

Altiostar Networks iRU4438 intelligent Remote Radio Head

Product Description and Installation Guide



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Preface

About this document

This document covers the basic installation of the Altiostar Networks, Inc. iRU4438 intelligent Remote Radio Head (iRRH) on towers, walls, roof or other structures utilizing a universal mounting assembly.

Connections to external interfaces, including signaling, grounding, and power are described. Descriptions of the iRU4438 iRRH indicators are also provided.

Refer also to the Altiostar Networks iRB1200 intelligent Baseband Unit (iBBU) Product Description and Installation Guide, document number 240-00-0007, for related information. The iRB1200 iBBU is a companion product.

Intended users

The target audience for this document is installation and engineering personnel. It assumes personnel have a basic understanding of wireless telecommunications terminology, and experience in installing wireless telecommunications equipment.

Conventions used

Illustrations and photos in this document are intended to show a basic installation. They show site and equipment configurations encountered during a typical installation. They do not show all details and exceptions, but highlight the main points of the installation.

Altiostar Networks, Inc. will often be referred to as Altiostar Networks, or simply Altiostar. The Altiostar Networks, Inc. iRU4438 intelligent Remote Radio Head will often be referred to as the iRU4438 iRRH, or simply the iRRH. The iRB1200 Baseband Unit, a companion unit to the iRU4438 iRRH in the Altiostar Networks LTE micro eNodeB solution, will often be referred to as the iRB1200 iBBU, or simply the iBBU.

The Operator or Owner of the facility and equipment where the iRU4438 iRRH is to be installed is referred to as the Operator in this document.



This is an example of a note used in this document that denotes important information about the text or procedure that follows it.

Overview

The iRU4438 intelligent Remote Radio Head is based on a distributed architecture with the following two essential elements:

- iRU4438 iRRH
- iRB1200 iBBU or vBBU

The iRU4438 iRRH is a compact, outdoor microcell radio head with integrated baseband for use in the AWS band. The iRU4438 iRRH is connected to the iRB1200 iBBU through a gigabit Ethernet (GigE) connection compliant with the Common Public Radio Interface (CPRI) standard. Connection to other compliant fronthaul devices can also be facilitated using the Ethernet fronthaul port.

The iRU4438 iRRH interconnects with compliant radio antennas and the iRB1200 iBBU which operates within the RAN portion of the LTE wireless network.

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1 Introduction

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The Operator or Owner of the facility and equipment where the iRU4438 iRRH is to be installed is referred to as the Operator in this document.

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1.2 Overview

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- iRU4438 iRRH
- iRB1200 iBBU

The iRU4438 iRRH is a compact, outdoor microcell radio head with integrated baseband for use in the AWS band. The iRU4438 iRRH is connected to the iRB1200 iBBU through a gigabit Ethernet (GigE) connection compliant with the Common Public Radio Interface (CPRI) standard. Connection to other compliant fronthaul devices can also be facilitated using the Ethernet fronthaul port.

The iRU4438 iRRH interconnects with compliant radio antennas and the iRB1200 iBBU which operates within the RAN portion of the LTE wireless network.

A block diagram of the iRU4438 iRRH is shown in [Figure 1-1](#).

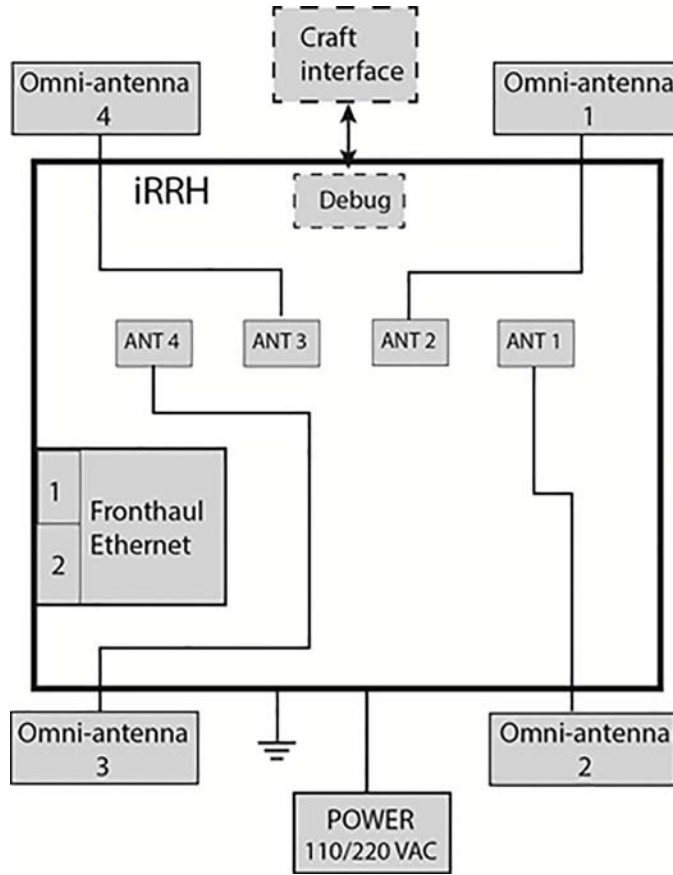


Figure 1-1 iRU4438 iRRH block diagram

2 Safety requirements

2.1 Overview

This section provides safety precautions that apply to the iRU4438 iRRH. The precautions statements are required by national or regional standards institutes in the country or region where they apply. This document complies with these requirements.

2.2 Purpose

To protect installation personnel, equipment and operations, this document contains safety statements. Safety statements are provided at points in procedures where risks may exist to personnel, equipment and network operations. Failure to follow the directions in the safety statements may result in serious consequences.

2.3 Warning symbols



Danger is used to indicate the presence of a hazard that will cause severe personal injury, death, or substantial property damage if the hazard is not avoided.



Warning is used to indicate the presence of a hazard that can cause severe personal injury, death, or substantial property damage if the hazard is not avoided.



Caution is used to indicate the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided.

2.4 General safety precautions

Safety precautions should be observed when performing these installation procedures. The following safety precautions are only intended to supplement the safety precautions usually practiced by the Operator.

The power system and connected cables will have hazardous energy and voltages present. Follow all safety warnings and practices when servicing this equipment.

This equipment must be installed, serviced, and operated only by authorized, qualified and trained personnel who have the necessary knowledge and practical experience with electrical equipment and who understand the hazards that can arise

when working on this type of equipment. Observe all local and national electrical, environmental and workplace codes.



HAZARDOUS VOLTAGES!

Hazardous voltages can be present when the system is operating. Use caution when removing or installing equipment.



FALL HAZARD!

A fall hazard is present when installation of this equipment requires working on towers, poles or at elevated work sites. All telecommunications personnel who perform tower work or work at elevation must be qualified to perform this type work.



Read and understand all instructions before starting this procedure.

- Follow all warnings and safety instructions in this procedure.
- Only trained personnel should install or operate this equipment.
- Observe all local and national electrical, environmental and workplace codes.
- Before working on equipment that is connected to power, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.
- The equipment must have a direct disconnect device in line with the power source.
- This unit has double pole/neutral fusing.
- Grounding and circuit integrity is vital to a safe operating environment. Grounding conductors must be in place before installing the equipment. Never operate equipment when grounding or bonding conductor has been removed.
- Never install equipment not identified in this procedure. Fire or injury could result from improperly installed equipment.
- Caution should be exercised when installing or modifying telecommunications lines.
- Disconnect all power sources before servicing the equipment.

- Never touch uninsulated wiring or terminals unless power to the lines have been disconnected at the source. Always verify power has been removed using an approved voltage tester.
- To prevent electrical shock, never remove the cover or disassemble the equipment. There are no user serviceable components in the equipment.
- Never insert probes or objects of any kind into slots or openings to the equipment. Dangerous voltages may be present or the object may cause a short circuit and start a fire or damage the equipment.



WARNING

LIGHTNING STRIKE HAZARD!

- Lightning strikes are possible during stormy weather. Do not install equipment if stormy conditions exist.
- Never work on telecommunications power supply lines or antenna feeders at the cell site during stormy conditions.



WARNING

SHOCK HAZARD!

- Some parts of all electrical systems are energized at all times. Exercise extreme caution at all times when working around telecommunications electrical systems. Short circuits can cause burns to the face or hands. Failure to observe this and other safety warnings may lead to bodily injury and property damage.
- Only trained and qualified personnel may install or service equipment as defined in IEC 215 and EN 60215.
- Turn off or disconnect equipment from its energy source(s) by switching off the power switch or breaker, by removing the fuse(s), or switching off the load disconnect switch at the distribution panel (whichever apply) before performing service or maintenance.



CAUTION

SHORT CIRCUIT HAZARD!

Condensation on the equipment has a potential to cause short circuits!

Weather conditions may exist at the site where condensation may form on the equipment. Installing or operating the equipment when condensation is present may cause a short circuit and damage the equipment.

Equipment showing signs of condensation should be allowed to dry before installation.



ELECTROSTATICALLY SENSITIVE EQUIPMENT!

Semiconductor components are sensitive to electrostatic electricity and may be damaged by static discharge.

When handling the equipment, the following rules must be followed:

- Wear conductive or anti-static clothing.
- Wear grounded ESD wrist strap.
- Wear shoes with conductive straps or soles.
- Verify anti-static safety devices are operating properly by testing yourself at an approved test station.
- Leave equipment in their original anti-static wrapping until ready for installation.
- When handling equipment or modules, use handles provided to carry the device and do not touch electrical contacts, pins or components.
- Only place equipment or modules on conductive surfaces.
- Use tools on equipment or modules only when equipment is grounded.
- Handle defective equipment or modules similarly to new equipment to prevent additional damage.



GROUNDING CAUTION!

- This equipment's grounding connection is between the DC power circuit and the grounding conductor.
- This equipment must have a direct connection to the DC supply grounding point or to a bonding jumper from the grounding terminal bus bar to the DC supply ground electrode for the site.
- The DC supply source should be located in the same premises as the transmission equipment.
- The grounding circuit must not have a disconnect device located in-line with the DC circuit grounding conductor.

3 Installation prerequisites










This section contains information on the documentation, tools, equipment, and conditions required for performing the installation procedure. The document assumes that the target audience has reasonable industry experience, is qualified, and has installed wireless base stations in the past.

3.1 Required tools

A typical telecommunications technician's toolkit is required to complete the iRRH installation. Additional required specialty tools and consumables are listed in [Table 3-1](#).

Table 3-1 Required tools

Required Tools			
ESD wrist grounding strap		Torque screwdriver and assorted bits	
Box cutter		Digital voltmeter	
Torque wrench, open-end, 8 mm		Crimp tool (2 to 8 AWG)	
Cordless electric screwdriver		Cable tie tool	

Required Tools			
Caribiner (2) (optional)		Pulley-minimum load-bearing capacity 440 lb (200 kg) (optional)	
Punch		Wire stripper	
Rope - minimum 220 lb (100 kg) breaking strength (optional)		Self-amalgamating waterproofing tape (e.g., Commscope Miracle Tape, Huber+Suhner Fast-Wrap, RFS CELL-Tape, EasyWrap® tape, etc.)	
Spirit level		Tape measure	
Assorted cable ties and hook & loop fasteners			

3.2 Required site equipment

This section describes the additional interconnecting equipment required for the installation of the AltioStar Networks iRU4438 iRRH. These are essentially cables, connectors and fixing arrangements. The specification of these items (specifically the length of cables) may need to be customized on site.

- Grounding cable connecting the iRU4438 iRRH to the grounding point is supplied by the Operator and assembled on site unless otherwise specified. AltioStar Networks provides the two-hole lug for crimping onto the cable.
- Power cable with plug connecting the iRU4438 iRRH to local 110/220 V ac power is supplied by the Operator and assembled on site unless otherwise specified.

Operator must provide a lightning and surge suppression device on the power line to the unit.

- RF transmission cables are supplied by the Operator. They are pre-assembled according to Operator requirements. Operator must supply and install inline surge arrestors on the RF transmission cables.

3.3 Site preparation

The conditions in this section must be fulfilled before starting work at the site.

3.4 Site pre-installation visit checklist

To verify site conditions required for the installation of the iRU4438 iRRH are known, a pre-installation visit, attended by the Operator's representative, AltioStar Networks, and other required parties, must be performed. Tasks required to be accomplished should include, at a minimum, those listed in [Table 3-2](#).

Table 3-2 Site pre-installation visit checklist

Item	Site pre-installation visit checklist	Check
1	Verify Site Installation Plan and installation documentation is available.	
2	Verify health and safety documentation specified by the Operator and AltioStar Networks are understood and installation personnel are trained accordingly.	
3	Know locations of fire equipment, eyewash stations, and evacuation procedures posted for fire/halon discharge.	
4	Know locations of first aid and emergency equipment and installation personnel are familiar with their operation and use.	
5	Verify site authorizations, clearances, and releases from Operator and local authorities are complete.	
6	Verify emergency telephone numbers are posted for fire, police, and ambulance/medical aid.	
7	Verify Operator and local authorities contact and phone numbers are posted.	
8	Verify installation schedule is approved.	
9	Wear approved protective equipment such as hard hats, safety glasses, gloves, etc. when needed.	
10	Verify the installation location of the iRRH meets the mounting requirements indicated in this document.	
11	Verify main power supply is properly installed and tested and capable of supplying the required 110/220 V ac voltage and current for proper operation of the iRRH system to within $\pm 20\%$ of rated output.	
12	Verify 110/220 V ac power cable to the iRU4438 iRRH is labeled and tested as specified in the Site Installation Plan.	

Item	Site pre-installation visit checklist	Check
13	Verify recommended size breakers/fuses for the external power source is properly installed and capable of protecting the 110/220 V ac power to the unit.	
14	Verify earth ground bonding point, for connection of the grounding cable to the iRU4438 iRRH, is correctly installed, labeled and tested as specified in the Site Installation Plan.	
15	Determine safe method to hoist and secure iiRU4438 RRH into position on selected structure and enter into Site Installation Plan.	
16	Verify proper in-line surge protectors are installed, where required, on power/RF/ fronthaul/backhaul cables to iRU4438 iRRH as specified in the Site Installation Plan.	
17	Verify that the Operator, AltioStar Networks and all other affected parties are in agreement with the equipment installation location, power source, and grounding location, to meet the installation checklist requirements.	

3.5 Site installation checklist

Verify site conditions required for the installation of iRRH are known. In addition, the site must be prepared by the Operator in accordance with the Site Installation Guide provided by the Operator which must include, at a minimum, the required tasks in [Table](#) .

Table 3-3 Site installation checklist

Item	Site installation checklist	Check
1	Verify Site Installation Plan and installation documentation is available.	
2	Verify health and safety documentation specified by the Operator and AltioStar Networks are understood and installation personnel are trained accordingly.	
3	Know locations of fire equipment, eyewash stations, and evacuation procedures posted for fire/halon discharge.	
4	Know locations of first aid and emergency equipment and installation personnel are familiar with their operation and use.	
5	Verify site authorizations, clearances, and releases from Operator and local authorities are complete.	
6	Verify emergency telephone numbers are posted for fire, police, and ambulance/ medical aid.	
7	Verify Operator and local authorities contact and phone numbers are posted.	
8	Verify installation schedule is approved.	
9	Wear approved protective equipment such as hard hats, safety glasses, gloves, etc. when needed.	
10	Verify pre-installation work specified in the Site Installation Plan is complete.	
11	Verify the installation location of the iRRH meets the mounting requirements indicated in this document.	

Table 3-3 Site installation checklist

Item	Site installation checklist	Check
12	Verify all required tools are available.	
13	Verify all ordered hardware, including that not provided as part of the Altiostar Networks intelligent eNodeB solution, is available and on site.	
14	Verify that the Operator, Altiostar Networks and all other affected parties are in agreement with the equipment installation location, power source, and grounding location, to meet the installation checklist requirements.	
15	Verify proper in-line surge protectors are installed, where required, on 110/220 V ac power and on RF/fronthaul/backhaul cables to iRU4438 iRRH as specified in the Site Installation Plan.	
16	Verify recommended size wire is installed in the external power source supplying 110/220 V ac power to the unit.	
17	Verify custom pre-assembled cables, wires and other material are properly labeled, installed and tested according to system and site requirements as specified in the Site Installation Plan.	
18	Verify earth grounding of the chassis/rack hosting the iRRH is correctly installed, using the correct size/type wire, and is tested.	
19	Verify main power supply is properly installed and tested and capable of supplying the required 110/220 V ac voltage and current for proper operation of the iRU4438 iRRH 3-sector system to within $\pm 20\%$ of rated output.	
20	Verify all cables are neatly routed through cable ladders, cable trays and ducts, are secured with cable ties, and dressed according to Company local practice.	

4 iRU4438 iRRH installation overview

This section provides an overview of the installation procedures and instructions for installing the Altiostar Networks iRU4438 iRRH.

All required cabling for grounding, power, fronthaul, with the exception of RF and optional GPS cables, are supplied by the Operator, as provided in the Site Installation Plan, and should already be pre-installed with drops to the iRU4438 iRRH installation location, or according Operator local practice.

4.1 Installation procedures

The following list describes the top-level iRU4438 iRRH installation procedures. You can instantly navigate to any procedure by clicking on the procedure with the mouse.

- [Unpacking the shipping container](#) on page 4-1
- [Verifying all parts received](#) on page 4-2
- [Assembling cables](#) on page 5-1
- [Routing pre-assembled power/fronthaul Ethernet/grounding cables](#) on page 5-2
- [Installing RF antennas on upper/lower omni-antenna brackets](#) on page 5-3
- [Installing RF antenna cables](#) on page 5-5
- [Installing the iRU4438 iRRH mounting bracket](#) on page 5-7
- [Hoisting the iRU4438 iRRH on elevated structures](#) on page 5-9
- [Installing the iRU4438 iRRH on the mounting bracket](#) on page 5-11
- [Connecting the grounding cable](#) on page 5-12
- [Connecting the fronthaul Ethernet cables](#) on page 5-13
- [Connecting the 110/220 V ac power cable](#) on page 5-15
- [Checking power](#) on page 5-15
- [Installing the solar shield](#) on page 5-16

4.2 Unpacking the shipping container

The following procedure describes removing the iRU4438 iRRH from the shipping container, inspecting the contents for damage, and what to do if damage is found.

To unpack the shipping container:

1. Verify no shipping damage to box.



It is important to report damage or material shortages to the shipping carrier while a representative is on site. If concealed damage or material shortages are found at a later time, contact the shipper to make arrangements for inspection and claim filing.

2. Remove packing materials.

The shipping materials can be recycled. In some regions or countries it is mandatory that packing materials be recycled or re-purposed. Please dispose of shipping material accordingly.

3. Remove equipment from packing material and inspect equipment for shipping damage or missing items.



NOTE

If concealed damage or material shortages are found at a later time, contact the shipper to make arrangements for inspection and claim filing.

4.3 Verifying all parts received

There are two iRB1200 iRRH models 340-00-0009 and 340-00-0008, depending on installed SSD. Verify all parts listed in the accessory list in [Table 4-4](#) were received.

Table 4-4 iRU4438 iRRH parts list

Qty	Pard number	Part description
1	340-00-0010	iRU4438 iRRH main unit
1	420-00-0030	Mounting clamp (metal, powder-coated)
1	420-00-0053	Mounting bracket (metal, powder-coated)
1	350-00-0007	Kit, mounting bracket hardware
2	460-00-0014	Screw, M4-0.7 × 12 mm, cross-head pan, SEMS, SS
2	460-00-0020	Screw stud, M12-1.75 × 168 mm, SS
4	495-00-0001	Washer, flat, M12, max. 24 mm OD, SS
4	495-00-0002	Washer, split, M12, max. 24 mm OD, SS
4	445-00-0003	Nut, M12-1.75, SS
1	350-00-0009	Kit, accessory, grounding cable lug
1	440-00-0033	Dual-hole grounding lug, CAT10-5POI
3	460-00-0017	Screw, crosshead pan, M5-0.8 × 10 mm, split/plain washer, SEMS, SS
4	195-00-0018	Omni-directional antenna, 1710-2700 MHz (with included mounting hardware)
2	360-00-0064	RF cable, QMA right angle plug to N-male, LMR 195 series coax, 0.195 in (4.95 mm) diameter, 26.5 in (67.3 cm) length
2	TBD	RF cable. QMA right angle plug to N-male, LMR 195 series coax, 0.195 in (4.95 mm) diameter, 9.5 in (24 cm) length
1	430-00-0002	Solar shield

Table 4-4 iRU4438 iRRH parts list

Qty	Pard number	Part description
4	460-00-0017	Screw, sun shield mounting, M5-0.8 × 10 mm, crosshead pan, split/plain washer, SEMS, SS
Standard equipment shipped pre-installed		
1	420-00-0054	Mounting plate
1	420-00-0064	Mounting bracket, upper antenna
1	420-00-0065	Mounting bracket, lower antenna
8	460-00-0012	Screw, antenna mounting bracket, M3 × 0.5, 10 mm, crosshead pan, split/plain washer, SEMS, SS
6	460-00-0016	Screw, mounting plate, M4-0.7 × 20 mm, crosshead pan, SEMS, SS
2	460-00-0018	Screw, unit mounting, M4-1 × 20 mm, 10 mm unthreaded, captive, crosshead pan, SEMS, SS
4	460-00-0017	Screw, sun shield mounting, M5-0.8 × 10 mm, crosshead pan, split/plain washer, SEMS, SS
GPS option shipped pre-installed		
1	195-00-0017	GPS antenna, 3-16 V dc
1	360-00-0066	GPS cable, LMR 240 series, 0.24 in (6.1 mm) diameter, SMA to N, 24 in (61 cm) length
1	420-00-0066	GPS bracket (includes mounting hardware)
4	460-00-0014	Screw, GPS bracket mounting, M4 × 0.7, 12 mm, pan head, split/plain washer, SEMS, SS
4	445-00-0004	Nut, GPS bracket mounting, M4 × 0.7, 7 mm WAF, SS
Operator-acquired parts for pre-installation requirements		
1	Amphenol BD 03BFFA LL7001	3-pin Amphenol power connector (Operator ordered and installed on power cable)
1	As specified per site requirement	Power cable, 110/220 V ac, (Operator ordered to length according to site requirements)
1	As specified per site requirement	Fronthaul cable assy, RJ45 Gigabit Ethernet, with cable gland

5 Installing the iRU4438 iRRH

This section provides the procedure for installing the iRU4438 iRRH in remote locations such as on towers, poles, masts, walls, roofs, or other structures utilizing a universal mounting assembly.

Instructions for making connections to external interfaces, cabling, grounding and power are also provided.

5.1 Assembling cables

5.1.1 Verify Operator supplied 110/220 V ac power cable

The Operator supplies and pre-assembles the 110/220 V ac power connection cable. We recommend using a 14 AWG, round, 2-wire with ground, shielded cable rated at 300 V minimum. The female plug (manufacturer's part no. BD-03BFFA-LL7001) for connection at the iRU4438 iRRH end is also provided by the Operator. The connection configuration for the supply side of the power cable is determined by site specific requirements.

5.1.2 Verify Operator supplied fronthaul Ethernet cable

The CAT-5 Ethernet cable is supplied and pre-assembled by the Operator. A cable gland may be pre-installed on the Ethernet cable, or may be installed on a CAT-5 cable, in the order shown in [Figure 5-2](#). If the cable gland has a lock nut installed on it, it must be removed before installing the cable gland to the fronthaul entry port. The cable gland screws directly into the fronthaul port on the bottom of the iRU4438. A gasket seals the cable gland at the fronthaul port. The sealing nut is then hand-tightened to complete the weatherproof seal.

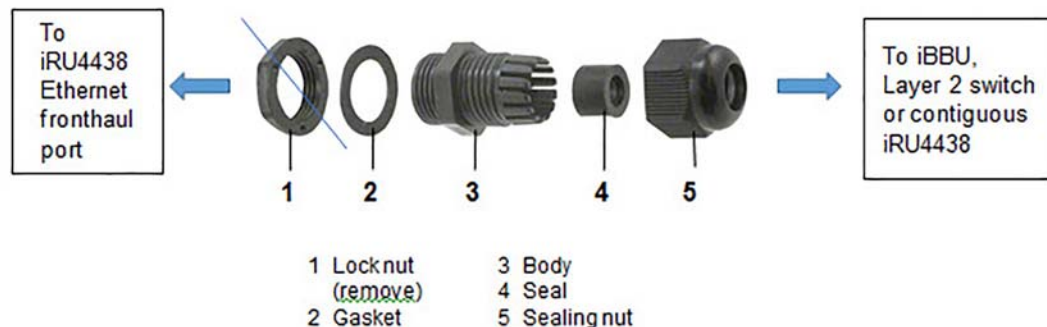


Figure 5-2 CAT-5 Ethernet cable gland assembly

5.1.3 Verify Operator supplied grounding cable

The operator pre-assembles the grounding cable prior to routing to the iRU4438 iRRH. The grounding cable and ground bonding hardware is supplied by the Operator. However, the grounding terminal lug is supplied with the iRU4438 iRRH.



NOTE

The grounding cable to the iRRH should be 3.9 in (10 cm) longer than other cables to the unit. This will maintain ground connection should the cables be pulled off when the unit is extended beyond the length of the cables.

To install ground terminal lug:

1. Cut a 6 AWG (4.11 mm) stranded grounding cable the appropriate length for the iRU4438 iRRH installation.
2. Strip away insulation from one end to expose 3/4 in (19 mm) of bare wire.
3. Crimp the dual-lug grounding terminal (supplied) to the cable using the special purpose crimp tool specified in (or equivalent) as directed by tool manufacturer instruction manual. [Figure 5-3](#) shows assembled cable/lug assembly.



Figure 5-3 Grounding terminal lug assembled on grounding cable

5.2 Routing pre-assembled power/fronthaul Ethernet/grounding cables

This procedure provides instructions for routing the pre-assembled 110/220 V ac power cable, the CAT 5 Ethernet cable, and the grounding cable to the iRU4438 iRRH mounting location before assembling the iRRH components.

To route cables:

1. Route the cables from the iRU4438 installation location to cable sources as shown in [Figure 5-4](#).

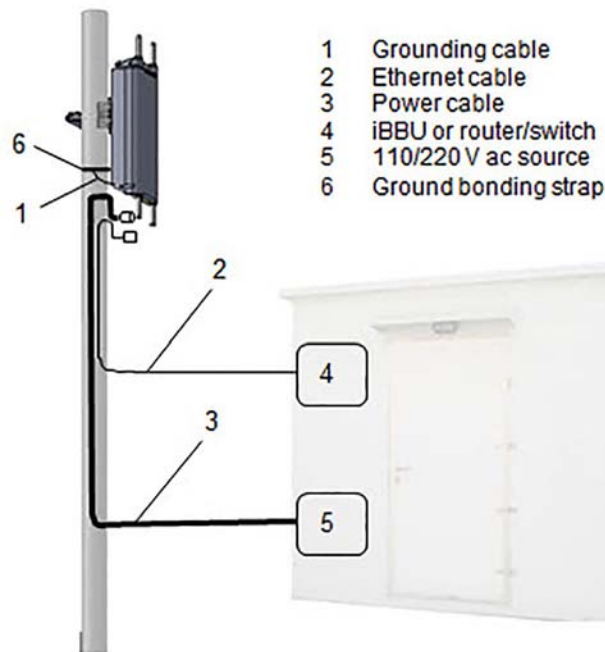


Figure 5-4 Cable routing

2. Secure and dress all cables according to Operator local practice.

5.3 Installing RF antennas on upper/lower omni-antenna brackets

This procedure describes installing up to four (4) omni-directional RF antennas on the upper and lower antenna brackets.

To install antennas on brackets:

1. Remove the nut and flat washer from each of the antennas leaving the rubber O-rings in place.
2. Install up to two (2) omni-antennas on the upper antenna bracket as shown in [Figure 5-5](#) using hardware removed from the antennas in [step 1](#).
3. Tighten the antenna nuts 6-7.4 ft-lb (8-10 Nm) using a torque wrench.

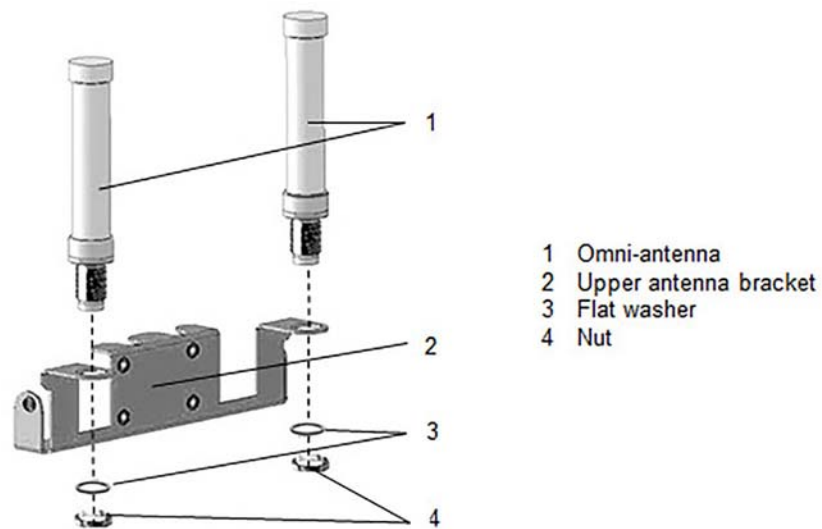


Figure 5-5 Installing omniantennas on upper antenna bracket

4. Install up to two (2) omniantennas on the lower antenna bracket as shown in [Figure 5-6](#) using the supplied antenna hardware.
5. Tighten the antenna nuts 6-7.4 ft-lb (8-10 Nm) using a torque wrench.

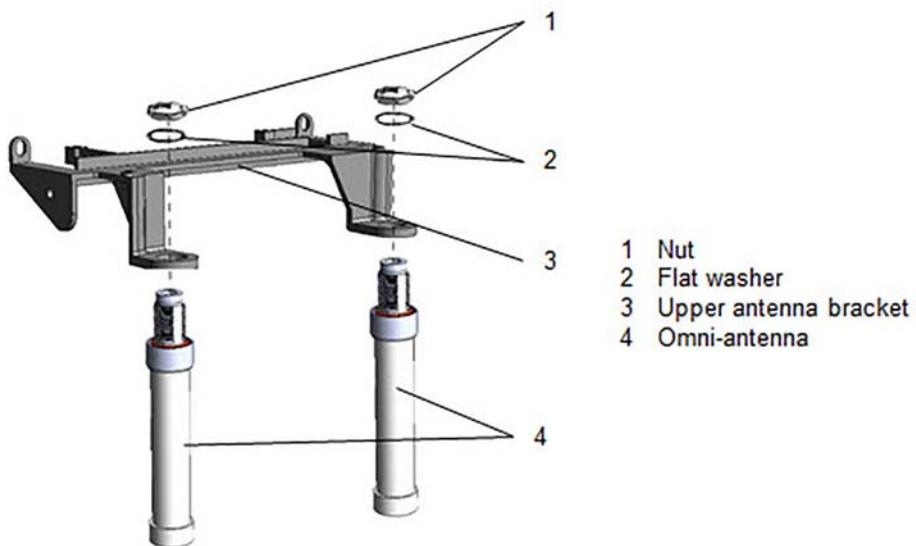


Figure 5-6 Installing omniantenna on lower antenna bracket

5.4 Installing RF antenna cables

The RF antenna cables are shipped installed on the iRU4438 iRRH. If for any reason the RF cables are removed, the following procedure provides instructions for routing and connecting the cables. The RF antenna cables connect to the omni-directional antennas. The upper RF antenna cables are 10.5 in (26.7 cm) in length. The lower RF antenna cables are 26.5 in (67.3 cm) in length.

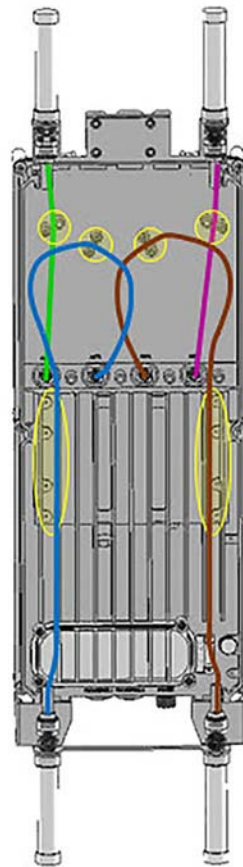


DANGER

RF antenna coaxial cables may be damaged if bent or curved to a radius that is less than the recommended minimum bend radius of 0.6 in (1.52 cm). Always observe the recommended bend radius limit when routing coaxial cables.

The RF coaxial cables are routed from the N-type connector at the base of each omni-directional antenna to the corresponding QMA RF jack located on the front of the iRRH. Antenna and connector designations are shown in [Figure 3-5](#) and [Figure 3-6](#), respectively.

The four QMA RF jacks on the front of the iRU4438 iRRH are labeled ANT 1–4 (as viewed from right to left) and as shown in [Figure 3-5](#). The four omni-directional antennas are designated OMNI 1–4 and are configured as shown in [Figure 3-6](#). The RF cable routing is shown in [Figure 5-4](#).



Note 1: Cables to upper antennas are installed first.

Note 2: Cables are run between pinch posts as shown in highlights.

Figure 5-7 RF antenna coaxial cable routing



NOTE

Leave the dust cover on any unused antenna port.



NOTE

The RF connections must be waterproofed using a self-fusing tape made for that purpose. The application of the tape will vary by Operator, so local practice will determine how the tape is applied.

To install RF cables:

1. Route one RF cable from ANT 1 to OMNI 1. Orient the cable with the N-type connector end at the antenna and the QMA-type connector end at the RF jack on the iRRH.

2. Connect the RF cable N-type connector to the OMNI 1 antenna and secure 15 in-lb (1.7 Nm).
3. Connect the RF cable QMA-type connector to the ANT 1 RF connector on the front of the iRRH by pushing on it until it snaps into place.
4. Repeat [step 1](#) through [step 3](#) for the remaining RF cables according to the RF cable connection scheme provided in [Table 3-3](#).
5. If required, waterproof the connections by wrapping each connector with self-fusing tape according to Operator local practice.

5.5 Installing the iRU4438 iRRH mounting bracket

This section provides the procedure for installing the iRU4438 iRRH on a mast/pole pipe, V-angle or H-angle, or mounting on a wall.

The iRU4438 iRRH can be installed on a pole/mast structure having the following dimensions using the supplied mounting bracket assembly:

Pole/mast: 2.36-4.49 in (60-114 mm)

U-frame: 1.97-3.94 in (50-100 mm)

V-frame: 1.97-3.94 in (50-100 mm)



NOTE

The iRU4438 iRRH is shipped from the factory with the aluminum mounting plate/carry handle pre-installed on the chassis as shown in [Figure 5-8](#).

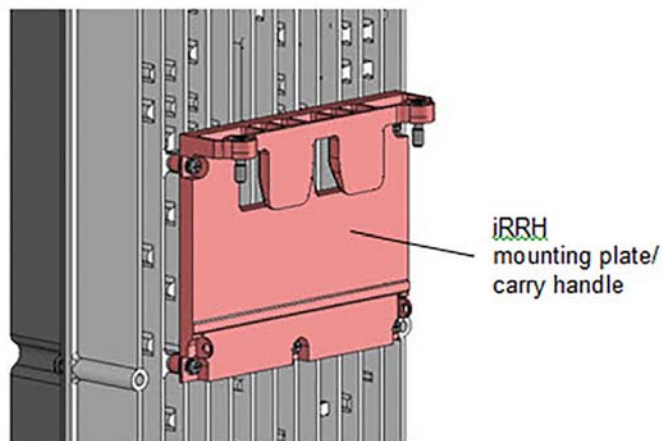


Figure 5-8 iRU4438 iRRH mounting plate/carry handle

5.5.1 Mounting on a pole/mast

The following procedure provides instructions for mounting the iRU4438 iRRH on a pole/mast using the supplied mounting bracket assembly.

To install mounting plate on a pole or mast:

1. Install the mounting bracket and mounting clamp onto the pole/mast with mounting hardware as shown in [Figure 5-9](#).

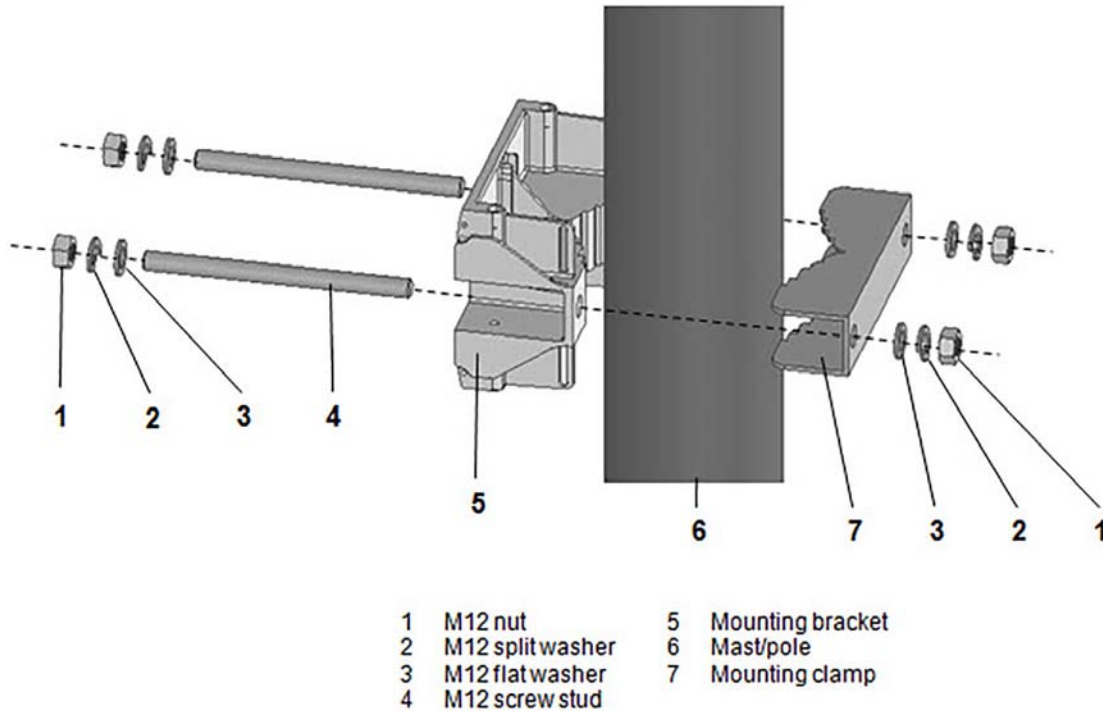


Figure 5-9 Installing mounting bracket on a pole



IMPORTANT! Maintain the parallel orientation of the clamp and bracket while tightening the nuts. This will require alternating tightening the nuts on each screw stud until the final torque is achieved.

5.5.2 Mounting on a wall

The following procedure provides instructions for mounting the iRU4438 iRRH to a wall or other flat, vertical surface.

**NOTE**

The wall where the iRU4438 iRRH is to be mounted must be able to support four times the weight of the unit. The unit can be mounted at a deviation from vertical of $\leq 10^\circ$.

**NOTE**

The mounting clamp is not used when mounting the iRU4438 iRRH to a wall or other flat surface. In addition, the M12 bolts supplied in the hardware kit are not used for wall-mount applications.

**NOTE**

The Operator must provide two (2) M12 anchors, designed for outdoor use, that are compatible with the type structure on which the iRRH is to be installed.

To install mounting plate on a wall:

1. Determine the location where the mounting bracket is to be installed.

**NOTE**

The center-to-center distance for drilling holes to install the selected anchor is 5.5 in (140 mm).

2. Using a tape measure and spirit level, mark where the anchor will be installed using a center punch.
3. Drill the holes where the fastener will be installed on the wall using a drill bit sized for the fastener.
4. Install the iRRH mounting bracket to the wall using the two (2) M12 anchor bolts selected and supplied by the Operator, two (2) washers and two (2) lock washers supplied with the mounting hardware.
5. Tighten the bolts as specified by the M12 anchor's manufacturer using a torque wrench.

5.6 Hoisting the iRU4438 iRRH on elevated structures

Hoist line and tag line lift points are provided on the iRU4438 iRRH. These are the **ONLY** recommended locations of attachment when hoisting and guiding the iRRH into position on elevated structures. Carabiners should be used at both the hoist and tag

lines lift and guy points. The carabiners must be $\leq 3/8$ in (≤ 9 mm) and sized to safely lift the load of the iRRH.

The hoist line lift point for the iRRH is shown in [Figure 5-10](#). The tag line guy point for guiding and limiting any rotation of the iRRH while lifting is shown in [Figure 5-11](#).



The Operator is responsible for determining the method of hoisting the iRU4438 iRRH into position on elevated structures. Be sure to follow all established Operator procedures safety precautions when hoisting the equipment on elevated structures.

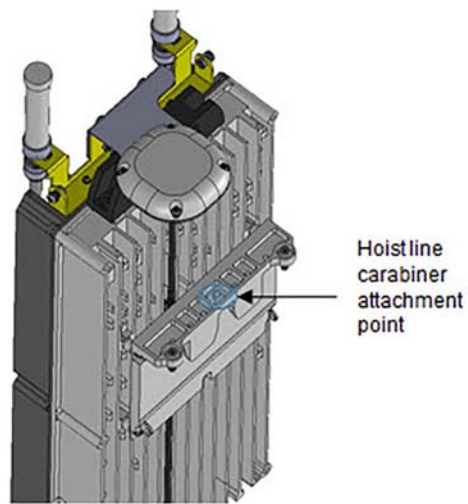


Figure 5-10 Hoist line carabiner attachment point

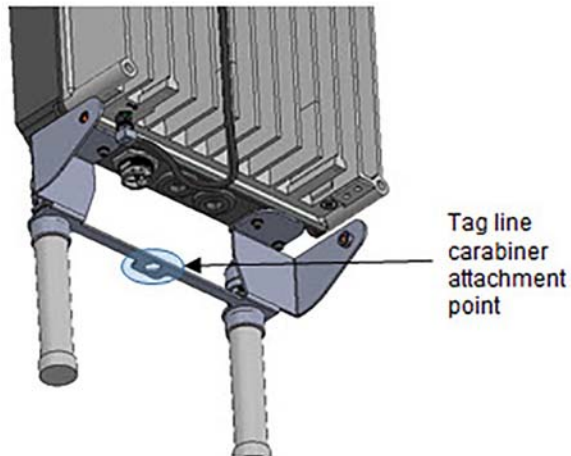


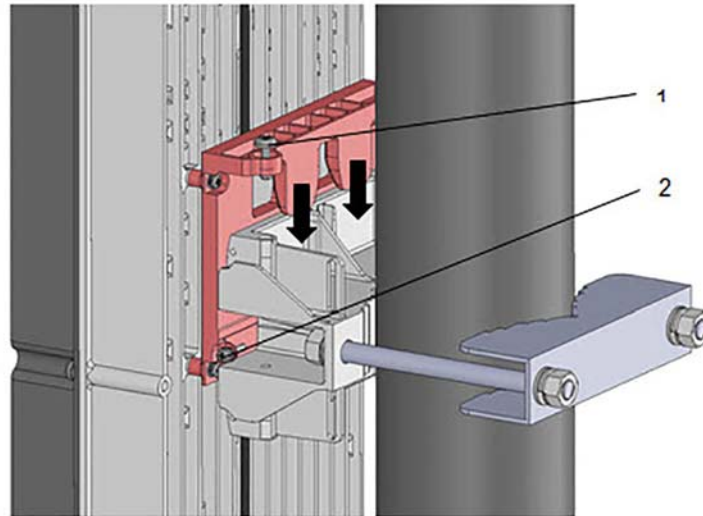
Figure 5-11 Tag line carabiner attachment point

5.7 Installing the iRU4438 iRRH on the mounting bracket

This section provides the procedure for installing the iRU4438 iRRH main unit on the installed mounting bracket.

To install iRRH on the mounting bracket:

1. Hang the iRU4438 iRRH chassis on the mounting bracket by aligning the mounting plate tabs on the rear of the chassis to the mounting bracket slots (see [Figure 5-12](#)).



1 M6×20 mm SEMS screw
2 M4×20 mm screw

Figure 5-12 Aligning mounting plate tabs to mounting bracket

2. Lower iRU4438 iRRH onto the mounting bracket and align the tapped screw hole on top of the mounting plate with the tapped screw hole on the mounting bracket.
3. Insert two (2) M6 × 20 mm SEMS screws into the screw hole on the top of the mounting plate. See [Figure 5-12](#).
4. Start threading the M6 screws into the mounting bracket screws. Do NOT fully tighten.
5. Insert two (2) M4 × 20 mm SEMS screws into the screw holes on either side of the mounting plate.
6. Tighten the M4 screws on the side 13.3 in-lb (1.5 Nm) using a torque wrench.
7. Tighten the M6 screws to 9 in-lb (1 Nm) using a torque wrench.

5.8 Connecting the grounding cable

This section provides the procedure for properly grounding the iRU4438 iRRH to an earth grounding point. Verify that grounding cable/lug assembly is terminated at the other end to a tested earth grounding point according to Operator local practice.

To connect grounding cable:

1. Fasten the dual-hole grounding lug and cable assembly to the iRU4438 iRRH chassis grounding posts using the two (2) M5-0.8 bolts and washers supplied. See [Figure 5-13](#).

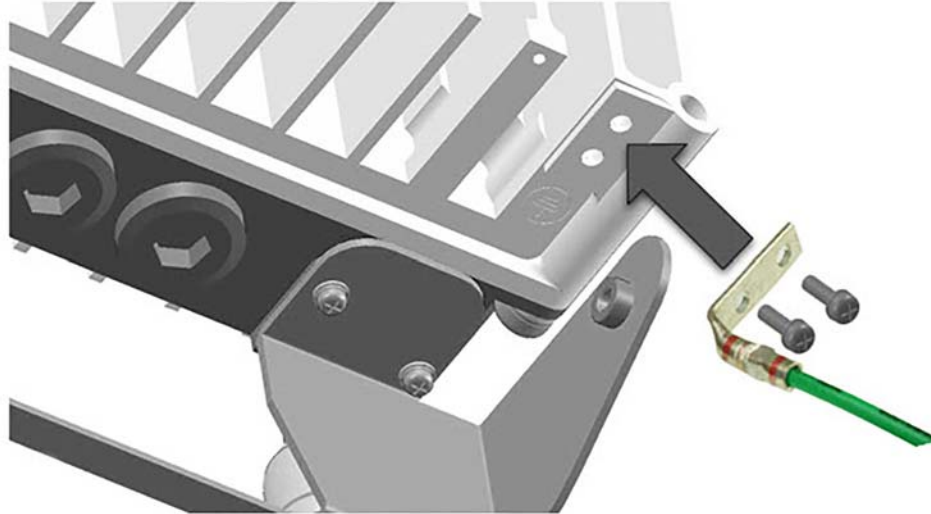


Figure 5-13 Connecting the grounding cable

2. Tighten the bolts to 2.4 ft-lb (3.2 Nm) using a torque screwdriver.

5.9 Connecting the fronthaul Ethernet cables

This section provides the procedure for connecting the fronthaul CAT-5 Ethernet cable to the **FRONTHAUL 1** or **FRONTHAUL 2** Ethernet RJ45 connector sockets located inside the front access panel. See [Figure 5-14](#).

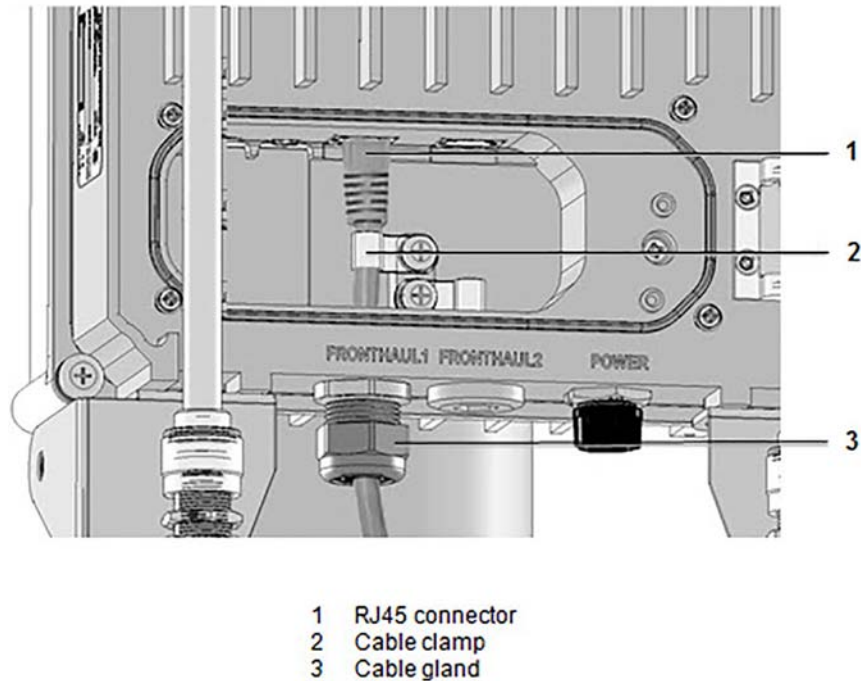


Figure 5-14 Connecting fronthaul Ethernet cable to iRU4438 iRRH

To connect fronthaul Ethernet cables:

1. Disconnect the **ANT 3** RF cable N-type connector from the **OMNI 3** omnidirectional antenna to allow access to the front access panel.
2. Open the front access panel by unscrewing the four (4) M3 × 0.5 captive panel screws.
3. Remove the dust plug in the **FRONTHAUL 1** Ethernet cable entry port and place in spare parts inventory.
4. Access the cable clamp by removing cable clamp screw.
5. Route the Ethernet cable through the **FRONTHAUL 1** Ethernet cable entry port.
6. Install the cable clamp onto the Ethernet cable directly behind the RJ45 connector plug.
7. Plug the RJ45 connector into the **FRONTHAUL 1** port.
8. Secure the cable clamp and Ethernet cable assembly inside the iRU4438 iRRH using the screw with washers removed in [step 7](#)
9. Tighten the cable clamp screw 28.3 in-lb (3.2 Nm) using a torque screwdriver.
10. If required, repeat [step 3](#) through [step 9](#) to install a **FRONTHAUL 2** Ethernet cable.

11. Close the access panel and tighten the four panel screws hand tight or 2.1 in-lb (0.24 Nm).



The fronthaul Ethernet connection must be waterproofed using a self-fusing tape made for that purpose. The application of the tape will vary by Operator, so local practice will determine how the tape is applied.

12. Waterproof the connection by wrapping the connector with self-fusing tape according to Operator local practice. Refer to [Required tools](#) on page 3-1.

5.10 Connecting the 110/220 V ac power cable

This section provide the procedure for connecting the 110/220 V ac power cable with the 3-conductor circular power plug to the iRU4438 iRRH power input connector. Recommended use type SJOW 14/3 stranded portable indoor/outdoor round cable wire rated 300 V, or equivalent.



Power to the 110/220 V ac power supply cable should be switched off at the breaker before connecting to the iRU4438 iRRH power input connector.

To connect the ac power cable:

1. Plug the power cable plug into the power input receptacle labeled POWER located on the bottom of the iRRH.
2. Secure the connection by hand tightening the coupling nut until you feel it "click" into the locked position.



The 110/220 V ac power connection must be waterproofed using a self-fusing tape made for that purpose. The application of the tape will vary by Operator, so local practice will determine how the tape is applied.

3. Waterproof the connection by wrapping the connector with self-fusing tape (refer to [Required tools](#) on page 3-1) according to Operator local practice.

5.11 Checking power

This section provides the procedure for verifying power to the iRU4438 iRRH is connected correctly and operating normally.



NOTE

After applying 110/220 V ac power and verifying that the iRU4438 iRRH is functioning properly, leave power to the unit ON.

To check power to the iRRU:

1. Switch ON the breaker (or insert the appropriate size and type of fuse) to provide power to the iRU4438 iRRH.
2. Verify that the iRU4438 iRRH powers up as indicated by the LEDs on the side of the iRU4438 iRRH lighting in the boot sequence provided in [Table 3-6](#).
3. Leave power to the iRU4438 iRRH ON.

5.12 Installing the solar shield

This section provides the procedure for installing the solar shield on the iRU4438 iRRH.



DANGER

When installing the solar shield on the iRU4438 iRRH, be sure that you do not crimp or crush the coaxial RF coaxial cables.



NOTE

When installing the solar shield on the iRU4438 iRRH, routing the coaxial cable between the cooling fins of the iRU4438 iRRH is permitted.

To install the solar shield:

1. Install the solar shield on the assembled iRU4438 iRRH as shown in [Figure 5-15](#).

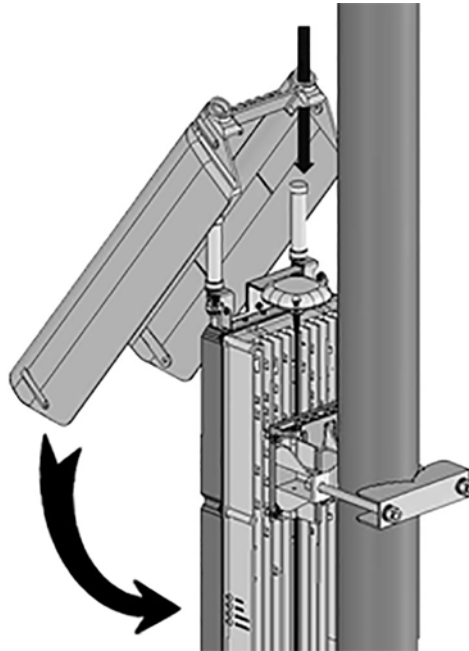


Figure 5-15 Installing solar shield

2. Secure the solar shield with four (4) screws as shown in [Figure 5-16](#).

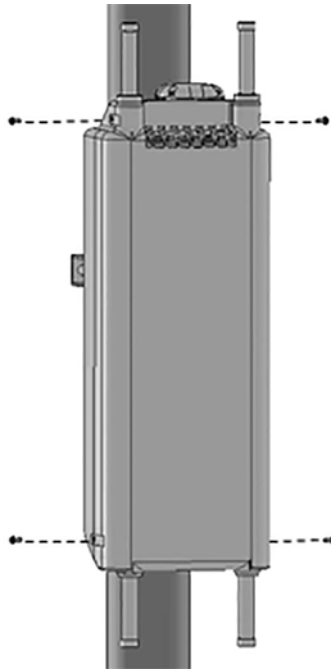


Figure 5-16 Securing solar shield on iRU4438 iRRH

3. Tighten the screws 62 in-lb (7 Nm) using a torque screwdriver.

6.13 Terms, Acronyms and Abbreviations

Term	Description
AISG	Antenna Interface Standards Group
AWG	American Wire Gauge
CFR	Code of Federal Regulations
EMC	Electromagnetic Compatibility
GPS	Global Positioning System
GigE	Gigabit Ethernet
iBBU	intelligent Baseband Unit
IEC	International Special Committee on Radio Interference
iRRH	intelligent Remote Radio Head
LED	Light Emitting Diode
ODC	Outdoor Connector
PWR	Power
RAN	Radio Access Network
RX	Receive
SEMS	Screw and Washer Assemblies
SS	Stainless Steel
TX	Transmit
VAC or V ac	Voltage alternating current

Terms, Acronyms and Abbreviations

Term	Description
vBBU	virtual Baseband Unit