

System Release 1.3
Nitro™



SLX 2000 Installation Guide

APRIL 2020

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Document History

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MN005659A01-A	Initial release of <i>SLX 2000 Installation Guide</i>	May 2019
MN005659A01-B	Second release of <i>SLX 2000 Installation Guide</i> . Added footnotes on PoE+ support.	July 2019
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MN005659A01-D	Fourth release of <i>SLX 2000 Installation Guide</i>	February 2020
MN005659A01-E	Fifth release of <i>SLX 2000 Installation Guide</i> MOTOTRBO® references removed from Nitro technology name	April 2020

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About This Manual

This document details procedures for installing the SLX 2000 Indoor-Pico Enterprise CBSD.

Helpful Background Information

Motorola Solutions offers various courses designed to assist in learning about the system. For information, go to <https://learning.motorolasolutions.com> to view the current course offerings and technology paths.

Related Information

Related Information	Purpose
SLX 4000 Installation Guide	Provides procedures for installing the SLX 4000 Outdoor-Pico Enterprise CBSD.
Nitro™ Cloud Provisioning Portal User Guide	Provides list of procedures describing functionalities available in the Nitro Cloud Provisioning Portal.
Nitro™ System Planner	Provides description of the system functionality, system design guidelines and orderability options
Nitro™ Installation and Configuration Manual	Provides instructions on setting up and configuring Nitro system

Chapter 1

General Safety Installation Standards and Guidelines

For safe installation, operation, service and repair of the equipment, follow the safety precautions and instructions, as well as any additional safety information in Motorola Solutions product service and installation manuals and the Motorola Solutions R56 Standards and Guidelines for Communications Sites manual, which can be obtained by ordering **CDROM 9880384V83**. To obtain copies of these materials, contact Motorola Solutions as directed at the end of this section. After installation, these instructions should be retained and readily available for any person operating, servicing or working near the repeater.

The installation process requires preparation and knowledge of the site. Review installation procedures and precautions in the Motorola Solutions R56 manual before performing any site or component installation. Personnel must use safe work practices and good judgment, and always follow safety procedures, such as requirements of the Occupational Safety and Health Administration (OSHA), the National Electrical Code (NEC), and local regulations and codes.

1.1

Human Exposure to Radio Frequencies

SLX 2000 must be installed and operated from a minimum safe distance of 48 cm (18.9 in).

1.2

Radio Interference

SLX 2000 generates, uses, and radiates radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. If SLX 2000 causes harmful interference to radio or television reception, try to perform one or more of the following measures:

- Re-orientate or relocate the unit.
- Increase separation between the unit and the end devices.
- Connect the equipment to a different circuit outlet that does not have the power source connected.

1.3

Modifications

Any changes and modifications to SLX 2000 that are not expressly approved by Motorola Solutions may void the authorization to operate the equipment.

1.4

Warnings and Cautions

The following rules must be observed when installing SLX 2000:

- Only qualified personnel are allowed to install, replace, and service the equipment.
- The device cannot be sold to the general public either in retail, or by mail order. It can only be leased to operators.

- Provisioning of SLX 2000 in the Nitro™ network must be contracted to a Certified Professional Installer (CPI).
- Installation requires special training. The SLX 2000 must be installed only by experienced installation professionals familiar with local building and safety codes and, wherever applicable, licensed by the appropriate government regulatory authorities. Failure to do so may void the product warranty and may expose the end user or the service provider to legal and financial liabilities.



NOTICE: Motorola Solutions and its resellers or distributors are not liable for injury, damage or violation of regulations associated with the installation of indoor and outdoor units and associated antennas.

1.5

Important Safety Instructions

Familiarize yourself with all the following operating and safety instructions before the installation and observe them when installing SLX 2000.

- Keep all product information for future reference.
- Position the power cord to avoid possible damage.
- Do not overload circuits.
- Do not place this product on or near a direct heat source.
- Avoid placing objects on the terminal.
- Use only a damp cloth for cleaning.
- Disconnect the power before cleaning.
- Do not install the unit near power lines or other electrical power circuits.
- Keep the socket outlet within easy reach if you need to disconnect the device.



NOTICE: The Certified Professional Installer (CPI) must install this device in accordance with the National Electric Code (NEC), the National Fire Protection Association (NFPA) requirements and the local electrical codes. When installed in the final configuration, the product must comply with the applicable safety standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

1.6

Hazardous Voltages

Short-circuiting the circuits with low voltage and low impedance can cause severe arcing that may result in burns or eye damage.

Remove rings, watches and other metal jewelry to avoid shorting DC circuits.

Chapter 2

SLX 2000 Overview

SLX 2000 is a part of Motorola Solutions carrier-class 4G Pico Citizens Broadband Radio Service Device (CBSD) family to be used for the Nitro™ network. To meet the demands of the Broadband Wireless Access market, SLX 2000 supports 3GPP Long Term Evolution (LTE) CBSDs, providing high-speed data and mobility.

SLX 2000 is a compact, easy to install high-performance indoor pico-cell CBSD¹, allowing an operator to deploy LTE broadband services in public venues and enterprise offices, supporting both wall and ceiling mounting.

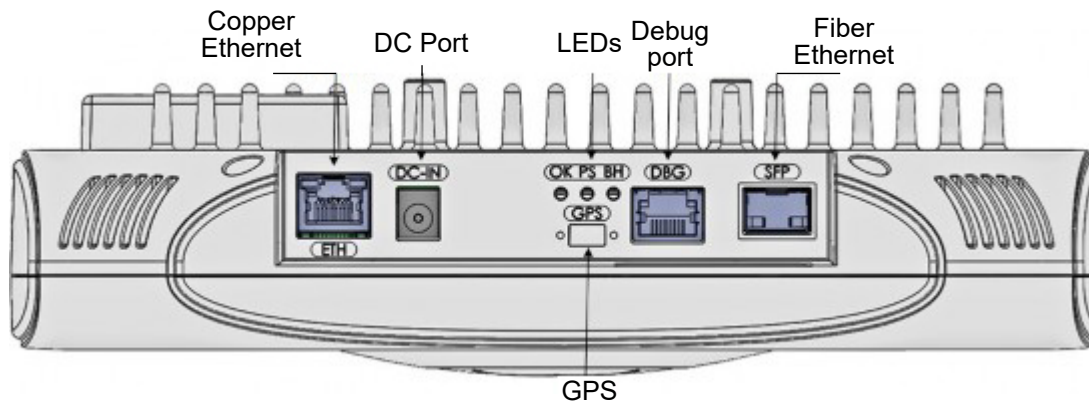
SLX 2000 employs Software Defined Radio (SDR) technology together with two transmit paths, two receive paths, antennas and clock synchronization in a highly integrated, physically small and light product, targeted to blend seamlessly into the environment. This compact pico product minimizes physical footprint, power consumption and operating expenses.

SLX 2000 LTE radio implements a quad 25 dBm (4 x 316 mW) transmit channel with an integral antenna.

Figure 1: SLX 2000



Figure 2: SLX 2000 Ports



¹A single sector non-contiguous dual carrier solution with up to a total of 40MHz bandwidth will be supported in future releases.

2.1 SLX 2000 Specifications

2.1.1 SLX 2000 Weight and Dimensions

The following tables list weight and dimensions of SLX 2000 and its components:

Table 1: SLX 2000 Dimensions

Component	Dimensions (Height x Width x Depth)
Main Unit	250 x 250 x 60 mm
Ceiling Mounting Plate	13.50 x 160 x 163.1 mm
Ceiling Rail Plate	52.9 x 52.9 x 18 mm (plate + pins)
Ceiling and Wall Rail Bracket (comes assembled on the AV 1500 unit)	17.50 x 64 x 55.50 mm

Table 2: SLX 2000 Weight

Component	Quantity	Weight	Total Weight
Main Unit	1	3 kg (6.6 lb)	
Ceiling Mounting Plate	1	263 g (9.28 oz.)	
Ceiling Rail Plate	4	26 g (0.917 oz.)	104 g (3.67 oz)
Ceiling and Wall Rail Bracket	2	47 g (1.66 oz.)	94 g (3.32 oz.)
Locking Pin	1	7 g (0.25 oz.)	



NOTICE: Total Weight is the combined weight of the entire quantity of the component.

2.1.2 SLX 2000 Maximum Output TX Total Power

The following table provides data on maximum output transmit (TX) total power.

Table 3: SLX 2000 ETSI/FCC Maximum Output TX Total Power

Frequency Band (MHz)	(European Telecommunication Standard Institute) ETSI		Antenna Gain (dBi)
	TX (dBm)	EIRP (dBm)	
3550-3700	4x25 (4x316 mW)	33 (2W)	8



CAUTION: Do not exceed maximum output TX total power settings allowed by the local regulations.

2.1.3

SLX 2000 Supported Frequency Bands

SLX 2000 supports the following frequency bands with the specific performance values:

Table 4: SLX 2000 Supported Frequency Bands

Band	Product Code	Downlink Frequency (MHz)	Uplink Frequency (MHz)	Duplex	Tx Power per Channel (dBm, mW)
48	EQ000182A0 1	3550-3700	3550-3700	Time Division Duplex (TDD)	4x25 dBm (4x316 mW)

2.1.4

SLX 2000 Power Consumption

SLX 2000 has a maximum nominal power consumption of 30W.

Table 5: SLX 2000 Power Consumption

- Nominal Power Consumption - average power consumption over time.
- Power Supply Requirement - the required power supply rating connected to the Citizens Broadband Radio Service Device (CBSD).

Duplex	LTE Tx Power Before the Antenna (dBm)	Nominal Power Consumption (W)
Time Division Duplex (TDD)	25	≤30

2.1.5


SLX 2000 Integral Sectorial Antenna Parameters

SLX 2000 has a sectorial antenna that can be used as an omni antenna for ceiling mount and directional antenna for wall mounting.

The integral sectorial antenna is a cross-polarized fixed antenna which is an inseparable part of the unit. Use of an external antenna is not part of the product design.

Table 6: Integral Sector Antenna Parameters (LTE)

Frequency (GHz)	Boresight Gain (typical)	Mounting Location	Horizontal 3dB BW (typical)	Vertical 3dB BW (typical)
3.55-3.7	8 dBi	Wall	65°	65°
		Ceiling	Omni	30°

 **NOTICE:** The included integral LTE antenna is dependent on the LTE band of the product.

2.2

SLX 2000 Power Supply


SLX 2000 supports direct connection to DC power source or to Power over Ethernet (PoE¹)/PoE+ power source:

Table 7: SLX 2000 Operational Voltage Range

Operational Voltage Range	
RJ45 PoE++:	50.0–57.0 VDC, IEEE802.3bt class 6
DC port:	9-14VDC

Table 8: SLX 2000 Power Supply Options

Installation Kit	Part Number	Note
PoE-171A-60 single-port 10/100/1000 Mbps 802.3 bt PoE Injector	DSPOE171A60	One per unit for PoE only
AC adapter, 60W, IN 100-240VAC, OUT 12VDC/5A and US AC Cable	PMLN7773A	One per unit for AC/DC only


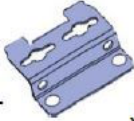
 **NOTICE:** AC to PoE+/PoE++ injector or AC and DC power supply are not included with SLX 2000 and must be ordered separately.

2.3


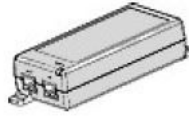

SLX 2000 Components

SLX 2000 includes the following components:

Table 9: SLX 2000 Components

Part	Part Number	Quantity	Image
Main Unit	AAE200 48ENA1 AN	1	
Angular Bracket		2	

¹ PoE+ is not officially supported

Part	Part Number	Quantity	Image
Suspended Ceiling/Ceiling mounting plate + hardware	DS9030 3267	1	
AC to PoE+*/PoE++ power supply		4	
AC to DC power Supply	PMLN77 73A	1	

*PoE+ is not officially supported

See [SLX 2000 Mounting Kit on page 17](#) for additional details.

2.4 SLX 2000 Environmental Compliance

SLX 2000 follows European Telecommunications Standards Institute (ETSI) standards in environmental compliance.

SLX 2000 meets the following environmental requirements:

- ETSI EN 300-019-1-3 Operational (weather protected locations)
- ETSI EN 300-019-1-1 Storage (weather protected, not temperature controlled locations)
- ETSI EN 300-019-1-2 Transportation

Table 10: SLX 2000 Environment Compliance

Type	Details	Standard Compliance
Operating Temperature	-5°C to 40°C	ETSI 300 019 1-3 Class 3.1
Operating Humidity	5% – 85% non-condensing	ETSI 300 019 1-3 Class 3.1
Storage Temperature	-20°C to 70°C	N/A
Storage Humidity	5% – 95% non-condensing	N/A
Ingress Protection	IP40	N/A
Operational Altitude	70 – 106 kPa as well as: From -60 m to 1800 m at 40°C From 1800 m to 4000 m at 30°C	N/A
Solar Radiation	700 W/m ²	ETSI 300 019 1-3 Class 3.1

Chapter 3

SLX 2000 Installation

You can install SLX 2000 by mounting it on a ceiling (including suspended ceiling¹) or on a wall using the mounting kit.

3.1

SLX 2000 Mounting Kit

Table 11: SLX 2000 Mounting Kit

Part Number	Components	Note
DS90303267	<ul style="list-style-type: none"> One ceiling mounting plate Four suspended ceiling rail plates One Y-hook Speed Link SLK locking device with Y-Hook configuration (wire rope diameter 2 mm. wire rope length 3.3 inches) One locking pin with key ring (6.5 x 15 mm) 	One kit per unit



NOTICE: SLX 2000 mounting kits are available separately.

3.2

SLX 2000 Minimum Hardware Requirements

The following tools are minimally required to install SLX 2000:

Table 12: Minimum Hardware Requirements

Tool	Use
Phillips-head screwdriver	Attaching the wall/ceiling mounting bracket
M5 spanner (wrench)	Tightening locking nuts

¹ Suspended ceiling bracket # BR000448A01 is sold separately.

3.3

SLX 2000 Ceiling Installation

SLX 2000 can be installed on a ceiling or a suspended ceiling.

3.3.1

Installing SLX 2000 on the Ceiling

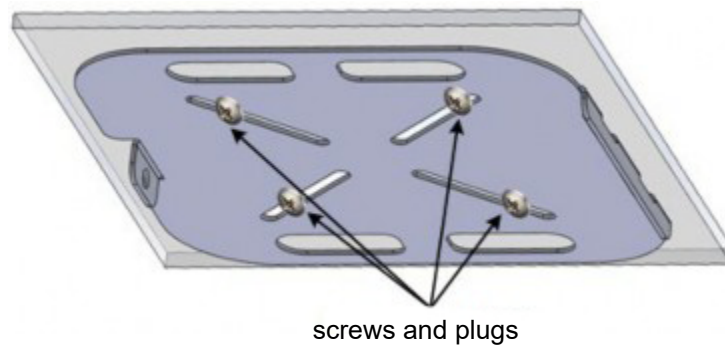
Prerequisites:

- Ensure that you have an IP connection to the Nitro™ network.
- Ensure that you have the minimum hardware required for the installation. See [SLX 2000 Minimum Hardware Requirements on page 17](#).
- Ensure that all the required parts and components are available. See [SLX 2000 Components on page 15](#) and [SLX 2000 Mounting Kit on page 17](#).

Procedure:

- 1 Determine the required location to install the SLX 2000 unit on the ceiling.
- 2 Position the ceiling mounting plate straight on the ceiling.
- 3 Through the diagonal slots on the ceiling mounting plate, mark the screw positions on the ceiling.
- 4 Drill four holes for screws and anchors (plugs).
- 5 Insert the ceiling anchors in the drilled holes.
- 6 Fasten the ceiling mounting plate to the ceiling with screws and washers.

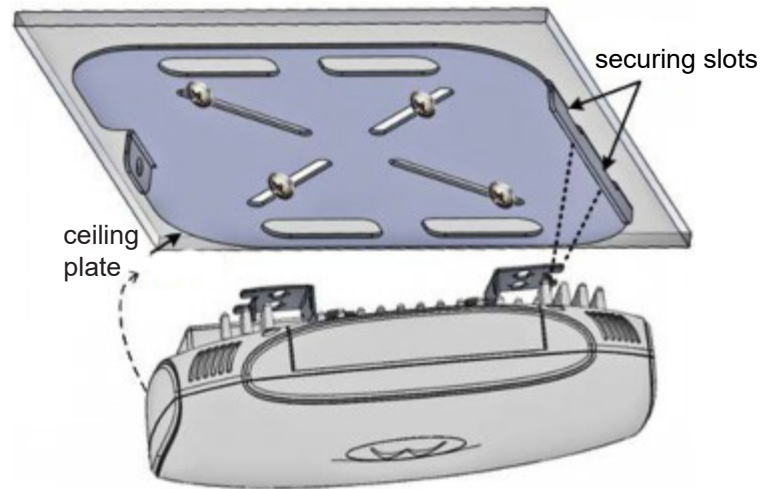
Figure 3: Mounting Bracket Attached to the Ceiling



Screws and washers are not supplied by Motorola Solutions. The installer is responsible for obtaining all the necessary hardware. Use appropriate ceiling hardware according to field conditions.

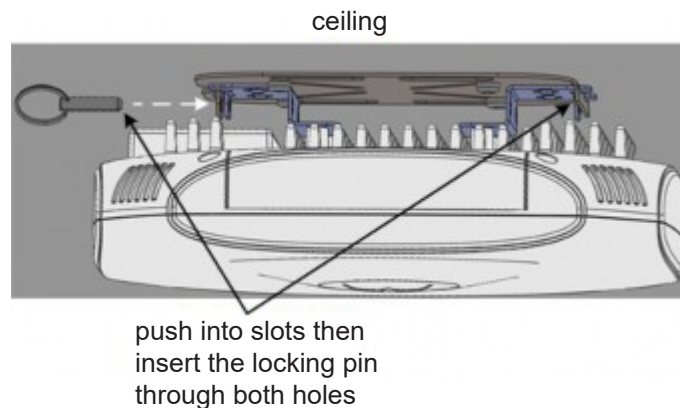
- 7 Lift the unit into position and engage the rail bracket projections to enter the securing slots on the ceiling mounting plate.

Figure 4: Installation on the Ceiling



- 8 Swing the unit into the other side of the ceiling mounting plate.
 - a Secure the locking pin (supplied) through the hole on the rail bracket and the ceiling mounting plate.

Figure 5: Locking Pin Secured for Ceiling Installation



- 9 Remove the plastic cover to expose the connectors.
- 10 Connect the cables to the following ports:
 - Power cable port
 - Copper Ethernet port (ETH) – if applicable
 - Fiber Ethernet port (SFP) – if applicable
 - GTPS port – when required
- 11 Replace the cover.

3.3.2

Installing SLX 2000 on the Suspended Ceiling

Prerequisites:

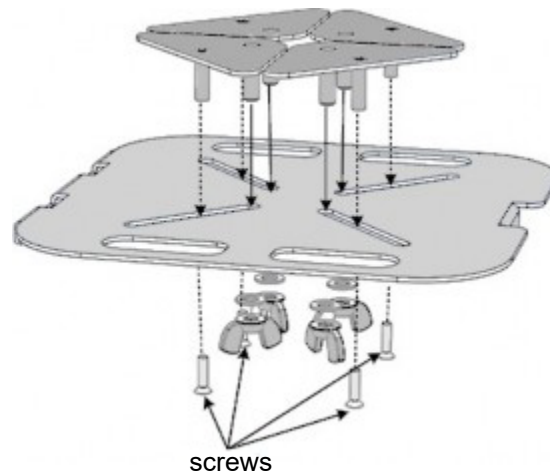
- Ensure that you have an IP connection to the Nitro™ network.
- Ensure that you have the minimum hardware required for the installation. See [SLX 2000 Minimum Hardware Requirements on page 17](#).

- Ensure that all the required parts and components are available. See [SLX 2000 Components on page 15](#) and [SLX 2000 Mounting Kit on page 17](#).
- Fasten the safety cable (included) to a secure riser within the ceiling cavity above the intended installation spot.

Procedure:

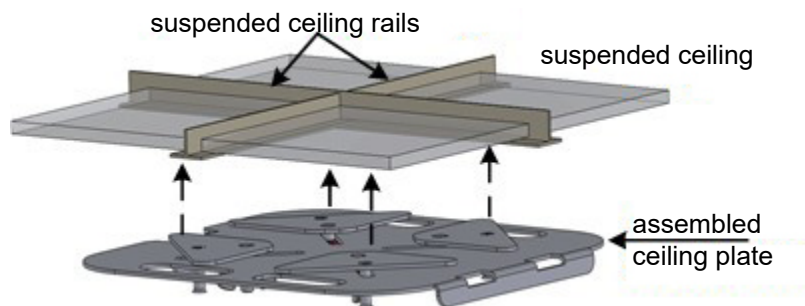
- 1 Determine the required location to install the SLX 2000 unit at an intersection between the suspended ceiling rail supports.
- 2 Assemble the four rail plates (triangular) on the ceiling mounting plate using suspended ceiling mount bracket BR000448A01.
- 3 Insert the screws into the stud slides.
- 4 Attach the fiber washer and the wing nut on to the four threaded studs.
- 5 Ensure that all four rail plates slide freely in their slots.

Figure 6: Rail Plates on the Mounting Plate



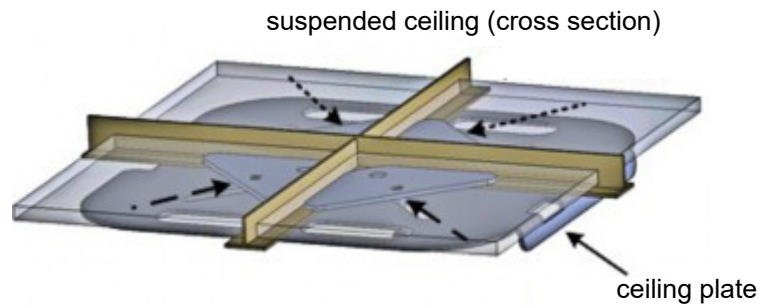
- 6 At the pre-determined juncture of the suspended ceiling rail supports, position the assembled mounting plate and rails on the rail supports.

Figure 7: Ceiling Mounting Plate and Rails Assembly



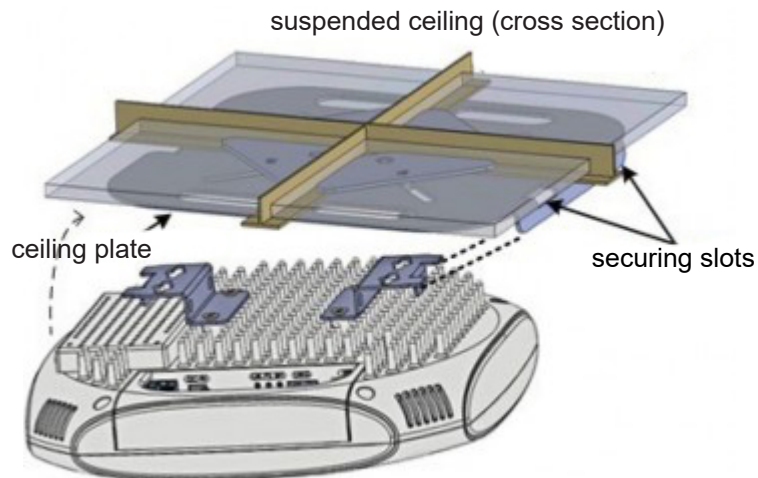
- 7 Slide the triangular rail plates so that they clinch the ceiling rails at the intersections.

Figure 8: Rail Plates Fixed on the Ceiling Rails



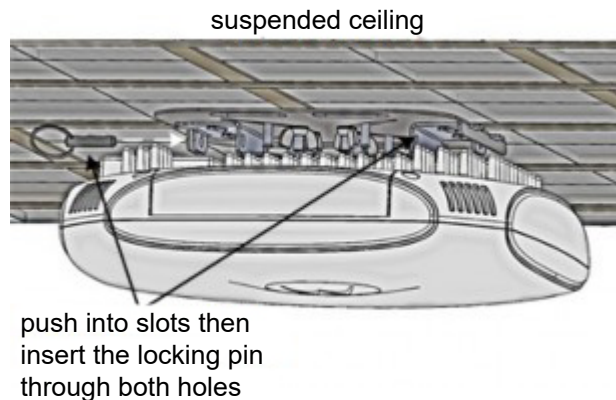
- 8 Tighten all four wing nuts.
- 9 Lift the unit into position and engage the rail bracket projections to enter the securing slots on the ceiling mounting plates.

Figure 9: Rail Brackets Projections Engaged into the Ceiling



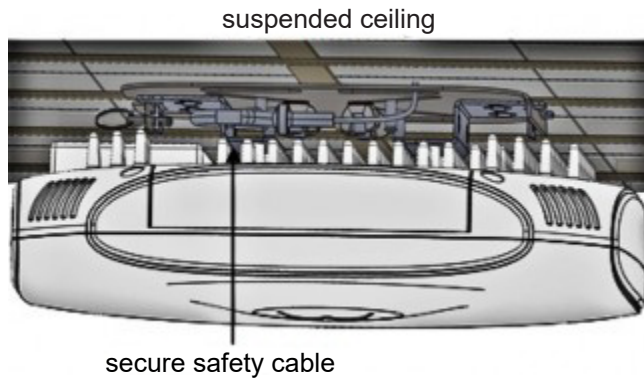
- 10 Swing the unit into the other side of the ceiling mounting plate.
 - a Insert and secure the locking pin (supplied) through the hole on the rail bracket and the ceiling mounting plate.

Figure 10: Locking Pin Insertions



- 11 After the locking pin is secured, insert and click close the safety cable (supplied).

Figure 11: Safety Cable Secured



- 12 Remove the plastic cover to expose the connectors.
- 13 Connect the cables to the following ports:
 - Power cable port
 - Copper Ethernet port (ETH) – if applicable
 - Fiber Ethernet port (SFP) – if applicable
 - GTPS port – when required
- 14 Replace the cover.

3.4

Installing SLX 2000 on the Wall

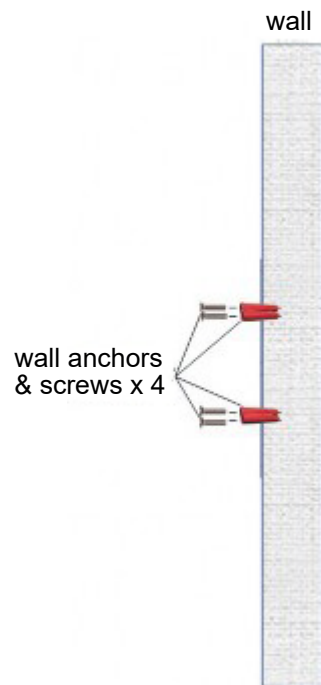
Prerequisites:

- Ensure that you have an IP connection to the Nitro™ network.
- Ensure that you have the minimum hardware required for installation. See [SLX 2000 Minimum Hardware Requirements on page 17](#).
- Ensure that all the required parts and components are available. See [SLX 2000 Components on page 15](#) and [SLX 2000 Mounting Kit on page 17](#).

Procedure:

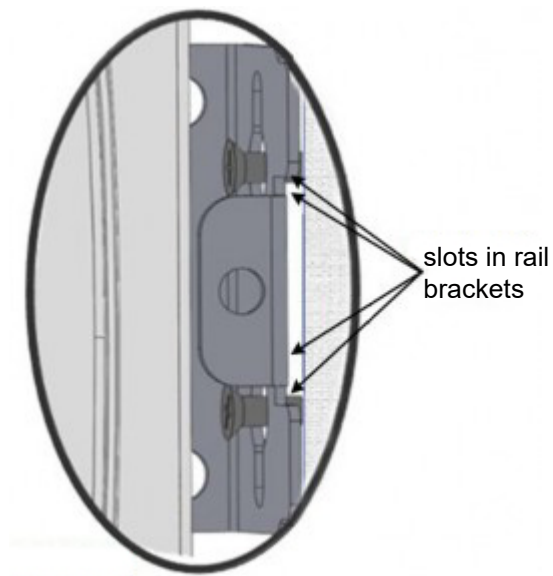
- 1 Determine the required location to install the SLX 2000 unit on the wall.
- 2 Position the supplied marking template on the spot of the wall where the unit is to be installed.
The template must be positioned straight for the unit to be leveled.
- 3 Through the template, mark the position of the holes on the wall.
- 4 Drill four holes.
- 5 Insert anchors into the drilled holes.
Anchors are not supplied by Motorola Solutions. The installer is responsible for obtaining all the necessary hardware. Use appropriate anchors according to field conditions.
- 6 Drive the screws into the wall far enough for the screw heads to stick out of the wall.
To hold the rail brackets tightly, the screw must stick out slightly more than the shoulder thickness of the head.

Figure 12: Wall Anchors and Screws Installation



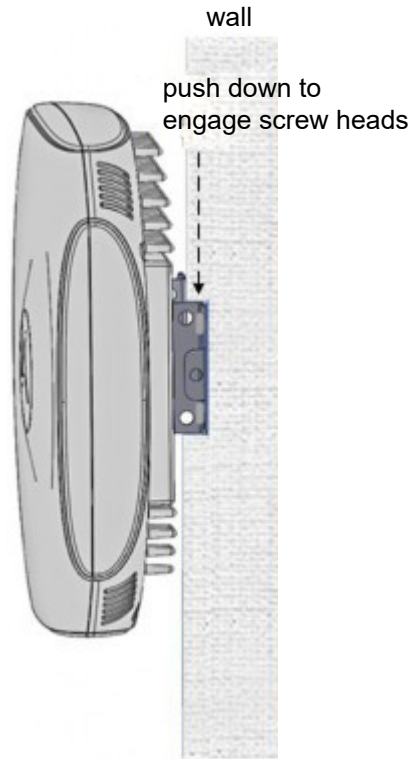
- 7 Place rail brackets onto the screw heads protruding from the wall.

Figure 13: Anchors and Screws Inserted



- 8 Push down each head of the screw to engage it into the slot.

Figure 14: Screw Heads Engagement



- 9 Remove the plastic cover to expose the connectors.
- 10 Connect the cables to the following ports:
 - Power cable port
 - Copper Ethernet port (ETH) – if applicable
 - Fiber Ethernet port (SFP) – if applicable
 - GTPS port – when required
- 11 Replace the cover.

3.5

SLX 2000 LED Display

The LED signals on the panel indicate the status of the unit. Refer to the following table for the indication of current status when powering up the unit.

Table 13: SLX 2000 LED Display

Name	Color	Status	Description
Status LED (OK LED)			
Powering Up	White	Illuminated	On until CBSD starts loading
Initiating Software	Green	Blinking (~3 Hz)	During initiating process until "All Running" signal

Name	Color	Status	Description
Normal operation	Blue	On Continuously	Normal operation (no alarm)
Major Alarm	Yellow/Orange	On Continuously	Service not affected
Critical Alarm or Sector OOS	Red	On Continuously	Service affected
Power Source LED (PS LED)			
PoE+*	Blue	On Continuously	The unit is powered from PoE+ (802.3 at) class 4 source
PoE++/DC	Green	On Continuously	The unit is powered from PoE++ (802.3 bt) class 6 or DC source
*PoE+ is not officially supported			

3.6

SLX 2000 Cables Management and Connection

The DC IN connector for DC power plug is located on the panel of the main unit.

Figure 15: SLX 2000 DC Power Plug and DC IN Connector



3.6.1

Installing the AC to PoE+/PoE++/DC Power Supply

The AC to PoE+¹/PoE++/DC power supply must be mounted on a wall in close proximity to the SLX 2000 unit.

Prerequisites: Ensure that an electrical outlet is available close to the preferred spot for installing the power supply.

Procedure:

Mount the power supply using the screws through the two holes on the frame of the unit.

3.6.2


SLX 2000 Ethernet Cable Installation

SLX 2000 uses both copper Ethernet and fiber (SFP) Ethernet cables.

For copper Ethernet cable, a standard RJ45 connection is used when applicable.

¹ PoE+ is not officially supported

Fiber (SFP) Ethernet cable and its connector are not supplied with the unit. Contact Motorola Solutions for additional information on SFP cables.

 **NOTICE:** You can manage and store any excess cable by winding it and tying it off before connecting to the appropriate port. It eliminates slack and accommodates more thorough and orderly installation.

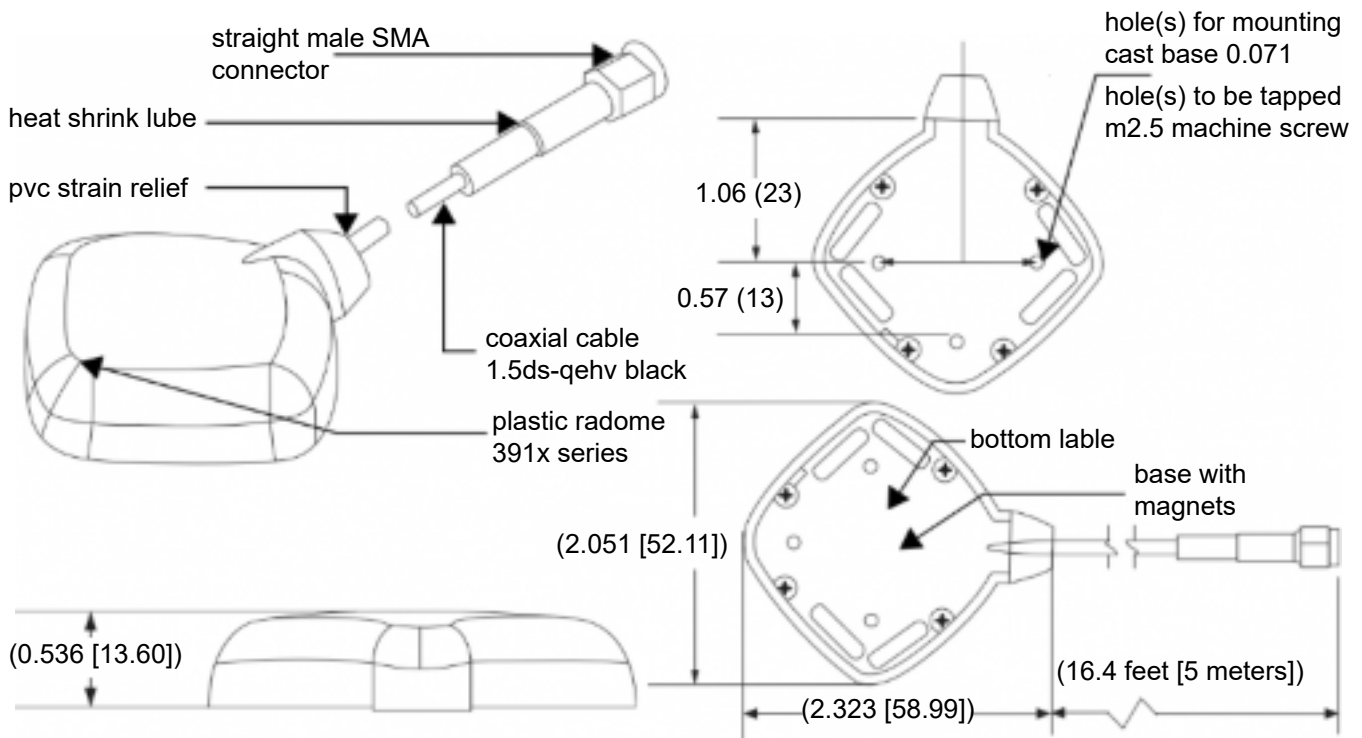
3.7 SLX 2000 GPS Antenna Installation


The GNSS magnetic mount antenna for SLX 2000 includes an active GPS/GLONASS antenna with an option for magnetic or screw mount installation. The strong magnetic force of the antenna secures it to the ferrous surface.

The optimum location for mounting the GNSS antenna is a flat level surface, free of obstruction, offering a clear view of the horizon and above in all directions

Figure 16: SLX 2000 GPS Antenna Installation

Dimensions in parentheses (inches and millimeters) are nominal values and are given for reference only.



 **NOTICE:** Silicone sealant around holes is recommended for secure and water-tight seal if using screw-mount installation.