



Cisco DigiStar Ethernet over COAX (EoC) Aggregation Point (AP) E230 Series

Installation and Operation Guide

For Your Safety

Explanation of Warning and Caution Icons



Avoid personal injury and product damage! Do not proceed beyond any symbol until you fully understand the indicated conditions.

The following warning and caution icons alert you to important information about the safe operation of this product:

-  You may find this symbol in the document that accompanies this product. This symbol indicates important operating or maintenance instructions.
-  You may find this symbol affixed to the product. This symbol indicates a live terminal where a dangerous voltage may be present; the tip of the flash points to the terminal device.
-  You may find this symbol affixed to the product. This symbol indicates a protective ground terminal.
-  You may find this symbol affixed to the product. This symbol indicates a chassis terminal (normally used for equipotential bonding).
-  You may find this symbol affixed to the product. This symbol warns of a potentially hot surface.
-  You may find this symbol affixed to the product and in this document. This symbol indicates an infrared laser that transmits intensity-modulated light and emits invisible laser radiation or an LED that transmits intensity-modulated light.

Important

Please read this entire guide. If this guide provides installation or operation instructions, give particular attention to all safety statements included in this guide.

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Important Safety Instructions

Read and Retain Instructions

Carefully read all safety and operating instructions before operating this equipment, and retain them for future reference.

Follow Instructions and Heed Warnings

Follow all operating and use instructions. Pay attention to all warnings and cautions in the operating instructions, as well as those that are affixed to this equipment.

Terminology

The terms defined below are used in this document. The definitions given are based on those found in safety standards.

Service Personnel-The term service personnel applies to trained and qualified individuals who are allowed to install, replace, or service electrical equipment. The service personnel are expected to use their experience and technical skills to avoid possible injury to themselves and others due to hazards that exist in service and restricted areas.

User and Operator-The terms user and operator apply to persons other than service personnel.

Ground(ing) and Earth(ing)-The terms ground(ing) and earth(ing) are synonymous. This document uses ground(ing) for clarity, but it can be interpreted as having the same meaning as earth(ing).

Electric Shock Hazard

This equipment meets applicable safety standards. Refer to this equipment's data sheet for details about regulatory compliance approvals.



WARNING

Avoid electric shock! Opening or removing the equipment cover may expose you to dangerous voltages. Refer all servicing to qualified service personnel only.

Electric shock can cause personal injury or even death. Avoid direct contact with dangerous voltages at all times.

Know the following safety warnings and guidelines:

- Only qualified service personnel are allowed to perform equipment installation or replacement.
- Only qualified service personnel are allowed to remove equipment covers and access any of the components inside the chassis.

Equipment Placement



WARNING

Avoid personnel injury and damage to this equipment. An unstable mounting surface may cause this equipment to fall.

To protect against equipment damage or injury to personnel, comply with the following: Install this equipment in a restricted access location (access restricted to service personnel).

Make sure the mounting surface or rack is stable and can support the size and weight of this equipment.

Continued on next page

Important Safety Instructions, Continued

Strand (Aerial) Installation



CAUTION

Be aware of the size and weight of strand-mounted equipment during the installation operation.

Ensure that the strand can safely support the equipment's weight.

Pedestal Installation



WARNING

Avoid possibility of personal injury. Ensure proper handling/lifting techniques are employed when working in confined spaces with heavy equipment.

Ensure this equipment is securely fastened to the mounting surface or rack where necessary to protect against damage due to any disturbance and subsequent fall.

Ensure the mounting surface or rack is appropriately anchored according to manufacturer's specifications.

Ensure the installation site meets the ventilation requirements given in the equipment's data sheet to avoid the possibility of equipment overheating.

Ensure the installation site and operating environment is compatible with the equipment's International Protection (IP) rating specified in the equipment's data sheet.

Connecting to Utility AC Power

Important: If this equipment is a Class I equipment, it must be grounded.

If this equipment plugs into an outlet, the outlet must be near this equipment, and must be easily accessible.

Connect this equipment only to the power sources that are identified on the equipment-rating label, which is normally located close to the power inlet connector(s).

- This equipment may have two power sources. Be sure to disconnect all power sources before working on this equipment.
- If this equipment does not have a main power switch, the power cord connector serves as the disconnect device.
- Always pull on the plug or the connector to disconnect a cable. Never pull on the cable itself.

Connection to Network Power Sources

Refer to this equipment's specific installation instructions in this manual or in companion manuals in this series for connection to network ferro-resonant AC power sources.

Continued on next page

Important Safety Instructions, Continued

AC Power Shunts

AC power shunts may be provided with this equipment.

Important: The power shunts (where provided) must be removed before installing modules into a powered housing. With the shunts removed, power surge to the components and RF-connectors is reduced.



CAUTION

RF connectors and housing seizure assemblies can be damaged if shunts are not removed from the equipment before installing or removing modules from the housing.

Grounding (Utility AC Powered Equipment in Pedestals, Service Closets, etc.)

This section provides instructions for verifying that the equipment is properly grounded.

Safety Plugs (USA Only)

This equipment is equipped with either a 3-terminal (grounding-type) safety plug or a 2-terminal (polarized) safety plug. The wide blade or the third terminal is provided for safety. Do not defeat the safety purpose of the grounding-type or polarized safety plug.

To properly ground this equipment, follow these safety guidelines:

Grounding-Type Plug

For a 3-terminal plug (one terminal on this plug is a protective grounding pin), insert the plug into grounded mains, 3-terminal outlet.

Note: This plug fits only one way. If this plug cannot be fully inserted into the outlet, contact an electrician to replace the obsolete 3-terminal outlet.

Polarized Plug

For a 2-terminal plug (a polarized plug with one wide blade and one narrow blade), insert the plug into a polarized mains, 2-terminal outlet in which one socket is wider than the other.

Note: If this plug cannot be fully inserted into the outlet, try reversing the plug.

If the plug still fails to fit, contact an electrician to replace the obsolete 2-terminal outlet.

Grounding Terminal

If this equipment is equipped with an external grounding terminal, attach one end of an 18-gauge wire (or larger) to the grounding terminal; then, attach the other end of the wire to a ground, such as a grounded equipment rack.

Continued on next page

Important Safety Instructions, Continued

Safety Plugs (European Union)

Class I Mains Powered Equipment

Provided with a 3-terminal AC inlet and requires connection to a 3-terminal mains supply outlet via a 3-terminal power cord for proper connection to the protective ground.

Note: The equipotential bonding terminal provided on some equipment is not designed to function as a protective ground connection.

Class II Mains Powered Equipment

Provided with a 2-terminal AC inlet that may be connected by a 2-terminal power cord to the mains supply outlet. No connection to the protective ground is required as this class of equipment is provided with double or reinforced and/or supplementary insulation in addition to the basic insulation provided in Class I equipment.

Note: Class II equipment, which is subject to EN 50083-1, is provided with a chassis mounted equipotential bonding terminal. See the section titled Equipotential Bonding for connection instructions.

Equipotential Bonding

If this equipment is equipped with an external chassis terminal marked with the IEC 60417-5020 chassis icon () , the installer should refer to CENELEC standard EN 50083-1 or IEC standard IEC 60728-11 for correct equipotential bonding connection instructions.

Continued on next page

Important Safety Instructions, Continued

General Servicing Precautions



WARNING

Avoid electric shock! Opening or removing the equipment cover may expose you to dangerous voltages. Refer all servicing to qualified service personnel only.



CAUTION

These servicing precautions are for the guidance of qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

Be aware of the following general precautions and guidelines:

- **Servicing** - Servicing is required when this equipment has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into this equipment, this equipment has been exposed to rain or moisture, does not operate normally, or has been dropped.
- **Wristwatch and Jewelry** - For personal safety and to avoid damage of this equipment during service and repair, do not wear electrically conducting objects such as a wristwatch or jewelry.
- **Lightning** - Do not work on this equipment, or connect or disconnect cables, during periods of lightning.
- **Labels** - Do not remove any warning labels. Replace damaged or illegible warning labels with new ones.
- **Covers** - Do not open the cover of this equipment and attempt service unless instructed to do so in the instructions. Refer all servicing to qualified service personnel only.
- **Moisture** - Do not allow moisture to enter this equipment.
- **Cleaning** - Use a damp cloth for cleaning.
- **Safety Checks** - After service, assemble this equipment and perform safety checks to ensure it is safe to use before putting it back into operation.

Continued on next page

Important Safety Instructions, Continued

Electrostatic Discharge

Electrostatic discharge (ESD) results from the static electricity buildup on the human body and other objects. This static discharge can degrade components and cause failures.

Take the following precautions against electrostatic discharge:

- Use an anti-static bench mat and a wrist strap or ankle strap designed to safely ground ESD potentials through a resistive element.
- Keep components in their anti-static packaging until installed.
- Avoid touching electronic components when installing a module.

Fuse Replacement

- To replace a fuse, comply with the following:
- Disconnect the power before changing fuses.
- Identify and clear the condition that caused the original fuse failure.
- Always use a fuse of the correct type and rating. The correct type and rating are indicated on this equipment.

Modifications

This equipment has been designed and tested to comply with applicable safety, laser safety, and EMC regulations, codes, and standards to ensure safe operation in its intended environment. Refer to this equipment's data sheet for details about regulatory compliance approvals.

Do not make modifications to this equipment. Any changes or modifications could void the user's authority to operate this equipment.

Modifications have the potential to degrade the level of protection built into this equipment, putting people and property at risk of injury or damage. Those persons making any modifications expose themselves to the penalties arising from proven non-compliance with regulatory requirements and to civil litigation for compensation in respect of consequential damages or injury.

Accessories

Use only attachments or accessories specified by the manufacturer.

Chapter 1

Introduction

Overview

Introduction

This guide provides instructions for installing, configuring, setting up, and troubleshooting the DigiStar™ Ethernet over Coax (EoC) Aggregation Point (AP) E230

This chapter describes typical system architectures for the AP and the components used in conjunction with the AP.

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Description

The Cisco DigiStar EoC Aggregation Point (AP) is designed to combine CATV signals with Ethernet signals for transmission to the subscriber's home through the existing coax access network.

With Ethernet data delivered to the building, the AP meets the IP interactive service requirement of cable operators for Multiple Dwelling Unit (MDU) application. The AP system fully supports Video-On-Demand (VOD) and IPTV services, and allows for subscriber service differentiation through rate limiting.

The aggregation point of the DigiStar EoC system, E230 provides CATV signal pass-through and Ethernet data management to the end-points. Ethernet data is delivered to an AP through an external media card or to an optical line terminal (OLT) with an internal ONU. An ONU with Small Form-Factor Pluggable (SFP) interface is an available AP option.

The AP provides high-speed and reliable data transmission.

Main Features

- Complies with 3.1 (ITU-T G.9954) and HomePlug AV international standards
- Complies with IEEE 802.1p and 802.1q
- Configurable RF ports; supports maximum configuration of 4 RF input ports and 4 RF output ports
- Supports PPPoE pass-through
- Supports SFP Interface to connect the ONU module
- Supports remote management through SNMP
- Supports Ethernet over COAX Network Element Management (ECEM) System
- Complies with IP68 waterproof standard; operable during extreme environment conditions
- Supports snooping (IGMP v2)

Solution

- Supports basic configuration 1 or maximum configuration 2 modules
- Supports 61 EPs per module
- Supports data throughput of 150 Mbps with 1 module and 300 Mbps data throughput with 2 modules

HomePlug Solution

- Supports basic configuration 1, standard configuration 2 or maximum configuration 4 HomePlug7400 modules
 - Supports 253 EPs per module
 - Supports the data throughputs of 250 Mbps with 1 module, 500 Mbps with 2 modules, and 1,000 Mbps with 4 modules
-

Description, Continued

List of Part Numbers

AP:

Solution	Description	Part Number
HomePlug7400 Module	DigiStar EoC AP E230.2, 65/87 MHz, 220 VAC, Ch-C, Basic Configuration, 1 Module, 1/1 or 2/2, without ONU	EAP7500211106000
	DigiStar EoC AP E230.2, 65/87 MHz, 220 VAC, Ch-C, Standard Configuration, 2 Modules, 2/2, without ONU	EAP7500212206000
	DigiStar EoC AP E230.2, 65/87 MHz, 60 VAC, NA, Maximum Configuration, 4 Modules, 1/4, with ONU	EAP7500104416000
	DigiStar EoC AP E230.2, 30/36 MHz, 60 VAC, NA, Maximum Configuration, 4 Modules, 1/4, with ONU	EAP7100104416000
HPNA Module	DigiStar EoC AP E230, 44/87 MHz, 220 VAC, US-C, Basic Configuration, 1 Module, 1/1 or 2/2, without ONU	EAP2300211106000
	DigiStar EoC AP E230, 44/54 MHz, 220 VAC, US-C, Basic Configuration, 1 Module, 1/1 or 2/2, without ONU	EAP2400221106000
	DigiStar EoC AP E230, 44/87 MHz, 220 VAC, Ch-C, Standard Configuration, 2 Modules, 2/2, without ONU	EAP2300212206000
	DigiStar EoC AP E230, 44/54 MHz, 220 VAC, US-C, Standard Configuration, 2 Modules, 2/2, without ONU	EAP2400222206000
	DigiStar EoC AP E230, 44/87 MHz, 60 VAC, NA, Standard Configuration, 2 Modules, 2/2, without ONU	EAP2300102216000
	DigiStar EoC AP E230, 44/87 MHz, 60 VAC, NA, Standard Configuration, 2 Modules, 4/4, without ONU	EAP2300102406000
	DigiStar EoC AP E230, 44/87 MHz, 220 VAC, Ch-C, Standard Configuration, 2 Modules, 4/4, without ONU	EAP2300212406000

Modules:

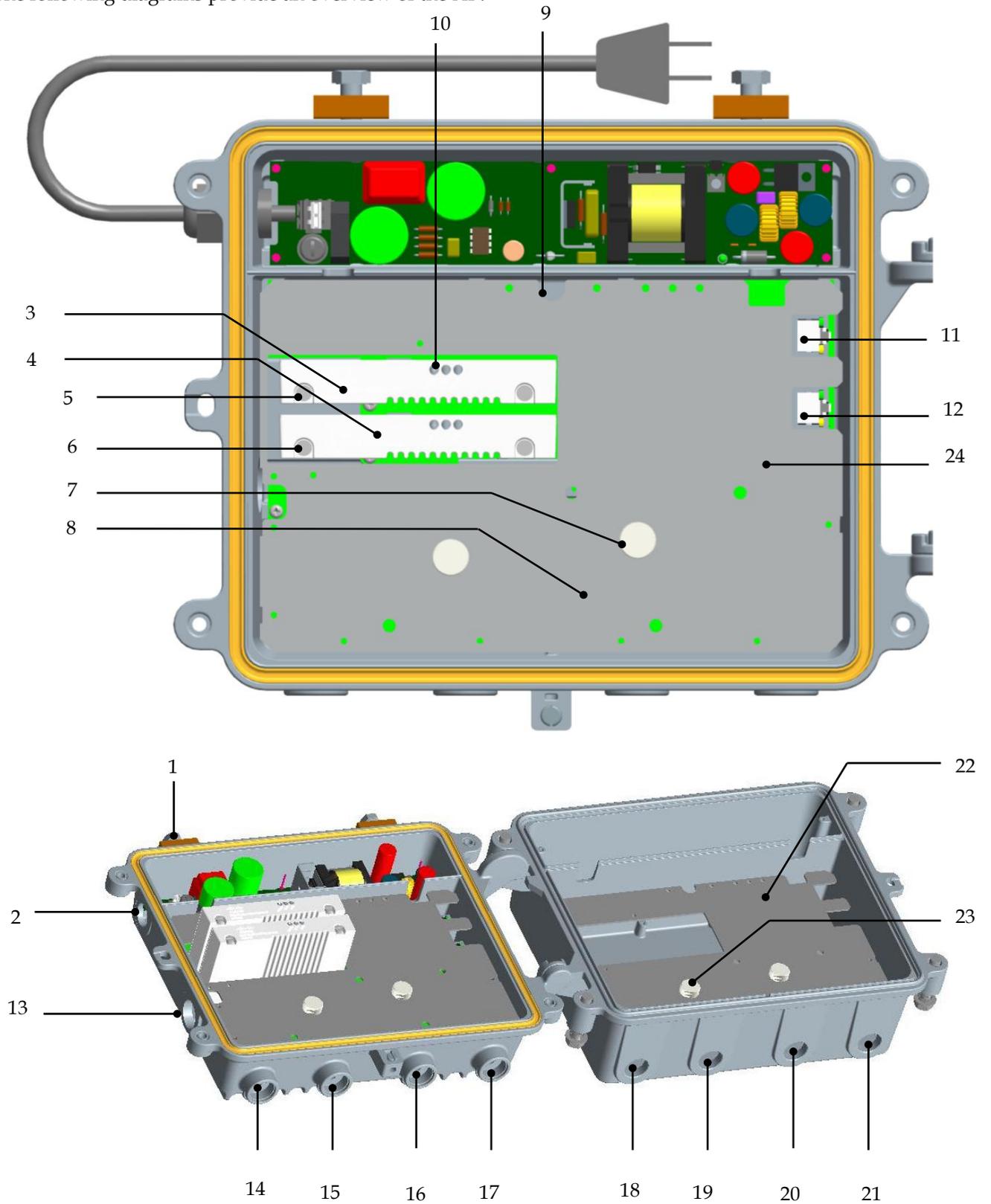
Description	Part Number
DigiStar EoC AP, 3210 module II	4035003
DigiStar EoC AP, HomePlug7400 Module	4038976
DigiStar EoC AP, ONU	4036988

Accessories:

Description	Part Number
DigiStar EoC AP, gland with 2 CAT 5 cable plugs	4038460
DigiStar EoC AP, gland with 1 CAT 5 cable plug and 1 Fiber plug	4038461
DigiStar EoC AP, F-Connector, Metric	4037919
DigiStar EoC AP, F-Connector, Standard	4037920
DigiStar EoC AP, 5/8" insert, short	4037921
DigiStar EoC AP, 5/8" insert, long	4037922
DigiStar EoC AP, port plug	4037907

AP Overview Diagram

The following diagrams provide an overview of the AP.



AP Overview Diagram, Continued

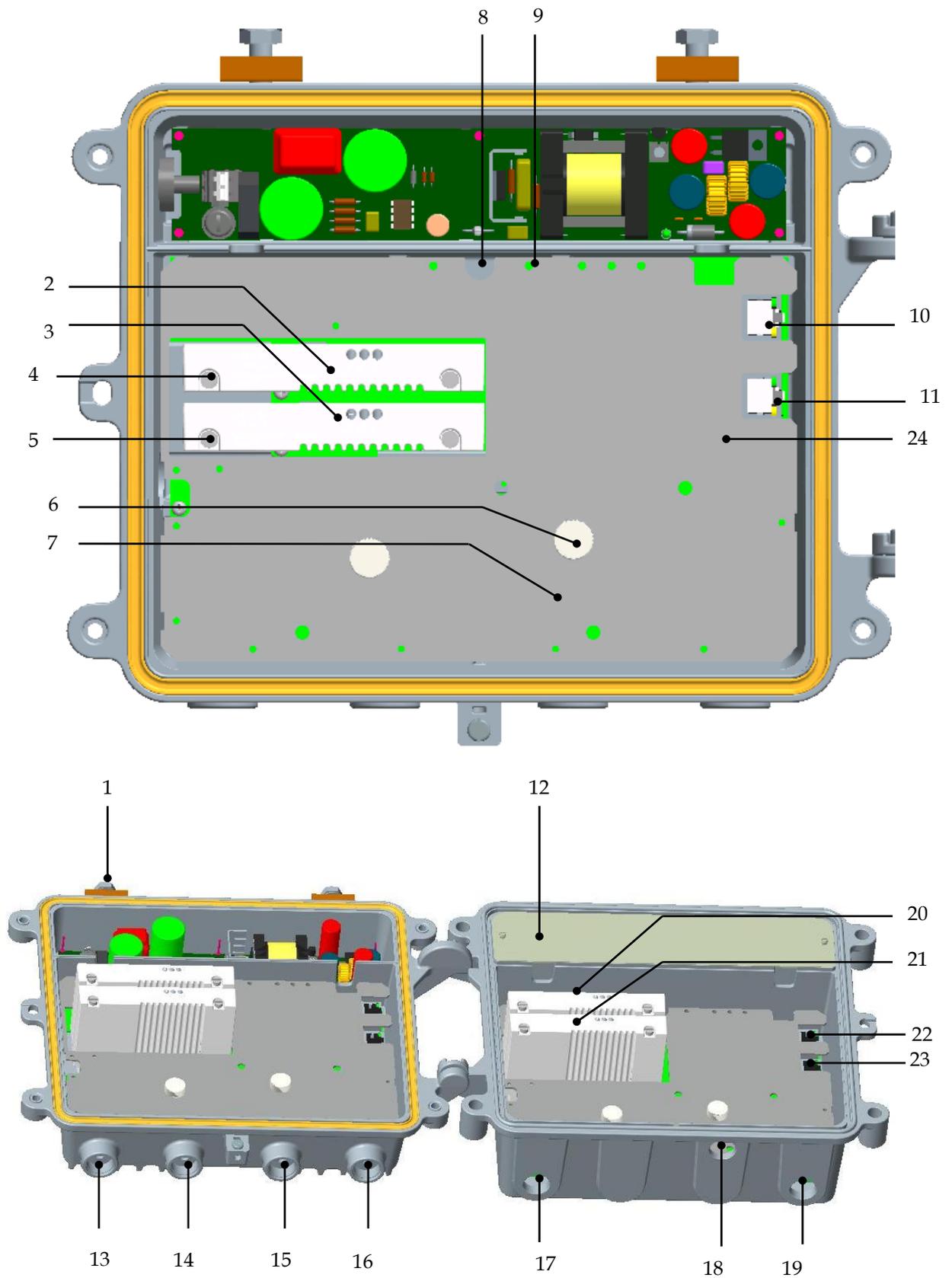
1. Strand Clamp x 2	13. Gland port for Ethernet and fiber installation
2. Gland port for power supply input	14. RF connector output 1
3. Module 2	15. RF connector input 1
4. Module 1	16. RF connector input 2
5. Screw x 2 to install Module 2	17. RF connector output 2
6. Screw x 2 to install Module 1	18. RF connector output 3
7. Screw x 2 on the metal cover	19. RF connector input 3
8. Metal cover	20. RF connector input 4
9. Opening for cable to connect to ports on the lid	21. RF connector output 4
10. LED indicators of two modules	22. Metal cover on the lid of AP
11. Ethernet port 1	23. Screw x 2 on the metal cover
12. Ethernet port 2	24. Software reset button under the metal cover

Notes:

- (1) Gland for power supply input is delivered only for the 220 VAC AP. The 60 VAC is feed by network power supply.
- (2) All the glands, inserts and port plugs are accessories not provided with the AP, refer to the **List of Part Numbers** section for ordering information.
- (3) Pin length required for RF connector output 1 and 2 is different from that for 3 and 4. Refer to **RF Installation** section for details.

Continued on next page

AP Overview Diagram, Continued



Continued on next page

AP Overview Diagram, Continued

1. Strand Clamp x 2	13. RF connector output 1
2. Gland port for power supply input	14. RF connector input
3. Module 2	15. 60 VAC input
4. Module 1	16. RF connector output 2
5. Screw x 2 to install Module 2	17. RF connector output 3
6. Screw x 2 to install Module 1	18. Fiber Port for SFP connection
7. Screw x 2 on the metal cover	19. RF connector output 4
8. Reserved (NA)	20. Module 4
9. LED Indicators on the mainboard	21. Module 3
10. Ethernet port 1	22. Ethernet port 3
11. Ethernet port 2	23. Ethernet port 4
12. Cable cage for extra fiber cables	24. Software reset button under the metal cover

Notes:

- (1) Gland for power supply input is delivered only for the 220 VAC AP. The 60 VAC is feed by network power supply.
 - (2) All the glands, inserts and port plugs are accessories not provided with the AP, refer to the **List of Part Numbers** section for ordering information.
 - (3) Pin length required for RF connector output 1 and 2 is different from that for 3 and 4. Refer to **RF Installation** section for details.
-

Interfaces Description

Interfaces	Description
Power Supply	220 VAC 50/60 Hz mains power supply or 60 VAC 50/60 Hz network power supply
ETH 1	RJ-45 port for CAT5 cable to connect to Ethernet
ETH 2	RJ-45 port for CAT5 cable to connect to Ethernet
ETH 3	RJ-45 port for CAT5 cable to connect to Ethernet
ETH 4	RJ-45 port for CAT5 cable to connect to Ethernet
ONU MODULE	SFP port for ONU (Optical Network Unit) to connect to OLT (Optical Line Terminal).
MODULE 1	Connector for Module 1
MODULE 2	Connector for Module 2
MODULE 3	Connector for Module 1
MODULE 4	Connector for Module 2
INPUT 1	RF input port 1 for coaxial cable to connect to HFC network.
OUTPUT 1	RF output port 1 for coaxial cable to connect to COAX network.
INPUT 2	RF input port 2 for coaxial cable to connect to HFC network.
OUTPUT 2	RF output port 2 for coaxial cable to connect to COAX network.
INPUT 3	RF input port 3 for coaxial cable to connect to HFC network.
OUTPUT 3	RF output port 3 for coaxial cable to connect to COAX network.
INPUT 4	RF input port 4 for coaxial cable to connect to HFC network.
OUTPUT 4	RF output port 3 for coaxial cable to connect to COAX network.

LED Indicators

LED Indicators of the Main Board

There are 3 green LED indicators on the module. The following table describes each LED.

LED	Description
POWER	<ul style="list-style-type: none">On indicates E230 is powered onOff indicates E230 is powered off
STATUS	<ul style="list-style-type: none">On indicates E230 is in runtime modeOff and POWER LED is blinking indicates E230 is in boot modeOff and POWER LED is off indicates E230 is downBlinking at 1 Hz indicates E230 is in reset mode when the reset button is pressed and held for 3 seconds.Blinking at 2 Hz indicates the E230 is restoring factory default mode of E230 as reset button is pressed and held for more than 3 seconds.
SFP	<ul style="list-style-type: none">On indicates SFP (ONU module) is connectedOff indicates SFP (ONU module) is disconnected
ETH 1	<ul style="list-style-type: none">On indicates ETH 1 port is connectedOff indicates ETH 1 port is disconnected
ETH 2	<ul style="list-style-type: none">On indicates ETH 2 port is connectedOff indicates ETH 2 port is disconnected
ETH 3	<ul style="list-style-type: none">On indicates ETH 3 port is connectedOff indicates ETH 3 port is disconnected
ETH 4	<ul style="list-style-type: none">On indicates ETH 4 port is connectedOff indicates ETH 4 port is disconnected

LED Indicators of the Module

There are 3 green LED indicators on the module. The following table describes each LED.

LED	Solution	Description
POWER	-	<ul style="list-style-type: none">On indicates module is powered on.
HPNA/HPLUG	HPNA/HPLUG	<ul style="list-style-type: none">On indicates module is connected to the network. Flashing indicates network communication activities.
SYNC	HomePlug	<ul style="list-style-type: none">On indicates module is connected with its EP devices
	HPNA	<ul style="list-style-type: none">On indicates module is powered on.

Chapter 2 Installation

Overview

Introduction

This chapter provides instructions for installing and configuring the AP in a typical EoC system.

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Before You Begin

The procedures in this chapter assume that you have completed the following:

- Prepared the installation site and made sure the environment is within the specified range of -20° to $+60^{\circ}$.
- Located the coaxial cable, with or without the pin-type coaxial connectors mounted on the cable.
- Identified and prepared the ONU for connection to the AP.

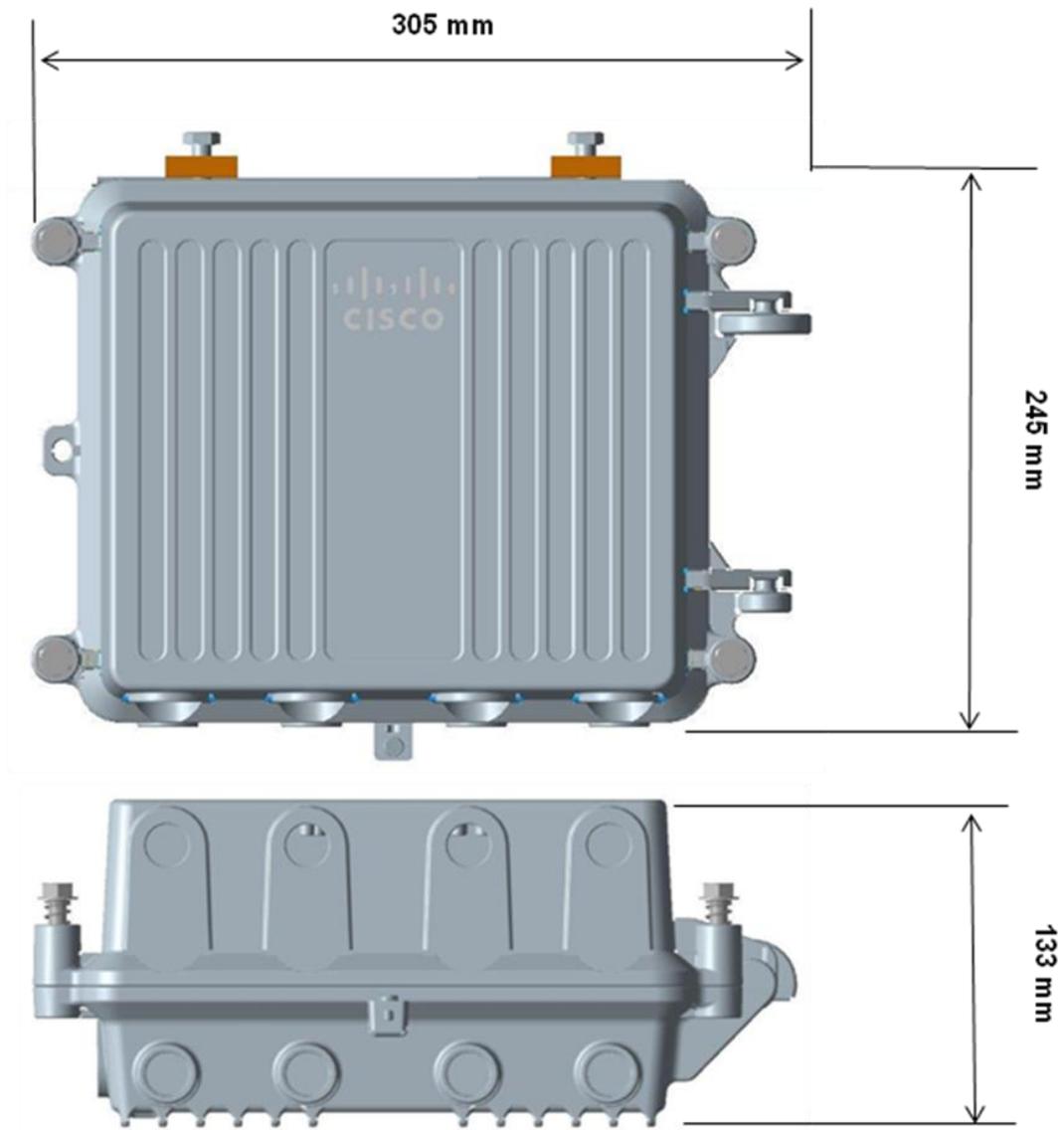
Tools and Torque Specifications

Before you start, make sure that you have the following tools. Use the following torque specifications to tighten the AP fasteners.

Tools	Fastener	Torque Specification
13 mm wrench	13 mm housing screw x 1	Tighten to 8 Nm
Torque wrench	Gland x 1	Tighten from 6 Nm to 7 Nm
	F Connectors x 4	Tighten from 5 Nm to 6 Nm
Flat-tip screw driver	M3- Module screw x 1	M3 Tighten from 0.39 Nm to 0.59 Nm
	M4- Module screw x 1	M4 Tighten from 0.78 Nm to 0.98 Nm
Screw driver or wrench	M5-Base Housing mounting screw x 3	Tighten from 4 Nm to 8 Nm
#1 Phillips screwdriver	Module cover screw x 6	Tighten from 0.34 Nm to 0.44 Nm

Dimensions

The following diagram shows the dimensions of the AP.



Note: All configurations of E230 are of the same size.

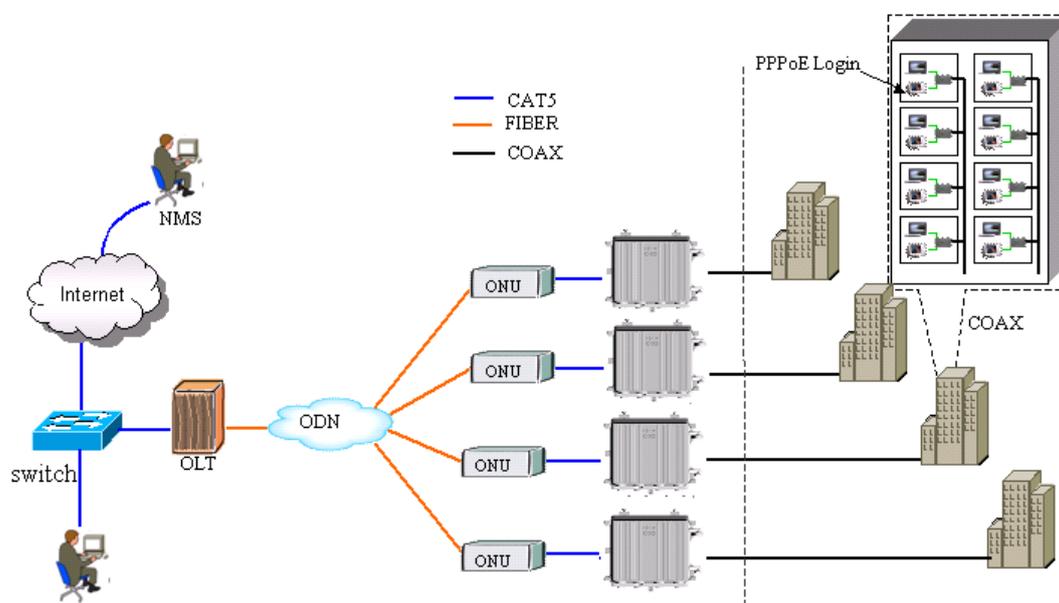
EoC AP Overview

The AP can utilize the existing COAX network in a MDU by overlaying a two-way Ethernet data path onto the RF spectrum of a COAX network so that the same cable can provide both video and data services to subscribers.

The E230 is the aggregation point of the DigiStar EoC system. It provides CATV signal pass-through and Ethernet data management to the end-points. Ethernet data is delivered to an AP via an external media card or to an OLT with an internal ONU. An ONU with SFP interface is an available option. The AP complies with HPNA 3.1 (ITU-TG.9954) and HomePlug AV International standards, and provides high-speed and reliable data transmission.

One or more splitters for an AP will connect up to 126 EPs with coaxial cables. The EP can connect to set-top boxes and televisions to provide video content through the RF connector. The EP can connect to set-top boxes, routers, and computers to provide data services, VoIP, and IPTV through the Ethernet port(s). The devices connected to EPs can obtain an IP address automatically from AP (DHCP service).

The following diagram shows the architecture of the EoC network system.



Notes:

1. The AP connects to the ONU devices or fiber optical transceiver in the EPON network via LAN interface, and the EP devices can connect to the AP via coaxial cable or splitter devices. The EP devices should be deployed in each subscriber's apartment in the MDU building.
2. Follow the network design to deploy a certain number of AP and EP devices in the MDU, and make sure adequate bandwidth is available to each subscriber. One AP can connect to up to 126 EP devices.
3. Change the IP address of each AP's LAN interface with an IP address. ECEM enables the user to remotely manage and monitor each online AP and EP device via the Ethernet network.

Strand Mounting

Complete the following steps to install the housing on a strand (aerial). The housing does not need to be opened for strand installation.

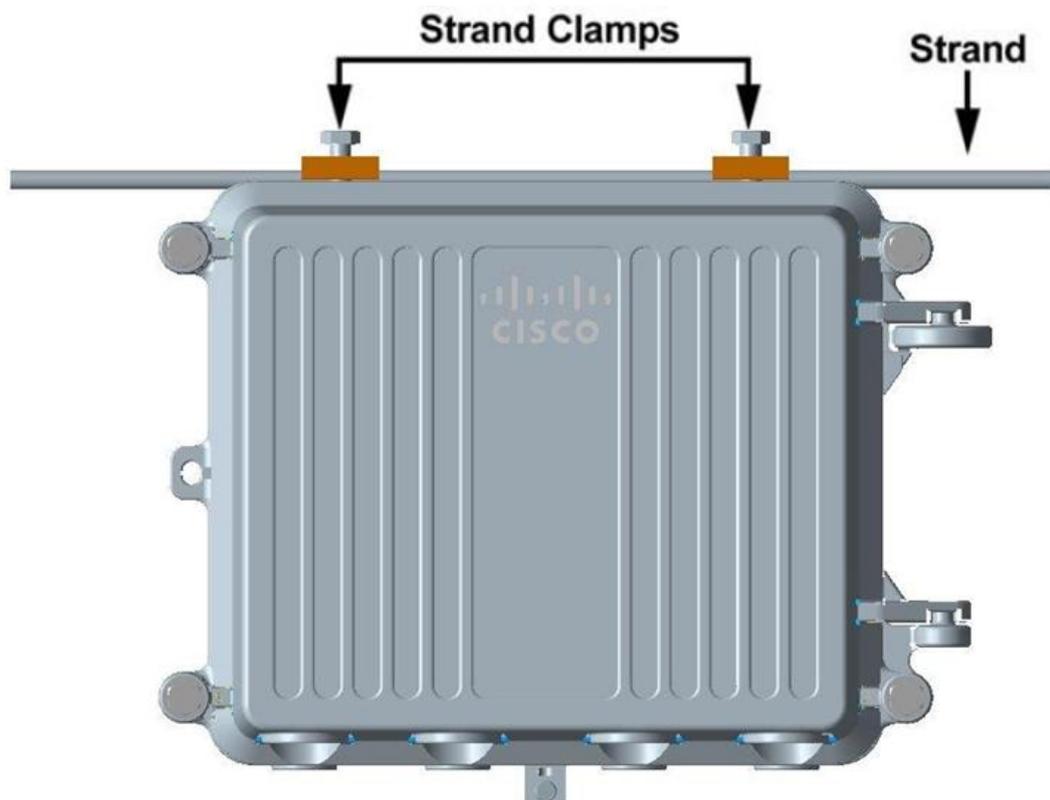
Important: The minimum strand diameter should be 5/16 inch.



CAUTION

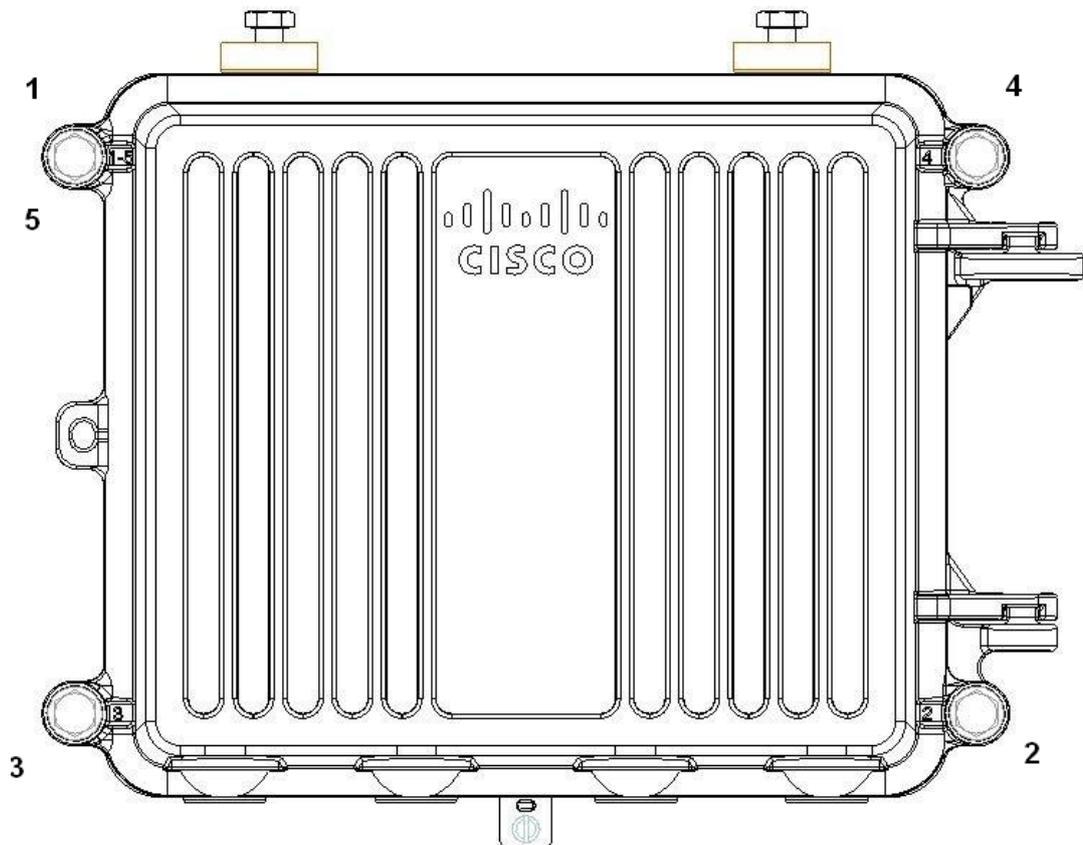
Be aware of the size and weight of the housing while strand mounting. Ensure that the strand can safely support the weight of the housing.

1. Using a torque wrench to tighten the strand clamp bolt. Make sure there is good mechanical contact between the strand and the housing.
Note: A slight tilt of the face of the housing is normal. Cable tension will cause the housing to hang more closely to vertical.
2. Connect the coaxial cable to the pin connector according to connector manufacturer specifications.
3. Loosen the strand clamp bolts.
4. Lift the housing into proper position on the strand.
5. Slip the strand clamps over the strand and finger tighten the clamp bolts. This allows additional movement of the housing as needed.
6. Move the housing as needed to install the coaxial cable and connectors.



Opening the Housing

1. Using the 13 mm wrench, unscrew the closure bolts in the order displayed in the following picture.



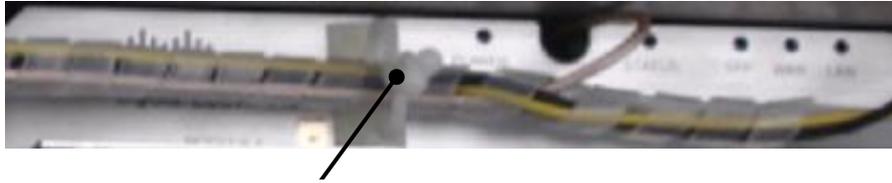
2. Open the AP cover with your hand.
-

Opening the Metal Cover

Perform the following steps to open the metal cover on the lid.

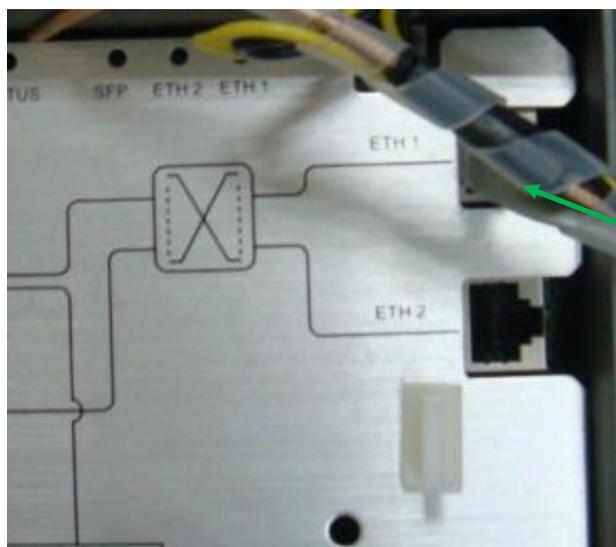
To Pull Out the Internal Cable (For 1/4 Configuration Only)

1. Open the Ethernet cable clip on the metal cover.



Ethernet Cable Clip

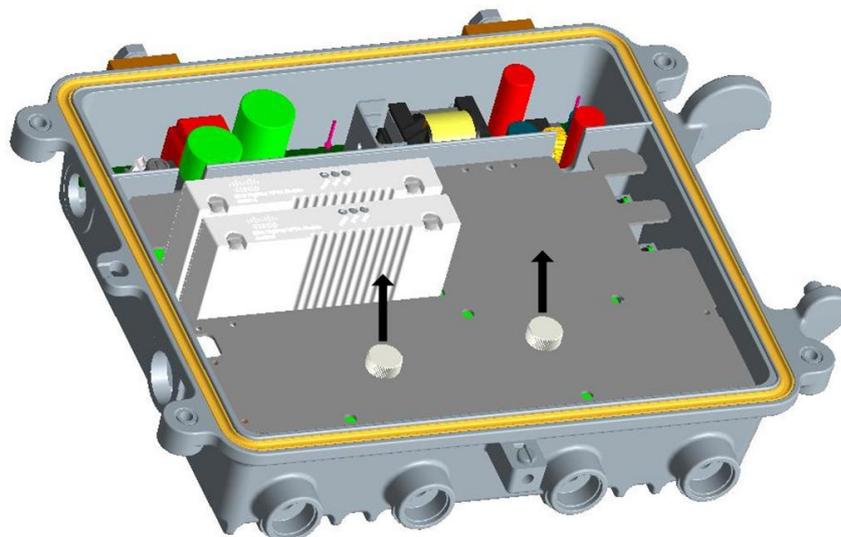
2. Pull out the Ethernet cable from the Internal Link Port. The cable connects the E230 mainboard and the lid.



Internal Link Port

To Open the Metal Cover

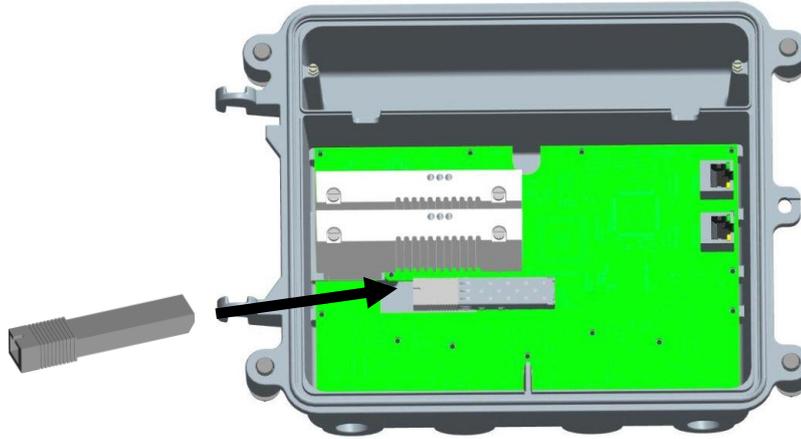
1. Unscrew the following two screws on the metal cover with your hand.



2. Open the metal cover with your hand.

Checking and Installing the ONU Module

1. Refer to Open the Metal Cover to open the metal cover on the E220 lid.
2. Check if ONU module exists inside the housing.
 - a) If ONU module was previously installed, continue to the next step.
 - b) If not, install the ONU module and proceed with step a).

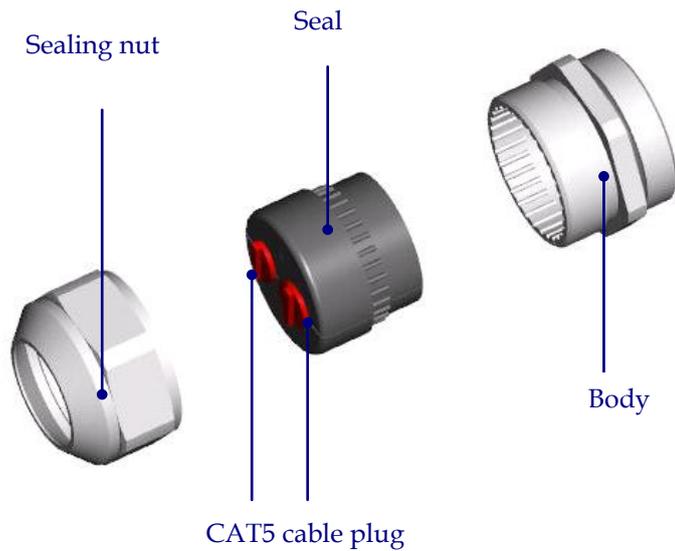


Cable Installation for 1/1, 2/2, 4/4 Configurations

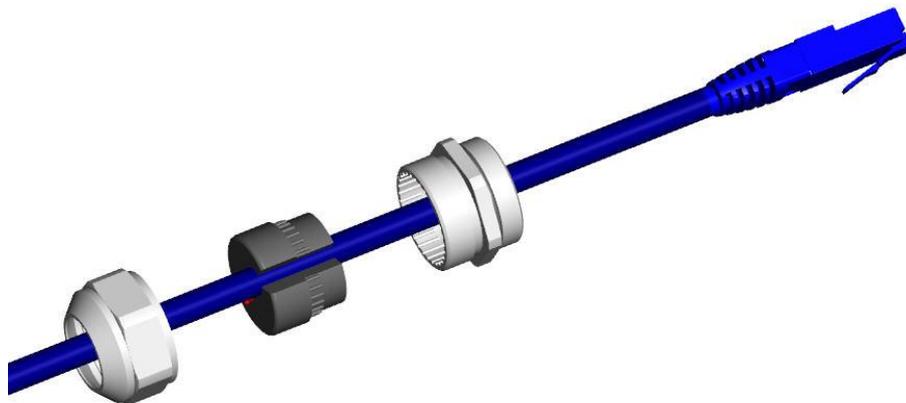
To Install the Ethernet Cable

The following steps describe how to connect to the Ethernet.

1. Choose the appropriate gland with two CAT5 cable plugs for dual Ethernet connection.
2. Disassemble the gland and open the seal to remove the two CAT5 cable plugs as shown below.



3. Insert the CAT5 cable into the seal as shown below.

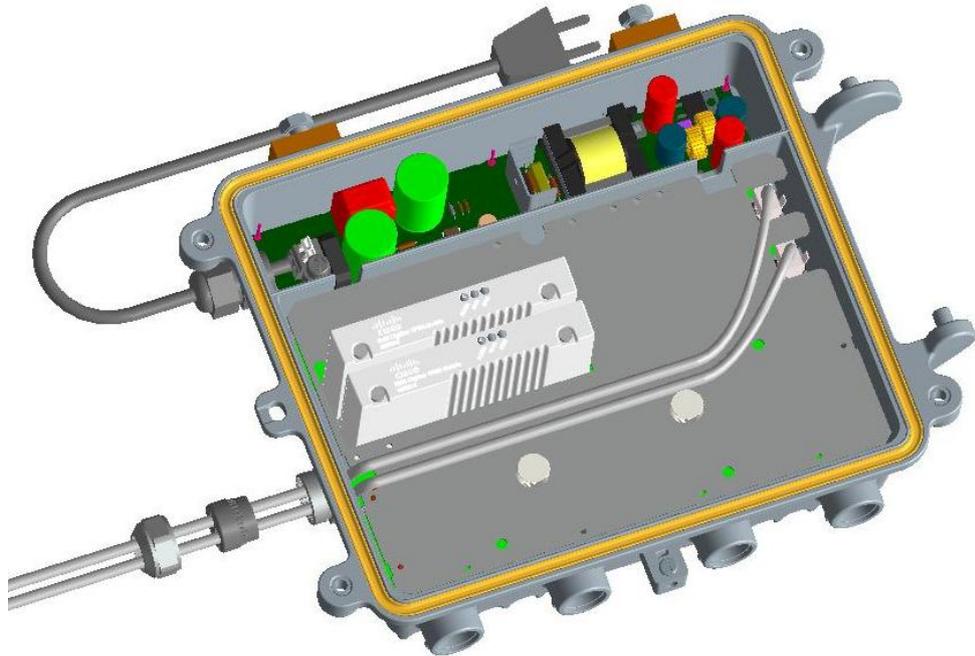


4. Insert the other CAT5 cable into the seal through the CAT5 cable plug.

Continued on next page

Cable Installation for 1/1, 2/2, 4/4 Configurations, Continued

5. Insert the 2 cables through the AP housing.
6. Turn the cable plug on the metal cover until secure
7. Connect the Ethernet cable to the WAN port and LAN port.
8. Screw the gland to the chassis as shown on the right, and tighten the gland from 6 Nm to 7 Nm with a torque wrench.



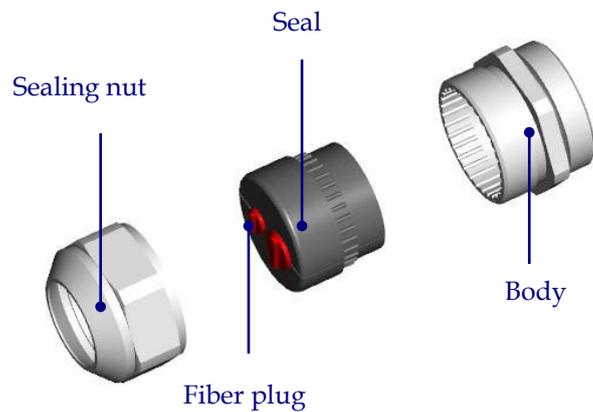
9. Re-assemble the gland and tighten the gland from 3 Nm to 4 Nm with a torque wrench.

Cable Installation for 1/1, 2/2, 4/4 Configurations, Continued

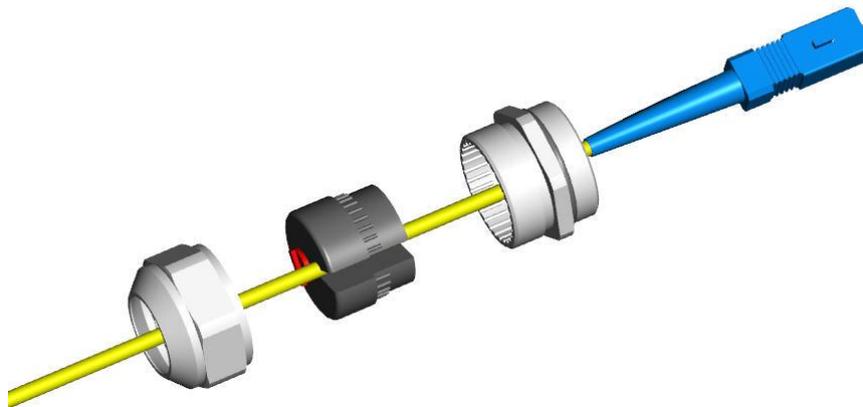
To Install the SFP (Fiber)

The following steps describe how to install fiber cable to the SFP module.

1. Choose the appropriate gland with one CAT5 cable plug and one fiber plug for dual Ethernet connection.
2. Disassemble the gland and open the seal to remove the fiber plug as shown below.



3. Insert the fiber into the seal as shown below.

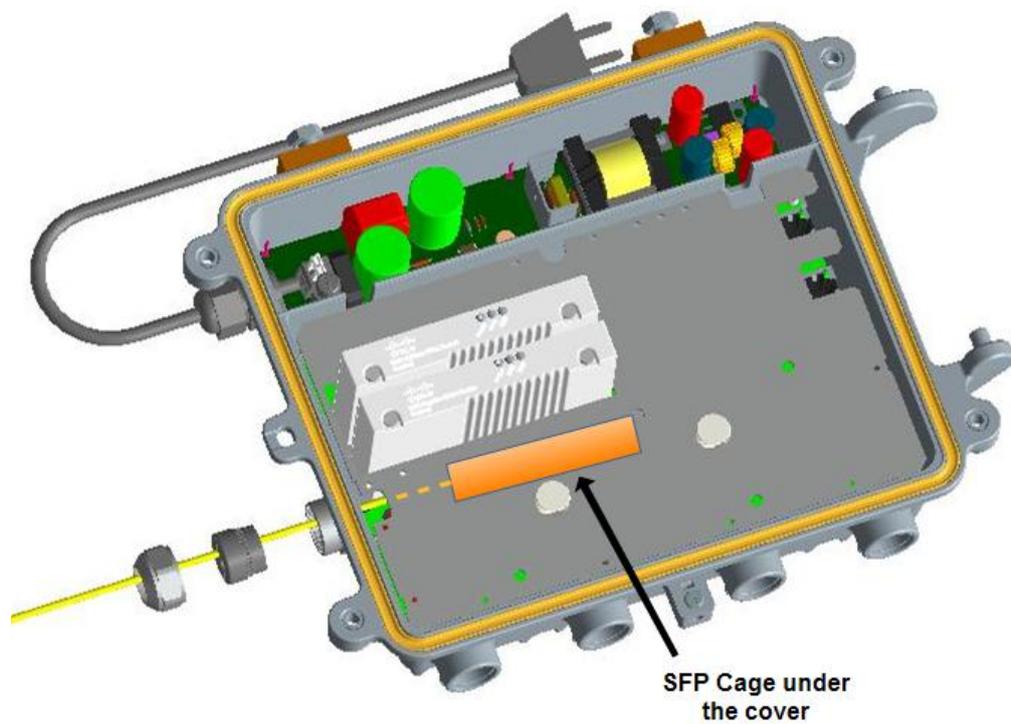


4. Open the metal cover. Refer to Open **the Housing** section.
5. Insert the SFP module into the SFP cage.

Continued on next page

Cable Installation for 1/1, 2/2, 4/4 Configurations, Continued

6. Insert the fiber through the AP housing and connect it to the SFP module.
7. Screw the gland to the chassis as shown on the right, and tighten the gland from 6 Nm to 7 Nm with a torque wrench.



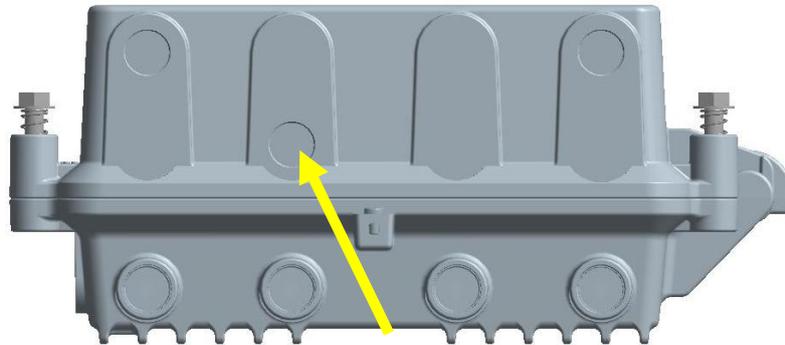
8. Re-assemble the gland and tighten the gland from 3 Nm to 4 Nm with a torque wrench. Install the metal cover.

Cable Installation for 1/4 Configuration

 **CAUTION**

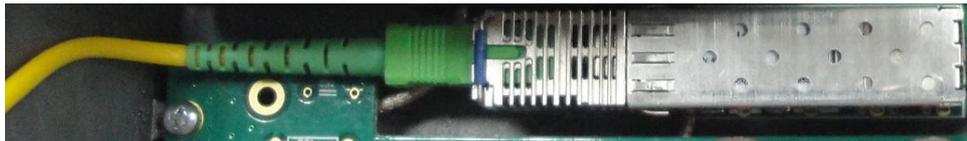
Fibers should be mounted very carefully. Be careful not to break the fiber. The fiber curve should be greater than 25 mm.

1. Insert the fiber cable in the E220 housing through the Fiber Port on the lid.



Fiber Port

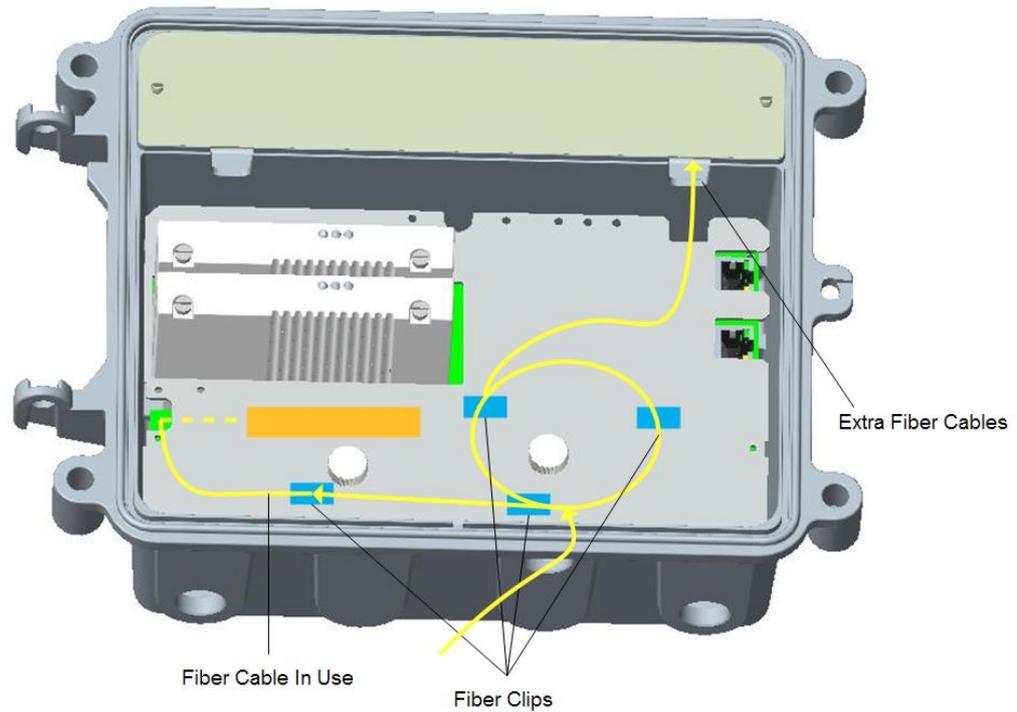
2. Connect the fiber cable to the SFP module.



3. Install the metal cover in tilted angle, and tighten the two screws on the metal cover.
 4. Connect the Ethernet cable that connects the E220 mainboard and the lid referring to **Opening the Metal Cover**.
 5. Close the Ethernet cable clip referring to Opening the Metal Cover.
-

Cable Installation for 1/4 Configuration, Continued

6. Wind the fiber around the fiber clips on the metal cover and leave the extra fiber cables in the fiber cage as shown below.



CAUTION

When winding the extra fiber cables into the fiber cage, make sure fiber cables go under the power cable and internal Ethernet cable.

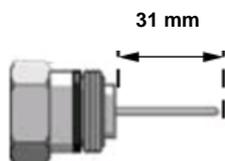
7. Turn the inserts to make sure the cables are secured and in the correct place.
-

RF Installation

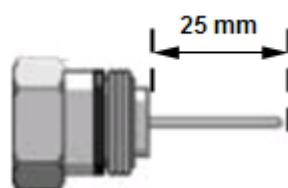
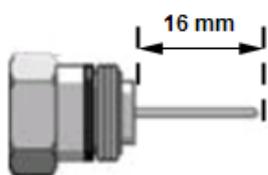
To Trim the Center Conductor

The AP requires F-Connectors with pins of a certain length. You must trim longer pins with heavy-duty wire cutters before inserting them into the housing.

For 1/4 Configuration: Pin length required for RF connector ports is 31 mm (including 5/8" inserts) for all RF ports.



For 1/1, 2/2, 4/4 Configurations: Pin length required for RF connectors on the lid is 16 mm, while that for the mainboard is 25 mm.



To Connect the Coaxial Cable Pin Connector to the Housing

Complete the following steps to connect the coaxial cable pin connector to the housing.

1. Begin this procedure with the housing and metal cover open.
2. Trim the center conductor pin of the connector according to the above section.
3. Loosen the screw on the pin post (red circle in the following diagram) and insert the coaxial connector into the housing at the desired RF port. Tighten the connector nut until the pin fits into the pin post.
4. If the trimmed center conductor pin still extends beyond the pin post, record the extra and trim the pin again with heavy-duty wire cutters.
5. Insert the coaxial connector again. If the center conductor pin matches the pin post, proceed to the next step.
6. Using a screw driver, tighten the screw on the pin post from 4 Nm to 8 Nm.
7. Repeat steps 2 through 4 for each RF port used.



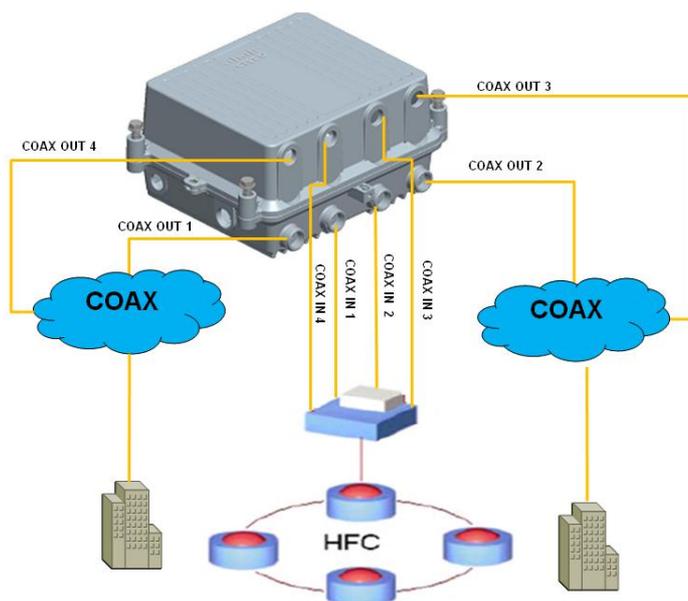
Pin Post

Note: 5/8" inserts are available for ordering. Please refer to the **Part Number List** on page 2.

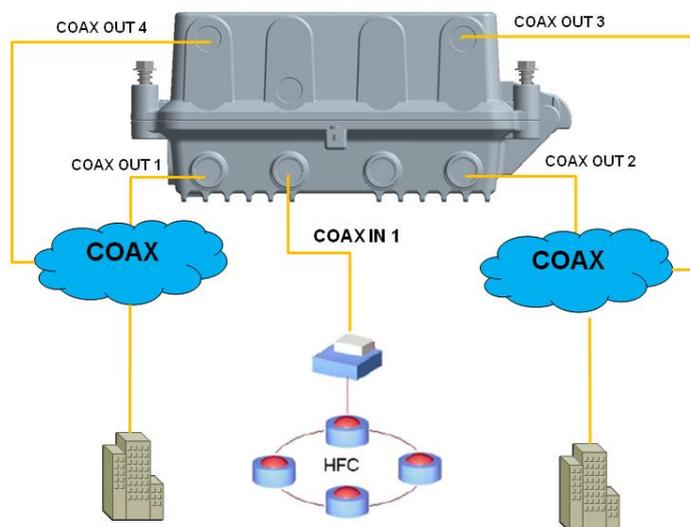
RF Connection

The following illustration shows a typical remote management connection of the DigiStar EoC AP.

1/1, 2/2, 4/4 Configurations:



1/4 Configuration:



RF Input and Output Connections



CAUTION

For AP with 60 VAC network power supply, remove all the red AC shunts before connecting the coaxial cable to RF connectors. This is to prevent damage to equipment connected to the other end of the coaxial cable.

1. Connect the coaxial cable from the node in the HFC network to INPUT connectors.
2. Connect the coaxial cable from OUTPUT connectors to a RF splitter.
3. Connect the EPs to RF splitter.

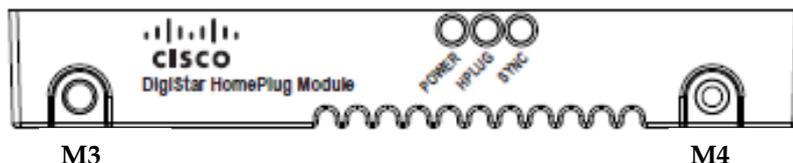
Module Installation

CAUTION

Power off the AP before removing or installing the module. Hot swapping the module may damage the AP and module.

Do not force the module connector into the main board connector. It may damage the connectors on the module and the main board.

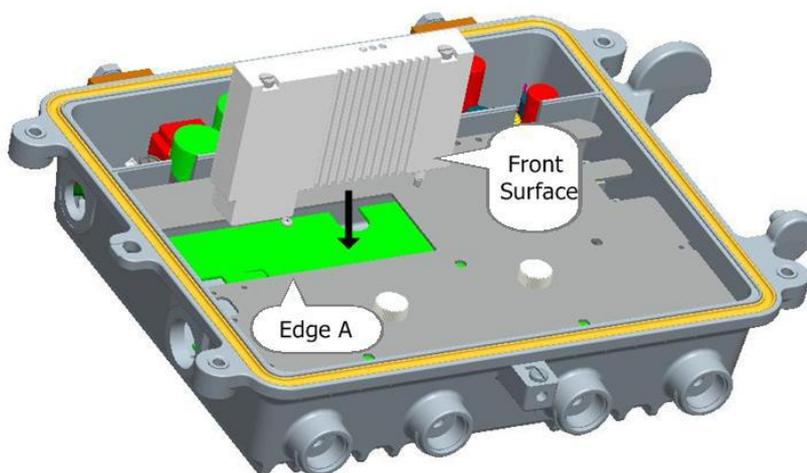
Read the **Torque Specifications** on page 7 before proceeding to the next step. The M3 and M4 module screws on the module require different driving.



Module 1 Installation

Follow the instructions below to install module 1.

1. Verify the AP is powered off.
2. If module 1 was previously installed, unscrew the two module screws as shown in #6 in *AP Overview Diagram* on page 3 and gently remove the module.
3. Place module 1 in a vertical orientation and align its Front Surface with Edge A of the metal cover as shown below.
4. Align the two module screws into its screw holes and the single guide hole.
5. Gently adjust the module to align and guide the module connector into the main board connector.
6. Gently press module 1 and confirm that the module connector is inserted completely into the main board connector.
7. Do not force the module connector into the main board connector. Repeat steps 4-7 if you find it difficult to insert the module connector into the main board connector.
8. Tighten the two module screws with a flat-tip driver from 0.39 Nm to 0.98 Nm.



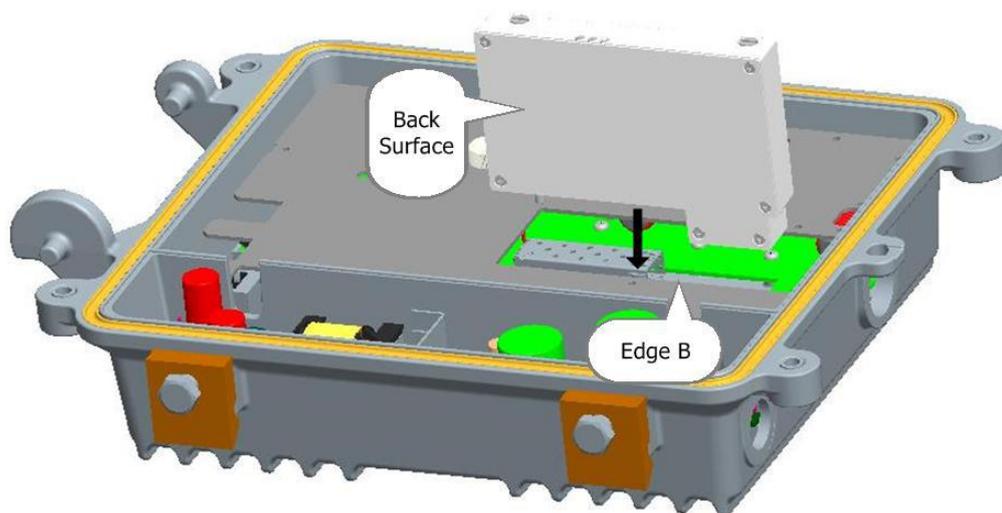
Continued on next page

Module Installation, Continued

Module 2 Installation

Follow the instructions below to install module 2.

1. Power off the AP.
2. If module 2 was previously installed, unscrew the two module screws as shown in #5 in *AP Overview Diagram* on page 3 and gently remove the module.
3. Place module 2 in a vertical orientation and align its Back Surface with Edge B of the metal cover as shown below.
4. Align the two module screws into its screw holes.
5. Gently adjust the module to align and guide the module connector into the main board connector.
6. Gently press module 2 and confirm that the module connector is inserted completely into the main board connector.
7. Do not force the module connector into the main board connector. Repeat steps 4-7 if you find it difficult to insert the module connector into the main board connector.
8. Tighten the two module screws with a flat tip-driver from 0.39 Nm to 0.98 Nm.



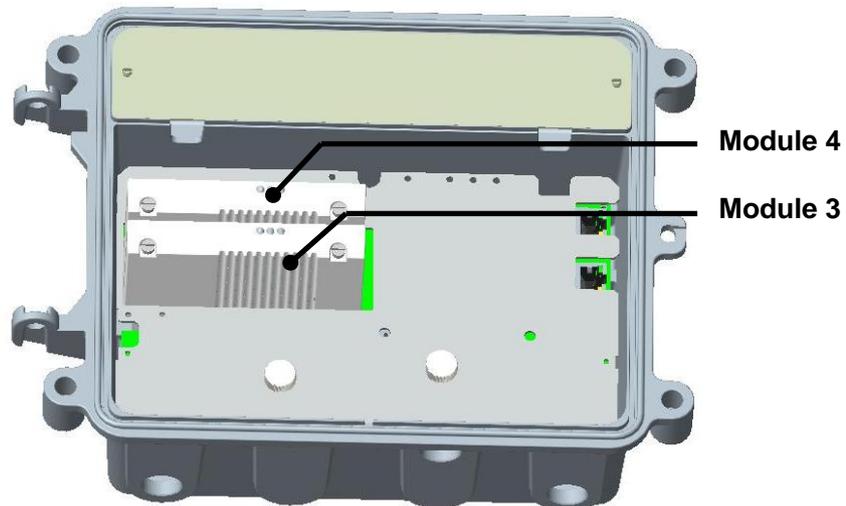
Continued on next page

Module Installation, Continued

Module 3 and Module 4 Installation

Follow the instructions below to install module 3 and module 4.

1. Perform the same process of **Module 1 Installation** to install Module 3.
2. Perform the same process of **Module 2 Installation** to install Module 4.



Power Supply Connection

220 VAC Mains Power Supply

Follow the instructions below to connect the 220 VAC power supply.

1. Plug the power supply plug (male) into the outlet. Observe the AP powering up.
2. Screw on the AP lid with a 13 mm wrench and tighten from 11 Nm to 13 Nm.

60 VAC Network Power Supply

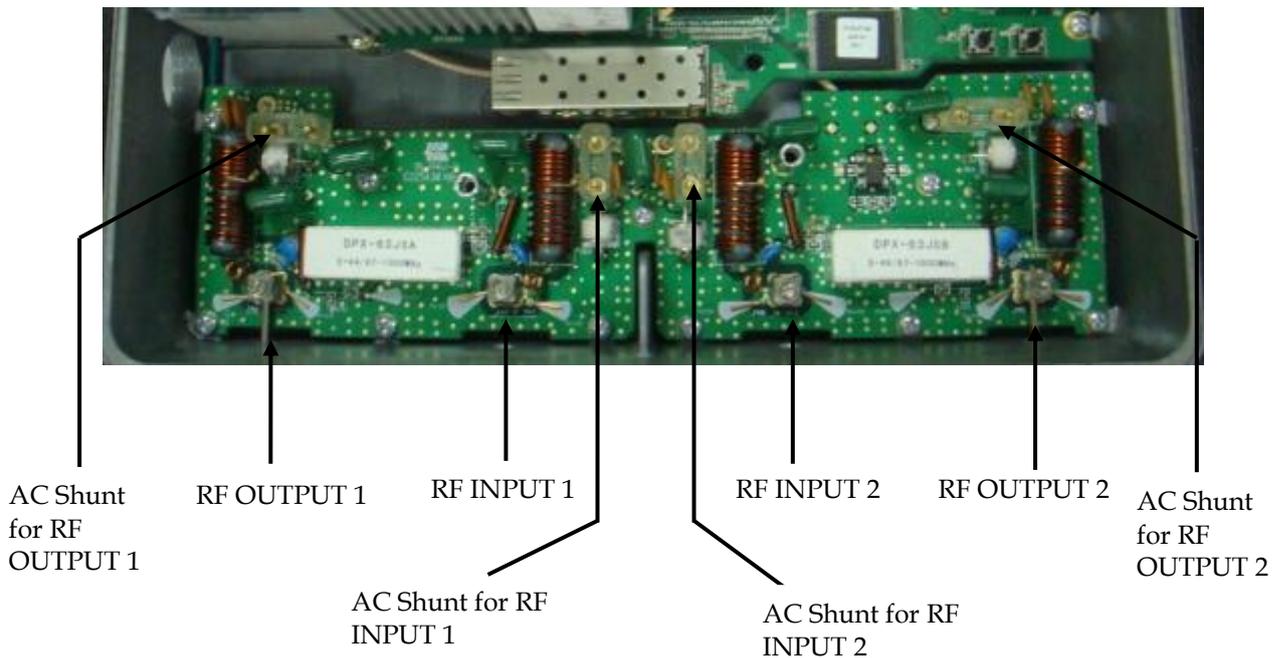
Follow the instructions below to connect the 60 VAC power supply



CAUTION

For the AP with 60 VAC network power supply, the 60 VAC power must only be supplied from one coaxial cable. Connecting more than one coaxial cable with the 60 VAC supply will damage the AP.

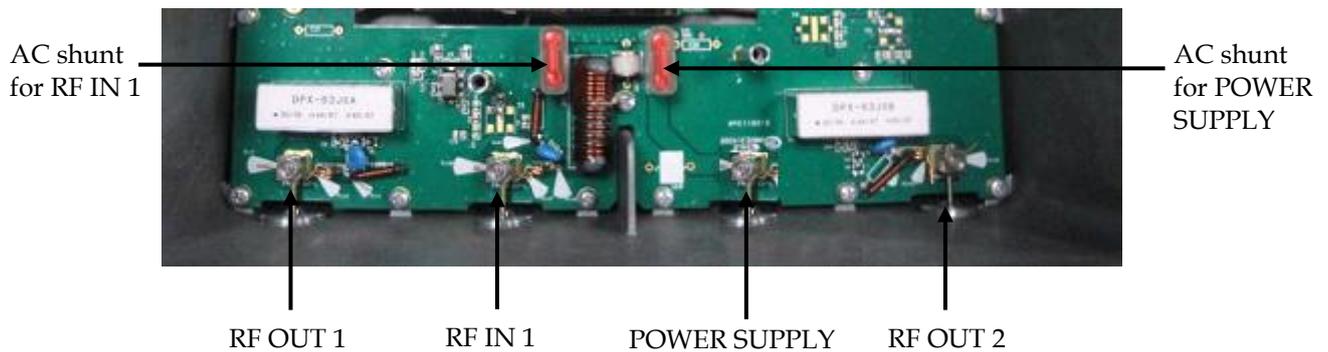
1. Verify that all the red AC shunts are NOT installed in the AP.
2. Connect the coaxial cables to all INPUT and OUTPUT connectors.
3. Determine all the coaxial cables that need to be supplied with 60 VAC from the AP and insert its red AC shunt.
4. Determine the coaxial cable that supply 60 VAC to the AP and insert its red AC shunt.
5. Observe the AP powering up.
6. Screw on the AP lid with a 13 mm wrench and tighten from 11 Nm to 13 Nm.



Note:

1. The AC shunt enables the port to supply power to AP or pass power to the next stage.
2. INPUT 3 and INPUT 4 cannot be used to supply power to AP.

Power Supply Connection, Continued



Note:

1. The AC shunt enables the port to supply power to an antenna or pass power to the next stage.
2. RF OUT ports are not applicable for supplying power to the next stage. To configure the AP to supply power to the next stage, you need to connect the RF input and power input both to RF INPUT 1, and connect the next stage equipment to the POWER SUPPLY port.
3. AC shunt is not applicable for ports on the lid.

Grounding Terminal Connection

The AP is equipped with an external grounding terminal. Follow the instructions below to connect the grounding terminal.

1. Attach one end of an 18-gauge wire (or larger) to the grounding terminal.
 2. Attach the other end of the wire to a ground, such as a grounded equipment rack.
-

Chapter 3

Operation

Overview

Introduction

Cisco provides the internal management system - Web User Interface (Web UI) to manage the DigiStar EoC AP via its Ethernet connection.

Web UI applies to various offerings of DigiStar EoC AP.

Available Documentation

Refer to the **DigiStar Ethernet over COAX (EoC) Aggregation Point (AP) Web User Interface (UI) User Guide**, part number 4040429. This document provides information on how to configure the AP via its internal management system by using a laptop or PC.

Note: You can order the user documents separately from your sales representative, or find them on the CD that comes packaged with the master and end-point devices.

Chapter 4

Troubleshooting

Overview

This chapter describes the steps you may take to troubleshoot the AP.

In This Chapter

Topic	See Page
Equipment	33
No Forward RF Signal	34
No Module Output Power	35
Low Module Output Power	36
Two Modules Work Intermittently	37
No Response from AP IP Address	38

Equipment

The following equipment may be necessary to perform some troubleshooting procedures.

- Compressed air (also called “canned air”)
 - Spectrum analyzer or a power meter to measure RF levels
 - Multi-meter
 - PC or Laptop with diagnostic software
 - Oscilloscope
-

No Forward RF Signal

The Forward RF signal can be measured at the OUTPUT ports.

No Forward RF Signal Troubleshooting Table

Before you begin troubleshooting for no forward RF signal, verify that the AP is receiving proper forward RF input signal from the amplifier/node.

Possible Cause	Solution
No forward RF signal at the OUTPUT ports.	Verify the connection of the RF Cable Connector. Verify that the amplifier is receiving proper forward RF input signal from the amplifier/node.

No Module Output Power

The Module output RF signal can be measured at all OUTPUT ports.

No Module Output Power Troubleshooting Table

Before you begin troubleshooting for no Module output power, verify that the AP is connected with Ethernet equipment and there is no TV signal input.

Possible Cause	Solution
No output power at the OUTPUT 1 and OUTPUT 2.	Verify that the Module is inserted into the Module 2 slot. Verify the connection of the RF Cable Connector. Verify that the AP is connected with Ethernet equipment and there is data transmission.
No output power at the OUTPUT 3 and OUTPUT 4.	Verify that the Module is inserted into the Module 1 slot. Verify the connection of the RF Cable Connector. Verify that the AP is connected with the Ethernet equipment and there is data transmission.

Low Module Output Power

The Module output RF signal can be measured at all OUTPUT ports.

Low Module Output Power Troubleshooting Table

Before you begin troubleshooting for low Module output power, verify that the AP is connected with the Ethernet equipment and that there is no TV signal input.

Possible Cause	Solution
Low Module output power at the OUTPUT Ports	Verify the output power after changing the Module to the other slot. Replace the Module if the power is still low.

Multiple Modules Work Intermittently

There are some rules that must be followed in order for multiple Modules to work together.

Multiple Modules Work Irregularly Troubleshooting Table

Before you begin troubleshooting for multiple Modules working irregularly, verify that the AP is connected with Ethernet equipment and EP.

Possible Cause	Solution
Receive wrong packets.	Verify that each Module work correctly.
No Module device information	Remove Module 1.

No Response from AP IP Address

The web browser does not respond after entering the AP IP Address.

No Response from AP IP Address Troubleshooting Table

Before you begin troubleshooting for no response to the AP IP address, verify that the AP has completed booting up (2 minutes).

Possible Cause	Solution
Network cable not connected to AP.	Verify the network cable is connected to the AP. From the PC connected to the AP network cable, verify that the PC network interface is on the same subnet as the AP. For example, set the IP Properties to use a fixed IP address of 192.168.1.2.
IP Address was set to a non-default value or other software network configuration is not default.	Remove the metal cover of the AP. Push the software reset button for more than 3 seconds Reboot (2 minutes) and try again.

Chapter 5

Customer Support Information

Overview

Introduction

This chapter contains information on obtaining technical support.

In This Chapter

Topic	See Page
Obtaining Product Support	40

Obtaining Product Support

IF...	THEN...
you have general questions about this product	Contact your distributor or sales agent for product information or refer to product data sheets on www.cisco.com .
you have technical questions about this product	Call the nearest Technical Service center or Cisco office.
you have customer service questions or need a return material authorization (RMA) number	Call the nearest Customer Service center or Cisco office.

Support Telephone Numbers

This table lists the Technical Support and Customer Service numbers for your area.

Region	Centers	Telephone and Fax Numbers
North America	Cisco Services Atlanta, Georgia United States	For <i>Technical Support</i> , call: Toll-free: 1-800-722-2009 Local: 678-277-1120 (Press 2 at the prompt) For <i>Customer Service</i> , call: Toll-free: 1-800-722-2009 Local: 678-277-1120 (Press 3 at the prompt) Fax: 770-236-5477 E-mail: customer-service@cisco.com
Europe, Middle East, Africa	Belgium	For <i>Technical Support</i> , call: Telephone: 32-56-445-197 or 32-56-445-155 Fax: 32-56-445-061 For <i>Customer Service</i> , call: Telephone: 32-56-445-444 Fax: 32-56-445-051 E-mail: service-elc@cisco.com
Japan	Japan	Telephone: 81-3-5908-2153 or +81-3-5908-2154 Fax: 81-3-5908-2155
Korea	Korea	Telephone: 82-2-3429-8800 Fax: 82-2-3452-9748 E-mail: songk@cisco.com
China (mainland)	China	Telephone: 86-21-2401-4433 Fax: 86-21-2401-4455 E-mail: eoc-support@cisco.com
All other Asia-Pacific countries & Australia	Hong Kong	Telephone: 852-2588-4746 Fax: 852-2588-3139 E-mail: support.apr@sciatl.com
Brazil	Brazil	Telephone: 11-55-08-9999 Fax: 11-55-08-9998 E-mail: fattinl@cisco.com or ecavalhe@cisco.com

Continued on next page

Obtaining Product Support, Continued

Region	Centers	Telephone and Fax Numbers
Mexico, Central America, Caribbean	Mexico	For <i>Technical Support</i> , call: Telephone: 52-3515152599 Fax: 52-3515152599 For <i>Customer Service</i> , call: Telephone: 52-55-50-81-8425 Fax: 52-55-52-61-0893
All other Latin America countries	Argentina	For <i>Technical Support</i> , call: Telephone: 54-23-20-403340 ext 109 Fax: 54-23-20-403340 ext 103 For <i>Customer Service</i> , call: Telephone: 770-236-5662 Fax: 770-236-5888 E-mail: keillov@cisco.com



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