ExcelMAX® Access Point Cell Installation & Maintenance Guide

Version 1.4

April 30, 2008

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1.0 Preface

The *ExcelMAX Access Point Cell Installation and Maintenance Guide* covers installation, configuration and maintenance of the ExcelMAX Access Point Base Station.

This guide assumes a working knowledge of wireless technology and how to configure networking systems.

1.1 Who Should Read This Manual

The *ExcelMAX Access Point Cell Installation and Maintenance Guide* is for Axxcelera trained or authorized service personnel who need to install the ExcelMAX Access Point and configure it to operate in a network environment.

1.2 Using This Guide

The *ExcelMAX Access Point Cell Installation and Maintenance Guide* explains how to install the physical components and then configure them for use. It includes a maintenance section and troubleshooting guidelines.

1.3 Conventions Used

This manual uses the following text formatting conventions:

- **Bold Text** indicates a specific module, field, window, or button.
- *Italic Text* highlights the name of other documents or references.
- Text in angle brackets indicates individual keystrokes. For example, **<Enter>**.
- `Fixed width text` identifies a specific file or directory.

 **Warning**  **Note**  **Tip**  **Hint**	Text within boxes indicates warnings, notes, helpful tips and hints.

1.4 Related Documentation

The following documents may also be useful:

- *Access Point Manager User's Guide*
- *CPE Manager User's Guide*
- *ExcelMAX CPE Installation Guide*
- *Base Station Plan Editor User's Guide*
- *Plan Concepts*

1.5 Technical Support

Axxcelera provides technical support to assist with any problems or to answer questions about Axxcelera ExcelMAX solutions. The technical support staff is factory trained and equipped to resolve questions about Axxcelera products.

Telephone:	+1 (804) 864-4222
Email:	support@axxcelera.com
Web site:	www.axxcelera.com

1.6 Sales

You may contact the Sales Department for more information:

Telephone:	+1 (480) 820-9270
Fax:	+1 (480) 820-9275
Email:	sales@axxcelera.com
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2.0 Introduction

This chapter covers the following information:

- ExcelMAX Access Point Packing List
- ExcelMAX Access Point Overview
- Major Components

2.1 ExcelMAX Access Point Packing List

The Access Point kit includes:

- 1 Access Point
- 1 L-bracket
- 1 clamp
- 1 U-bolt
- 1 PG-11 cable gland
- 1 PG-11 cable gland o-ring
- 1 ground lug
- 5 hex head bolts, M6 x 16 mm Lg
- 5 M6 split lock washers
- 1 M6 flat washer
- 2 M6 serrated flange nut
- GPS antenna (optional)
- 1 AC or DC NIA/Power Adapter (power cable not included, supplied by the service provider*)

  * AC power cables are included

2.2 ExcelMAX Access Point Overview

ExcelMAX Access Points contain modem and radio circuitry that connects to an external sectorized or omnidirectional antenna. The antenna is designed for mounting on a standard communications tower or on a building rooftop, and requires minimal “real estate.” The Access Point connects to the local network device (switch/router) via a standard 10/100BaseT interface.

The antenna is connected to the Access Point via 50-ohm low loss coaxial cable.

Some ExcelMAX Access Points also contain GPS circuitry that connects to a separate supplied external antenna (supplied by Axxcelera). The antenna is designed for mounting on a standard communications tower or on a building rooftop, and requires minimal “real estate.”

The ExcelMAX Management System is typically located at the customer Network Operating Center (NOC), and allows complete control of the Axxcelera ExcelMAX system singly or in a network environment

2.2.1 ExcelMAX Access Point

The Access Point is composed of five main physical components:

- Access Point – Outdoor Unit
- Network Interface Adaptor/AC or DC Power Adaptor
- Interconnecting Cable (supplied by the service provider)
- AC or DC Power cord (supplied by the service provider, except for some models where the AC cords are included)
- Mounting hardware

Additionally, some ExcelMAX Access Point units contain GPS circuitry that connects to a separate external antenna (supplied by Axxcelera).

Figure 2-1: ExcelMAX Access Point kit

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Figure 2-2: ExcelMAX Access Point views

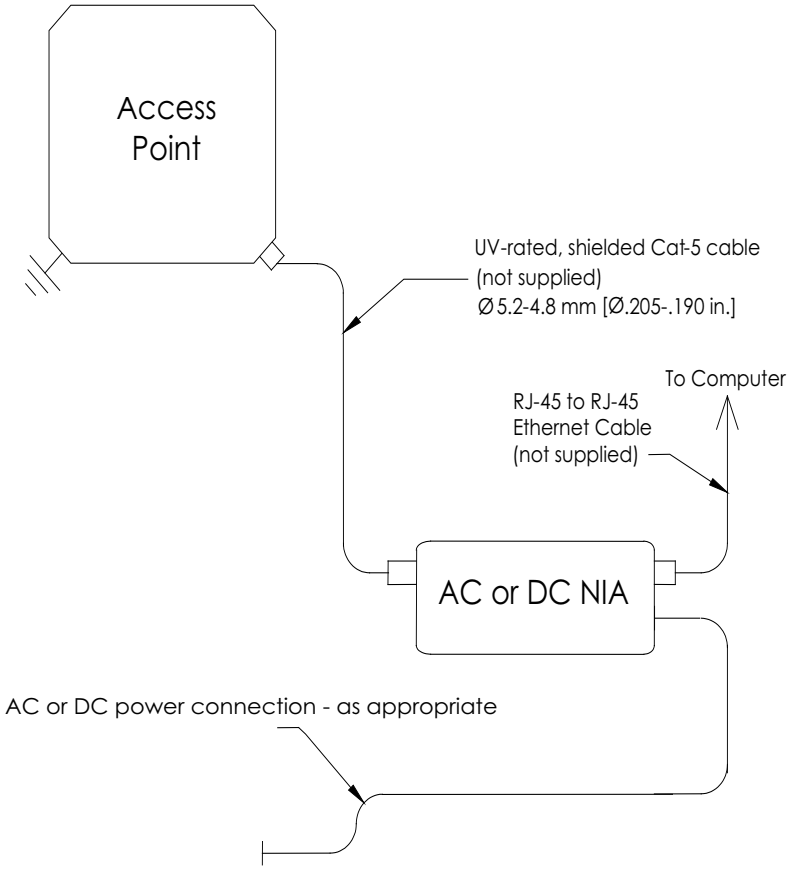

Figure 2-3: Access Point block diagram

2.2.1.1 OPTIONAL: GPS Synchronization

Global Positioning System (GPS) support is a factory-fit option for ExcelMAX Access Points. When supported, a GPS antenna may be connected to each co-located ExcelMAX Access Point to allow them to synchronize their RF transmissions. Although not required for basic system operation, use of the “network synchronization” feature synchronizes Access Points so that they transmit and receive at the same time to limit interference. This function of the GPS reduces adjacent channel interference, and also reduces interference between adjacent base-station sites (i.e., frequency re-use).

2.3 Major Components

2.3.1 Indoor Equipment

The indoor equipment consists of the NIA/Power Adapter, which may be an AC or DC variant, according to the model ordered.

2.3.1.1 AC NIA/Power Adapter

The AC NIA/Power Adapter (Figure 2-4:) is the customer's interface with the Access Point. The AC NIA/Power Adapter contains interfaces to the AC power supply, customer's data network, and the Access Point connecting cable. The AC NIA/Power Adapter has a power indicator LED that illuminates when power is applied to the AC NIA/Power Adapter. The AC NIA/Power Adapter is wall-mountable using the screw hangers on the back. An included tie wrap is used for strain relief of the interconnecting cable.

Figure 2-4: AC NIA/Power Adapter

2.3.1.2 DC NIA/Power Adapter

The DC NIA/Power Adapter (Figure 2-5:) is the customer's interface with the Access Point. The DC NIA/Power Adapter contains interfaces to the DC power supply, customer's data network, and the Access Point connecting cable. The DC NIA/Power Adapter has two LEDs:

1) **Power Input LED** (furthest from the Access Point RJ45) – The Power Input LED lights green when the battery input (-ve supply and return) are wired correctly. It does not check the ground. The Power Input LED lights red if the battery input is reversed (i.e., the -ve supply and return are connected in reverse order).

2) **Current Draw LED** – The Current Draw LED is either green or unlit. It lights green when the Access Point is drawing a significant current (approximately 0.2A or more).

Note	The early DC NIA/Power Adapter units are desk mountable, but future units will be wall-mountable with four fixing screws provided by the customer.

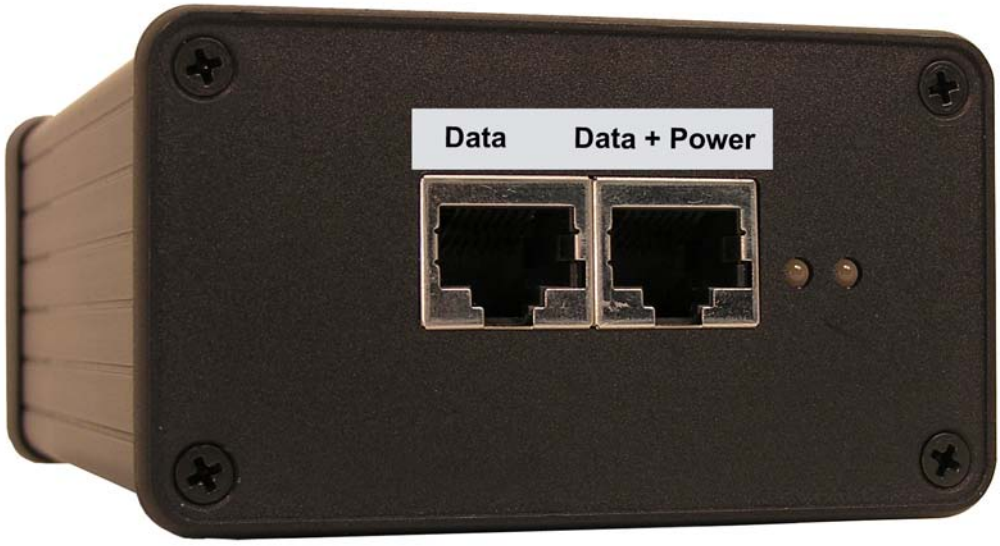

Figure 2-5: DC NIA/Power Adapter

2.3.2 Interconnecting cable

The interconnecting cable is used to connect the Access Point to the NIA. The cable must be straight-through CAT-5, electrically shielded, and outdoor rated. The cable carries Ethernet data as well as DC power from the NIA to the Access Point. Customer equipment requiring Ethernet connectivity may be located up to 100 meters from the outdoor Access Point. The cable must have shielded field-installable connectors on both the Access Point and NIA ends. Wiring distances are illustrated in Figure 2-6:.

The Access Point supports MDIX, therefore either a straight cable or a cross-over cable can be used to connect the NIA and any customer equipment.

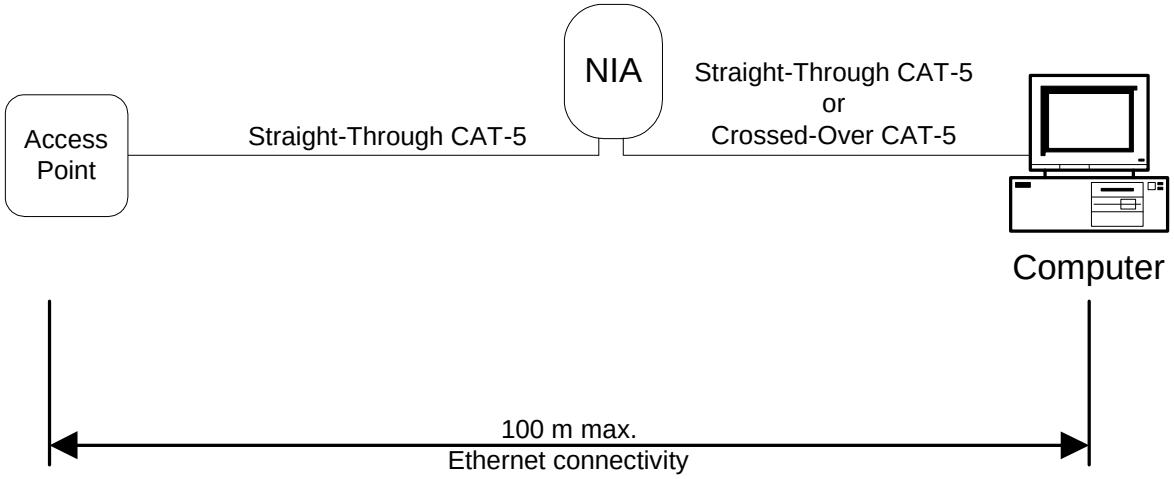

Figure 2-6: Wiring Distances

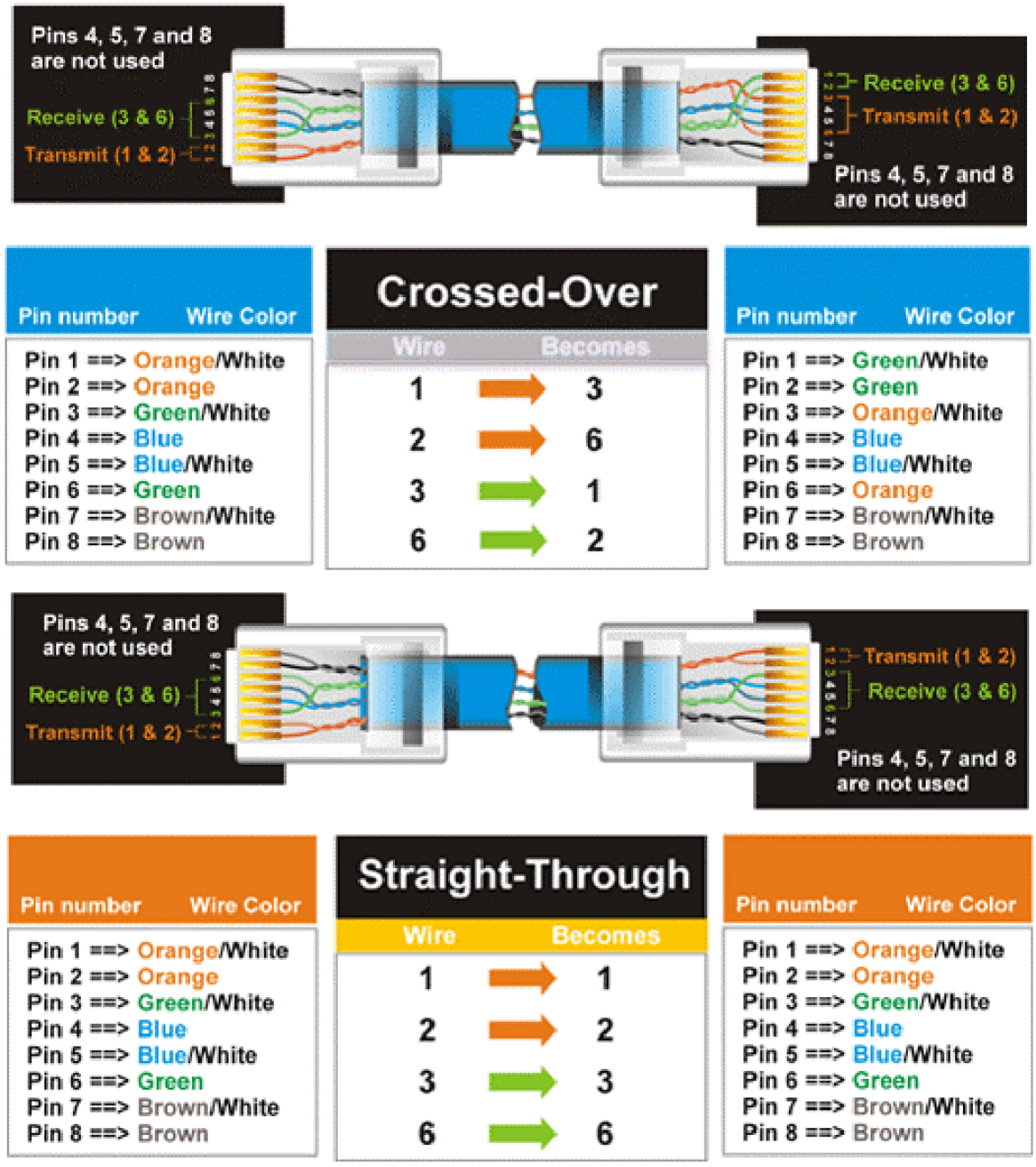

Figure 2-7: Interconnecting Cable Configurations

2.3.3 Outdoor Equipment

- ExcelMAX Access Point
- Antenna Cables (customer furnished)
- Sectorized or Omnidirectional Antenna
- GPS antenna (optional)

3.0 Installation

3.1 Compliance Alert – Operation in the 3.4 - 3.6 GHz Band

The CE Marking with alert symbol (see below) appears on the Access Point assembly. The alert symbol indicates operation on frequency bands that are not harmonized throughout the European community.

Figure 3-8: Compliance Alert Label

Note	This equipment operates in the 3.4 - 3.6 GHz frequency band, which is not harmonized throughout the community.

Member states must be notified, in accordance with Article 6.4 of the R&TTE Directive 99/5/EC, before this equipment can be sold or put into service. Contact Axxcelera Customer Support for an up-to-date listing of Member State Notifications. See “Technical Support” on page 8.

3.2 Operation in the 3.650 - 3.675 GHz Band

3.2.1 FCC Information to Users @ FCC 15.21 & 15.105

For Class B Unintentional Radiators:

This equipment has been tested and found to comply with the limits for a Class B digital devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

3.2.2 Warning to Users @ FCC 15.21 & 15.105:

Warning	Changes or modifications not expressly approved by Axxcelera Broadband Wireless could void the user’s authority to operate the equipment

3.2.3 FCC Label @ FCC 15.19

For Class B - Unintentional Radiators:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following 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.

3.2.4 RF EXPOSURE REQUIRMENTS @ 1.1310 & 2.1091

Warning	To satisfy FCC RF exposure requirements for transmitting devices, a separation distance of 25 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter

3.3 Installation Warnings

Please pay attention to the following warnings:

When servicing equipment and selecting a location for the ExcelMAX antennas, it is important to note that a minimum distance of 25 cm is required between personnel and ExcelMAX antennas to comply with a radio-frequency exposure limit of 1.0mW/cm2.

Figure 3-9: RF Warning Label

Arcing may occur when connecting the outdoor Ethernet cable to either the Access Point or the NIA should the power be connected to the NIA. Arcing may irrevocably damage the NIA or the Access Point. To prevent any chance of damage from occurring, verify that the power is disconnected from the NIA before attempting to connect the interconnecting cable to either the Access Point or NIA.

3.4 Environmental Cautions

- **Ambient Temperature** – The BTS equipment (indoor equipment) must be installed in a temperature-controlled environment. Ambient temperature should be within a temperature range of -5° C to +40° C. The TMAs and antennas are outdoor equipment that are designed to operate over a temperature range of -33° C to +55° C.
- **Reliable Grounding** – Reliable grounding of the equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

3.5 Installing Outdoor Equipment

3.5.1 Access Point Packing List

See "ExcelMAX Access Point Packing List" on page 9.

3.5.2 Sector Antenna Packing List

The following is included in the shipment of each sector antenna:

- 1 antenna
- 1 upper bracket
- 1 lower bracket
- 2 swing arms
- 2 clamps
- 4 M8X100 Hex Head bolts
- 6 M8X25 Hex Head bolts
- 10 M8 Flat washers
- 10 M8 Lock washers

3.5.3 Omnidirectional Antenna Packing List

- 1 Omni antenna
- 1 Omni antenna pole bracket
- 4 Worm drive clamps
- 2 M3 X 10MM socket head screws
- 2 M3 Lock washers
- 2 M3 Flat washers

3.5.4 Customer Supplied Equipment Required for Antenna Installation

The following is not supplied with the Access Point but is required for installation:

- Installation Collar Kit Axxcelera P/N 020-16300-0003, includes:
  - 1 collar clamp
  - 1 collar bracket with pin
  - 2 nuts
- Box/open end wrench for M8
- Torque wrench (rated to 34 Nm [25 ft.-lb.])
- Ground Lug Ring Terminal Panduit LCB8-14-L or equivalent

3.5.5 Antenna Site Requirements

Basic installation locations should have been established at the initial site survey phase, before equipment has been delivered.

1) Verify that the elevation of the antennas can be sufficiently high to avoid obstructions and the antennas will have a clear line of sight to the desired coverage area.

2) Be sure to observe local building and electrical codes when running all cables.

3) Verify that the antenna mounting is approved by both the owners of the structure and a qualified engineer.

4) Verify that the tower mounting base can handle both the weight and the wind loading stress of the installed antennas and cables.

5) Find suitable equipment locations with consideration for RF cable length restrictions.

3.5.6 Required Tools for Outdoor Installation

Be sure you have the following equipment available for mounting the antennas and Access Point:

Warning	Do not leave tools lying around unattended on tower platforms and roofs. They may cause a tripping hazard leading to equipment damage, personal injury or death.

Recommended Tool Kit (screw drivers, all-purpose knife, adjustable wrenches, SAE and Metric socket set and ratchet, hacksaw, wire cutters, wire strippers, coax cable strippers)

- Crimp tool for #8 AWG Ground Lug Terminal, Panduit part number CT-17000 or equivalent
- Electric drill and assorted drill bits
- Extension cord
- UV-rated coax seal, for example, 3M Scotch Seal Industrial Sealant 800
- UV-rated rubberized tape, 3M Weatherban Sealant Tape PF-5422 or similar
- Safety rope and climbing harness
- UV-rated tie wraps
- Antenna sighting equipment

3.5.7 Preparing to Mount the Antenna Brackets

Depending on the type of tower or other style of mounting in use at each site, 5cm (2 in.) diameter mounting poles will need to be positioned on the tower with the antennas pointed in the proper direction.

3.6 Installing an Optional Sector Antenna

3.6.1 Grounding the Antenna Mounting

1) Attach the ground lug using the Hex bolt, lock washer and flat washer that came with the Access Point.

2) Ensure the cable has a good connection. Remove all paint and corrosion where the clamp is attached.

3) Use dielectric grease on the clamp connection to prevent any electrolysis activity due to dissimilar metals.

3.6.2 Attaching the Sector Antenna to the Mounting Points

Warning	Do not work on antenna installations of any kind when there is any possibility of electrical storm activity in the area.

1) Observing the correct polarity for the antenna in accordance with the initial RF Site Survey, lay out the antenna assembly for mounting. Confirm the required polarity against the polarity label on the back of each antenna assembly.

2) Attach the upper and lower brackets to the antenna. See details A and B.

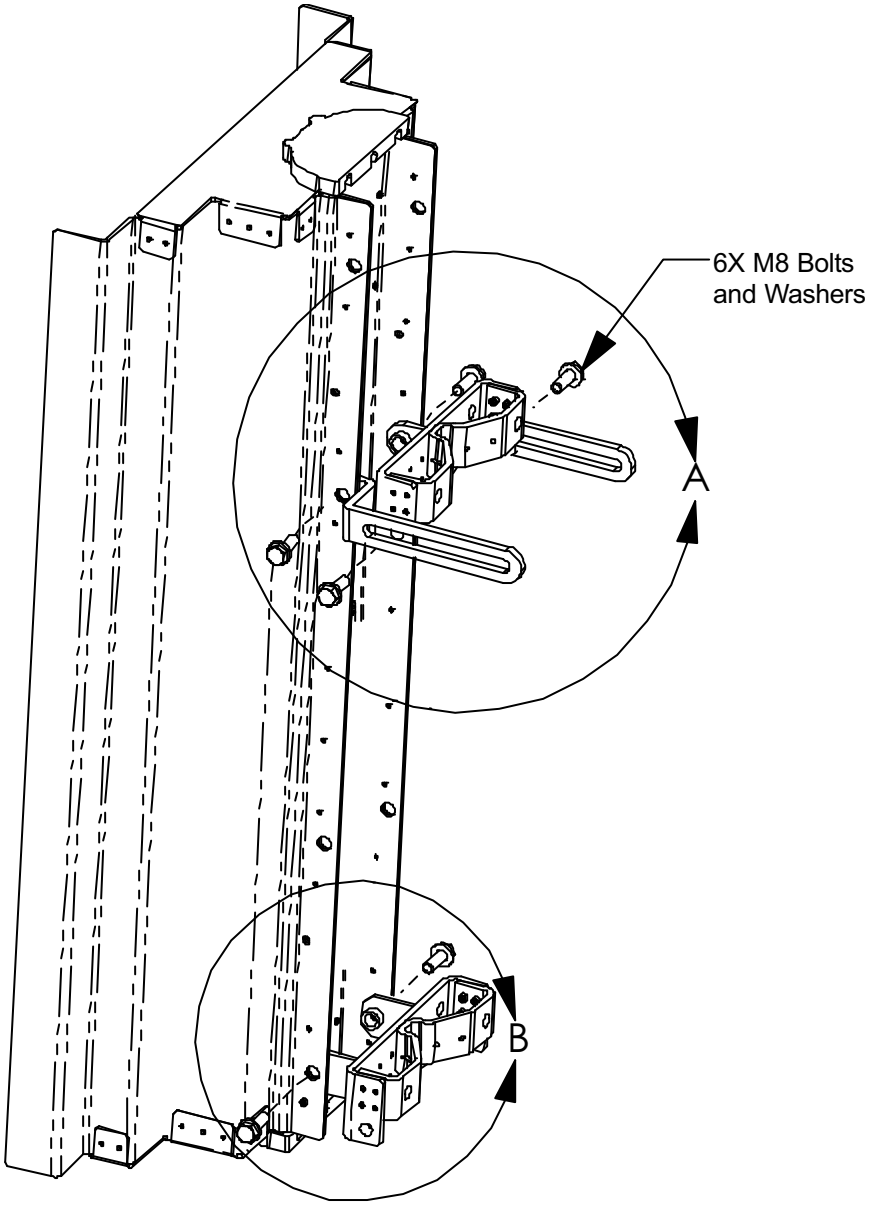

Figure 3-1: Attach upper and lower brackets

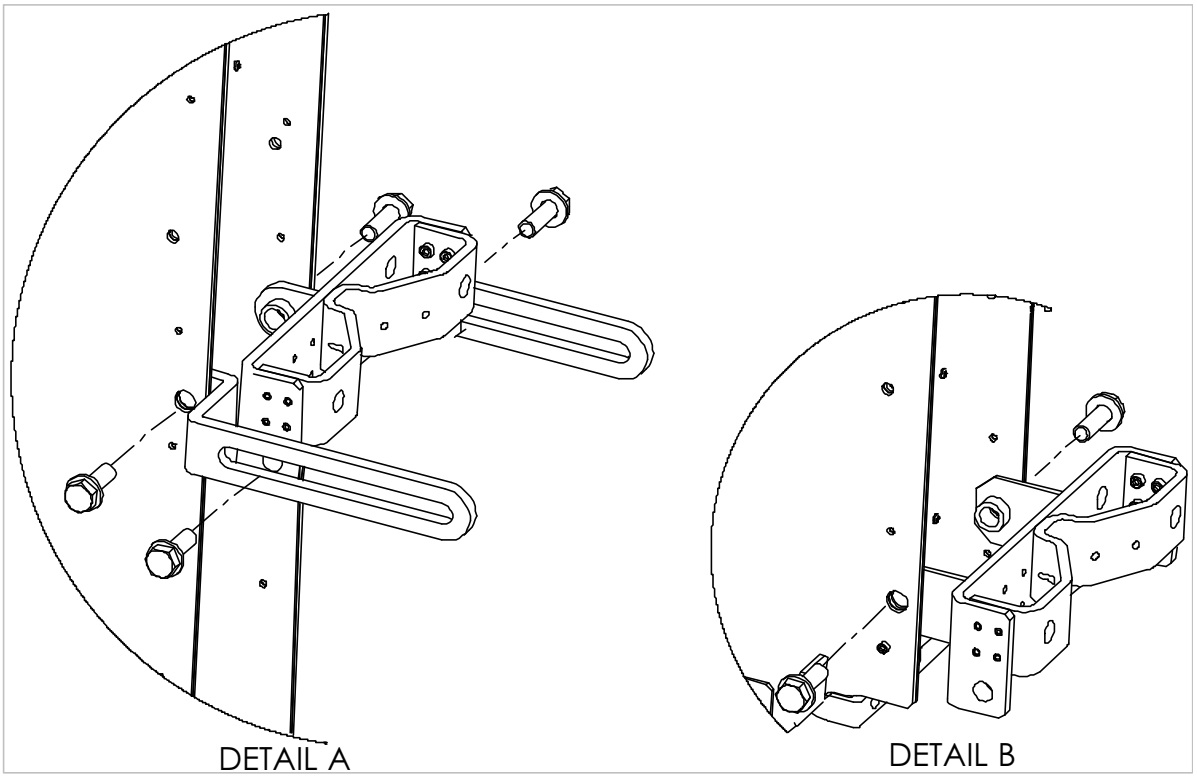

Figure 3-2: Details A and B

3) Attach the collar bracket to the pole.

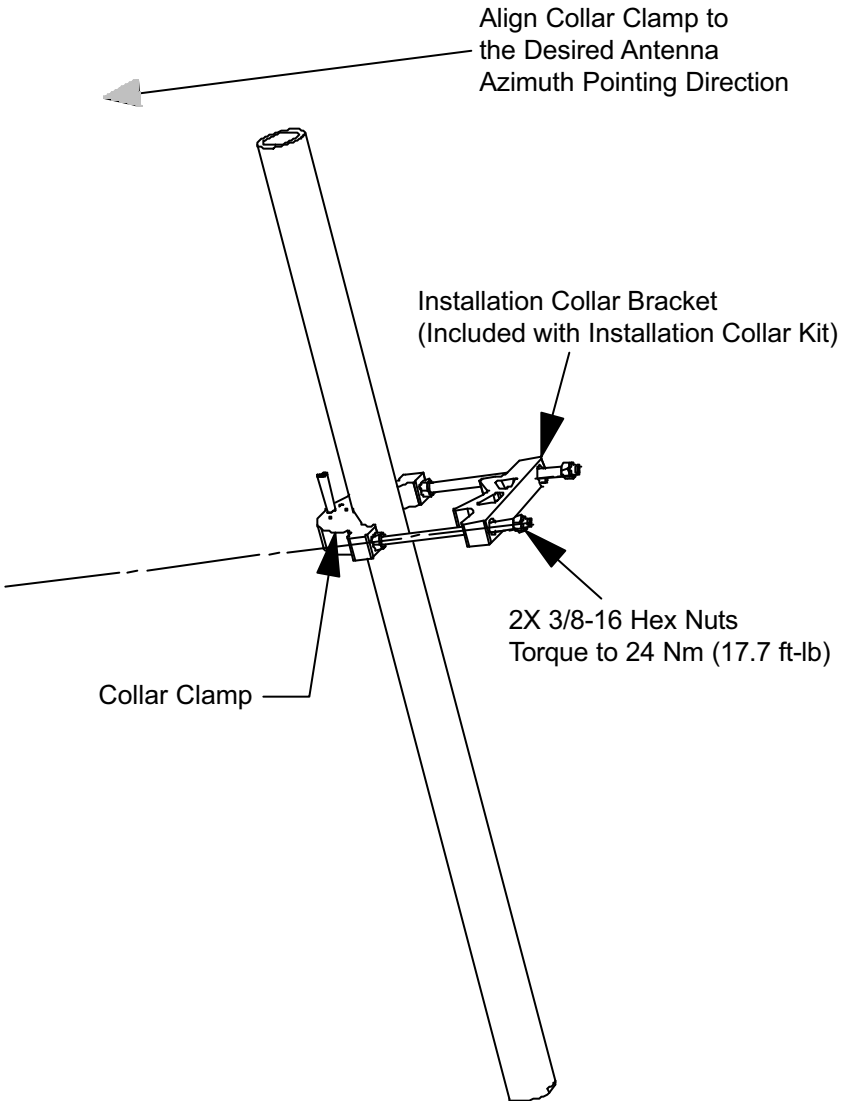

Figure 3-3: Attach the collar bracket to the pole.

4) Mount the antenna to the pole. Rest the antenna on the Installation Collar Clamp and attach the clamps loosely. See Detail C.

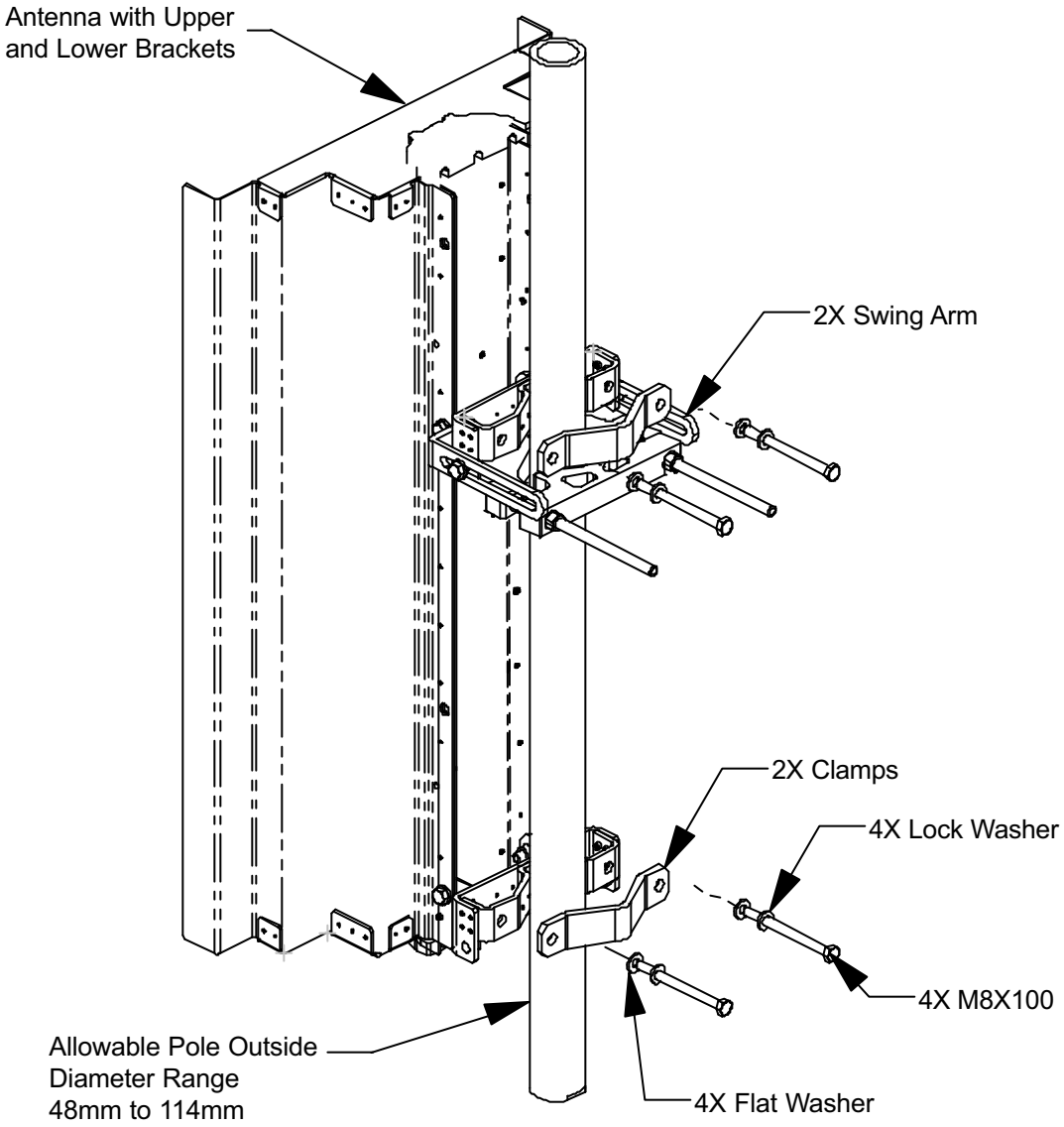

Figure 3-4: Mount the antenna to the pole.

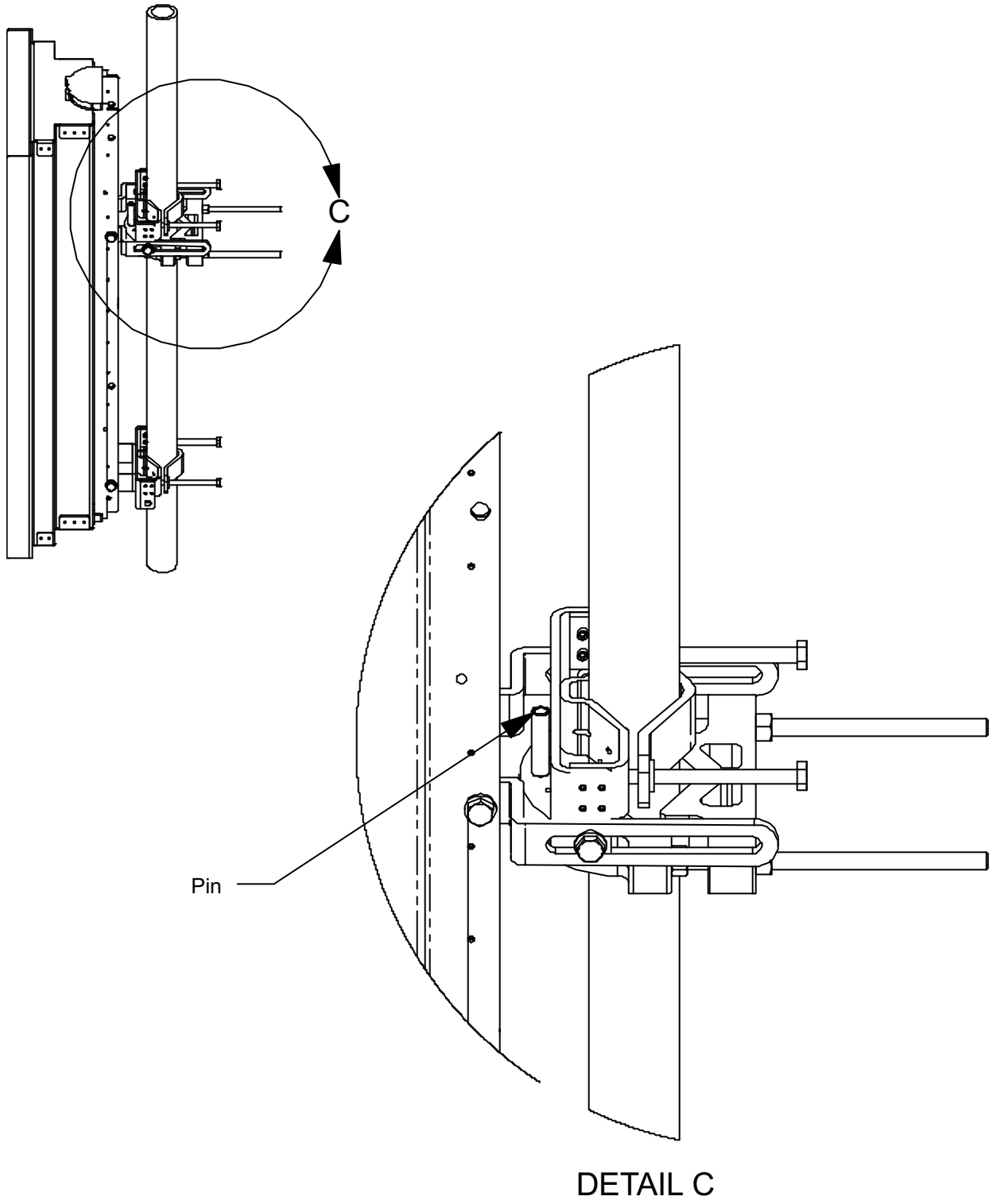

Figure 3-5: Detail C - upper bracket rests on installation collar clamp and is held in place by the pin.

5) Align the antenna to the desired elevation angle and azimuth direction.

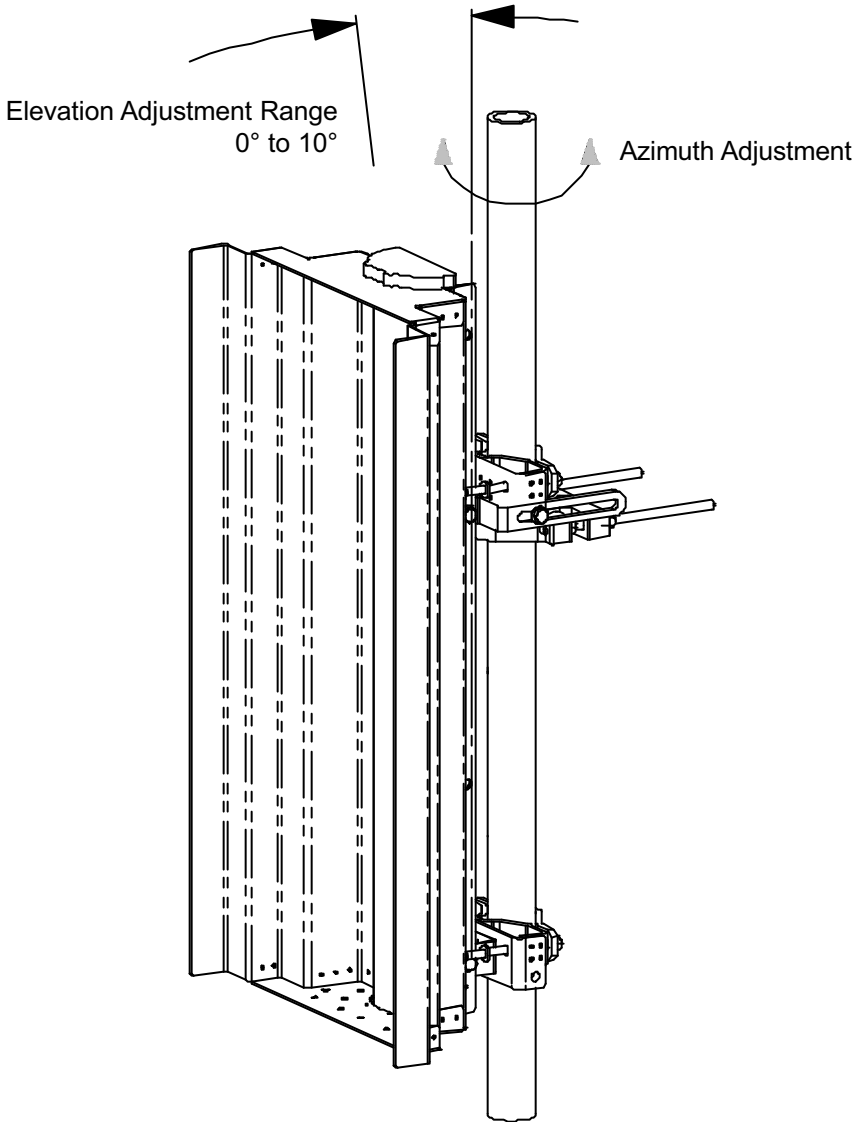

Figure 3-6: Azimuth and elevation adjustment

6) Tighten down all the hardware. Torque all bolts to 27 Nm (20 ft.-lb.

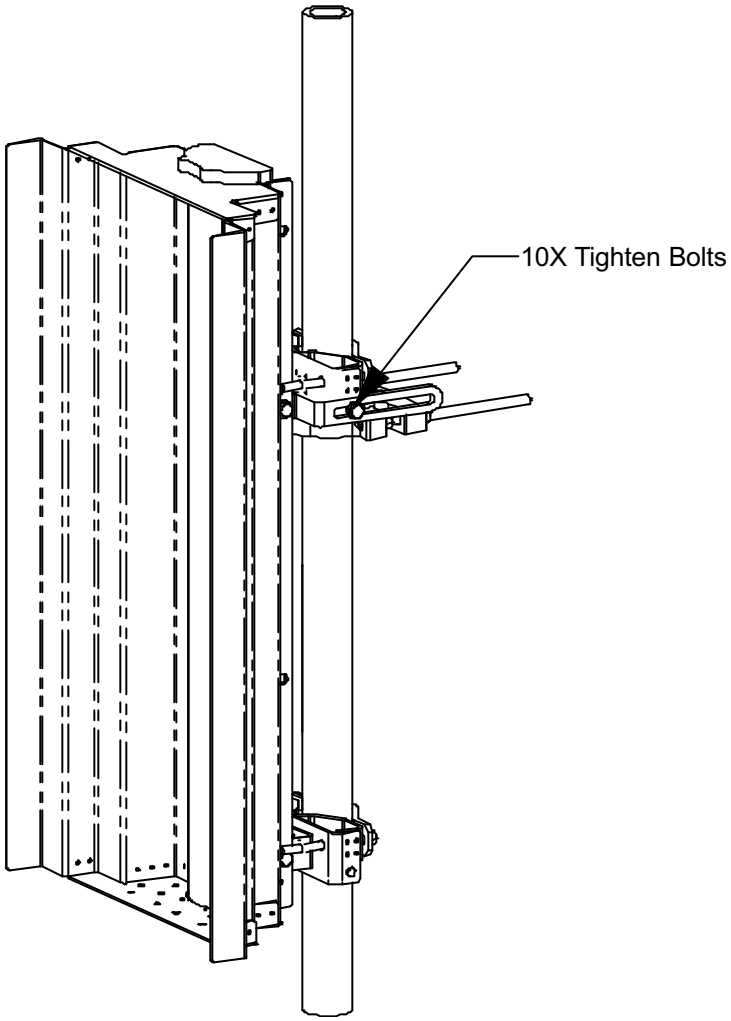

Figure 3-7: Tighten down all bolts

7) Remove the installation collar kit.

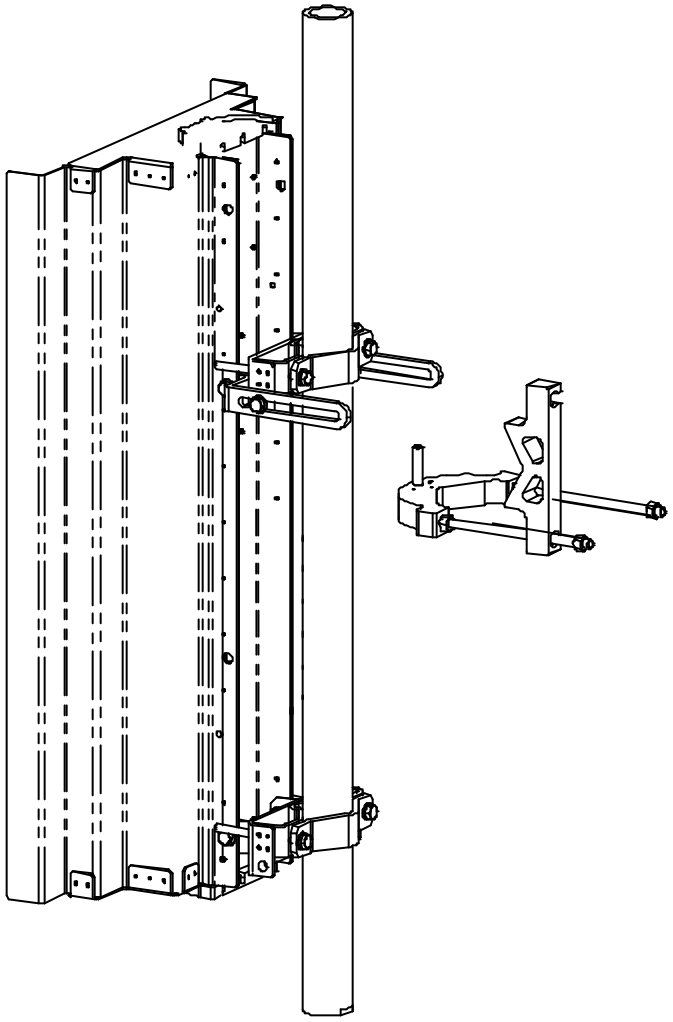

Figure 3-8: Remove installation collar kit

8) Attach the cable. Torque the N-connector to 1.0 Nm (8.9 in-lb.).

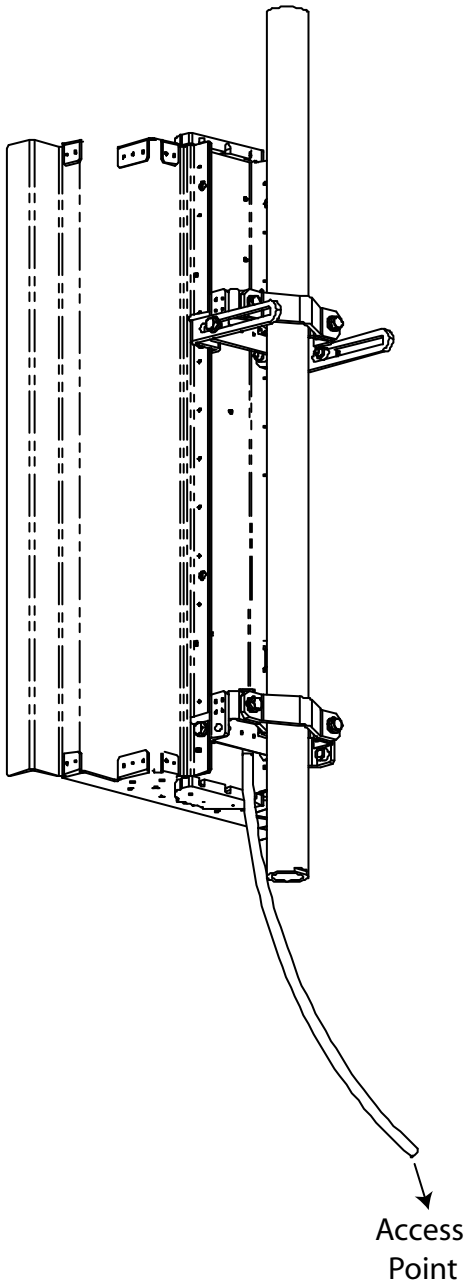

Figure 3-9: Attach the cable to the antenna

3.6.3 Attaching RF Cable to Access Point

1) Attach the RF cable to the Access Point.

2) Torque the connector to 1.7 Nm (15 in.-lb.).

3) Seal the connection.

3.6.4 Grounding the Cables

Ground the RF cables in accordance with the manufacturer's specification. Ground the cables at the top of the tower.

Grounding methods may vary from site to site and with the manufacturer's recommendations.

One method of grounding is to strip the cover from the low-loss cable and clamp a ground strap to the exposed copper shield.

The strap is then connected to the tower. The clamp is wound with waterproof tape.

3.6.5 Waterproofing Cable Connections

Wrap RF cable connections with waterproof tape.

3.7 Installing Optional Omnidirectional Antenna

3.7.1 Grounding the Antenna Mounting

1) Attach the ground lug using the Hex bolt, lock washer and flat washer that came with the Access Point.

2) Ensure the cable has a good connection. Remove all paint and corrosion where the clamp is attached.

3) Use dielectric grease on the clamp connection to prevent any electrolysis activity due to dissimilar metals.

3.7.2 Installing the Omnidirectional Antenna

Warning	Do not work on antenna installations of any kind when there is any possibility of electrical storm activity in the area.

1) Attach the worm clamps to the omni bracket.

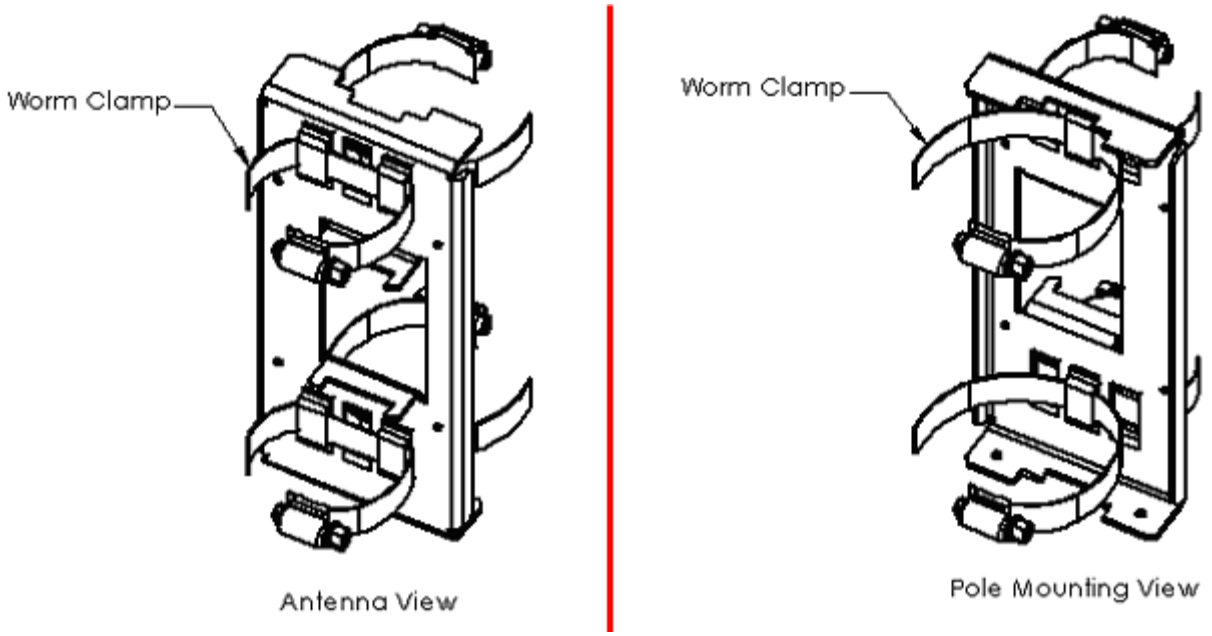

Figure 3-10: Attach worm clamps to Omni bracket

2) Attach the pole and tighten all worm clamps.

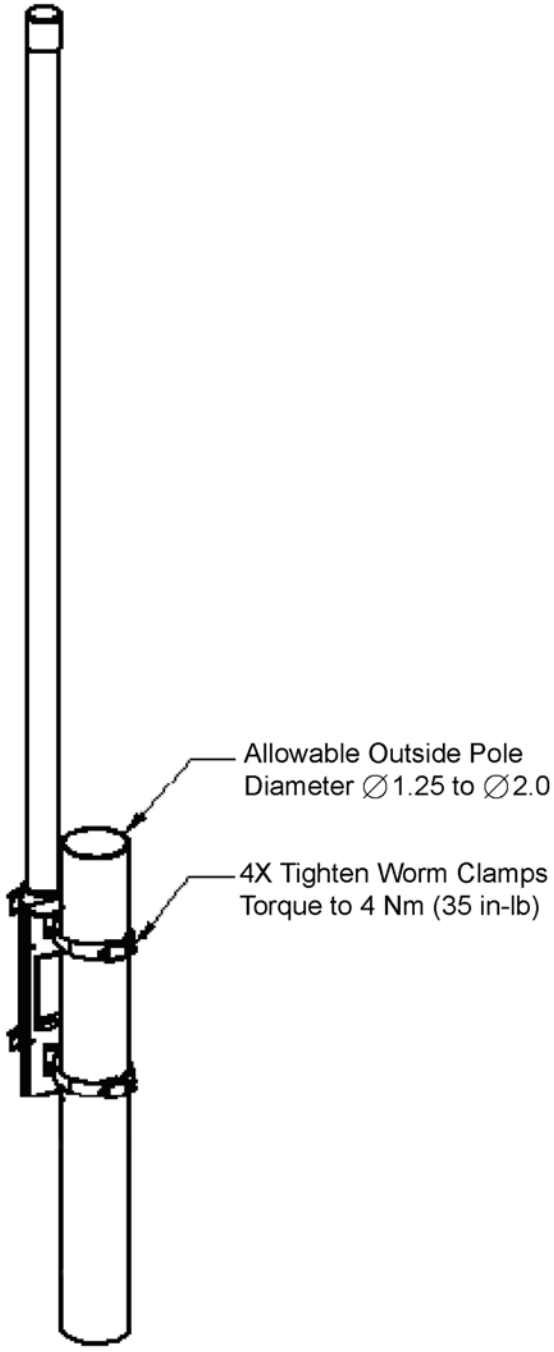

Figure 3-11: Attach to the pole

3) Attach the RF cable. Torque the connector to 1.7 Nm (15 in.-lb.).

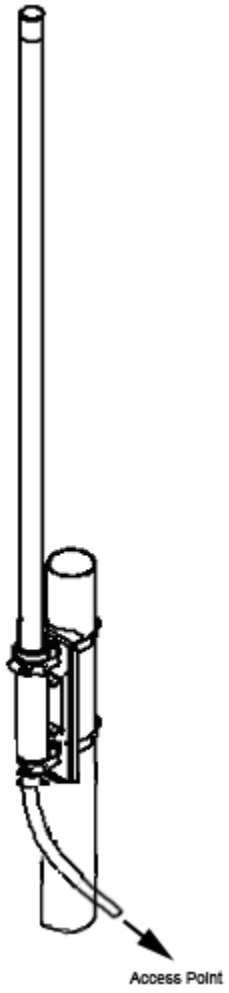

Figure 3-12: Attach cable to Access Point

3.7.3 Attaching RF Cable to Access Point

1) Attach the RF cable to the Access Point.

2) Torque the connector to 1.7 Nm (15 in.-lb.).

3) Seal the connection.

3.7.4 Grounding the Cables

Ground the RF cables in accordance with the manufacturer's specification. Ground the cables at the top of the tower.

Grounding methods may vary from site to site and with the manufacturer's recommendations.

One method of grounding is to strip the cover from the low-loss cable and clamp a ground strap to the exposed copper shield.

The strap is then connected to the tower. The clamp is wound with waterproof tape.

3.7.5 Waterproofing Cable Connections

Wrap RF cable connections with waterproof tape.

3.8 Installing the Access Point

3.8.1 Mounting L-bracket to the Access Point

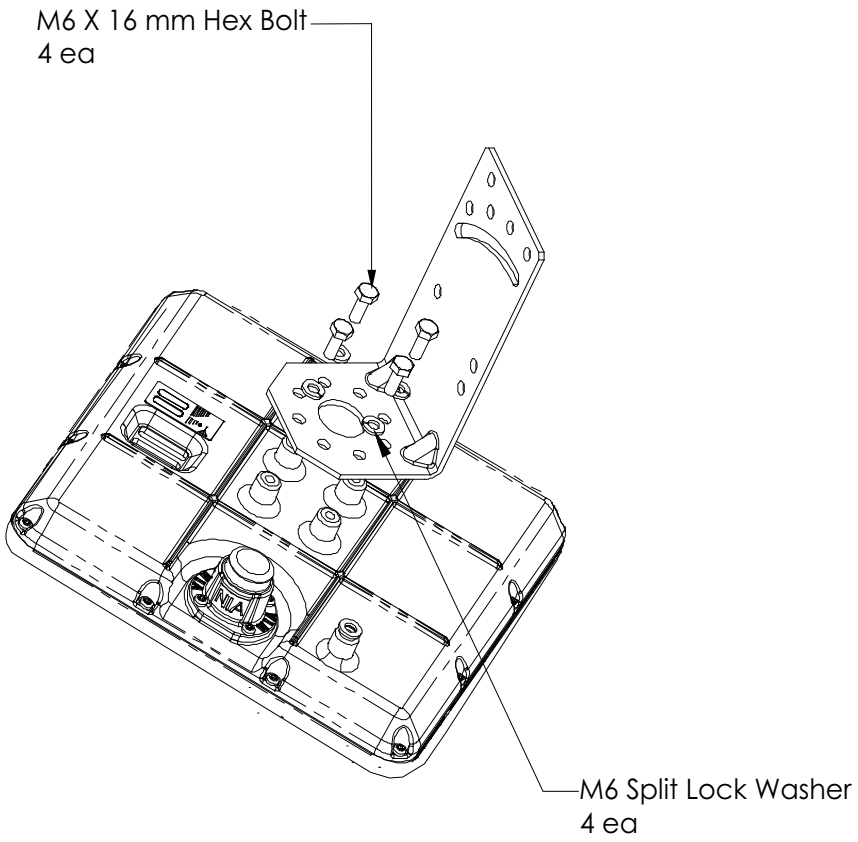

Figure 3-13: Mounting the L-bracket to the Access Point

1) Attach the L-bracket to the Access Point using 4 hex bolts with 4 split lock washers.

2) Torque the hex bolts to 8.81 ±67 Nm (78 ±6 in.-lb.) with a 10 mm open-end wrench.

3.8.2 Mounting Access Point to the Pole

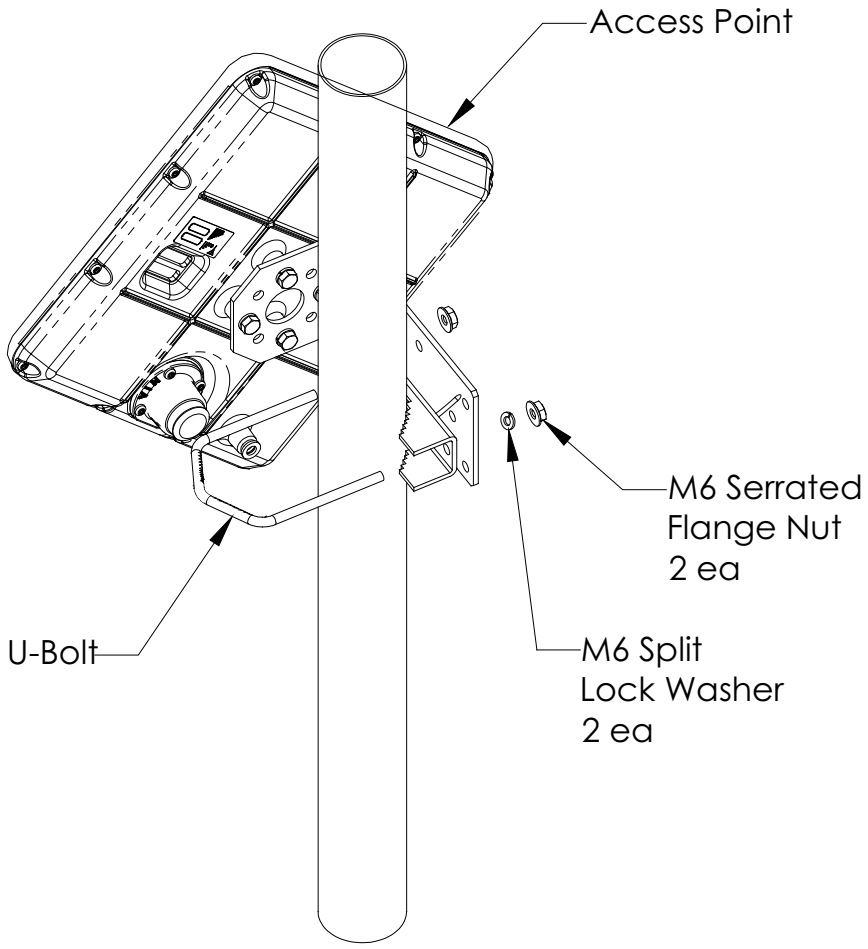

Figure 3-14: Mounting the Access Point to the Pole

Attach the Access Point to the pole using the clamp, U-bolt, M6 split lock washer and M6 serrated flange nut. Hex nuts should be tightened enough to prevent the Access Point from falling.

3.8.3 Aligning the Access Point

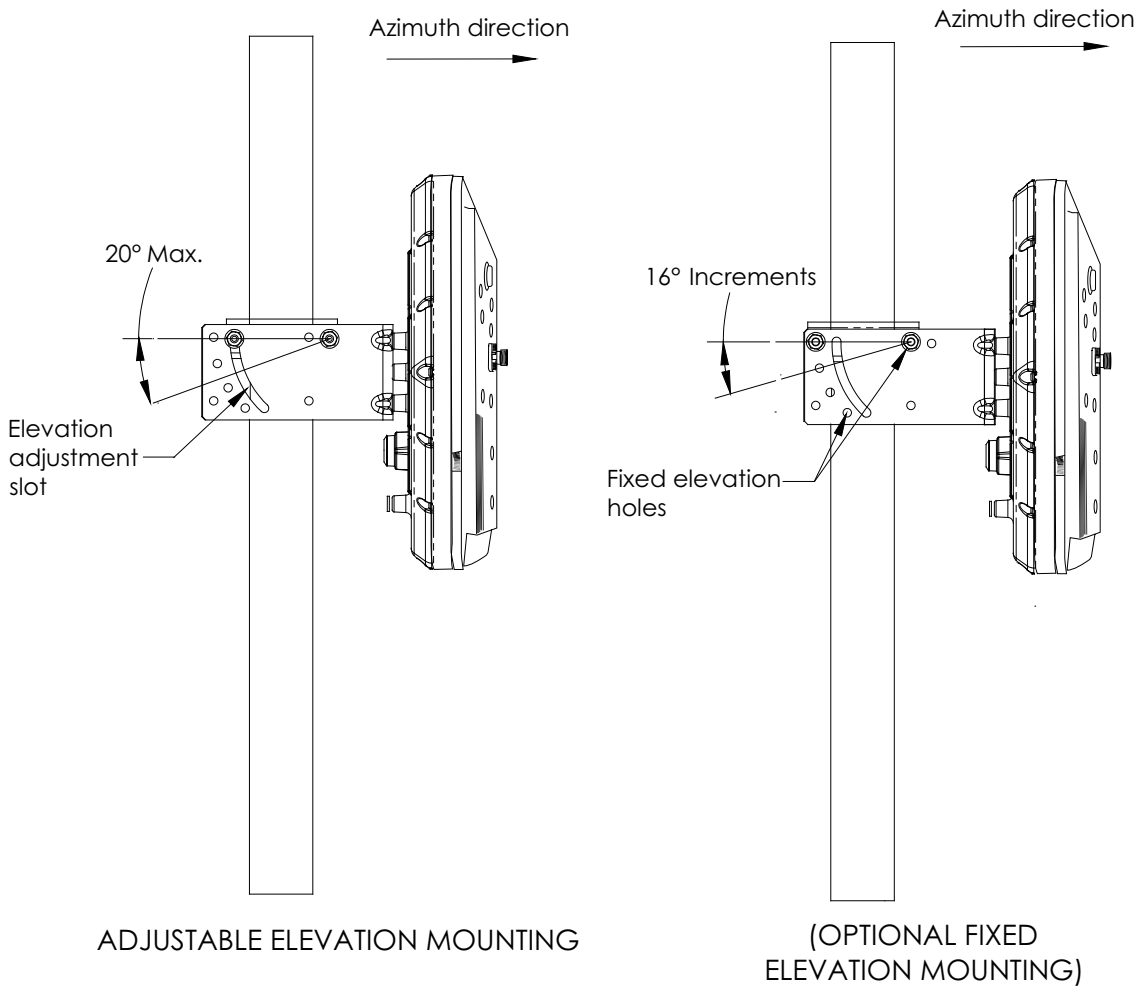

Figure 3-15: Aligning the Access Point

1) Rotate the Access Point to the desired azimuth pointing direction.

2) Tilt the Access Point to adjust the elevation (L-bracket may need to be rotated 180° for further adjustment).

3) Torque the U-bolt nuts to 8.8 ±7 Nm (78 ±6 in.-lb.).

3.8.4 Attaching the Ground Wire (recommended)

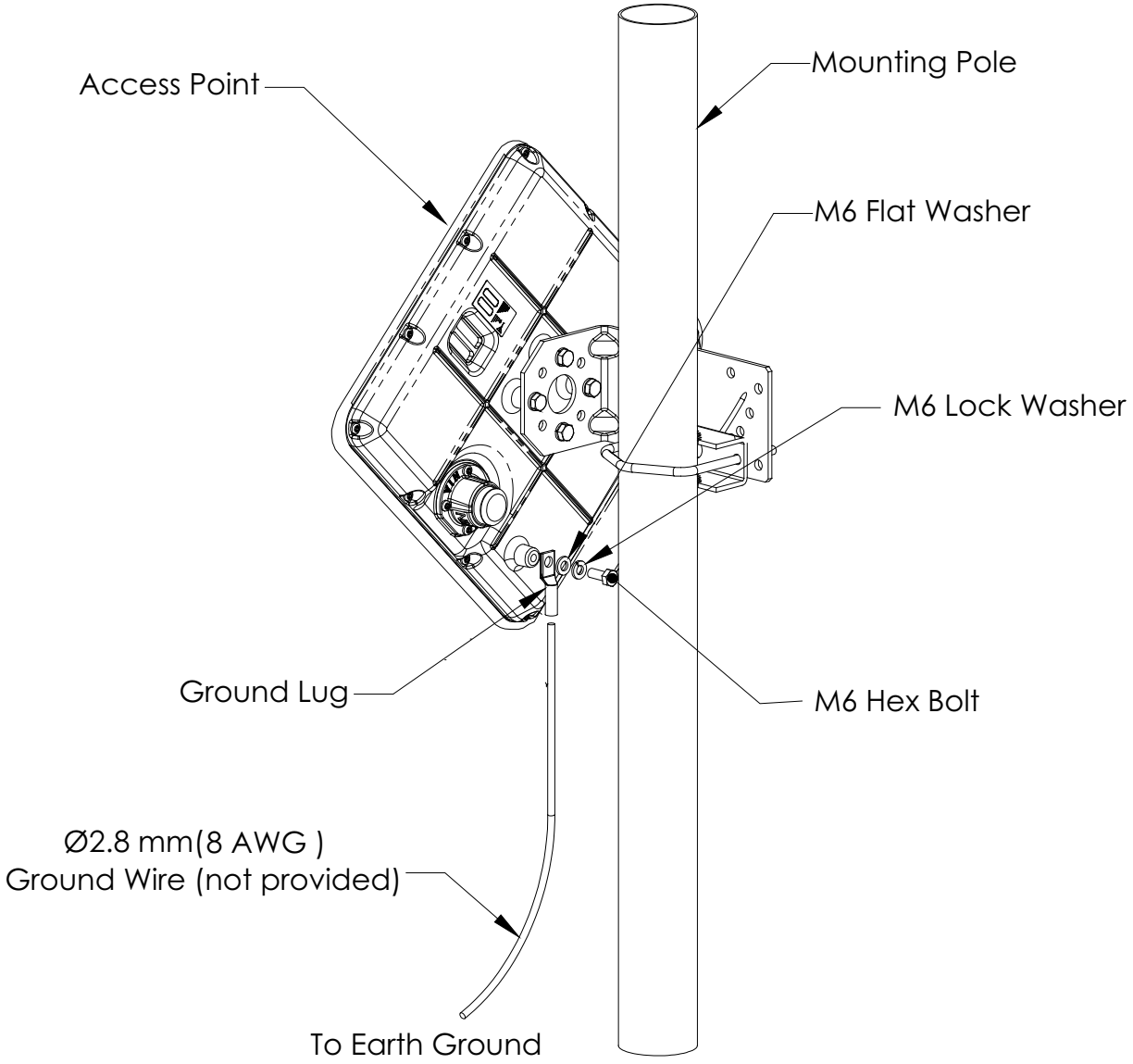

Figure 3-16: Attaching the Ground Wire

Warning	Axxcelera recommends grounding the unit and supplies the following instructions as a reference only. Necessary grounding should be completed per local electrical codes.

1) Crimp one end of ∅ 2.8 mm (8 AWG) wire to the ground lug.

2) Attach the assembled ground lug to the transceiver housing using an M6 x 16 lg hex bolt, M6 split lock washer and M6 flat washer. Torque the hex bolt to 8.8 ± .7 Nm (78 ± 6 in.-lb.) using a 10 mm open-end wrench.

3) Attach the remaining ground wire end to the "Earth Ground" and/or mounting pole per the local electrical code.

3.8.5 Attaching the Cat-5 Cable

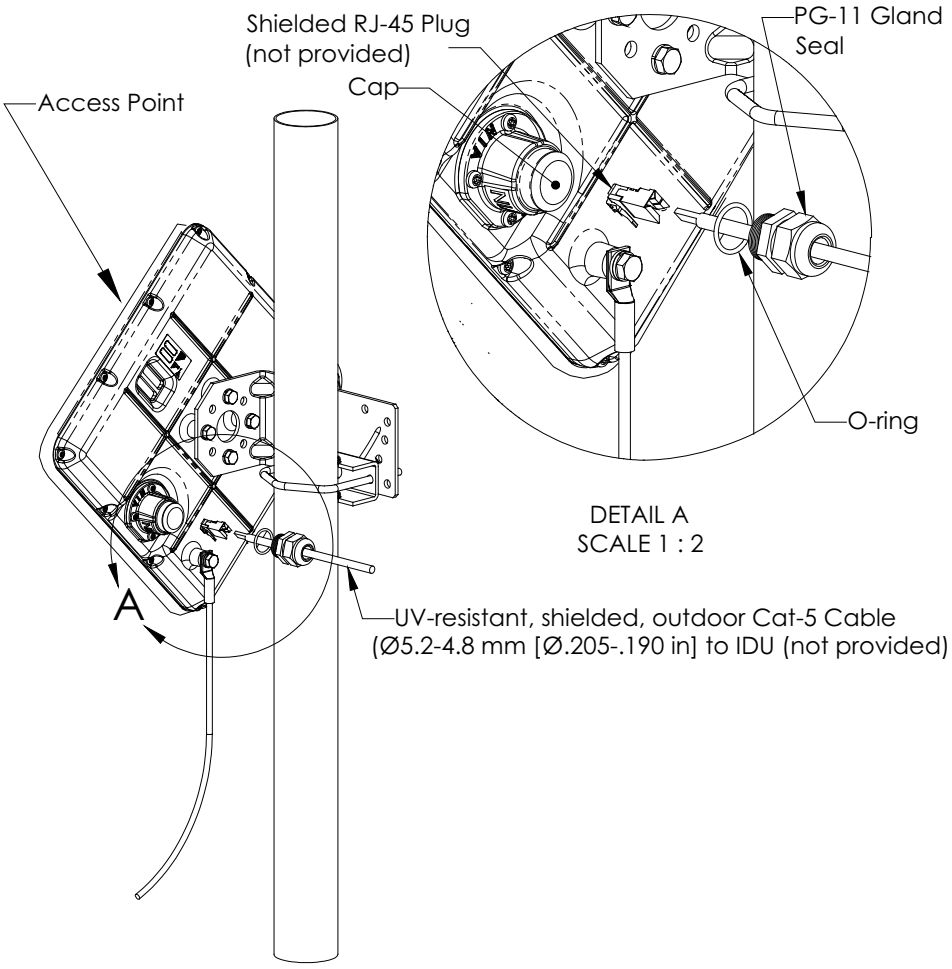

Figure 3-17: Attaching the Cat-5 Cable

1) Push the un-terminated, un-stripped (no plug) Cat-5 cable through the hole in the gland seal. Loosen the nut on top of the gland seal if the wire is not moving freely.

2) Using a shielded RJ-45 plug, terminate (attach plug) to the Cat-5 cable per the manufacturer's recommended specifications for plug attachment. (Recommended manufacturer: AMP, P/N 5-569552 or equivalent)

3) Remove and discard the cap plugging the hole in the transceiver.

4) Slide the O-ring over the Cat-5 cable and onto the PG-11 gland seal.

5) Look into the open hole and orient the RJ-45 plug, pushing the plug into the socket until the connectors are locked together.

6) Thread the gland seal into the transceiver and torque using the bottom nut of the gland seal (closest to the Access Point) to 3.8 Nm (33.2 in.-lb.) using the 7/8 open-end wrench.

7) Torque the dome nut at the top of the gland seal to 2.5 Nm (22.1 in.-lb.) using the 7/8 open-end wrench.

8) Secure the Cat-5 cable and ground wire to the mast using UV-resistant tie wraps.

3.9 Power and Data Connections – AC and DC Power Options

There are two types of PSU/NIA units:

1) AC PSU/NIA

2) DC PSU/NIA

The installation instructions for the AC and DC units are different. For instructions on installing the **AC PSU/NIA**, refer to 3.9.1. For instructions on installing the **DC PSU/NIA**, refer to 3.9.2.

ExcelMAX Access Points are shipped with either the AC PSU/NIA or the DC PSU/NIA unit, depending on what the customer ordered.

3.9.1 AC PSU/NIA Option

3.9.1.1 Connecting the Access Point to the AC Power Supply/NIA

Warning	It is extremely important to connect the AC power to the AC PSU/NIA as the last step. Connecting AC power prematurely can damage the Access Point and lead to faulty behavior.

The following procedures will guide you through the connection of the AC PSU/NIA unit:

1) Remove the new AC PSU/NIA from the installation kit.

2) Using a shielded RJ-45 plug, terminate (attach plug) to the Access Point Cat-5 cable per the manufacturer's recommended specifications for plug attachment. (Recommended manufacturer: AMP P/N 5-569552).

3) Insert the RJ-45 plug from the outdoor Access Point into the RJ-45 receptacle, labeled **Data+Power**, on the NIA (Figure 3-18:).

Figure 3-18: Connect the Access Point

3.9.1.2 Completing the Connection of the AC Power Supply/NIA

Warning	It is extremely important to connect the AC power to the AC PSU/NIA as the last step. Connecting AC power prematurely can damage the Access Point and lead to faulty behavior.

Note	Other than the models where the power supply cord is included, the AC PSU/NIA does not come with cables or power cord. Service provider must provide their own cables and power cord.

1) Insert one end of an RJ-45 to RJ-45 Ethernet cable assembly to the RJ-45 receptacle, labeled **Data**, on the outside of the NIA and the other end to the customer's computer (Figure 3-19:).

Figure 3-19: Connect customer computer or network device

Note	Customer equipment requiring Ethernet connectivity may not be located more than 100 m (328 ft.) from the Access Point.

2) Check to see that the connection to the Access Point is in place.

3) Connect the three-prong female power cord to the NIA. The power cord uses an IEC-320-C13 type connector (Figure 3-20: and Figure 3-21:).

4) Insert the power cord connector from the NIA into the nearest wall outlet.

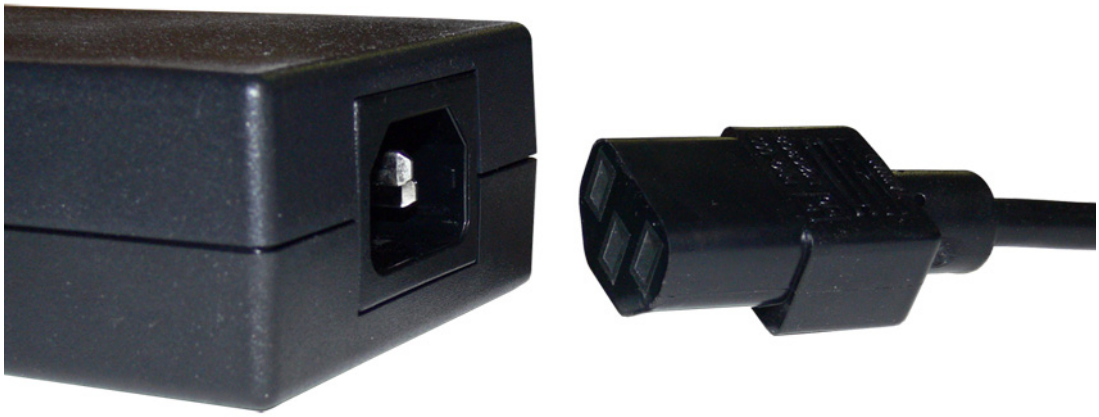

Figure 3-20: Connect the power cord

Figure 3-21: NIA's IEC320-C7 type connector

Warning	It is extremely important to connect the AC power to the NIA as the last step. Connecting AC power prematurely can damage the Access Point and lead to faulty behavior.

5) The completed setup is shown in Figure 3-22:. After verifying all connections to the NIA, connect the power cord to the wall and complete the process of setting up of the Access Point.

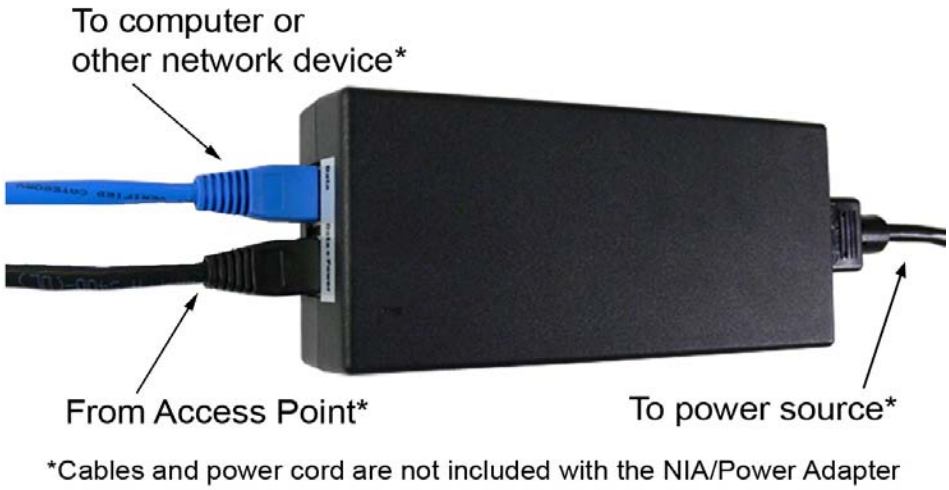

Figure 3-22: NIA setup is complete

3.9.2 DC PSU/NIA Option

The DC PSU/NIA unit powers the ExcelMax Access Point from a -48V DC power source, typically a battery back-up supply. The ExcelMax DC PSU/NIA units (020-44109-0802; see **Appendix B:**) are black, and output an isolated supply of +53.5V.

 **Warning**	ExcelMAX Access Points can only be powered by the ExcelMax version of the DC PSU/NIA. The Access Point will be permanently damaged if used with another version of the DC PSU/NIA. The DC PSU/NIA unit contains no serviceable parts.

The DC PSU/NIA has an input power connector at one end, and is supplied with the mating plug, which has 3 screw terminals on it for easy installation. The two supply wires and Earth/Ground are connected here. The Power Input LED is green when the power connection is wired correctly, but red if the polarity is reversed. It is off when there is no power.

The DC PSU/NIA has two RJ45 connectors at the other end. One is for the LAN Ethernet connection. The other is a Power-Over-Ethernet type connection, supplying power and data to the ExcelMAX Access Point. The Current Sense LED is green when the Access Point is on and drawing minimum specified current (approximately 0.2A or more).

 **Warning**	The DC PSU/NIA unit is designed for indoor use only. The body of the unit is used as a heat sink, and will get very warm.

3.9.2.1 Connecting the Access Point to the DC Power Supply/NIA

Warning	It is extremely important to connect the DC power to the DC PSU/NIA as the last step. Connecting DC power prematurely can damage the Access Point and lead to faulty behavior. The DC PSU/NIA unit contains no serviceable parts.

Note	The power should be tested - the power (outer) LED should light green. If the light is red or off then the connections are incorrect. The Earth connection is not checked by the LED.

The following procedures will guide you through the connection of the DC PSU/NIA unit:

1) Remove the new DC PSU/NIA from the installation kit.

2) Using a shielded RJ-45 plug, terminate (attach plug) to the Access Point Cat-5 cable per the manufacturer's recommended specifications for plug attachment. (Recommended manufacturer: AMP P/N 5-569552).

3) Insert the RJ-45 plug from the outdoor Access Point into the RJ-45 receptacle, labeled **Data+Power**, on the DC PSU/NIA (Figure 3-23:).

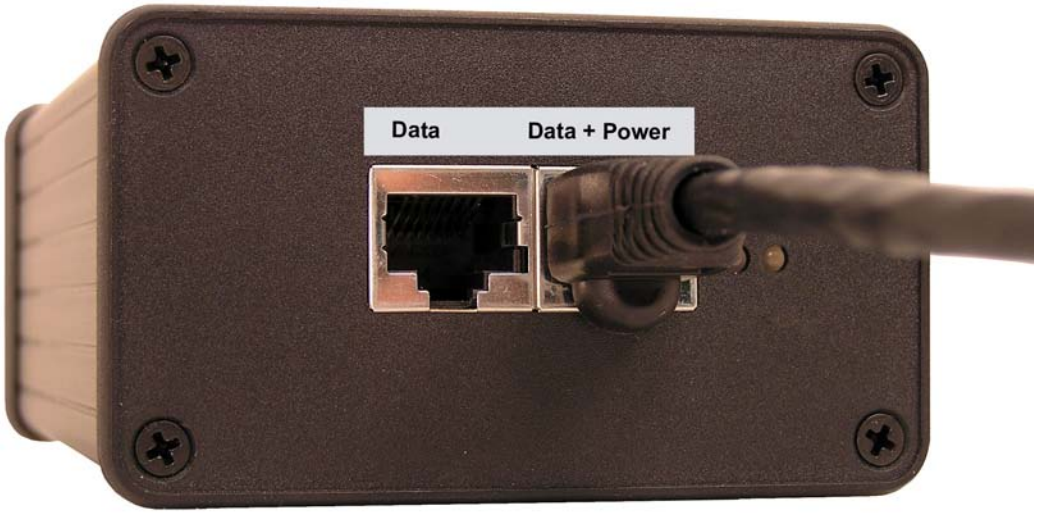

Figure 3-23: Connect the Access Point

Note	The DC PSU/NIA does not come with cables or power cord. Service provider must provide their own cables and power supply wires.

3.9.2.2 Completing the Connection of the DC Power Supply/NIA

Warning	It is extremely important to connect the DC power to the DC PSU/NIA as the last step. Connecting DC power prematurely can damage the Access Point and lead to faulty behavior.

Note	The DC PSU/NIA does not come with cables or power cord. Service provider must provide their own cables and power cord.

1) Insert one end of an RJ-45 to RJ-45 Ethernet cable assembly to the RJ-45 receptacle, labeled **Data**, on the outside of the DC PSU/NIA and the other end to the customer's computer (Figure 3-24:).

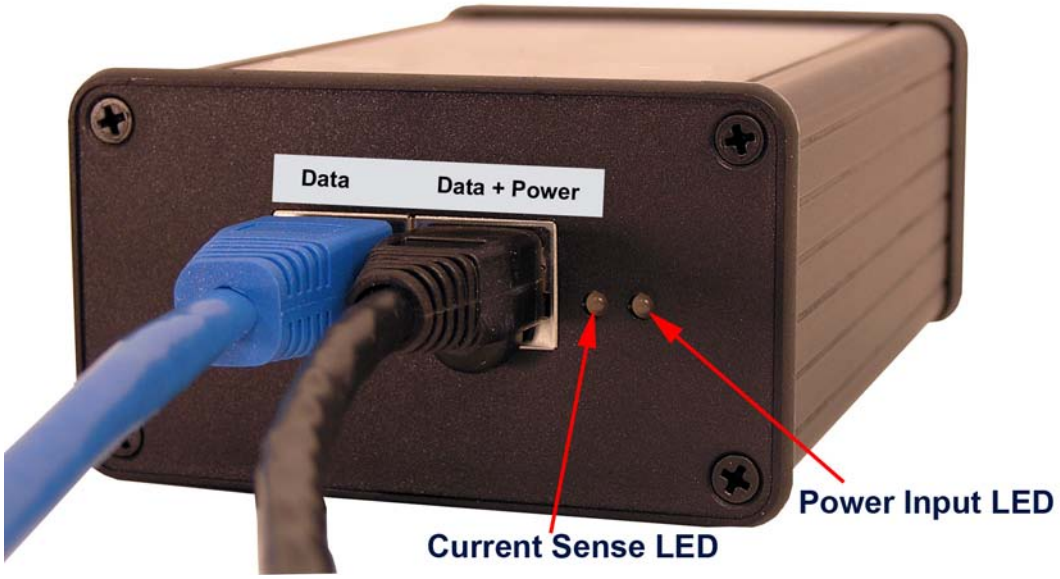

Figure 3-24: Connect customer computer or network device

Note	Customer equipment requiring Ethernet connectivity may not be located more than 100 m (328 ft.) from the Access Point.

2) Check to see that the connection to the Access Point is in place.

3) Screw three wires (22-14AWG) from the power supply into the mating plug (-48V DC supply, DC return, and earth) (Figure 3-25:).

Figure 3-25: Mating Power Plug

4) Connect the assembled mating plug into the DC PSU/NIA (Figure 3-26: and Figure 3-27:).

Figure 3-26: NIA's connector without mating plug

.

Figure 3-27: Connect the mating plug

Warning	It is extremely important to connect the DC power to the DC PSU/NIA as the last step. Connecting DC power prematurely can damage the Access Point and lead to faulty behavior.

5) The completed setup is shown in Figure 3-28:.

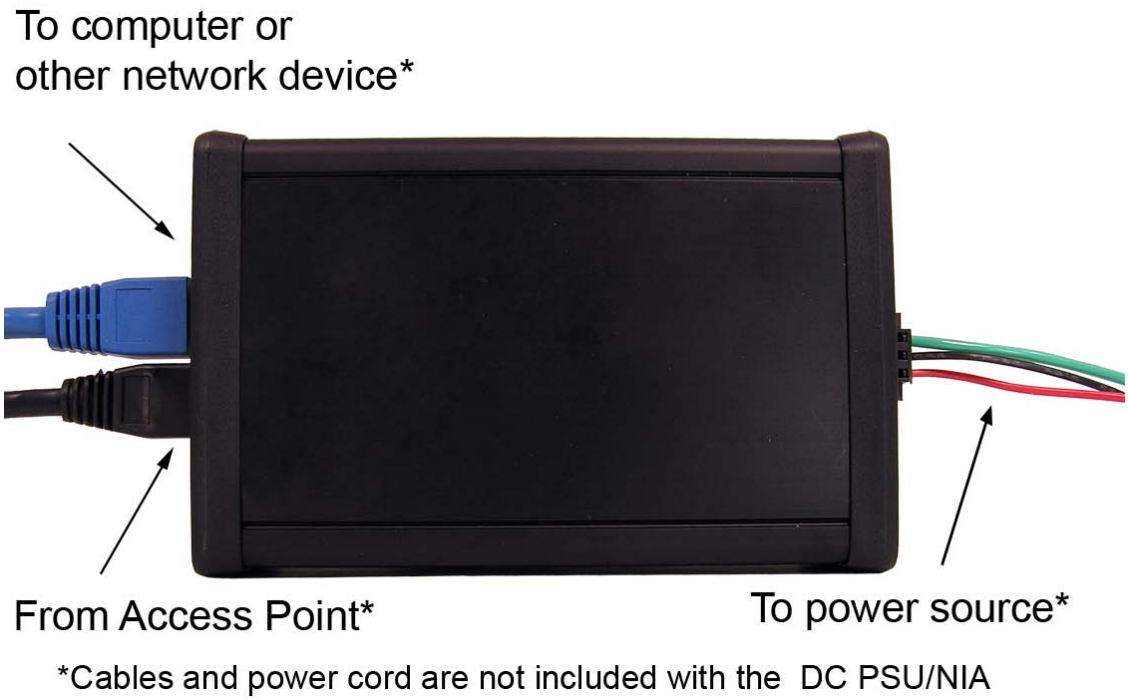

Figure 3-28: NIA setup is complete

4.0 Configuring an Access Point for Single-Channel Use

Using the Access Point setup screens, follow the procedure below to configure a single-channel Access Point.

Note	Where dynamic frequency selection (DFS) is not required, the Access Point will only support a single-channel configuration.

The following topics cover configuring an Access Point for single-channel use.

- **Logging into the Access Point Web Page**
- **Configuring IP Address Settings**
- **Configuring System Information Settings**
- **Completing Access Point Setup**

4.1 Logging into the Access Point Web Page

1) If the installer laptop is not running, power on and wait for the installer laptop to complete initialization to the desktop.

2) Set the IP address to be on the same network as the single-channel Access Point.

Note	The Access Point default IP address is **10.1.1.254**, and the netmask is **255.255.255.0**.

3) To run the Access Point setup operation, open an internet browser and type the following Access Point's IP address in the browser **Address** field:

Example: 10.1.1.254

4) When the authentication popup appears (Figure 4-1:), type the following default values in the user name/password fields:

User Name: **admin**

Password: **admin**

Figure 4-1: Authentication popup

5) When the **Access Point Status** screen appears (Figure 4-2:), continue with the setup process by using the links from the screen menu, starting with configuring the IP Address settings.

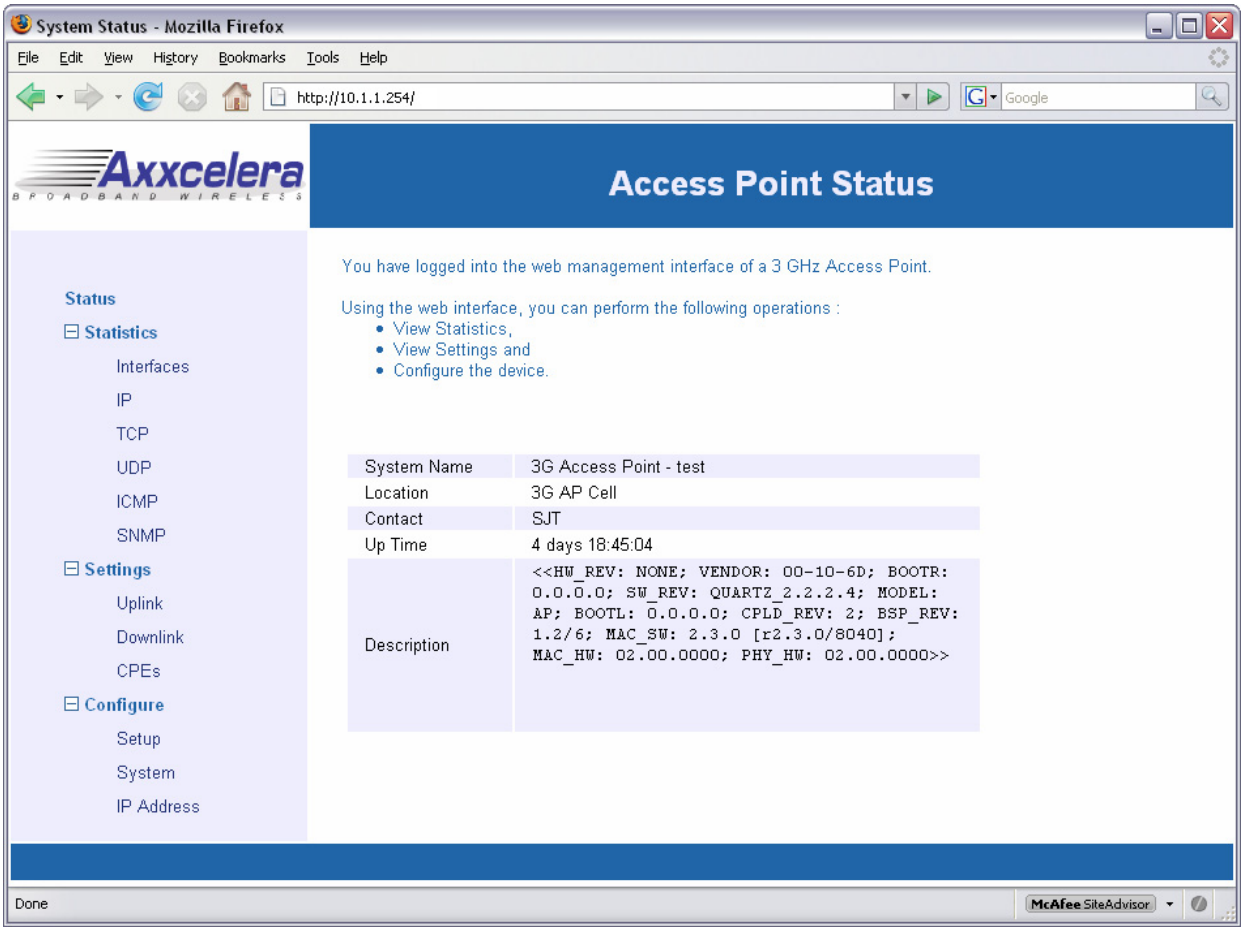

Figure 4-2: Single-Channel Access Point Status screen

4.1.3 Configuring IP Address Settings

Follow this procedure to configure the IP Address settings.

1) Select **IP Address** from the menu list.

2) When the **IP Address** screen (Figure 4-3:) appears, in the **Edit Settings** fields enter the appropriate IP Address, Subnet Mask, and Gateway addresses.

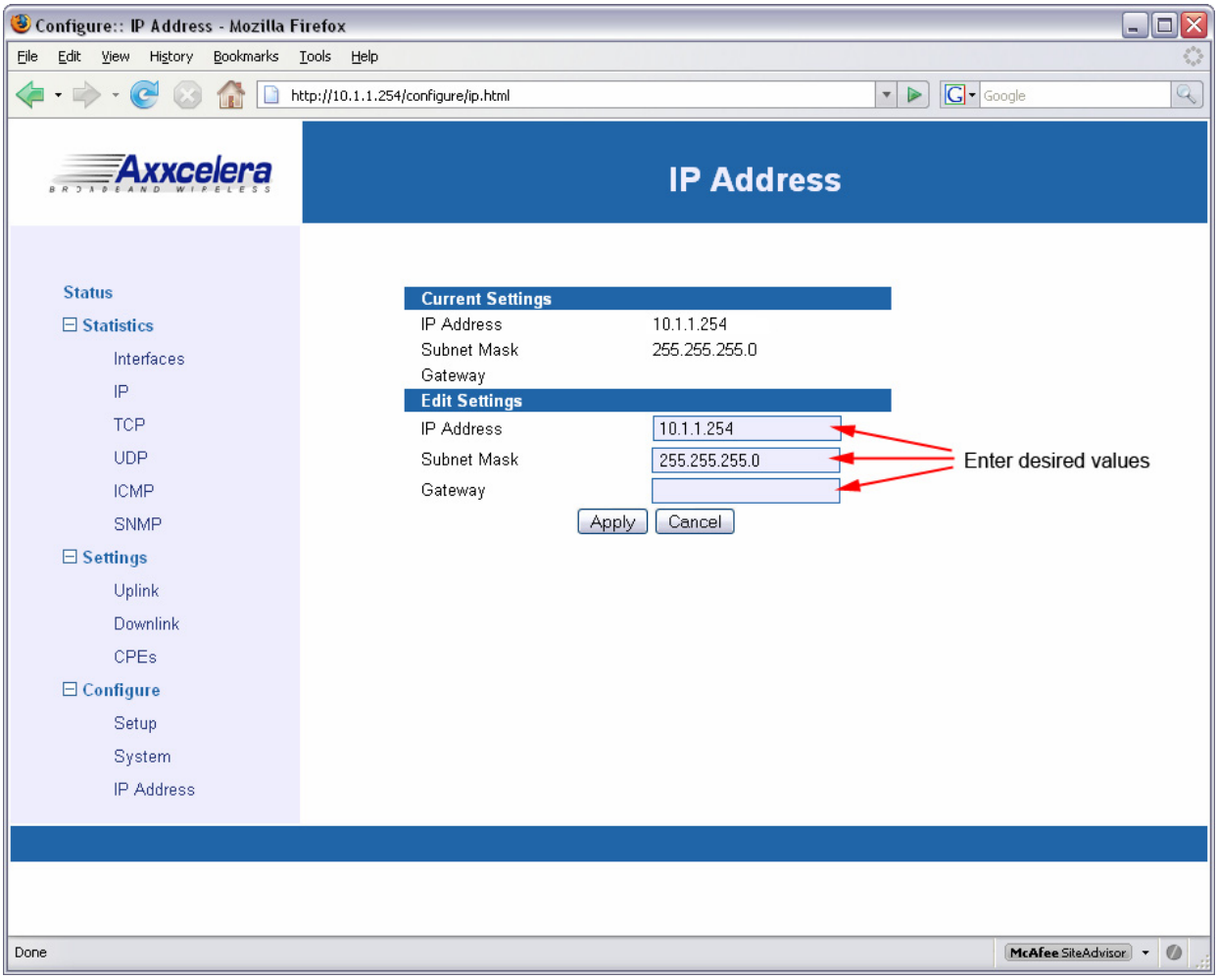

Figure 4-3: Configuring the IP Address

3) Click **Apply** to accept the addresses. The **Current Settings** will display the address values.

4) If the current addresses need to be changed, then enter new addresses in the **Edit Settings** fields and click **Apply**.

4.1.4 Configuring System Information Settings

Follow this procedure to configure the System Information settings.

1) Select **System** from the menu list.

2) When the **System Information** screen (Figure 4-4:) appears, enter the System Name, Location, and Contact information in the appropriate fields.

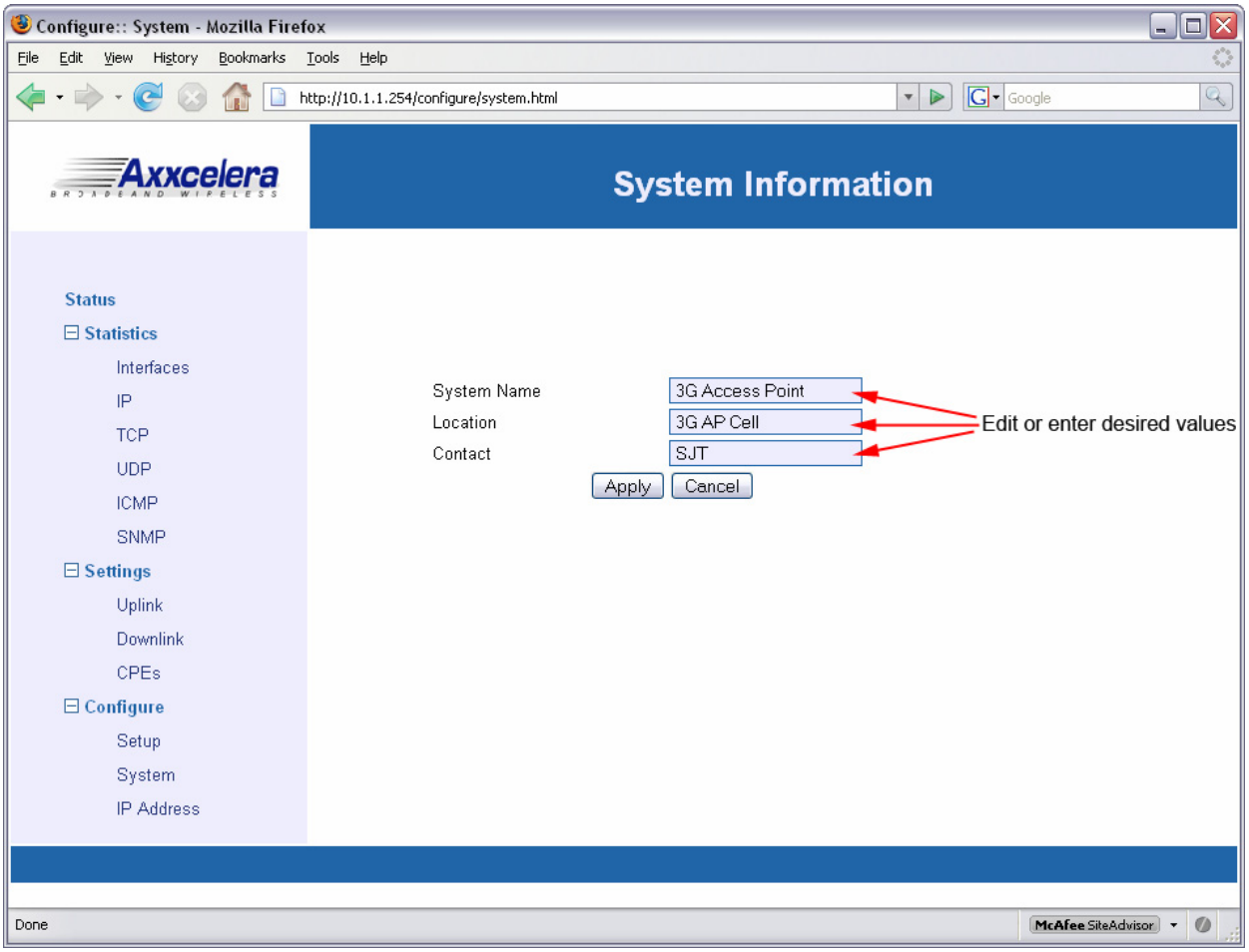

Figure 4-4: Configuring System Information Settings

3) Click **Apply** to accept the entries.

Note	Access Points with the same **Location** name will be placed into the same cell on the Axxcelera NMS.

4) If the current information needs to be changed, then enter the new information in the appropriate fields and click **Apply**.

4.1.5 Completing Access Point Setup

Follow this procedure to complete the setup of the Access Point.

1) Select **Setup** from the menu list.

2) When the **Access Point Setup** screen appears (Figure 4-5:), enter the desired parameters.

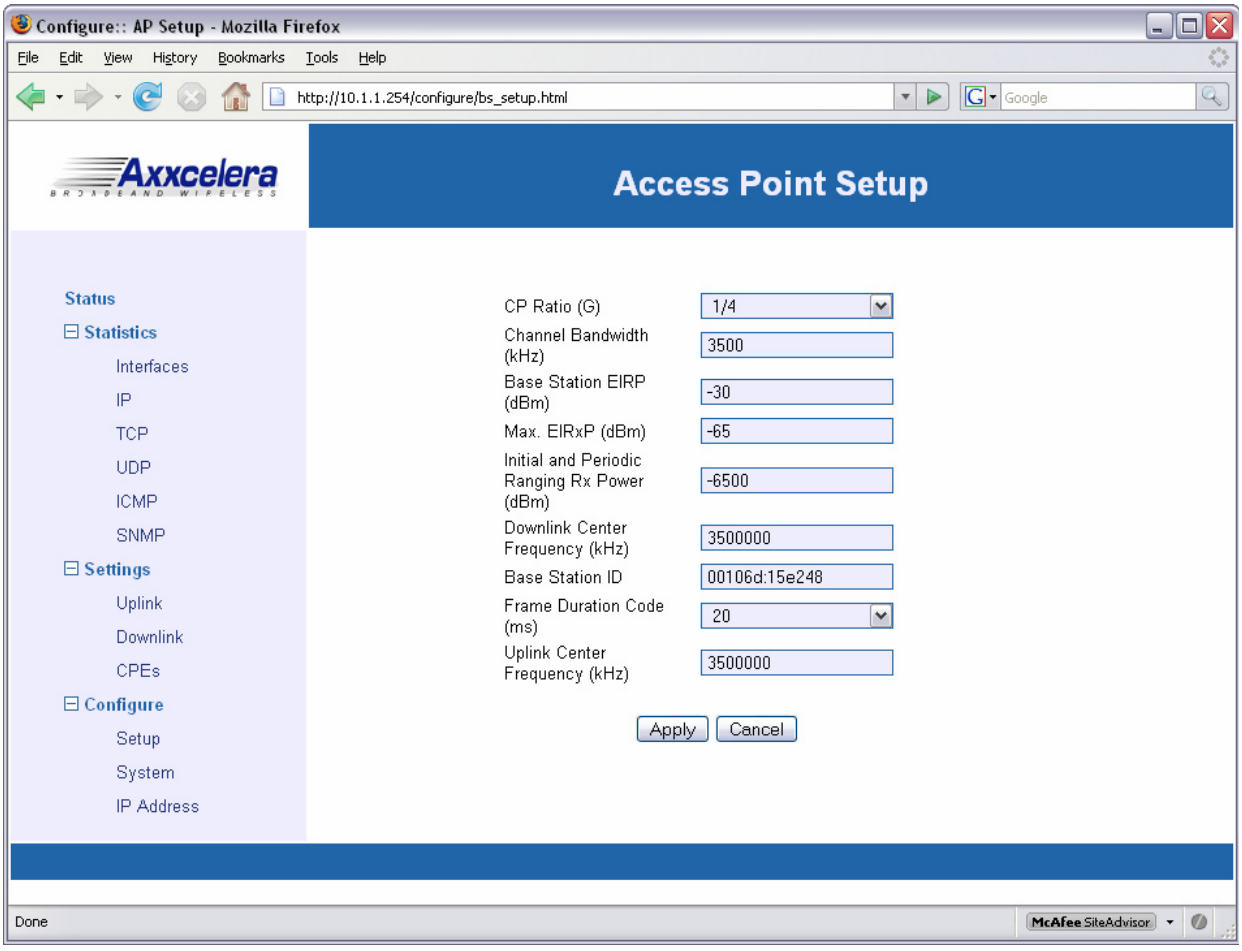

Figure 4-5: Single-Channel Access Point Setup screen

3) Select the desired **CP Ratio (G)** from the dropdown list (Figure 4-6:).

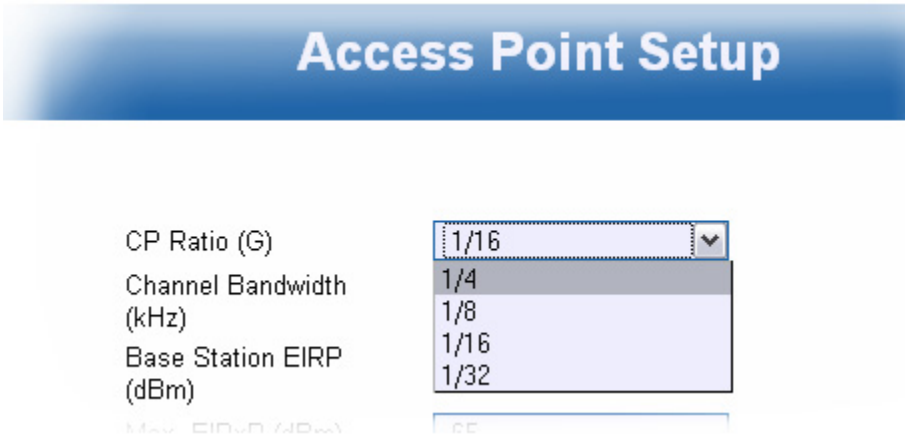

Figure 4-6: CP Ratio (G) options

4) Select the desired **Frame Duration Code** from the dropdown list (Figure 4-7:

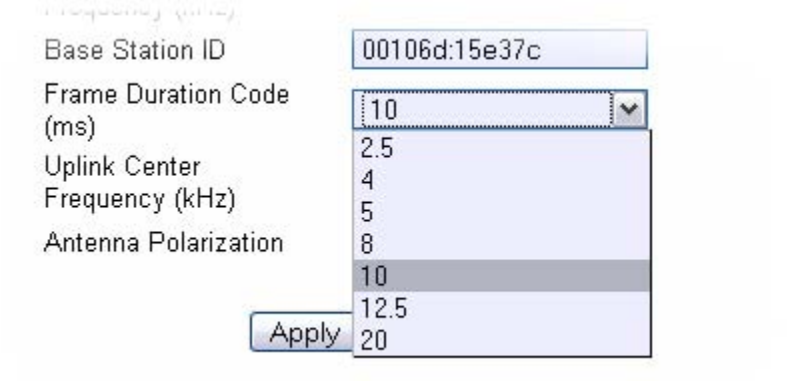

Figure 4-7: Frame Duration Code options

5) Click **Apply** to complete the single-channel Access Point setup.

4.1.6 Power Settings for Operation in the 3.650 - 3.675 GHz Band

AP Antenna Gain	16.5 dBi		External, Sectored, 60deg			
	1 dBi		Cable Loss			
Channel Spacing: 7MHz						
Freq	Gant	BW	TX set	PPSD (cond)	PPSD EIRP	PPSD EIRP Limit	Margin
(MHz)	(dBi)	(MHz)	(dBm)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	dB
3662.5	15.5	7	10	14.45	29.95	30	0.05
Channel Spacing: 3.5MHz						
Freq	Gant	BW	TX set	PPSD (cond)	PPSD EIRP	PPSD EIRP Limit	Margin
(MHz)	(dBi)	(MHz)	(dBm)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	dB
3662.5	15.5	3.5	8	14.49	29.99	30	0.01

AP Antenna Gain	14 dBi		External, Sectored, 90deg			
	1 dBi		Cable Loss			
Channel Spacing: 7MHz						
Freq	Gant	BW	TX set	PPSD (cond)	PPSD EIRP	PPSD EIRP Limit	Margin
(MHz)	(dBi)	(MHz)	(dBm)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	dB
3662.5	13	7	12	16.95	29.95	30	0.05
Channel Spacing: 3.5MHz						
Freq	Gant	BW	TX set	PPSD (cond)	PPSD EIRP	PPSD EIRP Limit	Margin
(MHz)	(dBi)	(MHz)	(dBm)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	dB
3662.5	13	3.5	10	16.97	29.97	30	0.03

AP Antenna Gain		10 dBi		External, Omni			
		1 dBi		Cable Loss			
Channel Spacing: 7MHz							
Freq	Gant	BW	TX set	PPSD (cond)	PPSD EIRP	PPSD EIRP Limit	Margin
(MHz)	(dBi)	(MHz)	(dBm)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	dB
3662.5	9	7	16	20.95	29.95	30	0.05
Channel Spacing: 3.5MHz							
Freq	Gant	BW	TX set	PPSD (cond)	PPSD EIRP	PPSD EIRP Limit	Margin
(MHz)	(dBi)	(MHz)	(dBm)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	dB
3662.5	9	3.5	14	20.97	29.97	30	0.03

5.0 Maintenance Guide

This section is intended for use by all Field Service Engineers.

Catastrophic failures can often be prevented by a regimen of preventative maintenance. The following is a list of maintenance suggestions supported by Axxcelera.

1) Perform regular visual inspections. Check the butyl-rubber waterproofing tape used to cover the cable connectors for integrity.

2) Check areas around ground clamps for any signs of oxidation or corrosion that might compromise the connection.

3) Periodically check the connectors for tightness.

4) Take care not to compromise the integrity of the cabling. IF, RF and Ethernet cabling can become damaged if it becomes pinched, for example during site construction or renovation.

5) Periodically check the integrity of the signal path clearance between the Access Point and the CPE. It may seem obvious, but when service is disrupted, and there is no obvious suspect hardware, it is possible that something in the environment has changed and the RF path itself is suspect. The path that was unobstructed yesterday might not be so clear today.

6) Check for near-field objects. No metallic objects, such as telephone or power wires, poles or fences, should be within the field view of the antenna (+/- 8 degrees) within the first 20 feet. These objects could reflect the microwave energy back to the antenna and distort the RF beam. This reflection could also cause the signal to be directed away from where it is needed.

7) Non-metallic objects in the vicinity can absorb microwave energy; however, when they become wet, these objects can become very reflective. Shots over water or flat surfaces should be avoided because these surfaces cause reflections that increase multipath. Multipath is when the same signal is received twice; one signal is the direct path and the other is the reflected (delayed) signal. The delayed signal can be out of phase with the direct signal and cause cancellation.

8) Periodically check for ground loops that might be introduced into the system inadvertently by engineers adding new equipment without regard to the grounding system already in place. Ground loops can cause noise problems in the system.

Appendix A: NIA/Power Adapter Specifications: Model # TR60A-POE-L

Features	Specifications	
• Universal Input: 90 ~ 264Vac • Continuous Short Circuit Protection • Conductive EMI Meets CISPR/FCC Class B • High Efficiency at 75% Minimum • Lighting Protection **NOTE** 1: Voltage accuracy is set at 60% full load. 2: Add a 0.1uF ceramic capacitor and a 10uf E.L. capacitor to output for Ripple & Noise measuring @20MHz BW. 3: Line regulation is measured from 100Vac to 240Vac with full load. 4: Load regulation is measured from 60% to 100% full load and from 60% to 20% full load(60%+/-40%fullload).	• **Input Characteristics**	
	Voltage Frequency Inrush Current Conducted EMI Isolation Leakage Current	90 ~ 264Vac 47 to 63Hz 50A Max. @ 264Vac CISPR/FCC Class B Input to output = 4,242Vdc 1.5mA max.
	• **Output Characteristics**	
	Hold-up Time Short Circuit Protection Over Voltage Protection	8mS typ. @ 115Vac Auto-Recovery Auto-Recovery
	• **Environmental Characteristics**	
	Operating Temperature Storage Temperature Operating Humidity Cooling	0 ~ 40° C -50 ~70° C 5% ~ 95% Free air cooling
	• **Mechanical Outline**	
	Dimensions	150mm x 70mm x 35mm
	Typical at 25° C, nominal line and 75% load, unless otherwise Specified.	

Model	Output Voltage	Max. Load	Min. Load	Ripple & Noise	Voltage Accuracy	Line Regulation	Load Regulation
TR60A-POE-L	48 V	1.2 A	0 A	1%	+/- 2%	+/- 1%	+/- 2%

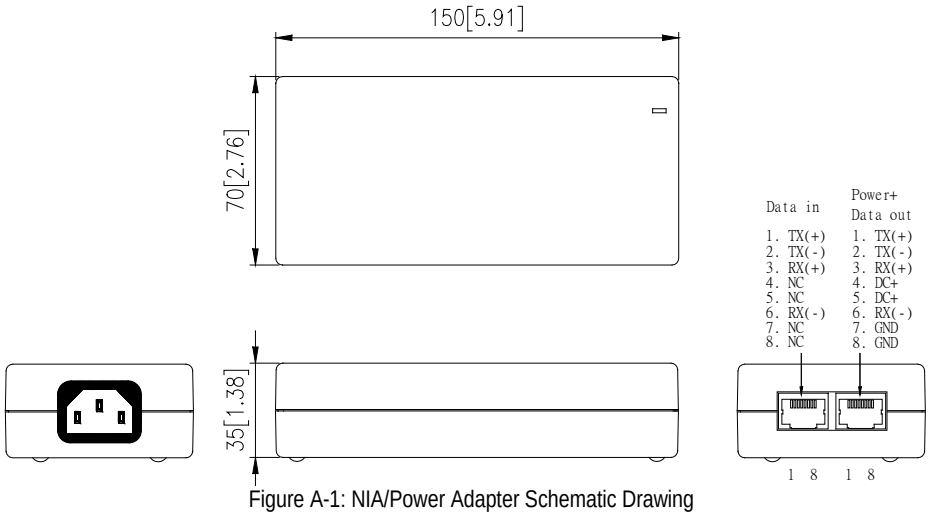

Figure A-1: NIA/Power Adapter Schematic Drawing

Figure A-2: NIA/Power Adapter label

Appendix B: ExcelMax DC PSU/NIA (020-44109-0802)

Features	Specifications
Dimensions	Desk-Mounting Unit: L= 126mm W= 81mm H= 46mm Wall-Mounting Unit: L= 153mm W= 81mm H= 51mm
Weight	350g
Color	Black
Operating Temperature	0° C to +40° C ambient (free air cooling) For Indoor Use Only
Storage Temperature	-40° C to +70° C
Input	DC, -48V (+/-20%)
Output	DC, +53.5V (typical) Max output current = 0.8A Max Power = 42W
Efficiency	85% typical
Protection	Continuous short-circuit protection on output Internal fuse on negative supply input Thermal shutdown at 100C
RoHS compliance	Yes

Appendix C: Glossary of Terms and Abbreviations

Bandwidth	A measure (in Hertz) of a transmission facility's ability to transmit signals that span a range of frequencies without degrading the amount of power in the signal. For example, a bandwidth of 2700 Hz.
Base Station	The indoor and outdoor equipment located at the central site.
Bit Error Rate (BER)	The percentage of received bits in error compared to the total number of bits received. Usually expressed as a number to the power of 10. For example, 10^5 means that one in every 100,000 bits transmitted will be wrong.
Broadband	A high number of signals multiplexed onto a single transmission channel.
BTS	Base Station Termination System
CPE	This unit contains both the antenna and the modem.
Default Gateway	A unique IP address that a device uses to put traffic on the network when it knows the address of a device it is trying to contact, but does not know exactly where on the network or on which sub-network it is located.
Downstream	Traffic traveling from the Access Point to the CPE
Fault	A hard failure or performance degradation serious enough to destroy the ability of a network element to function effectively.
FEC	Forward-Error correction
Firmware	Software "burned" into a chip.
Frequency	The rate at which an electromagnetic waveform, such as an electrical current, alternates. Measured in Hertz, i.e., cycles per second.
Gain	The increase in signaling power that occurs as a signal is boosted by an electronic device. Measured in decibels (dB).
IP	Internet Protocol. Set of standardized rules for the transmission of data over the internet.
IP Address	A unique numerical identifier of an intelligent network device. Because IP addresses are often in short supply, sometimes a DHCP server dynamically applies the address.
Modulation	The process of varying some characteristic of the electrical carrier wave as the information on that carrier wave varies.
NIA	Network Interfacing Adaptor. This unit supplies power and data to the CPE or Access Point.
ODU	Outdoor Unit
Polarization	Characteristic of electromagnetic radiation, such as radio waves, where the electric-field vector of the wave energy is perpendicular to the main direction, or vector, of the electromagnetic beam.

Polling Interval	The frequency with which a management station invites network nodes to transmit management information from several seconds to several hours. Transmits packets that can themselves add to network congestion, especially if the poll is too frequent on a big network.
PSU	Power Supply Unit
QPSK	Quadrature Phase Shift Keying. Two phase carriers are at 90° to each other and are thus electrically isolated.
RF	Radio Frequency: Signals that appear in the air link from antenna to antenna.
RSSI	Radio Signal Strength Indicator. Either visual or audio indicator used in antenna pointing.
Rx	Symbol meaning “Receive.”
Signal-To-Noise Ratio (SNR)	A measure of how much stronger a signal is than the background noise; usually expressed in decibels (dB)
SNMP	The Simple Network Management Protocol, developed to manage TCP/IP and Ethernet networks
Spectrum	A continuous range of frequencies, usually wide in extent, within which waves have some specific common characteristics
Symbol Rate	In digital transmission, a recognizable electrical state which is associated with a signal element, which is an electrical signal within a defined period of time. In binary transmission, for example, a signal element is represented as one of two possible states or symbols, i.e., 1 or 0.
Threshold	A level, point, or value above which something is true or will take place and below which, it is not true or will not take place.
Throughput	The amount of data passed through a network measured in units of time, or as a percentage of the time available.
Transceiver	Device used to transmit and receive RF traffic.
Tx	Symbol meaning “Transmit.”
Upstream	Network traffic passing from CPE to the Access Point.

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