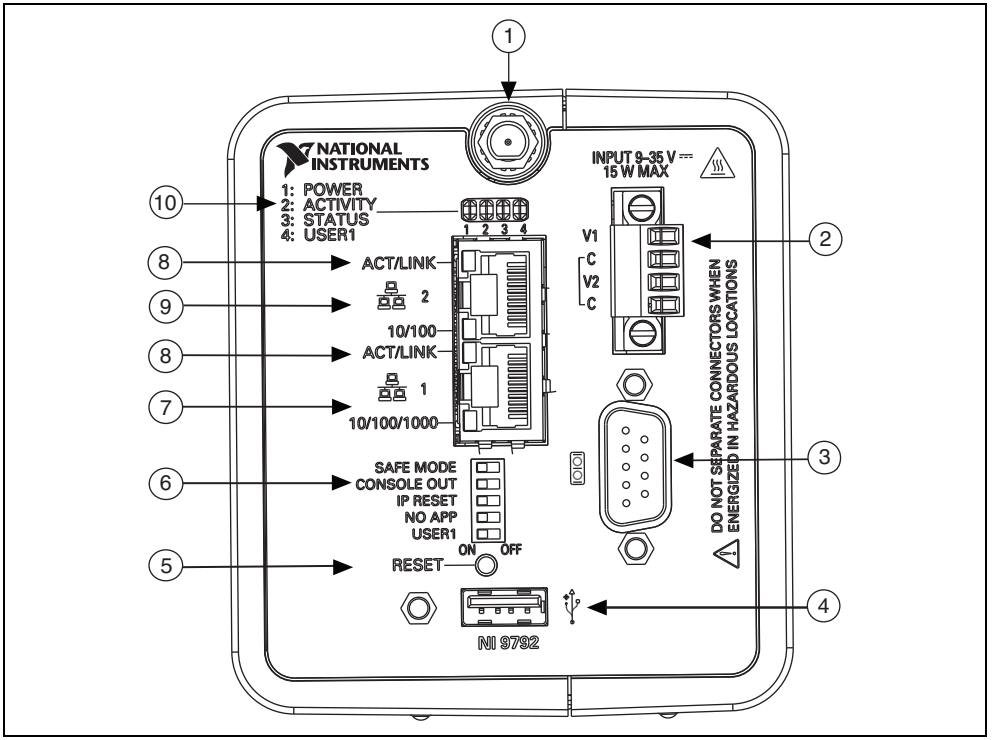
For more information about setting up the NI 9792 as an RT target, refer to the *RT Getting Started Guide*, available on the host computer at **Start»All Programs»National Instruments» LabVIEW 2009» LabVIEW Manuals**.

Using the Internal Real-Time Clock

The system clock of the NI 9792 is synchronized with the internal high-precision real-time clock at startup. This synchronization provides timestamp data to the NI 9792. You can also use the internal real-time clock to correct drift of the system clock. Refer to the *Specifications* section for the accuracy specifications of the real-time clock.

Device Interface

Figure 11 shows the NI 9792 device interface.



1	Antenna RP-SMA Connector	6	DIP Switches
2	9–35 VDC Power Connector	7	RJ45 Ethernet Port 1, 10/100 LED
3	RS-232 Port	8	ACT/LINK LED
4	USB Port	9	RJ45 Ethernet Port 2, 10/100 LED
5	RESET Button	10	LEDs: POWER, ACTIVITY, STATUS, USER1

Figure 11. NI 9792 Device Interface

Connecting Serial Devices to the NI 9792

The NI 9792 has an RS-232 serial port to which you can connect devices such as displays or input devices. Use the Serial VIs to read from and write to the serial port. For more information about the Serial VIs, refer to the *LabVIEW Help*.

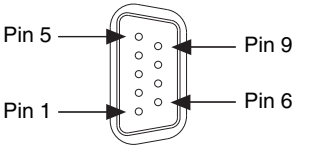


Figure 12. NI 9792 RS-232 Serial Port

Table 1. DB-9 Pin Descriptions

Pin	Signal
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

Connecting USB Mass Storage Devices to the NI 9792

The NI 9792 supports common USB mass storage devices such as USB Flash drives and USB-to-IDE adapters formatted with FAT16 and FAT32 file systems. LabVIEW usually maps USB devices to the `U:`, `V:`, `W:`, or `X:` drive, starting with the `U:` drive if it is available. You can connect multiple USB mass storage devices to the NI 9792 if you use a USB hub. Refer to the *LabVIEW Help* for more information.

Note If the NI 9792 is not in a hazardous location, you can connect and disconnect USB devices without affecting operation.

Configuring DIP Switches

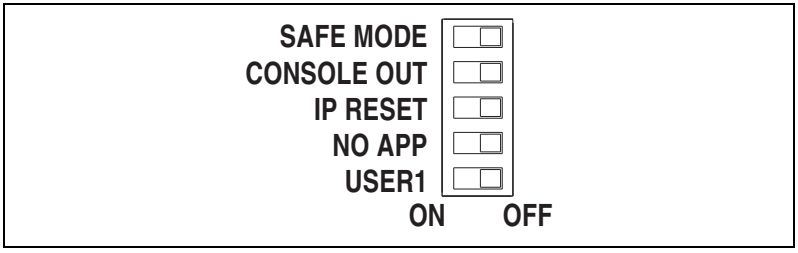


Figure 13. NI 9792 DIP Switches

All of the DIP switches are in the OFF position when the NI 9792 is shipped from National Instruments.

SAFE MODE Switch

The position of the SAFE MODE switch determines whether the embedded LabVIEW Real-Time engine launches when the NI 9792 boots. If the switch is in the OFF position, the LabVIEW Real-Time engine launches. Keep this switch in the OFF position during normal operation. If the switch is in the ON position when the NI 9792 boots, the NI 9792 launches only the essential services required for updating its configuration and installing software. In the latter case, the LabVIEW Real-Time engine does not launch.

Move the SAFE MODE switch to the ON position if the software on the NI 9792 is corrupted. Even if the switch is not in the ON position, if there is no software installed on the NI 9792, the NI 9792 automatically boots into safe mode. The SAFE MODE switch must be in the ON position to reformat the drive on the NI 9792. Refer to the *Measurement & Automation Explorer Help* for more information about installing software on the NI 9792 and reformatting the drive on the NI 9792.

CONSOLE OUT Switch

With a serial-port terminal program, you can use the CONSOLE OUT switch to read the IP address and firmware version of the NI 9792. Use a null-modem cable to connect the serial port on the NI 9792 to a computer. Move the switch to the ON position. Make sure that the serial-port terminal program is configured to the following settings:

- 9,600 bits per second
- Eight data bits
- No parity
- One stop bit
- No flow control

The serial-port terminal program displays the IP address and firmware version of the NI 9792, and alerts you when you connect an unsupported USB device to the NI 9792. Keep this switch in the OFF position during normal operation.

IP RESET Switch

Move the IP RESET switch to the ON position and reboot the NI 9792 to reset the IP address and other TCP/IP settings of the NI 9792 to the factory defaults. Refer to the *Resetting the Network Configuration* section for more information about resetting the IP address.

NO APP Switch

Move the NO APP switch to the ON position to prevent a LabVIEW startup application from running on the NI 9792 when the NI 9792 powers on. If you want to permanently disable the application from running when the NI 9792 powers on, you must disable it in LabVIEW. To run an application when the NI 9792 powers on, move the NO APP switch to the OFF position, create an application using the LabVIEW Application Builder, and configure the application in LabVIEW to launch when the NI 9792 powers on. If you already have an application configured to launch when the NI 9792 powers on and you move the NO APP switch from ON to OFF, the startup application is automatically enabled. For more information about automatically launching VIs when the NI 9792 powers on and disabling VIs from launching when the NI 9792 powers on, refer to the *LabVIEW Help*.

USER1 Switch

You can define the USER1 switch for your application. To define the purpose of this switch in your embedded application, use the RT Read Switch VI in your LabVIEW RT embedded VI. For more information about the RT Read Switch VI, refer to the *LabVIEW Help*.

Reset Button

The NI 9792 is equipped with a RESET button as shown in Figure 11. Pressing the RESET button resets the NI 9792 in the same manner as cycling power.

LED Indicators

The LED indicators for the NI 9792 device are listed in Table 2.

Table 2. LED State/Device Status

LED Description	Color	LED State	Device Status
10/100	Green	On	Connected at 100 Mbps
		Off	No Ethernet connection or 10 Mbps connection
LINK/ACT	Green	On	Ethernet link
		Off	No Ethernet connection
		Blinking	Ethernet activity
POWER	Green/Yellow	Green	Powered from V1
		Yellow	Powered from V2
		Off	Power off

Table 2. LED State/Device Status (Continued)

LED Description	Color	LED State	Device Status
STATUS	Yellow	On	Device firmware booting or resetting to factory default.
		Off	Normal operation.
		1 Blink	The gateway is unconfigured. Use MAX to configure the controller. Refer to the *Measurement & Automation Explorer Help* for information about configuring the gateway.
		2 Blinks	The gateway has detected an error in its software. This usually occurs when an attempt to upgrade the software is interrupted. Reinstall software on the gateway. Refer to the *Measurement & Automation Explorer Hel*p for information about installing software on the gateway.
		3 Blinks	The gateway is in safe mode because the Safe Mode DIP switch is in the ON position. Refer to the *Configuring DIP Switches* section for information about the Safe Mode DIP switch.
		4 Blinks	The gateway software has crashed twice without rebooting or cycling power between crashes. This usually occurs when the gateway runs out of memory. Review your RT VI and check the gateway memory usage. Modify the VI as necessary to solve the memory usage issue.
		Continuously flashing or solid	Error. Reboot device. If problem persists, reset device to factory default settings. Contact `ni.com/support` for additional troubleshooting steps.

Table 2. LED State/Device Status (Continued)

LED Description	Color	LED State	Device Status
ACTIVITY	Green	On	Radio is active and sending or receiving data.
		Off	No radio activity.
USER1	Green/ yellow		You can define the USER1 LED to meet the needs of your application. To define the LED, use the RT LEDs VI in LabVIEW. For more information about the RT LEDs VI, refer to the *LabVIEW Help*.

Resetting the Network Configuration

If the NI 9792 cannot communicate with the network, you can use the IP RESET switch to manually restore the NI 9792 to the default network settings. When you reboot the NI 9792 with the IP RESET switch in the ON position, the NI 9792 attempts to connect to the network using DHCP. If the NI 9792 is unable to initiate a DHCP connection, it connects to the network with a link-local IP address with the form `169.254.x.x`.

Complete the following steps to restore the NI 9792 to the default network settings:

1. Move the IP RESET switch to the ON position.
2. Move the RESET button to cycle power to the NI 9792. The STATUS LED flashes once, indicating that the NI 9792 IP address is unconfigured.
3. Move the IP RESET switch to the OFF position.

You can reconfigure the settings in MAX from a computer on the same subnet. Refer to the *Measurement & Automation Explorer Help* for more information about configuring the NI 9792 settings.

Note If the NI 9792 is restored to the factory network settings, the LabVIEW run-time engine does not load. You must reconfigure the network settings and restart the NI 9792 for the LabVIEW run-time engine to load.

Adding, Removing, and Replacing NI WSN-32*xx* Devices

Use NI MAX to add and remove nodes to and from your NI Wireless Sensor Network. You can remove and insert NI WSN-32*xx* devices while the system is operating and without powering down the NI WSN system. NI WSN-32*xx* devices already working in the system remain operational and accessible on the network. Commands sent to a missing NI WSN-32*xx* device return an error response, but the NI 9792 stores the commands and applies the effects of the commands if a suitable replacement is installed.

When you remove a NI WSN-32*xx* device and add a new one, the NI 9792 first verifies that the replacement device is compatible with the one that was removed. If it is compatible, the NI 9792 device configures the replacement NI WSN-32*xx* device with the previous device settings.

For more information, refer to **Start»All Programs»National Instruments»NI-WSN»Configuring WSN in MAX**.

The NI WSN system is built on an IEEE 802.15.4 wireless mesh network. The 802.15.4 radio in each NI WSN device provides for low-power communication of measurement data across a large network of devices. The NI-WSN software builds on top of that to provide network configuration and reliable communication from the host PC or PAC to the NI WSN-32*xx* node devices.

Mesh Networking

The NI WSN system consists of two types of devices: gateways and nodes. Gateways act as the network coordinator, in charge of node authentication, message buffering, and bridging from the 802.15.4 wireless network to the wired Ethernet network. Nodes primarily function as end nodes in the network to collect data and control DIO channels, but can also be programmed as routers to relay data from other nodes back to the gateway and Host PC or PAC. Use NI MAX to configure nodes as end nodes or routers. Figure 1 shows a typical NI Wireless Sensor Network.

The gateways and nodes work together to form a mesh network. The gateway maintains a list of nodes (by serial number) that have been authorized for network access. When a node powers up, it scans for available networks, locates either a gateway or router, and attempts to join it. If the gateway has the node in its list, the node joins the network, downloads the latest configuration from the gateway, and begins its normal operation of acquiring measurement data and controlling DIO.

Since each node joins a network instead of a particular router or gateway, it can find a new path back to the gateway in the event that the signal is lost or blocked to its existing network route. In this way, the mesh network is inherently self-forming and self-healing. However, this may also cause network throughput to decrease, as there is no way to force a router or end node to join to a particular device in the network. Each time a node joins through a router, the overall throughput of that node is halved, due to the fact that the node must hop to get its messages back to the gateway. Figure 14 shows an example of one possible mesh configuration.

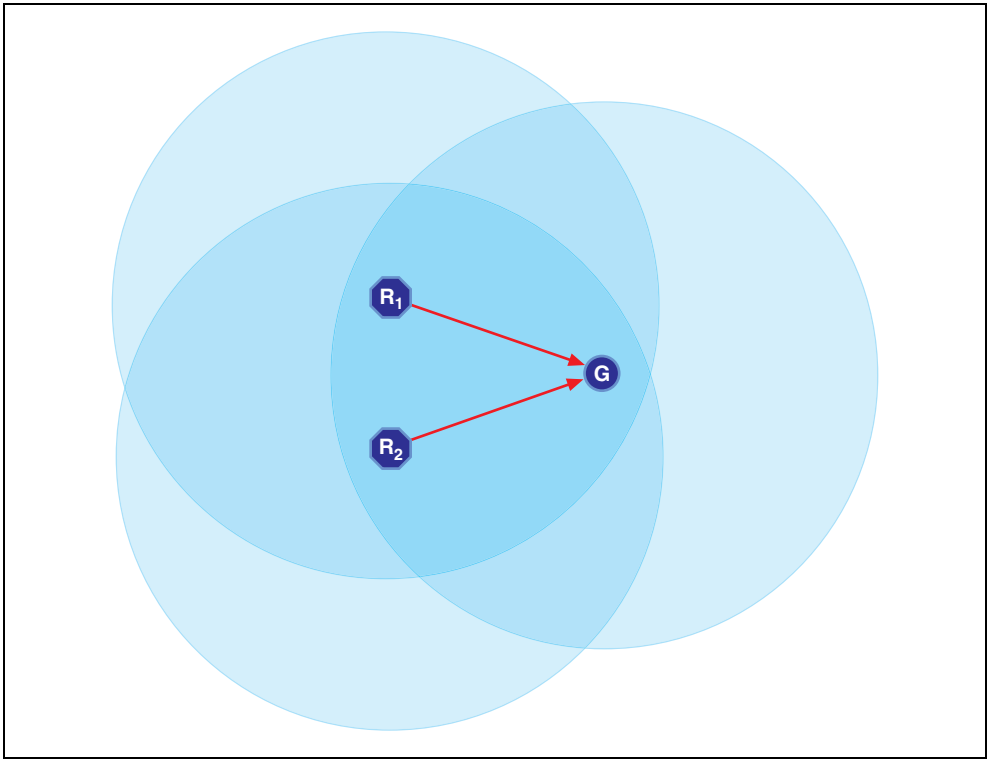


Figure 14. Mesh Configuration Example

In this configuration, R_1 (a router) and R_2 (a router) both communicate directly with the gateway. Measurements taken by both devices can directly reach the gateway without having to hop through another node. However, the configuration above does not always mesh in the same way. Figure 15 shows another possible configuration for the same network.

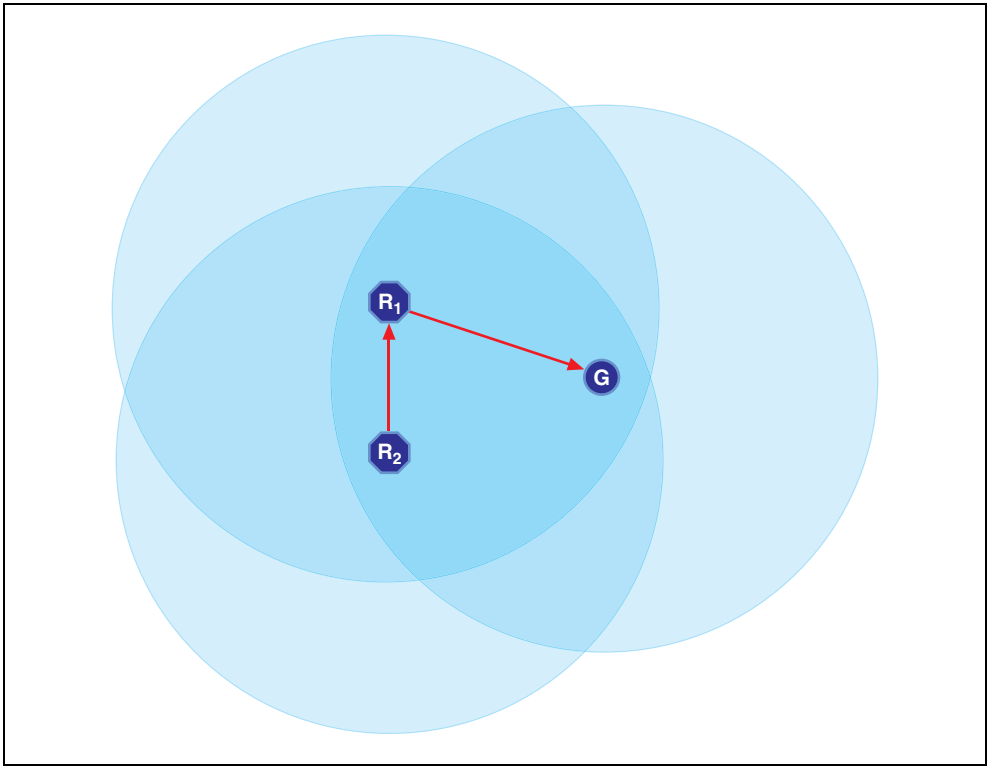


Figure 15. Same Network Configuration Example

In this configuration, R_1 can still communicate with the gateway, but R_2 is now connected through R_1. This means that all measurements taken by R_2 must hop through R_1 before making it back to the gateway. In addition, R_1 is now not only responsible for sending its own measurement data, but also the R_2 data. This configuration is considered a worst case 1-hop system, as R_2 and R_1 both have the possibility of meshing through a router that is connected to the gateway. National Instruments recommends configuring your system for no more than three hops. Configuring multiple nodes as routers and placing them within close proximity introduces the possibility that your system could mesh inefficiently. Figure 16 shows how a system could mesh efficiently, yet also have the possibility of meshing inefficiently.

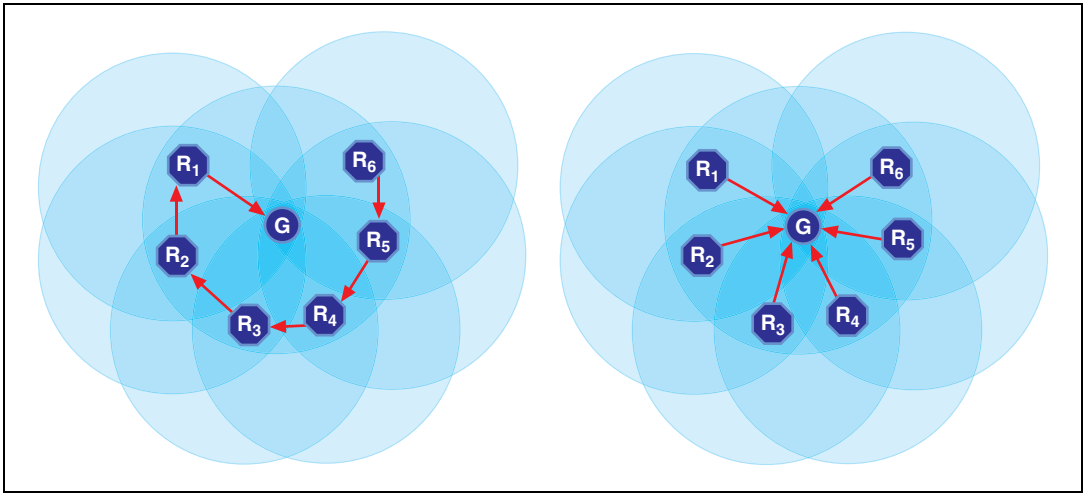


Figure 16. Inefficient Versus Efficient Meshing

The network can be improved with two separate techniques:

1. Convert some routers to end nodes.
2. Set up the network to prevent the routers from being in range of each other (spatially separated by distance, or introducing objects that increase radio interference, such as buildings).

Another advantage of the mesh network is the ability to extend the distance of the end measurement from the wired Ethernet gateway. By placing mesh routers throughout the space where you wish to acquire signals, you can expand the area and distance across which measurement data can be acquired and sent. Refer to the *Specifications* section for typical line of sight ranges for the NI WSN devices. Figure 17 shows how a network can be set up to cover greater distances.

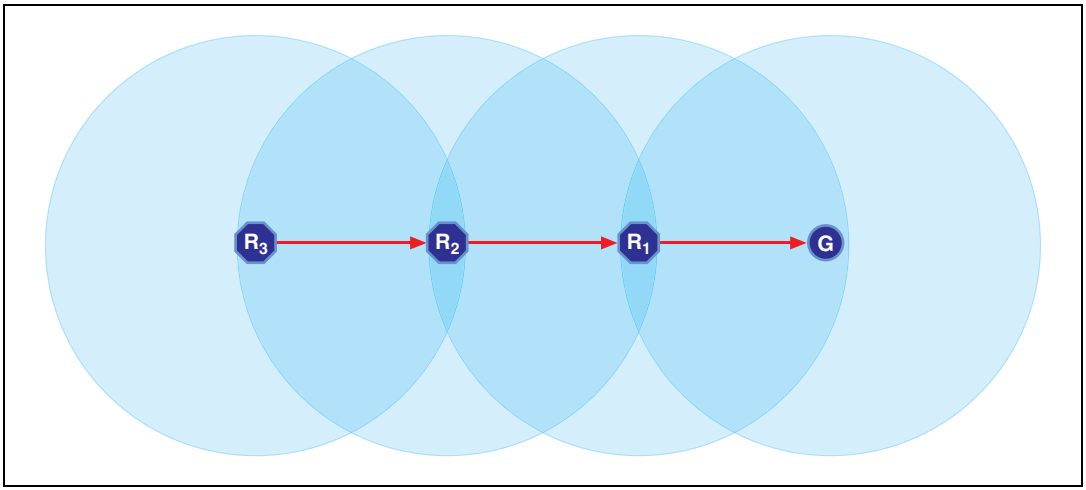


Figure 17. Network Containing Distance Example

End Node Versus Router

Each NI WSN-32*xx* node can be configured as either an end node or a router. NI WSN-32*xx* nodes are configured by default at the factory in end node mode. You can change the mode of the node using the NI-WSN software and NI MAX. One trade-off to consider when configuring nodes is power consumption. NI WSN-32*xx* nodes configured as end node are designed to be run from battery power while routers are designed to use external power at all times to send, receive, and buffer messages to and from end nodes.

Data Transfer in the NI WSN Network

The NI WSN system is built on a low-power, reliable IEEE 802.15.4 network. In order to save power and increase reliability, this network delivers a maximum theoretical throughput of 250 kbps. This correlates to a typical maximum rate of 1 sample per second per node.

Measurements taken with NI WSN-32*xx* nodes are single point acquisition. NI WSN-32*xx* devices have no onboard buffer, therefore the data is considered to be lost, meaning there is no way to retrieve past data from the device.

Configuring Your NI WSN System

As discussed in the *Mesh Networking* section, creating a reliable and efficient wireless sensor network requires an understanding of the physical environment of the network, as well as an understanding of the expected meshing configuration. For example, parent devices (routers and gateways) can only have a maximum of eight end nodes connected to them at a given time.

This maximum number introduces the stranded node problem. The stranded node problem exists when a node, configured as an end node, ends up not being able to join a network. Figure 18 shows a network consisting of one gateway, two routers, and nine end nodes.

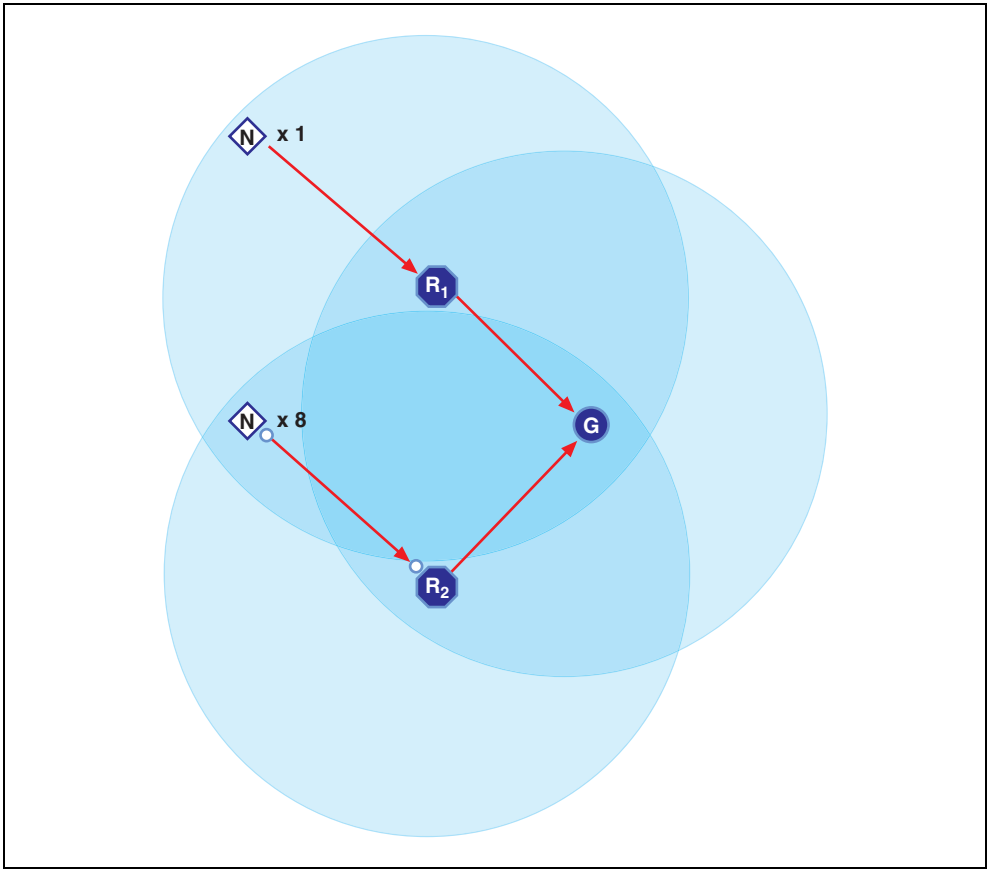


Figure 18. Network Containing Distance, Example 1

In this case, all nodes have properly meshed, and all nodes can communicate with the gateway. However, this network could potentially strand end nodes. Figure 19 shows another possible mesh of the same network.

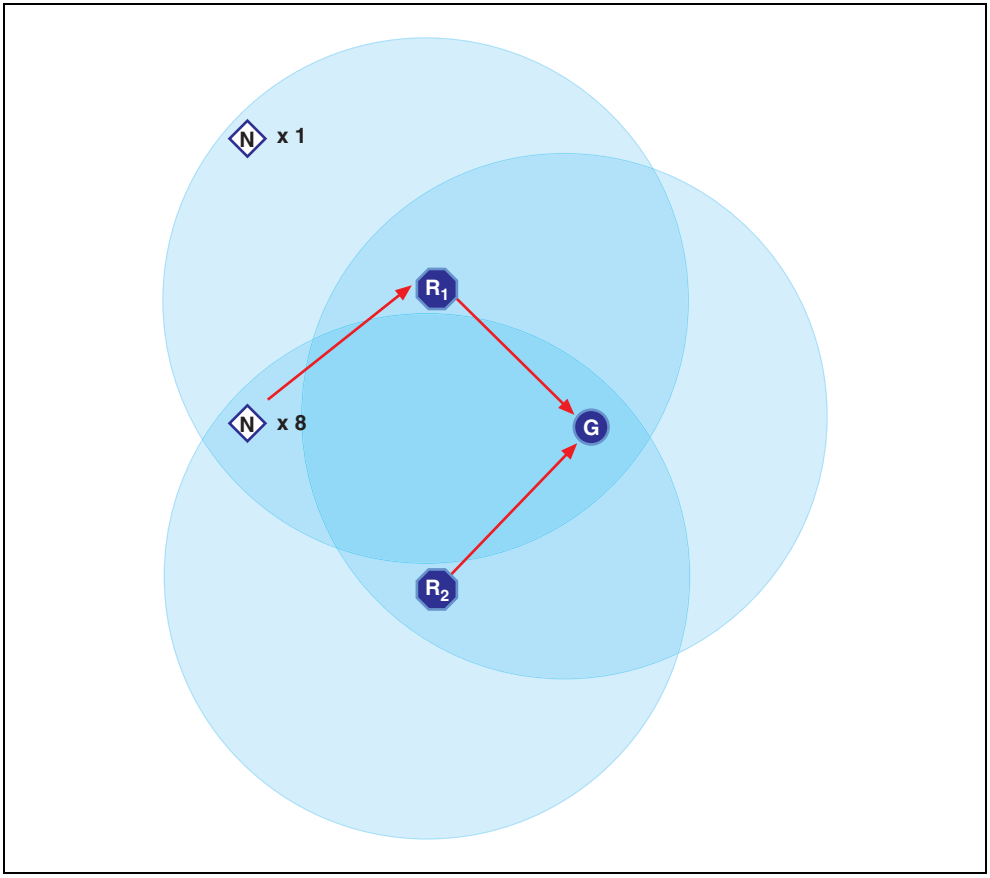


Figure 19. Network Containing Distance, Example 2

In this mesh configuration, eight end nodes in range of both R_1 and R_2 join with R_1. This leaves one end node stranded from the network. This can be corrected in the following two ways:

1. Move the set of eight end nodes to where they can only communicate with R_2. This prevents them from possibly joining R_1.
2. Add an additional router that is in range of the single end node. This introduces the possibility of creating additional hops in the network, but also guarantees coverage of all end nodes.

Specifications

These specifications are typical at 25 °C unless otherwise noted. For the NI WSN-32*xx* specifications, refer to the device user guides.

Wireless Characteristics

Radio mode .....IEEE 802.15.4

RF data rate .....250 kbits/s

Frequency band[1] .....ISM 2.4 GHz (2400 MHz to 2483.5 MHz)

Channels[2] 11–24

TX power

Version	Maximum Radio Output	Outdoor Range
Americas	+17 dBm max (50 mW)	Up to 300 m
Europe/Asia	+10 dBm max (10 mW)	Up to 150 m

Modulation type.....DSSS (O-QPSK)

Receiver sensitivity.....–102 dBm

Antenna

Connector.....Female RP-SMA connector

VSWR.....MAX 2.0

Impedance.....50 Ω

Directivity.....Omni

Nominal gain.....1.5 dBi

Network Interface

Ethernet port 1.....10BaseT and 100BaseTX Ethernet

Ethernet port 2.....10BaseT and 100BaseTX Ethernet

Compatibility.....IEEE 802.3

Communication rates

Ethernet port 1.....10 Mbps, 100 Mbps, auto-negotiated

Ethernet port 2.....10 Mbps, 100 Mbps, auto-negotiated

Maximum cabling distance.....100 m/segment

RS-232 DTE Serial Port

Baud rate.....300–230, 400 bps

Data bits.....5, 6, 7, 8

Stop bits.....1, 1.5, 2

Parity.....Odd, even, mark, space, none

Flow control.....RTS/CTS, XON/XOFF, DTR/DSR, none

USB Port

Maximum data rate.....480 Mb/s

Maximum current.....500 mA

[1] Due to regulations, the frequency bands depend upon the country of operation.

[2] Due to regulations, the valid channels depend upon country of operation.

Memory

Non-volatile .....2 GB

Use the following formula to determine the minimum life span in years of the nonvolatile memory:

Memory life span in years = *Amount of memory in NI 9792 (MB)* × 100,000/365 days]/[*file size (MB)* × *write rate (per day)*]

DRAM .....256 MB

Internal Real-Time Clock

Accuracy .....200 ppm; 35 ppm at 25 °C

Integrated Voltage Input Monitor

The integrated voltage input monitor under reports the voltage at the power connector by up to 400 mV because of voltage drops across internal circuits.

Power Requirements

Caution You must use a UL Listed ITE power supply marked LPS with the NI 9792. The power supply must also meet any safety and compliance requirements for the country of use.

Recommended power supply .....15 W secondary, 35 VDC max

Power consumption.....9.5 W

Maximum power consumption .....15 W

Voltage requirement

On powerup.....9 to 35 V

After powerup .....6 to 35 V

Note For EMC compliance, operate this device with shielded cables. The NI 9792 is guaranteed to power up when 9 V is applied to V and C. After power up, it can operate on as little as 6 V.

Physical Characteristics

If you need to clean the NI 9792, wipe it with a dry towel.

Screw-terminal wiring .....12–18 AWG shielded copper conductor wire with 10 mm (0.39 in.) of insulation stripped from the end

Torque for screw terminals .....0.5 to 0.6 N · m (4.4 to 5.3 lb · in.)

Weight .....Approx. 833 g (29.4 oz)

Weight with antenna .....Approx. 842 g (29.7 oz)

Dimensions .....Refer to Figure 3 for device dimensions.

Safety Standards

Note For UL and other safety certifications, refer to the product label, or go to `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

The NI 9792 is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Hazardous Locations

U.S. (UL) .....Class I, Division 2, Groups A, B, C, D, T4;
Class I, Zone 2, AEx nC IIC T4

Canada (C-UL) .....Class I, Division 2, Groups A, B, C, D, T4;
Class I, Zone 2, Ex nA IIC T4

Europe (DEMKO).....Ex nA nL IIC T4

Note For UL and other safety certifications, refer to the product label, or go to `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Safety Voltages

Connect only voltages that are within these limits.

V terminal to C terminal .....35 V max, Measurement Category I

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

Caution Do not connect the system to signals or use for measurements within Measurement Categories II, III, or IV.

RF Safety Warning

This product complies with FCC radiation exposure limits set for uncontrolled equipment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65. This product generates and radiates radio frequency energy. To comply with the radio frequency radiation exposure guidelines in an uncontrolled environment, this equipment should be installed and operated with at least 20 cm between the radiator and the person's body (excluding extremities: hands, wrists, feet, and legs).

This product complies with the European Council Recommendation (1995/519/EC) on the limitation of exposure of the general public to electromagnetic fields. Compliance was determined in accordance with the requirements in EN 50371.

Electromagnetic Compatibility

This product is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic Immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11, Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

The NI 9792 also meets the requirements of the following EMC standards for intentional radiators:

- EN 300 328
- EN 301 489-1 and EN 301 489-17
- FCC 47 CFR Part 15C
- IC RSS-210

Note For the standards applied to access the EMC of this product, refer to the *Online Product Certification* section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)
- 1999/5/EC; Radio and Telecommunications Terminal Equipment (R&TTE) Directive

Regulatory Information

United States

This product complies with Part 15 of the FCC Rules. Operation is subject to these two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canada

This product complies with Industry Canada RSS-210.

Cet appareil est conforme aux norme RSS210 d'Industrie Canada.

Europe—EU Declaration of Conformity CE

Marking by the above CE symbol on the label indicates compliance with the Essential Requirements of the R&TTE Directive of the European Union (1999/5/EC). This equipment meets the following conformance standards: EN 301489-01, EN300 328, EN301 489-17, EN60950.

Europe – Restrictions for Use of 2.4 GHz Frequencies in European Community Countries

België/ Belgique:	For private usage outside buildings across public grounds over less than 300 m no special registration with IBPT/BIPT is required. Registration to IBPT/BIPT is required for private usage outside buildings across public grounds over more than 300 m. For registration and license please contact IBPT/BIPT.
	Voor privé-gebruik buiten gebouw over publieke groud over afstand kleiner dan 300 m geen registratie bij BIPT/IBPT nodig; voor gebruik over afstand groter dan 300 m is wel registratie bij BIPT/IBPT nodig. Voor registratie of licentie kunt u contact opnemen met BIPT.
	Dans le cas d'une utilisation privée, à l'extérieur d'un bâtiment, au-dessus d'un espace public, aucun enregistrement n'est nécessaire pour une distance de moins de 300 m. Pour une distance supérieure à 300 m un enregistrement auprès de l'IBPT est requise. Pour les enregistrements et licences, veuillez contacter l'IBPT.
Deutschland:	License required for outdoor installations. Check with reseller for procedure to follow.
	Anmeldung im Outdoor-Bereich notwendig, aber nicht genehmigungspflichtig.Bitte mit Händler die Vorgehensweise abstimmen.

France:	Restricted frequency band: only channels 1 to 7 (2400 MHz and 2454 MHz respectively) may be used outdoors in France.
	Bande de fréquence restreinte : seuls les canaux 1–7 (2400 et 2454 MHz respectivement) doivent être utilisés endroits extérieur en France. Vous pouvez contacter l'Autorité de Régulation des Télécommuniations (`http://www.art-telecom.fr`) pour la procédure à suivre.
Italia:	License required for indoor use. Use with outdoor installations not allowed.
	E'necessaria la concessione ministeriale anche per l'uso interno. Verificare con i rivenditori la procedura da seguire.
Nederland:	License required for outdoor installations. Check with reseller for procedure to follow.
	Licentie verplicht voor gebruik met buitenantennes. Neem contact op met verkoper voor juiste procedure.

Japan

The certified radio equipment is embedded in this device.

本機器には認証済み無線設備が内蔵されています

Singapore

Complies with IDA Standards DA105692

Taiwan R.O.C.

低功率電波輻射性電機管理辦法
第十二條經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
第十四條低功率射頻電機之使用不得影響飛航安全及幹擾合法通信；經發現有幹擾現象時，應立即停用，並改善至無幹擾時方得繼續使用。
前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之幹擾。

EU Regulatory Statements

Česky [Czech]	*National Instruments* tímto prohlašuje, _e tento NI WSN-9792 je ve shodě se základními po_adavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
Dansk [Danish]	Undertegnede *National Instruments* erklćrer herved, at fřlgende udstyr NI WSN-9792 overholder de vćsentlige krav og řvrige relevante krav i direktiv 1999/5/EF.
Deutsch [German]	Hiermit erklärt *National Instruments*, dass sich das Gerät NI WSN-9792 in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.

et Eesti [Estonian]	Käesolevaga kinnitab*National Instruments* seadme NI WSN-9792 vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
en English	Hereby, *National Instruments*, declares that this NI WSN-9792 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
es Español [Spanish]	Por medio de la presente *National Instruments* declara que el NI WSN-9792 cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
el Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ *National Instruments* ΔΗΛΩΝΕΙ ΟΤΙ NI WSN-9792 ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
fr Français [French]	Par la présente *National Instruments* déclare que l'appareil NI WSN-9792 est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
it Italiano [Italian]	Con la presente *National Instruments* dichiara che questo NI WSN-9792 è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
lv Latviski [Latvian]	Ar šo *National Instruments* deklarē, ka NI WSN-9792 atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
lt Lietuvių [Lithuanian]	Šiuo *National Instruments* deklaruoja, kad šis NI WSN-9792 atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
nl Nederlands [Dutch]	Hierbij verklaart *National Instruments* dat het toestel NI WSN-9792 in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
mt Malti [Maltese]	Hawnhekk, *National Instruments*, jiddikjara li dan NI WSN-9792 jikkonforma mal-htigijiet essenzjali u ma provvedimenti ohrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
hu Magyar [Hungarian]	Alulírott, *National Instruments* nyilatkozom, hogy a NI WSN-9792 megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
pl Polski [Polish]	Niniejszym *National Instruments*. oświadcza, że NI WSN-9792 jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
pt Português [Portuguese]	*National Instruments* declara que este NI WSN-9792 está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
sl Slovensko [Slovenian]	*National Instruments* izjavlja, da je ta NI WSN-9792 v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
sk Slovensky [Slovak]	*National Instruments* týmto vyhlasuje, _e NI WSN-9792 spĺňa základné po_iadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
fi Suomi [Finnish]	*National Instruments* vakuuttaa täten että NI WSN-9792 tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
sv Svenska [Swedish]	Härmed intygar *National Instruments* att denna NI WSN-9792 står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.
Íslenska [Icelandic]	Hér með lýsir *National Instruments* yfir því að NI WSN-9792 er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 1999/5/EC.
no Norsk [Norwegian]	*National Instruments* erklærer herved at utstyret NI WSN-9792 er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 1999/5/EF.

Online Product Certification

Note Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Shock and Vibration

To meet these specifications for shock and vibration, you must panel mount or wall mount the WSN system, affix ferrules to the ends of all terminal wires, install a strain relief on the power cable, and install tie wraps on the Ethernet and power cables. You can order the NI 9979, a strain-relief kit for the power cable, from National Instruments. The kit is NI part number 196939-01.

Operating vibration, random
(IEC 60068-2-64).....5 g_{rms}, 10 to 500 Hz

Operating shock
(IEC 60068-2-27).....30 g, 11 ms half sine,
50 g, 3 ms half sine,
18 shocks at 6 orientations

Operating vibration, sinusoidal
(IEC 60068-2-6).....5 g, 10 to 500 Hz

Environmental

Operating temperature
(IEC-60068-2-1 and IEC-60068-2-2) .....–40 to 70 °C

Storage temperature
(IEC-60068-2-1 and IEC-60068-2-2) .....–40 to 85 °C

Ingress protection.....IP 40

Operating humidity (IEC-60068-2-56).....10 to 90% RH, noncondensing

Storage humidity (IEC-60068-2-56).....5 to 95% RH, noncondensing

Pollution Degree (IEC 60664) 2

Maximum altitude.....2,000 m

Indoor use only

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at `ni.com/environment`. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit `ni.com/environment/weee`.

Battery Replacement and Disposal



Battery Directive This device contains a long-life coin cell battery. If you need to replace it, use the Return Material Authorization (RMA) process or contact an authorized National Instruments service representative. For more information about compliance with the EU Battery Directive 2006/66/EC about Batteries and Accumulators and Waste Batteries and Accumulators, visit `ni.com/environment/batterydirective`.

电子信息产品污染控制管理办法 （中国 RoHS）



中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。
关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。
(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

Where to Go for Support

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at `ni.com/support` and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

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France 01 57 66 24 24, Germany 49 89 7413130, India 91 80 41190000, Israel 972 3 6393737,
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Portugal 351 210 311 210, Russia 7 495 783 6851, Singapore 1800 226 5886,
Slovenia 386 3 425 42 00, South Africa 27 0 11 805 8197, Spain 34 91 640 0085,
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