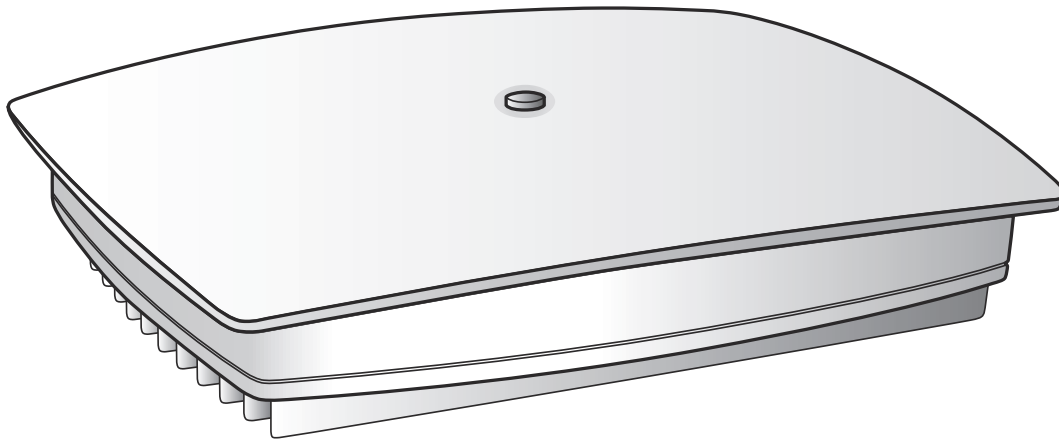


# SpiderCloud<sup>®</sup> Radio Node - SCRN-200 Hardware Installation Guide



Part number: DOC-SCRN-HW-07, Rev. 1  
Published: December 2012

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### **FCC Statements**

**Caution:** Any changes or modification cautions to this device not explicitly approved by manufacturer could void your authority to operate this equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum 20 cm between the radiator and your body. This transmitter must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.

### **Industry Canada Statements**

This Class [A/B] digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe [A/B] est conforme à la norme NMB-003 du Canada.

### **Revision History**

| <b>Revision</b> | <b>Date</b> | <b>Summary of Changes</b>   |
|-----------------|-------------|-----------------------------|
| 1               | 12/04/2012  | First release for SCOS R3.1 |

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# Contents

## About this Manual

This guide provides the system specifications of the SpiderCloud® Radio Node 200 (SCRN-200). It includes detailed hardware installation instructions, the boot sequence, and expected LED behavior both during the boot-up and under operating conditions. An appendix shows the radio node antenna patterns.

The primary audience for this guide includes network planners, system administrators and installation personnel. It assumes you have knowledge about networking principles, networking configuration, site preparation, powering, and experience in hardware installation and maintenance.

## System Overview

The SCRN-200 is a low-cost, low-power (100mW) base station designed for indoor use. The radio node is 3GPP compliant, supporting Universal Mobile Telecommunications System (UMTS) Release 6.

The radio node enables mobile operators to offer dedicated, in-building coverage and capacity for UMTS services. It is easy to install and connects to the existing enterprise LAN using standard Ethernet cabling or to a dedicated LAN infrastructure deployed for use by the operator. Radio nodes are managed by the SpiderCloud Services Node 8000 (SCSN-8000) access controller, typically installed in the enterprise DMZ.

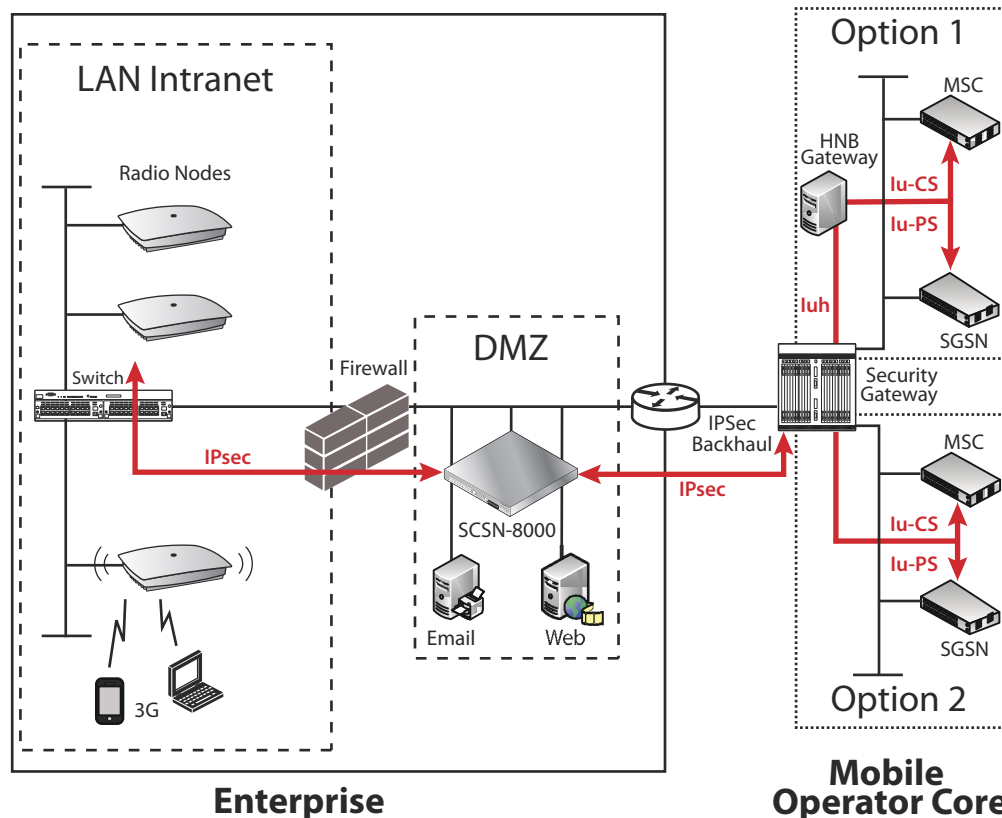


Figure 1 Radio Node Relationship to Enterprise and Mobile Operator Core Networks

## Services Provided

The radio node provides the following services:

- Complete enterprise mobility using licensed spectrum
- Radio Frequency (RF) self-calibration for autonomous setup, operation, and management
- Enhanced networking
- Transparent integration into enterprise network environments

## Radio Node System Isometric Top View and Bottom View

The radio node ships with either two internal antennas, or with two TNC connectors for use with external antennas. The following drawings display an isometric top and bottom views of the radio node with internal antennas:

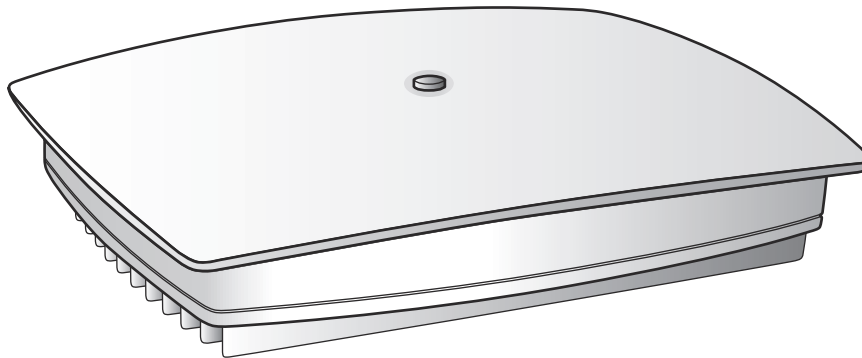


Figure 2 Radio Node Top View

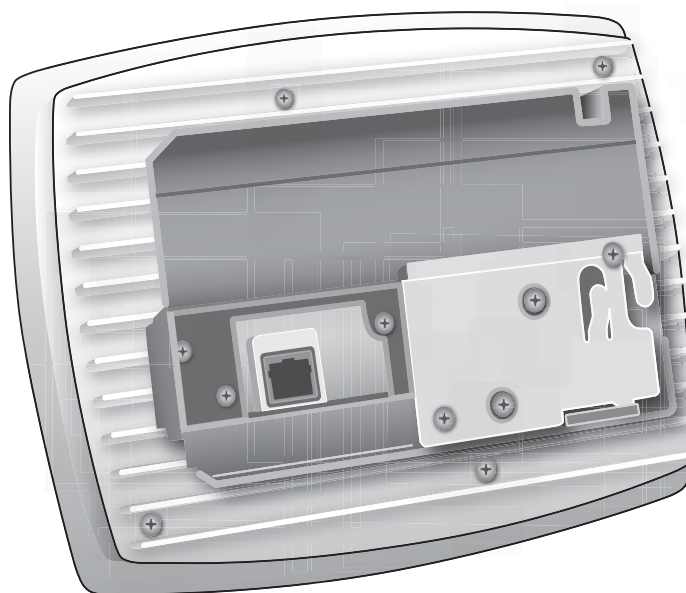


Figure 3 Radio Node Bottom View with Pedestal Base

# System Specifications

Following are the system specifications for the radio node frequency bands of operation, system size, environmental requirements, power, and compliance:

## Frequency Bands of Operation

SpiderCloud Wireless provides three versions of the SCRN-200 for operation in the following bands:

- UMTS Band I: Receiver: 1920-1980 MHz, Transmitter: 2110-2170 MHz.  
GSM monitor at 925-960 MHz, 1805-1880 MHz
- UMTS Band II: Receiver: 1850-1910 MHz, Transmitter: 1930-1990 MHz.  
GSM monitor at 869-894, 1930-1990 MHz
- UMTS Band IV: Receiver: 1710-1755 MHz, Transmitter: 2110-2155 MHz.  
GSM monitor at 869-894, 1930-1990 MHz

## Size and Dimensions

- Height:
  - 4.9 centimeters (1.9 inches)
  - 8.1 centimeters including mount bracket assembly (3.2 inches)
- Width: 19.0 centimeters (7.5 inches)
- Length: 23.8 centimeters (9.4 inches)
- Weight (both models):
  - 0.91 kilograms (2 pounds)
  - 1.41 kilograms with mounting bracket (3.1 pounds)

## Environmental Requirements

- Operating temperature range:
  - 0° to 50° C (32° to 122° F) vertical mount
  - 0° to 40° C (32° to 104°F) horizontal mount, fins up
- Operating humidity: 0 to 90% non-condensing
- Storage temperature range: 0° to 85° C (-40° to 185° F)
- Altitude range: 0 to 1,800 meters (0 to 5,905 feet)
- Storage humidity: 0 to 90% non-condensing

## Power

The radio node is compliant with both IEEE 802.3af (PoE) and IEEE 802.3at (PoE+).



Note

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SpiderCloud Wireless recommends PoE+ powering so the site can readily support future products operating at higher power levels.

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- Power consumption: 12W

## SpiderCloud Radio Node - SCRN-200 Hardware Installation Guide

- Two orderable options for transmitter output power:
  - 100mW (20 dBm) RMS radio power
  - 250mW (24 dBm) RMS radio power

## Compliance

- ETSI:
  - EN 301 489-1
  - EN 301 489-23
  - EN 301 908-1
  - EN 301 908-3
  - EN 50385
  - EN 60950-1 (safety)
- IEEE 802.3at PoE+
- FCC:
  - FCC Part 15 Class A
  - FCC Part 24 (UMTS Band II only)
  - FCC Part 27 (UMTS Band IV only)
- CE Marking
- NRTL Marking
- RoHS (Directive 2002/95/EC on RoHS)
- R&TTE (Directive 1999/5/EC on R&TTE)
- CB certification as per IEC 60950-1:2011
- Industry Canada: RSS-133, RSS-139, ICES-003 (Class A)

## Radio Node Models

[Table 1](#) displays the orderable configurations of the SCRN-200 radio node:

**Table 1: SCRN-200 Radio Node Configurations**

| Radio Node Model | Description                           |
|------------------|---------------------------------------|
| SCRN-200-1       | UMTS Band I, Internal antennas        |
| SCRN-200-1E      | UMTS Band I, external antennas        |
| SCRN 200-2       | UMTS Band II, Internal antennas       |
| SCRN-200-2E      | UMTS Band II, external antennas       |
| SCRN 200-4       | UMTS Band IV, external antennas       |
| SCRN-200-4E      | UMTS Band IV, external antennas       |
| SCRN-200-241     | UMTS Band I, Internal antennas, 24dBm |



**Table 1: SCRN-200 Radio Node Configurations** *(continued)*

| Radio Node Model | Description                            |
|------------------|--|
| SCRN-200-242     | UMTS Band II, Internal antennas, 24dBm |
| SCRN-200-242E    | UMTS Band II, external antennas, 24dBm |
| SCRN-200-244     | UMTS Band IV, Internal antennas, 24dBm |
| SCRN-200-244E    | UMTS Band IV, external antennas, 24dBm |

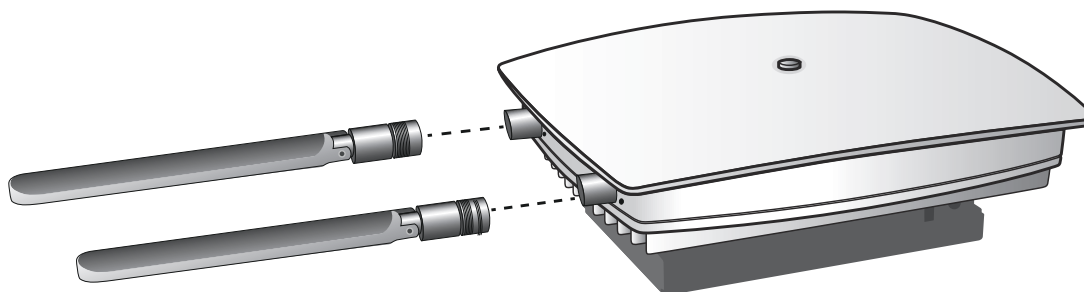
## Antennas

The radio node uses two vertically-polarized, omnidirectional 2 dBi nominal gain antennas. Both antennas receive, only one antenna transmits. One model has internal antennas. The other has two antenna ports with TNC connectors for use with external antennas.



Tip

To maximize antenna transmission, SpiderCloud Wireless recommends not installing the radio node inside a metallic enclosure.



**Figure 4 Typical External Antennas**

For regulatory compliance, use only antennas certified by SpiderCloud Wireless.

## Ports

The radio node has one 10/100 Ethernet port that supports a Category 5e (Cat 5e) or better twisted-pair cable with an RJ-45 connector. [Figure 5](#) on page 10 shows the 10/100 port. There are two LEDs on the connector:

- **Link:** Steady green state indicates a normal Layer 2 link connection has been established.
- **Activity:** Yellow blinking indicates data activity.

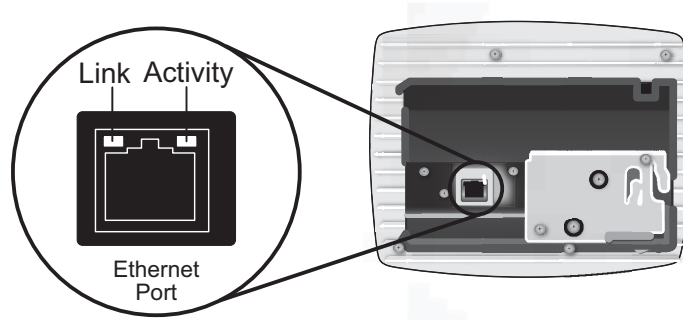


Figure 5 Ethernet Port

The radio node for use with external antennas has two antenna ports with TNC connectors labeled **A** and **B**. Connector **A** transmits and receives. Connector **B** is receive only.

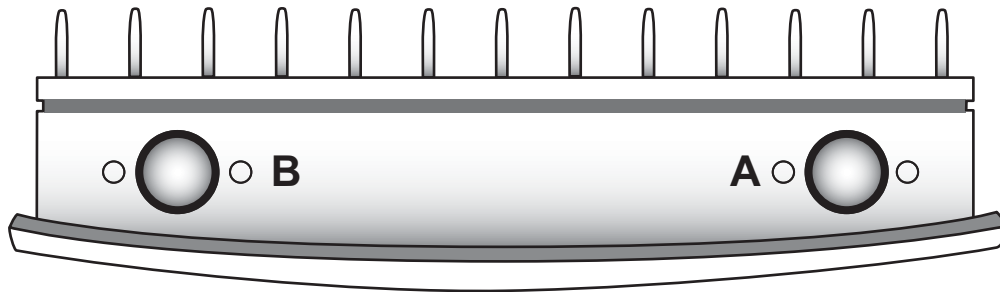


Figure 6 Antenna Port TNC Connectors

## The Top-Panel LED

The radio node has one top-panel tricolor LED to indicate power and status. This is the only LED visible under normal operating conditions.

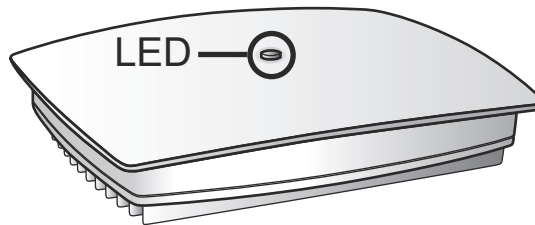


Figure 7 Radio Node Tricolor LED

When the radio node initially boots the LED cycles through a number of colors and flashing behaviors until it is fully operational. Refer to [Radio Node LED Boot Sequence](#) on page 20 for more information about the LED boot cycle and [Radio Node LED Management](#) on page 21 for information about LED management.

## Input Power

The radio node receives its power from a standard PoE+ switch (typical) or injector. The radio node is fully compliant with the IEEE 802.3at Power Over Ethernet (PoE+) specification. SpiderCloud Wireless recommends PoE+ powering to support future products and functionalities operating at higher power levels.

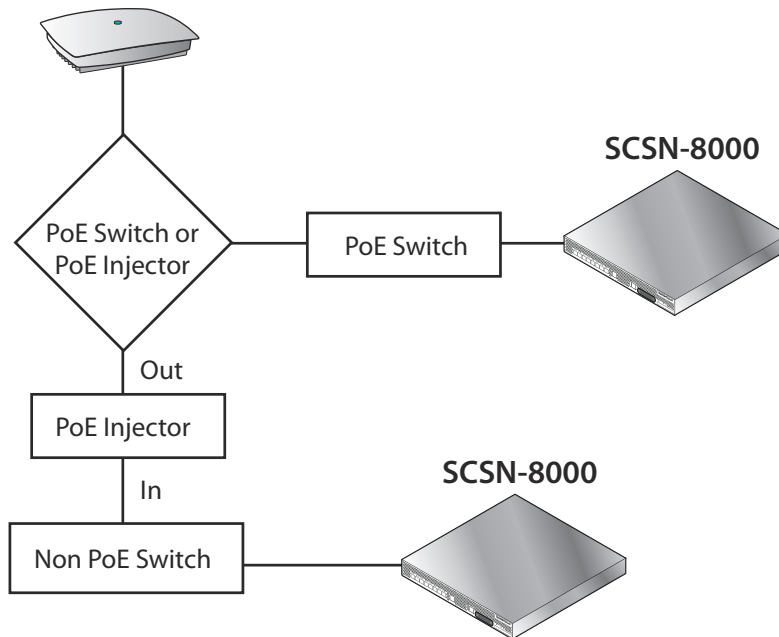
Per IEEE 802.3at, use standard Cat 5e or better twisted-pair cable with a maximum length restriction of 100 meters (328 feet) for PoE+. This restriction minimizes power loss between the PoE+ power source and the radio node.



**Note**

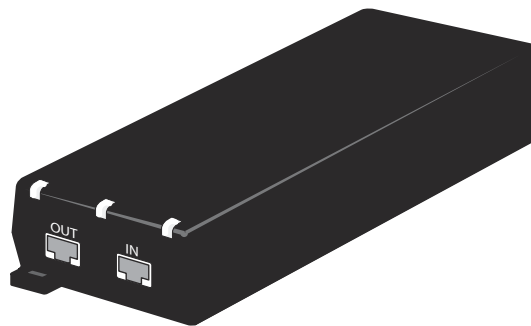
Power is distributed over two pairs of the four available pairs in Cat 5e cables. The radio node can accept power on either used or un-used pairs.

Figure 8 shows the valid radio node cabling/powering options:



**Figure 8 Valid Radio Node Cabling/Powering Options**

The illustration below shows a generic single-port PoE+ injector. Use this injector only when a PoE+ Ethernet switch is *not* available.



**Figure 9 Typical PoE+ Injector**

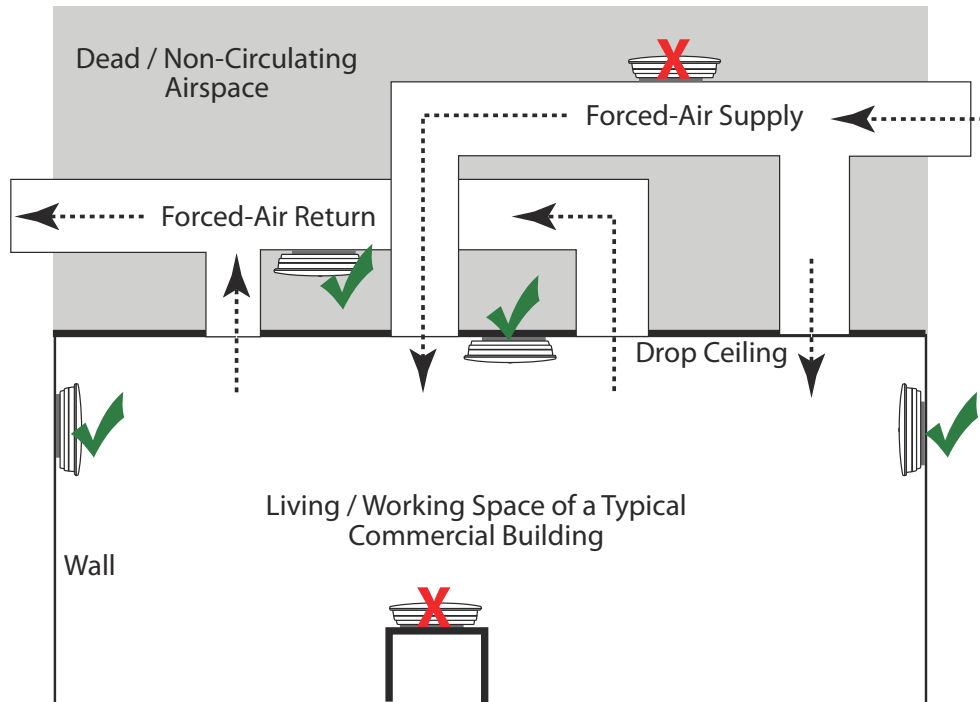
### To connect the PoE+ injector to a radio node

- Step 1** Attach the injector power cord to a power source.
- Step 2** Connect an unpowered Ethernet cable from a switch to the **IN** port on the injector.

- Step 3** Connect an Ethernet cable from the injector's **OUT** port to the radio node. The injector will now inject power onto a pair of wire pairs in the cable. The radio node will expect a nominal 48V DC input (57V max) from a typical PoE+ injector.

## Select the Radio Node Location

Radio nodes can be installed in a wide range of locations including walls, ceilings, and plenum spaces. Follow the installation guidelines for selecting appropriate mounting locations for the unit. When mounting a radio node vertically, align the bottom-side fins vertically for superior cooling.



**Figure 10 Radio Node Locations**

When possible, locate radio node units at least 5 meters (16 feet) from an external wall. This distance maximizes indoor coverage and minimizes RF leakage outside the building. When mounting near a wall or other obstruction, orient the mounting bracket such that the transmit antenna faces towards the coverage area and faces away from the wall. Refer to [Bracket Mounting and Cabling Guidelines](#) on page 14 for more information.

Use [Table 2](#) to determine the maximum distance between radio node units. Greater separation may affect coverage or system performance.

| <b>Table 2: Recommended Radio Node Separation Distances</b>         |                                   |
|---|-----------------------------------|
| <b>Type of Building</b>   | <b>Max Recommended Separation</b> |
| Warehouses and large open-spaced buildings                          | 70 m (230 feet)                   |
| Open-plan offices   | 45 m (148 feet)                   |
| Closed-plan offices (e.g., individual rooms - plasterboard)         | 30 m (98 feet)                    |
| Closed-plan offices (e.g., individual rooms - stone/brick/concrete) | 20 m (66 feet)                    |

## Installation and Mount Bracket Assembly

The radio node has a pedestal base that slides into a long bracket for ceiling or wall mounting. SpiderCloud Wireless pre-bolts the pedestal base onto the extrusion plate on the radio node. However you must attach the pedestal base to the mount bracket as shown in [Figure 11](#):

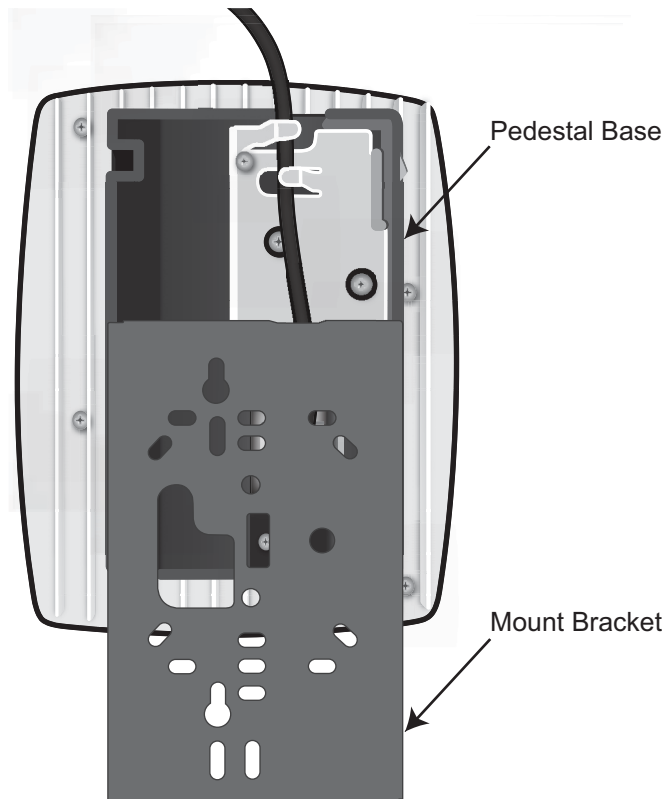


Figure 11 Pedestal Base Slides into Mount Bracket

## Bracket Mounting and Cabling Guidelines

Incorrectly cabling and mounting a radio node can result in crushed cables and loss of communications to the unit. Follow these guidelines in cabling the radio node and mounting it on the bracket:

- Ensure that the cabling is properly routed and dressed.
- Ensure that the pedestal base is fully inserted into the mount bracket so that it locks into place and is flush. A correctly installed cable should at no time during installation impede inserting the pedestal base into the mount bracket.
- Secure the pedestal base to the mount bracket with a padlock or tie wrap to provide physical security.
- When mounting the radio node vertically, orient the bracket with the open end on top and the closed end on the bottom. [Figure 12](#) on page 14 shows the proper vertical orientation.
- When mounting the radio node near a wall or other obstruction, orient the bracket such that the radio node transmit side towards the coverage area. In vertical mountings, this is on the right side of the radio node. [Figure 12](#) on page 14 shows the mounting bracket orientation:

## Installing the Radio Node

The radio node receives its power source over powered Ethernet. If your wiring closet does not have existing PoE+ equipment, SpiderCloud Wireless recommends a PoE+ power injector for the radio node. See section [Input Power](#) on page 10.

The Ethernet cable can route openly or directly through a surface such as a wall or ceiling:

- Refer to [Installing the Radio Node \(Method 1\)](#) on page 14 for open cable routing installation.
- Refer to [Installing the Radio Node \(Method 2\)](#) on page 16 for direct cable routing installation.

### Installing the Radio Node (Method 1)

#### To route the cable openly and mount the radio node

- Step 1** With two user-provided screws, attach the mount bracket assembly to a wall or ceiling. The screw holes are sized for an M4 (#10) screw. Ensure the screws have a snug fit onto the studs, sheetrock, anchor, or other material you are bolting onto.

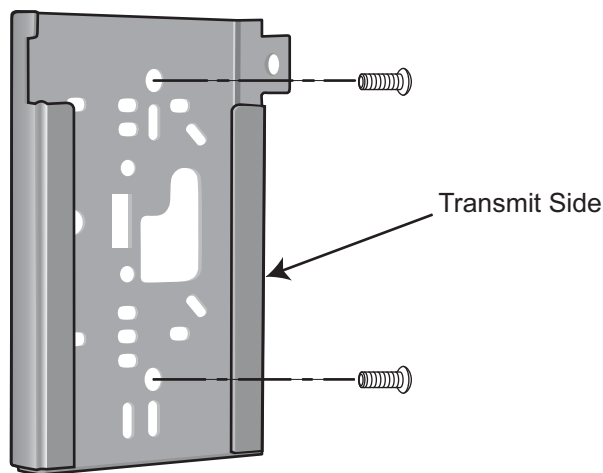


Figure 12 Attach the Mount Bracket