Section 2.1033(C)(3)

USERS MANUAL

USERS MANUAL

SECTION 2.1033(c) (3)

A copy of the installation and operating instructions to be furnished the user. A draft copy of the instructions may be submitted if the actual document is not available. The actual document shall be furnished to FCC when it becomes available.

RESPONSE: A copy of
(1) 9442 Remote Radio Head (RRH) Hardware Installation Manual is attached.

Alcatel-Lucent

FDD Remote Radio Head 700 MHz_15.5 (Lower Band)

Hardware Installation Manual (formerly 418-000-425)

3MN-00075-0002-RJZZA

Issue 0 | September 2012

Alcatel·Lucent

Notice

Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

Developed by the Alcatel-Lucent Documentation Team.

Contents

About this document

Purpose

This document provides hardware installation instructions for an Alcatel-Lucent FDD Remote Radio Head.

Procedures are provided for handling, placement, grounding, powering, and cabling the RRH.

Safety information

For your safety, this document contains safety statements. Safety statements are given at points where risks of damage to personnel, equipment, and operation may exist. Failure to follow the directions in a safety statement may result in serious consequences.

Intended audience

This document is intended for customers installing an Alcatel-Lucent FDD Remote Radio Head (700 MHz).

Safety labels

The safety alert symbol is used on product labels and in this IP to alert the user the user to important safety instructions.

Systems supported

This document applies to LTE indoor and outdoor cell sites.

How to comment

To comment on this document, go to the Online Comment Form (http://infodoc.alcatel-lucent.com/comments/) or e-mail your comments to the Comments Hotline (comments@alcatel-lucent.com).

1 Safety

Overview

Purpose

This chapter covers safety precautions.

Contents

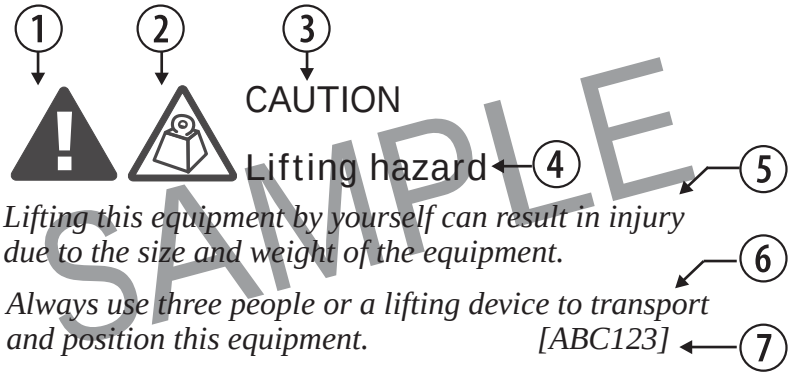
Structure of safety statements

Overview

This topic describes the components of safety statements that appear in this document.

General structure

Safety statements include the following structural elements:



Item	Structure element	Purpose
1	Safety alert symbol	Indicates the potential for personal injury (optional)
2	Safety symbol	Indicates hazard type (optional)
3	Signal word	Indicates the severity of the hazard
4	Hazard type	Describes the source of the risk of damage or injury
5	Safety message	Consequences if protective measures fail
6	Avoidance message	Protective measures to take to avoid the hazard
7	Identifier	The reference ID of the safety statement (optional)

Signal words

The signal words identify the hazard severity levels as follows:

Signal word	Meaning
DANGER	Indicates an extremely hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a hazardous situation not related to personal injury.

Safety

General precautions for installation procedures

WARNING

Failure to observe these safety precautions may result in personal injury or damage to equipment.

- *Read and understand all instructions.*
- *Follow all warnings and instructions marked on this product.*
- *Installation and maintenance procedures must be followed and performed by trained personnel only.*
- *The equipment must be provided with a readily accessible disconnect device as part of site preparation.*
- *Grounding and circuit continuity is vital for safe operation of the equipment. Never operate the equipment with grounding/bonding conductor disconnected.*
- *Install only equipment identified in the product's installation manual. Use of other equipment may result in an improper connection which could lead to fire or injury.*
- *Use caution when installing or modifying telecommunications lines.*
- *The product has multiple power inputs. Before servicing, Disconnect all inputs to reduce the risk of energy hazards.*
- *For continued protection against risk of fire, all fuses used in this product must be replaced only with fuses of the same type and rating.*
- *Never install telecommunications wiring during a lightning storm.*
- *Never install telecommunications connections in wet locations.*
- *Never touch uninsulated wiring or terminals carrying direct current or ringing current, and never leave this wiring exposed. Protect and tape uninsulated wiring and terminals to avoid risk of fire, electrical shock, and injury to personnel.*
- *Never spill liquids of any kind on the product.*
- *To reduce the risk of an electrical shock, do not disassemble the product. Opening and removing covers and/or circuit boards may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.*

Safety - specific hazards

DANGER

Electric-shock hazard

Working in severe weather can result in personal injury or death and damage to the equipment.

Never install or perform maintenance during severe weather (high winds, lightning, blizzards, hurricane etc.).

DANGER

Noxious-substance hazard

Use of unspecified cleaning agents can result in personal injury.

Use only specified cleaning agents. Never use flammable solvents.

Always ensure there is adequate ventilation in the work area and wear the appropriate personal protective equipment.

DANGER

Laser hazard

This equipment operates with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or into an open optical connector when the optical source is switched on. Always observe the laser warning instructions.

WARNING

Electric-shock hazard

Some parts of all electrical installations are energized. Failure to observe this fact and the safety warnings may lead to bodily injury and property damage.

For this reason, only trained and qualified personnel (electrical workers as defined in IEC 60215 + A1 or EN 60215) may install or service the installation.

WARNING

Electric-shock hazard

The power supply lines to the network element are energized. Contact with parts carrying voltage can cause health problems, possibly including death, even hours after the event.

Open and lockout the load disconnect switch in the distribution box to completely de-energize the network element.

WARNING

Electric-shock hazard

This product may be connected to an AC main power supply and may contain an internal battery supply. Disconnecting one power source may not de-energize the system, and can lead to serious injury.

Disconnect and lock out the AC main power supply, if present, and the internal battery supply, if present, before servicing the equipment.

WARNING

Laser hazard

The light from laser and high-radiance LED's may cause eye damage if absorbed by the retina.

In the US consult ANSI Z136.2, in Europe consult IEC-60825 Safety of laser products, for guidance on the safe use of optical fiber communication systems in the workplace.

NOTICE

ESD hazard

Semiconductor devices can be damaged by electrostatic discharges.

The following rules must be complied with when handling any module containing semiconductor components:

- *Wear conductive or antistatic working clothes (for example, coat made of 100% cotton).*
- *Wear the grounded wrist strap.*
- *Wear shoes with conductive soles on a conductive floor surface or conductive work mat.*
- *Leave the modules in their original packaging until ready for use.*
- *Make sure there is no difference in potential between yourself, the workplace, and the packaging before removing, unpacking, or packing a module.*
- *Hold the module only by the grip without touching the connection pins, tracks, or components.*
- *Place modules removed from the equipment on a properly grounded approved ESD work mat.*
- *Test or handle the module only with grounded tools on grounded equipment.*
- *Handle defective modules exactly like new ones to avoid causing further damage.*

NOTICE

Condensation

Sudden changes in the weather may lead to the formation of condensation on components. Operating the unit when condensation moisture is present can destroy the unit.

Units which show signs of condensation must be dried before installation.

CAUTION

Laceration hazard

The RRH may have sharp edges and burrs and contact may cause cuts and lacerations.

Beware of sharp edges and burrs.

Wear appropriate personal protective equipment.

NOTICE

Tools

Tools left in the working area can cause short circuits during operation which can lead to the destruction of units.

Make sure after finishing your work that no tools, testing equipment, flashlights, etc., have been left in or on the equipment.

NOTICE

Inadequate circulation

Inadequate circulation of cooling air can cause some units to become too warm. This can lead to operational impairment.

Cover all installation slots for unequipped units with blanking panels.

CAUTION

Hot-surface hazard

Touching a hot heater may cause burns.

Do not touch the heaters.

Before touching the units wait until they have cooled down, wear safety gloves and clothes.

NOTICE

Corrosive-substance hazard

Cleaning plastic containers and lids with abrasive and aggressive cleaning agents may cause permanent damage.

Do not use solvents, paraffin, abrasive or aggressive cleaning fluids, abrasive or aggressive antiseptic agents or abrasive or aggressive materials.

NOTICE

Service-disruption hazard

Cleaning with water or a high-pressure cleaner will damage the RRH.

The washing down of the equipment with water or a high-pressure cleaner is not permitted.

CAUTION

Lifting hazard

Lifting this equipment by yourself can result in injury due to the size and weight of the equipment.

Always use at least three people or a lifting device to move or position this equipment.

Product safety

Equipment safety

Safety information for this equipment can be found on various Caution, Warning, Danger, information labels or instructions affixed to or included with the RRH, its internal assemblies or included within this document. Informational and cautionary labels may appear near the item they address or may be grouped in a single location on the equipment. Warnings are typically adjacent to the hazard that is noted on the label. The instructions, cautions and warnings found on these labels must be understood and observed by all personnel involved with the equipment installation and maintenance.

2 Product overview

Overview

Purpose

This chapter provides an overview of the Alcatel-Lucent FDD Remote Radio Head.

Contents

Functional description

General description

The 2 x 40W 700MHz RRH specified here supports 3GPP E-UTRAN Band 12. The RRH includes an amplifier with two transmitters, four receivers, and filter all within one chassis. The RRH supports 2 x 2 MIMO and 2 x 4 MIMO within one module. The RRH units can be combined to support 4 x 4 MIMO. The nominal transmit power is 40Watts at the filter output for each of the two transmit paths.

Product capabilities

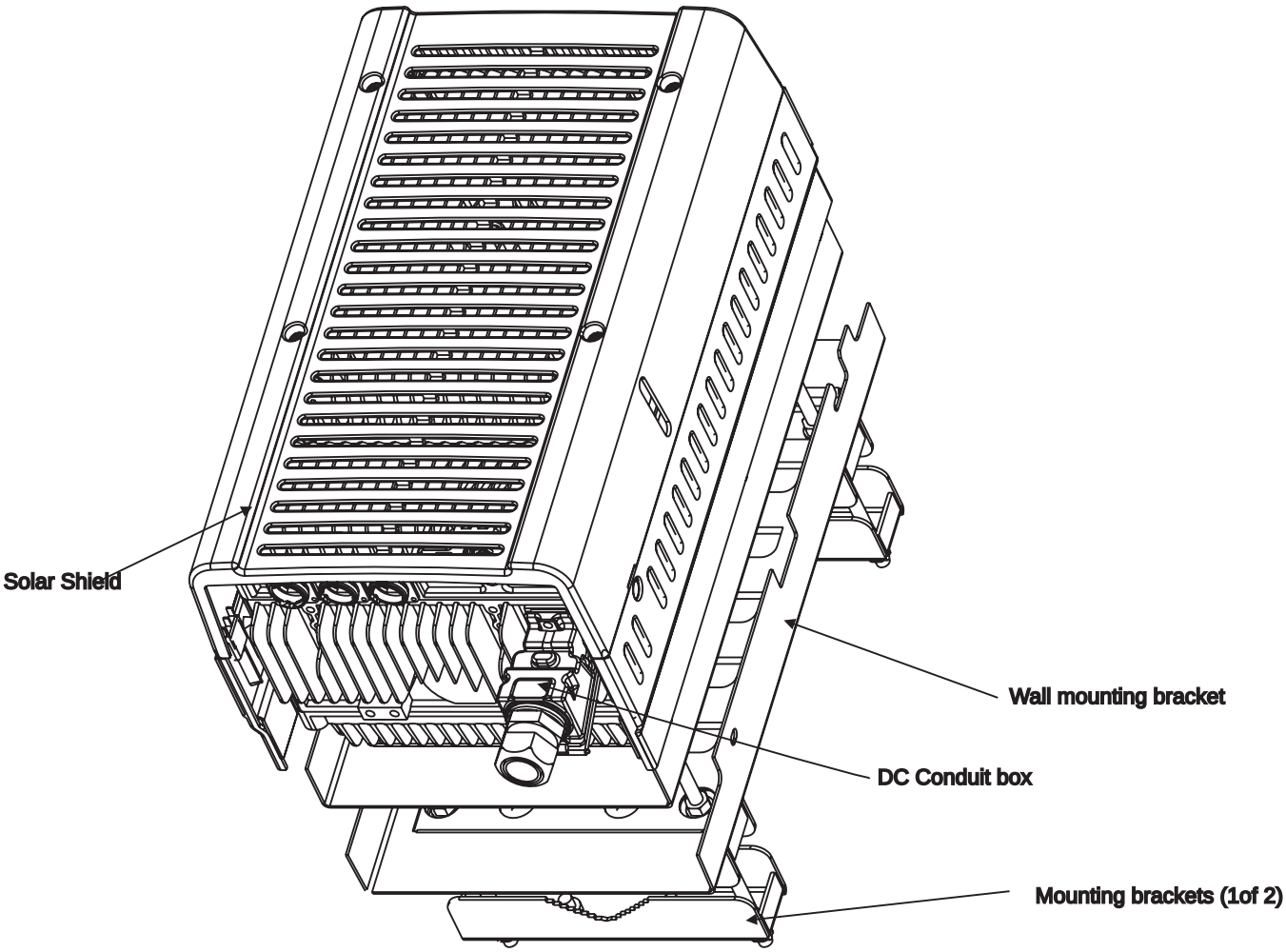
The product capabilities in this release are:

- Outdoor, -48 V DC
- Transmit Power 2 Tx at 40W each
- 700 MHz
- Supports up to six user alarms for each RRH
- RRH Mounting:
  - pole
  - wall
- Front access installation and service
- Bottom I/O panel access

RRH description

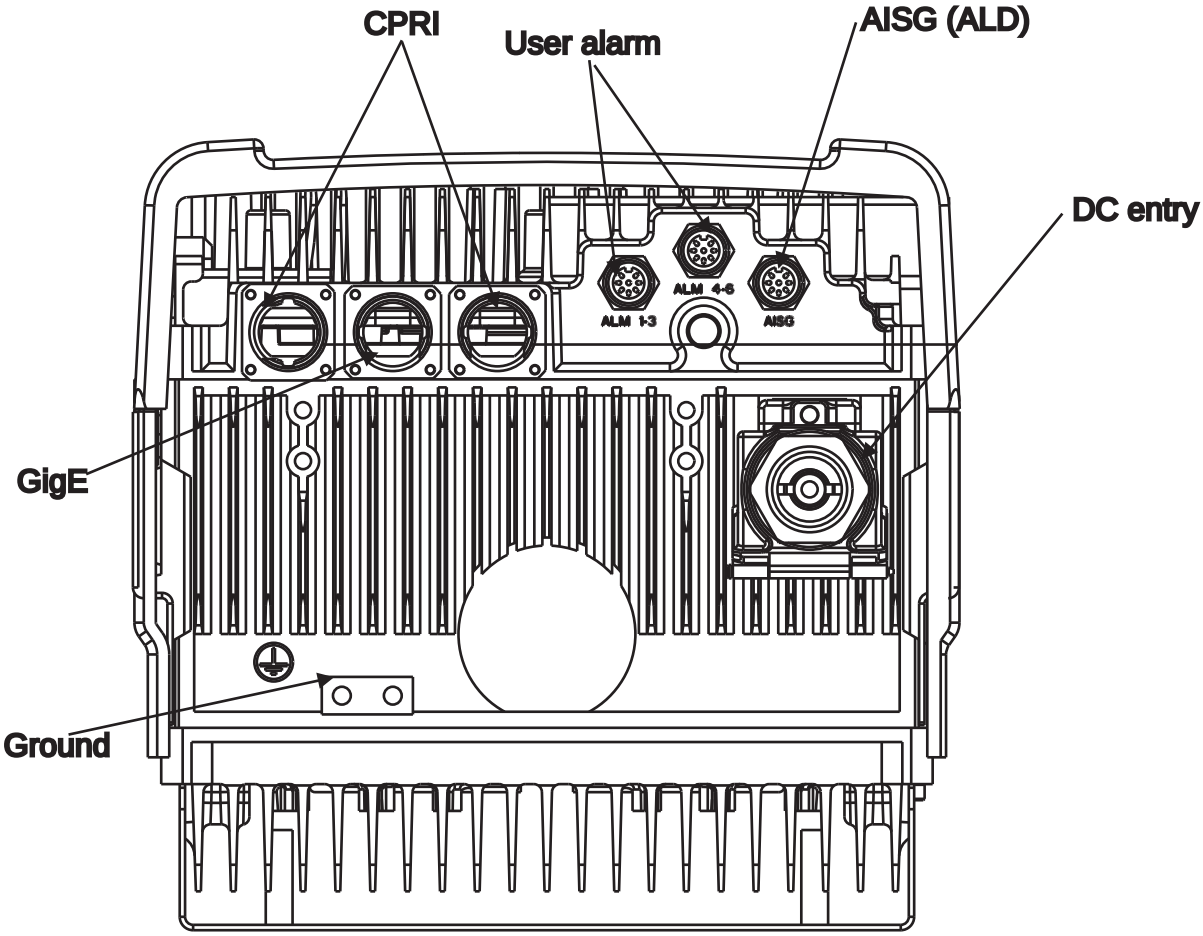
RRH front-view (external)

The following figure shows the front external view of the 700 MHz RRH.



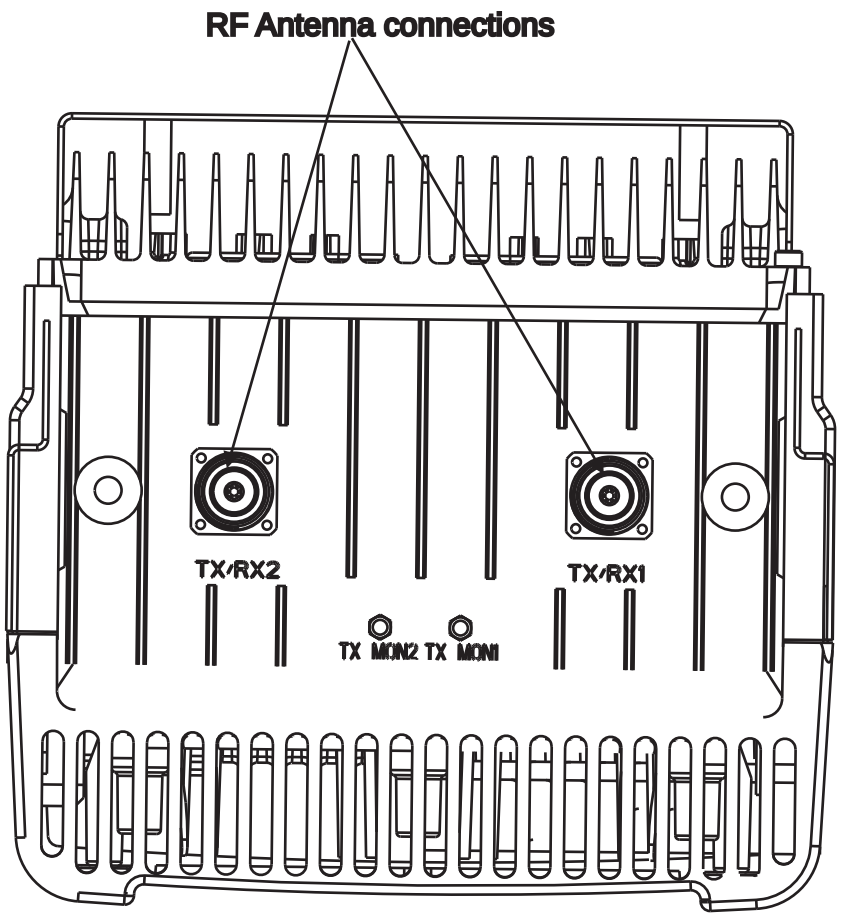
Bottom view of the RRH

Bottom view of the RRH 700 MHz:



Top view of the RRH

Top view of the RRH 700 MHz:



Cable interfaces

At the bottom of the RRH, the following cable interface points are found:

- *-48 DC power connector*:
- *Two (2) Optical connectors:* One optical interface to connect the RRH and the second optical interface to support daisy-chain
- *Two (2) External Alarm Connectors:* (8-pin Circular Din Female connector)
- *One ALD (RS485) Connector*: (8-pin Circular Din Female connector)
- *ANT RX*: (7/16 DIN coaxial female connector)
- *ANT TX/RX*: (7/16 DIN coaxial female connector)
- *Two (2) SMA connectors*: (For testing TX main and TX Diversity)

The top of the RRH allows access for connecting RF cables.

RRH weights and dimensions

Weights and dimensions

This topic covers the RRH weights and dimensions.

Standard RRH weights and dimensions

The following table provides weights and dimensions for the RRHs.

RRH configuration	Estimated maximum installed weight without mounting brackets kg (lb.)	Overall dimensions width x depth x height mm (inches)
RRH 700 MHz w/ Solar Shield	23 (51)	310 x 275 x 530 (12.2 x 10.8 x 21)

Notes:

1. Dimensions are including mounting bracket, solar shield and connectors.

Miscellaneous hardware weights

The following table provides approximate weights for other miscellaneous hardware.

Item	Weight kg (lb.)
Shipping box	4.9 (10.8)
Wall bracket (RRH)	4.1 (9)
Pole brackets (2) (standard)	2.73 (6)
Pole Bands (2)	1.8 (4)
Pole Bracket (Low Profile)	1.8 (4)

3 Site configurations

Overview

Purpose

This chapter provides configuration information for the RRH site.

Contents

RF configurations

The RF capacity is measured in sectors, carriers, and RF signal power. The RF capacity determines what components appear in the RRH and what antenna connections are required.

Physical RF connections

The base station can be connected to RRHs with the following RF frequencies:

- 700 MHz.

The RRH accept connections for:

- Two RF antenna cables with 7-16 DIN female connectors.

RF configurations

The following configurations are supported.

Configuration	RF connectors (per sector)	RF signal power per carrier (nominal)
700 MHz	2	40W

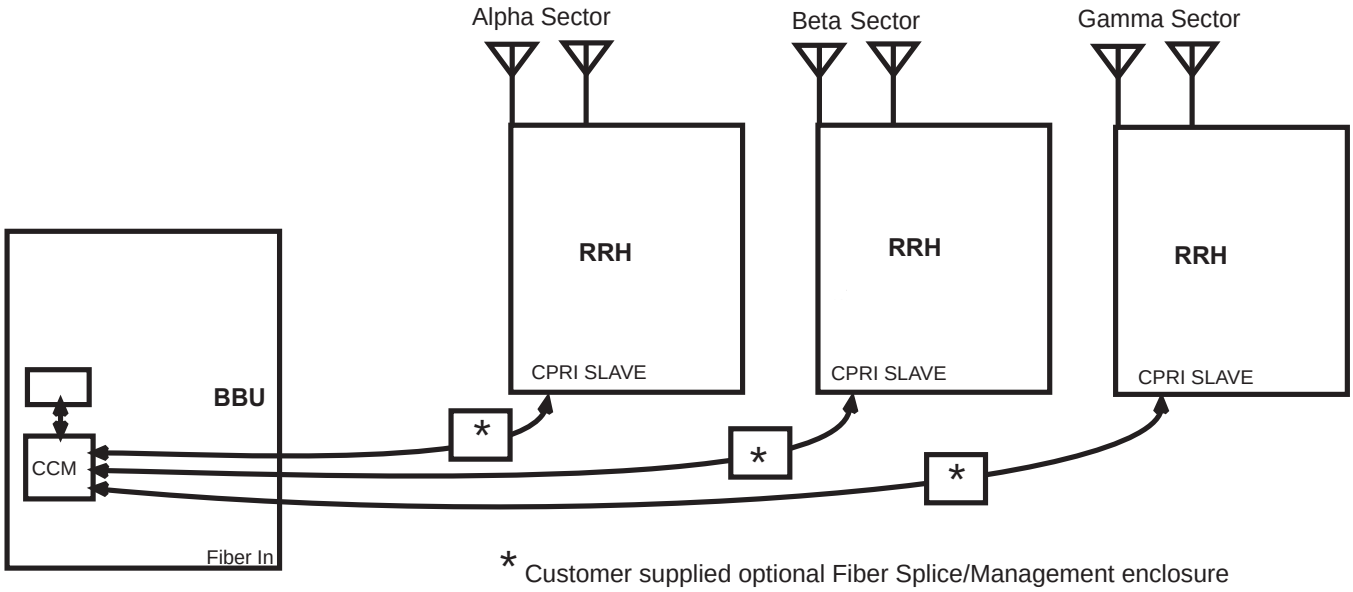
Common Public Radio Interface Configuration

The Common Public Radio Interface (CPRI) of the RRHs can be connected in two different ways to the Base Band Unit:

- Star configuration
- Daisy chain configuration

Star configuration

The star configuration is used when the RRHs are being mounted far from each other, but nearly equally spaced from the Base Band Unit.

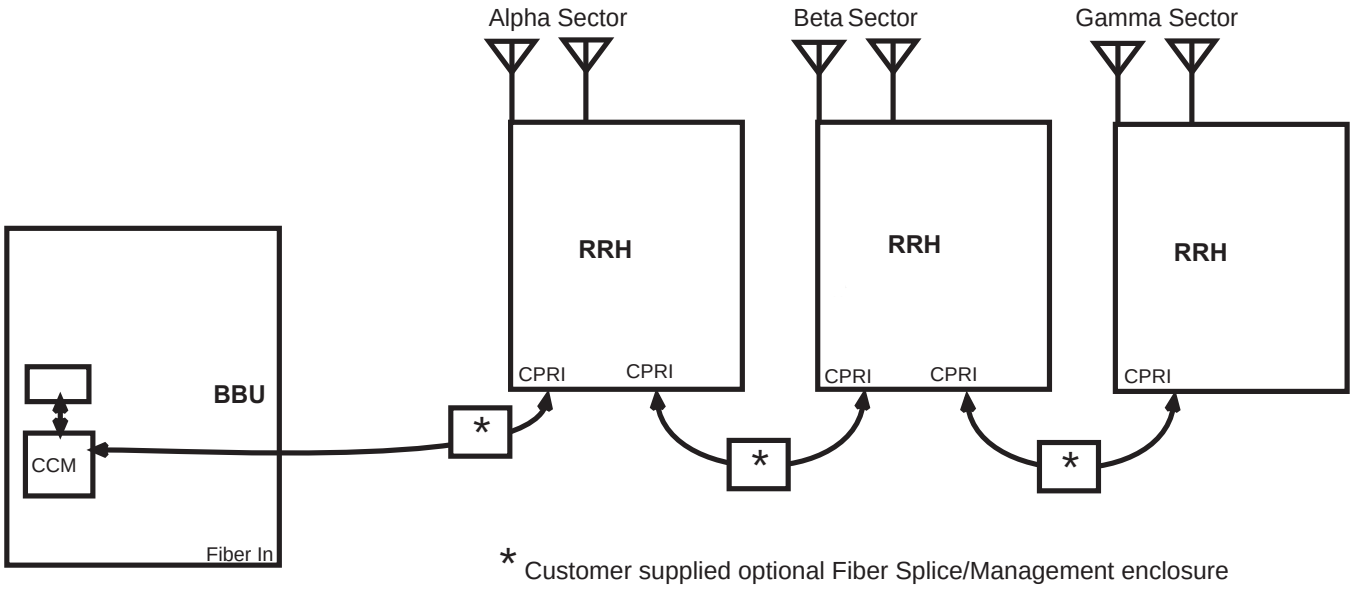


Daisy chain configuration

The daisy chain configuration is used when the RRHs are being mounted close together but far from the Base Band Unit

From an installation perspective these main configurations can be distinguished:

Daisy chain 1 x 3:



4 Tools, materials, and checklist

Overview

Purpose

This chapter provides the tools and general installation requirements for the RRH.

Contents

Preparatory information

Overview

Purpose

This section presents information and procedures that are relevant before the RRHs are mounted, and grounded.

Also included in this section is information for verifying that site preparation requirements have been met so that installation of the product can begin properly.

Reference documents

Further information on RRH clearances and anchor holes can also be found in the *Alcatel-Lucent FDD Remote Radio Head (700MHz) Site Preparation Guidelines,* 418-000-424.

Refer to the site-specific layout information for details on where the equipment must be positioned.

This document also contains all necessary information on how to mark the positions of the anchor holes and how to drill them.

Contents

Tools required for installation

Overview

This section provides a master list of all tools, materials, and parts required during the installation process. Items required for installation of the RRH are listed within the applicable chapter.

Tools

WARNING

Electric-shock hazard

If the installation is performed with energized DC circuits or with a battery backup supply connected, an energy hazard exists.

Therefore, always use tools that are properly insulated.

The following is a master list, in alphabetical order, of all tools that may be utilized during installation:

- Adjustable open-ended wrench (or set of fixed open-ended wrenches)
- Antioxidant compound
- Shackle links, or equivalent (quantity: 2)
- Bolt anchor setting tool
- Bonding clamps for facility and phone line cables (normally provided by telephone company)
- Box cutter or equivalent, to open packaging
- Chalk line
- Channel-lock pliers [for 2-1/2 inch nuts, max. 3/4-inch (19 mm) wide]
- Channel-lock pliers (standard)
- Crimping tools 22-16 gauge, 10-4/0 gauge (5-120 mm^2) for installation of terminal lugs and c-taps (R-3695A)
- Derrick, capable of supporting a 500 lb. (220 kg) load
- Drill and drill bits (including 5/8" [16 mm] and 11/16" [18 mm] for drilling anchor holes)
- Drill bit (3/4") for 5/8" through bolts, if required
- Drill - Pneumatic Hammer (R-5006),
  Roto-Stop Hammer Kit (R-4416) with 1/2-inch (12 mm) chuck, or equivalent to drill anchor holes
- Ear protection gear

- Electrical conduit installation equipment and materials
- Electrical tape
- ESD wrist strap (not provided with RRHs)
- Eye protection gear
- Fish tape
- Flashlight
- Floor punch, for cutting asbestos floor tile prior to drilling
- Floor tile puller, for raised floor tiles
- A hoist capable of lifting and moving the RRH into final position
- Galvanizing paint
- Gin boom
- Gloves - Low voltage rubber lineman's gloves (R-4285)
- Hammer, 16 oz. (.5 kg) for anchor installation
- Heat gun for heat shrink
- Insulated gloves
- Insulated hand tools (for completing electrical connections)
- Ladder or work stand/stool .
- Level (4 ft. - 1.5 m) (steel)
- Marker, to mark floor for lineup and drilling
- Measuring tape
- Nut driver set (decimal) with 10-inch extension
- Nut driver set (metric) with 250-mm extension
- Ohmmeter (Multimeter, volt/ohmmeter, or equivalent)
- Pallet jack
- Pliers
- Plumb line
- Pry bar
- Safety goggles or glasses (R-3055)
- Screwdrivers (power and manual), flat-blade, Phillips
- Silicone caulk
- Socket sets (decimal and metric) various drives, including 1/4" drive for security bit
- Stripping tool (for LDF4 antenna jumper cables) - part number 74Z-0-12-15 for Huber Suhner connectors; part number ITE-7189 for Andrew connectors.
- Tools for preparing cables
- Torque wrenches, 35 - 300 in.-lb. (4 - 34 Nm)
- Torque wrenches, 4.4 -150 ft.-lb. (6 - 200 Nm)

- Vacuum cleaner or equivalent, as required for clearing debris from anchor holes
- Volt/ohmmeter
- Wire stripper
- Wire rope or chain slings, 7/16 inch (11 mm), 7 feet long (2 m), minimum (quantity: 2)
- Wrench - Adjustable, (3/4 in./20 mm) open-ended wrench (or set of fixed open-ended wrenches)
- Wrench - Flare Nut or Box Wrench, 12 mm (1/2 in.) required to install seismic anchors.

Parts and/or kits needed

The following is a master list of all parts and kits that are required during installation of the RRH.

- DC connectorized cable
- External user alarm interface kit
- Fiber optics connectorized cable
- RF antenna jumper cables
- Anchor kit - 12 mm expansion anchor kit
- RRH grounding kit
- R-ITE-6111 M10 eyebolts (2).
- Mounting bracket (wall, pole, floorstand)

Torque requirements

Overview

This section provides mechanical torque requirements. Refer to the table below.

Torque requirements for mechanical connections

The table below identifies the torque requirements to be followed when making mechanical connections.

Item Description	Torque	
	Newton Meters	Inch Pounds
RF cable connections	25	221
M6 x 16-mm thread rolling screw	4	30
All other M6 fasteners (nuts, hex-head bolts, etc.)	4	30
All M5 fasteners (pan-head screws, Torx screws and hex nut, etc.)	4	30
All M4 fasteners (pan-head screws, hex nut, etc.)	1.5	14

Generic torque specifications for electrical connections

Important! The table below is to be used exclusively for electrical connections. Refer to the previous table for mechanical connections.

The table below identifies the torque requirements to be followed when making electrical connections.

Metric Screw Size	SAE Screw Size	Torque - in.-lb. [or ft.-lb.] and (Nm)					
		Wire Connections		Head Tightened		Nut Tightened	
		Slotted Machine	Hex or Socket Cap	Slotted Machine	Hex or Socket Cap	Slotted Machine	Hex or Socket Cap
M4	8-32	15 (1.7)	15 (1.7)	19 (2.1)	19 (2.1)	19 (2.1)	23 (2.6)
M5	10-24	21 (2.4)	21 (2.4)	27 (3.1)	27 (3.1)	27 (3.1)	33 (3.7)
M6	1/4-20	50 (5.6)	50 (5.6)	65 (7.3)	65 (7.3)	65 (7.3)	80 (9.0)
M8	5/16-18	-	100 (11.3)	-	135 (15.3)	135 (15.3)	165 (18.6)
M10	3/8-16	-	180 (20.3)	-	240 (27.1)	240 (27.1)	290 (32.8)

Metric Screw Size	SAE Screw Size	Torque - in.-lb. [or ft.-lb.] and (Nm)					
		Wire Connections		Head Tightened		Nut Tightened	
		Slotted Machine	Hex or Socket Cap	Slotted Machine	Hex or Socket Cap	Slotted Machine	Hex or Socket Cap
M12	1/2-13	-	280 (31.6)	-	385 (43.5)	385 (43.5)	465 (52.5)
M14	1/2-13	-	500 (56.5)	-	585 (66.1)	585 (66.1)	710 (80.2)
M16	5/8-11	-	[71] (96.3)	-	[97] (131.5)	[97] (131.5)	[118] (160.0)
M20	3/4-10	-	[125] (169.5)	-	[172] (233.2)	[172] (233.2)	[209] (283.4)

Verify site preparation completed

Overview

This topic describes what must be done to verify that the site preparation is complete so that installation procedures can begin.

If some of the requirements are not met, the installer must do so now.

Verify site preparation

Before installation of the RRH site can begin, site preparation should have been completed in accordance with *Alcatel-Lucent FDD Remote Radio Head (700 MHz) Site Preparation Guidelines,* 418-000-424.

This unit is only to be installed in restricted access locations.

The following site preparation requirements must be met before the installation of the RRH can begin:

- Adequate clearance must be provided for service access.
- DC electric service must be installed.
- User alarm facilities must be installed.
- Grounding electrode system must be installed.
- RF and antenna runs must be installed.
- Surge protection for antennas must be installed (if required).
- Tower light power must be installed (if required).
- Tower light alarm must be installed (if required).
- Mounting bracket holes must be drilled.
- The environment must comply with limits listed under Environmental Requirements.
- Cable supports and racks must be installed.
- Conduits for user alarms, and power are provided.

Physical installation process overview

Overview

This topic delineates the steps involved in the installation of the RRH.

Installation process

Following are the high level steps of the installation process:

1. Verify site preparation is complete
2. Transport the RRH
3. Mount the RRH
4. Ground the RRH
5. Connect user alarm
6. Connect DC power cable
7. Connect RF cables
8. Initial start-up & system test
9. Connect fiber optics cable.
10. Final steps to finish installation.

Installation procedure checklist

Overview

The following is a procedure checklist.

Checklist installation procedure

Done	N/A	Task
		Verify site preparation completed
		Transport and mount the RRH
		Mounting instructions
		Ground the RRH
		Connect DC cable to the RRH
		Connect twisted-pair cables to the RRH
		Connect user alarms cable
		Connect fiber optics cable
		Background information on antenna jumper cables
		Final installation procedures

5 Transport, mount, and ground the RRH

Overview

Purpose

This chapter provides general instructions for mounting and grounding the RRH.

Contents

Pre-installation instructions

Overview

Purpose

This section covers the:

1. Instructions for transporting and mounting the RRH.

Contents

Transport and mount the RRH

Overview

This topic describes how to attach a two-leg lifting sling to the RRH and to move it near to its designated position using a lifting mechanism such as a derrick.

Unpack the RRH

Use the following steps to unpack the RRH.

1 Make note of the "TIP N TELL" indicator on the package to see if the RRH was mishandled or tipped during shipment.

2 Remove the bubble wrap.

Important! Keep RRH upright.

3 Check RRHs for signs of damage.

4 Report damage as required.

Prepare RRH for lifting and transport

A lifting device or hoisting mechanism is required when moving the RRH.

Obtain M10 eyebolts, lifting device, and mounting hardware.

Lifting harness requirements, when required

The general requirements for a lifting harness are as follows:

- Two-leg sling
- Without shortening element
- Length: greater than or equal to 305 mm (12 inch) from hook to lifting point
- Angle should not be greater than 45 degrees from y-axis
- Sufficient lifting capacity for the RRH including the pallet.

WARNING

RRH may fall

If the RRH falls while being lifted, it may injure or kill a person.

Take both of the following precautions:

- *Use lifting shackles and lifting straps that can support the RRH if one shackle or one lifting strap fails and three remain. If a separate rating for shear is not provided, each shackle must be used at no more than 25% of its tension rating.*
- *Keep the area beneath the RRH and the immediate surrounding area completely clear of personnel at all times during the lifting operation.*

Before you begin

For each cell site, the shipping company, installer, or installation supervisor must plan which methods to use based on:

- How the equipment is delivered
- The dimensions and weights of the equipment
- The access route to the position where the equipment will be installed

The RRH equipment typically arrive at the site by truck. This topic assumes that:

- Each RRH is on a pallet
- The packaging has been removed.

Lift RRH using boom tip winch, when required

Important! Before attempting to use derrick equipment, refer to Chapter 2, "Safety precautions for handling equipment".

Use the following procedure to lift a RRH using a rotating derrick equipped with a boom tip winch.

1 **Important!** Use only the required eyebolts. DO NOT use any other holes or the RRH may be damaged.

At two positions, install an M10 eye bolt on the top of the RRH.

2 

WARNING

Slip hazard

Personnel injury or equipment damage

When moving the RRH, use appropriate lifting devices and sufficient number of personnel.

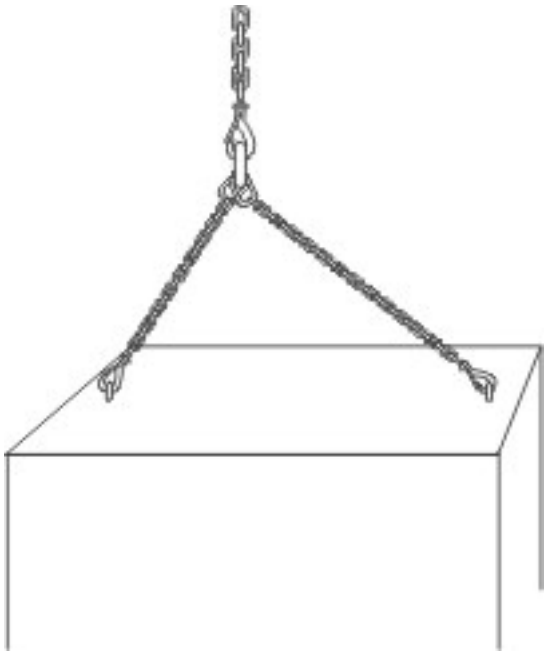
For more detailed information, refer to Corner Mounted Rotating Derrick Equipped with Hydraulic Digger- Description and Maintenance, 649-300-021 for operating procedures and precautions. Also consult Slings, 649-310-115, and B Connecting Links, 081-410-105.

3 **Important!** To avoid excessive stress on the top of the RRH, make sure that each leg of the lifting harness is at least 305 mm (12 inches) long.

Note: It is permissible for two people to lift.

Attach the slings to the boom line on the winch with a B connecting link or clevis.

4 Attach the other ends of the slings to the lifting eye-bolts on the RRH with a shackle link or clevis.



END OF STEPS

Transport and place the RRH

Proceed as follows to transport the RRH by derrick:

1 Carefully lift the RRH using the boom tip wench.

2 Transport the RRH via the rotating derrick to the installation position.

3 Determine if the RRH is being installed against a wall or on a pole.

4 Set the RRH down at or near the installation position, depending on the type of mounting method is to be used. Use the following instructions.

If mounting on a:	Then:
Wall	Use the hoisting mechanism to align the RRH where it is to be mounted on the wall. Continue with “Wall mount hardware installation”.
Pole	Use the hoisting mechanism to align the RRH where it is to be mounted on the pole. Continue with “Pole mount installation overview” (p. 5-16).

5 Remove the lifting harness and the eye bolts once the RRH is in position.

For wall and pole mounting, continue using the lifting harness to hold the RRH into position until mounting has been fully completed.

END OF STEPS

Mounting instructions

Overview

Purpose

This sections contains instructions for the various methods of mounting the RRH.

Contents

To mount hardware to wall

Overview

This section describes the procedures to be followed when installing the mounting hardware for the RRH on a solid concrete wall (or to the Unistrut on a wall).

Wall mount brackets

WARNING

Personnel injury or equipment damage

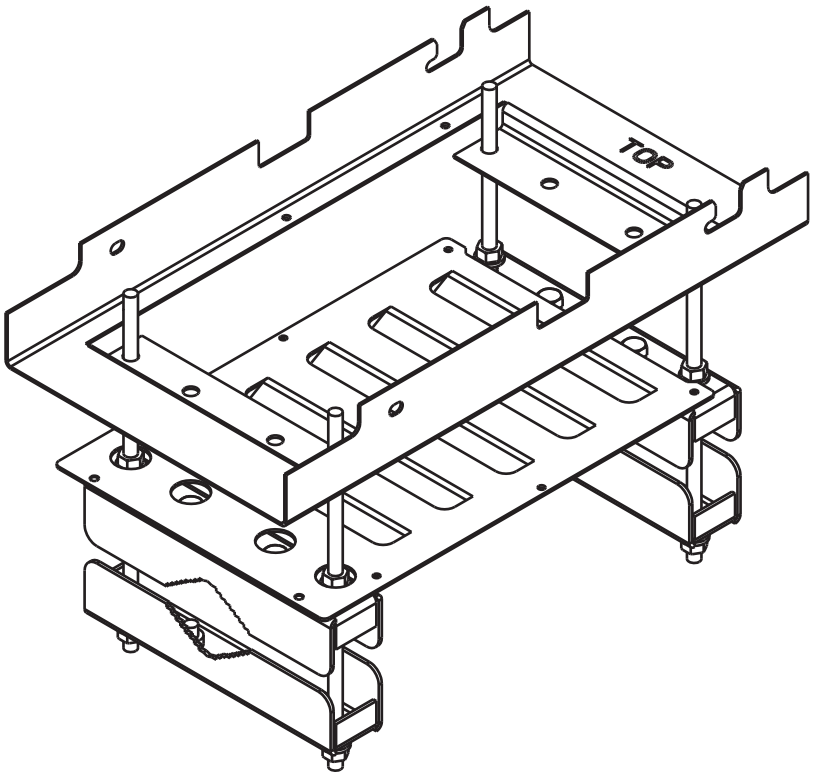
Before any hardware installation occurs, carefully read the section:

"Safety precautions for handling and placement"

Important! Various building materials and construction methods dictate that the RRH be fastened to the wall with appropriate mounting hardware. It is the responsibility of the customer to provide any necessary support material and structures to ensure that the installation will be in compliance with Building Officials and Code Administrators (BOCA), Uniform Building Code (UBC), and all local codes.

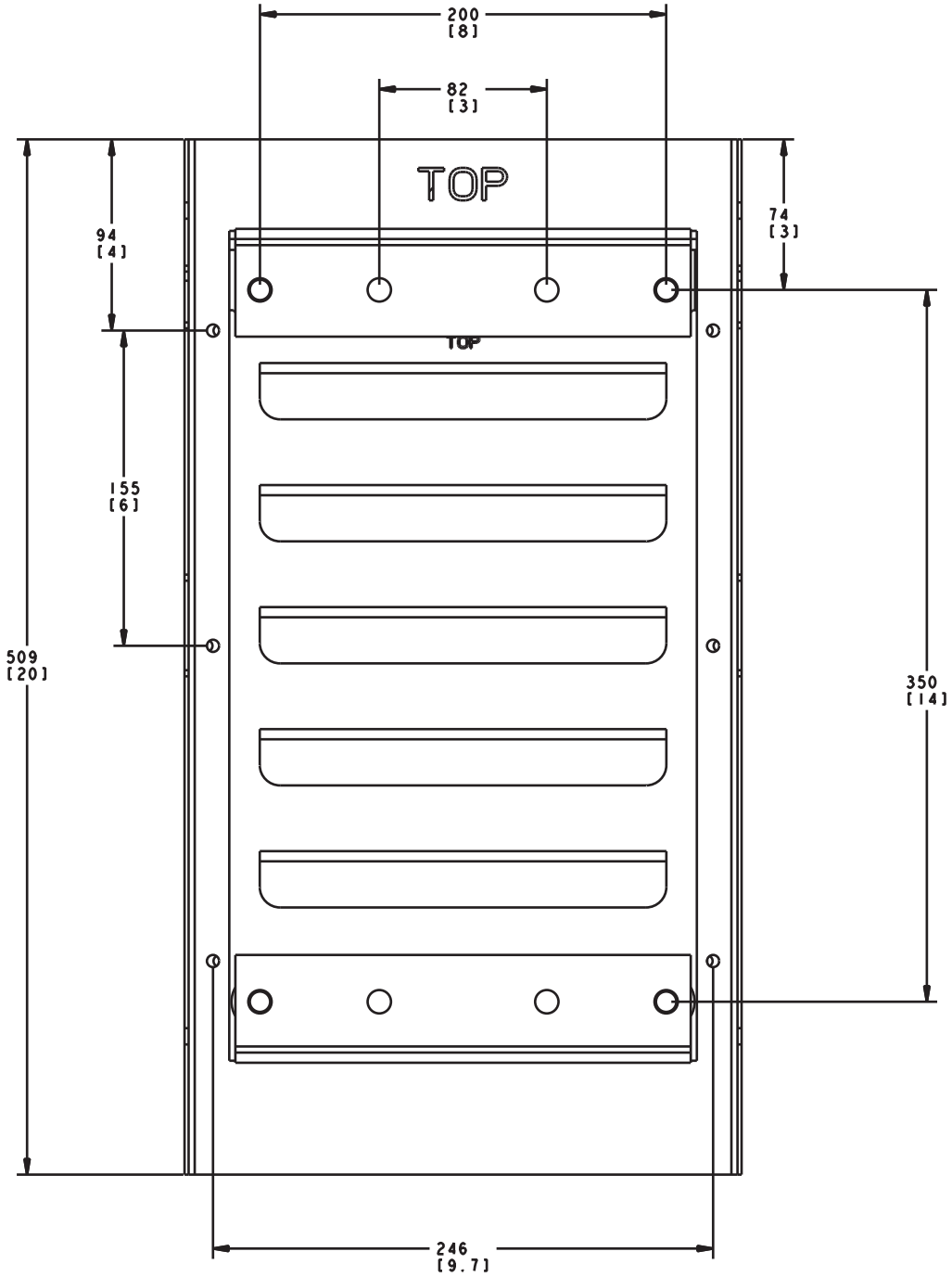
The following figure illustrates the mounting bracket that is required to mount the RRH on a wall.

Wall bracket assembly



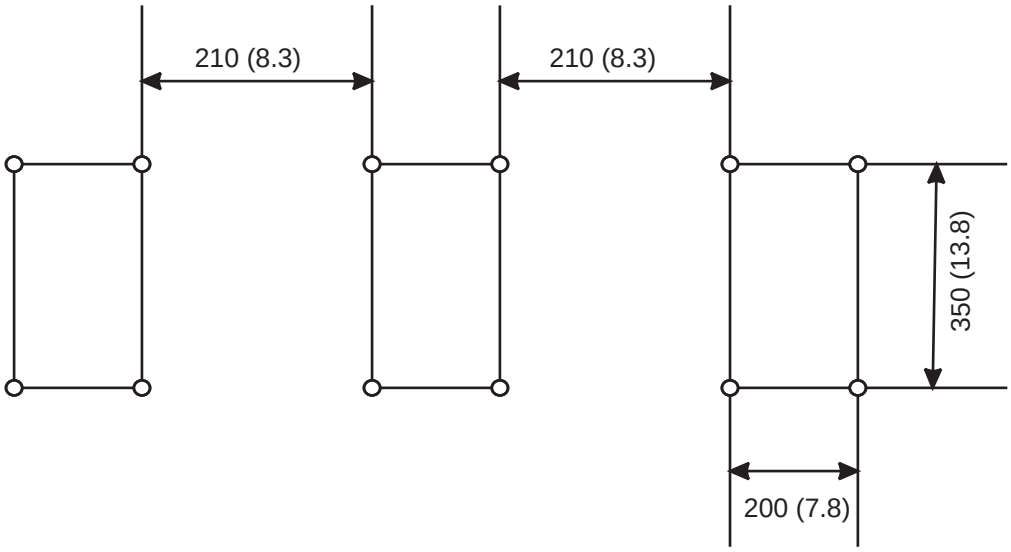
Wall mount - hole pattern

The following graphic shows the wall mounting hole pattern for the RRH. The dimension shown are in millimeters.



Wall mount clearances - Three RRHs

The following graphic shows the hole patterns and minimum distances for wall mounting up to three RRHs in a row.



Indirect wall mounting (unistrut)

The following graphic shows the unistrut.

Before you begin

Make sure you have read and understood the section "Transport and mount the RRH" (p. 5-3).

Attach mounting bracket

1 Attach the wall mounting bracket for the RRH to concrete wall using four M10 or 3/8" anchor bolts. Use four M10 (3/8") hex bolts with flatwasher, lockwasher and, springnut for unistrut system.

2 Level and properly torque bolts.

END OF STEPS

Result

The RRH mounting bracket is attached to the wall or to the unistrut.

Install RRH on wall

CAUTION

Personal Injury

The bolts on the RRH can pinch and damage your fingers.

Keep fingers clear when lowering the RRH into position.

Perform the following procedure to install the RRH on a wall or to the unistrut on a wall.

1. Insert Gin Boom into top of the wall mount bracket.
2. Attach the hoisting mechanism chains.
3. If you have not already done so, attach lifting harness to the two lifting points (eye bolts) of the RRH.
4. Carefully raise the RRH into position using the hoisting mechanism, if required.
5. Loosely attach the two side top M10 hex bolts, flat washers, and lock washers to the RRH as supplied with the wall mounting kit. Do not tighten yet, install only halfway. Tape the washers to the bolts.

   Important! When lifting the RRH, do not rest the bottom side on the ground.
6. At the upper corners of the RRH, pull the washers to the sides. Position to the M10 hex bolts on the RRH in the top mounting slots of the wall bracket.
7. Remove the sling.
8. Install the two bottom side M10 hex bolts, flat washers, and lock washers through the wall mounting bracket.

   Remove tape from top hardware.

9 If necessary, level brackets to insure that the RRH will be mounted level. Use a level to level the top of the RRH.

10 Tighten all the M10 hex bolts and use a torque wrench to tighten all the nuts 32.2 Nm (25 ft/lb).

11 Install tamper proof screws.

END OF STEPS

Pole mount installation overview

Overview

This section describes the procedures to be followed when installing the RRH on a pole.

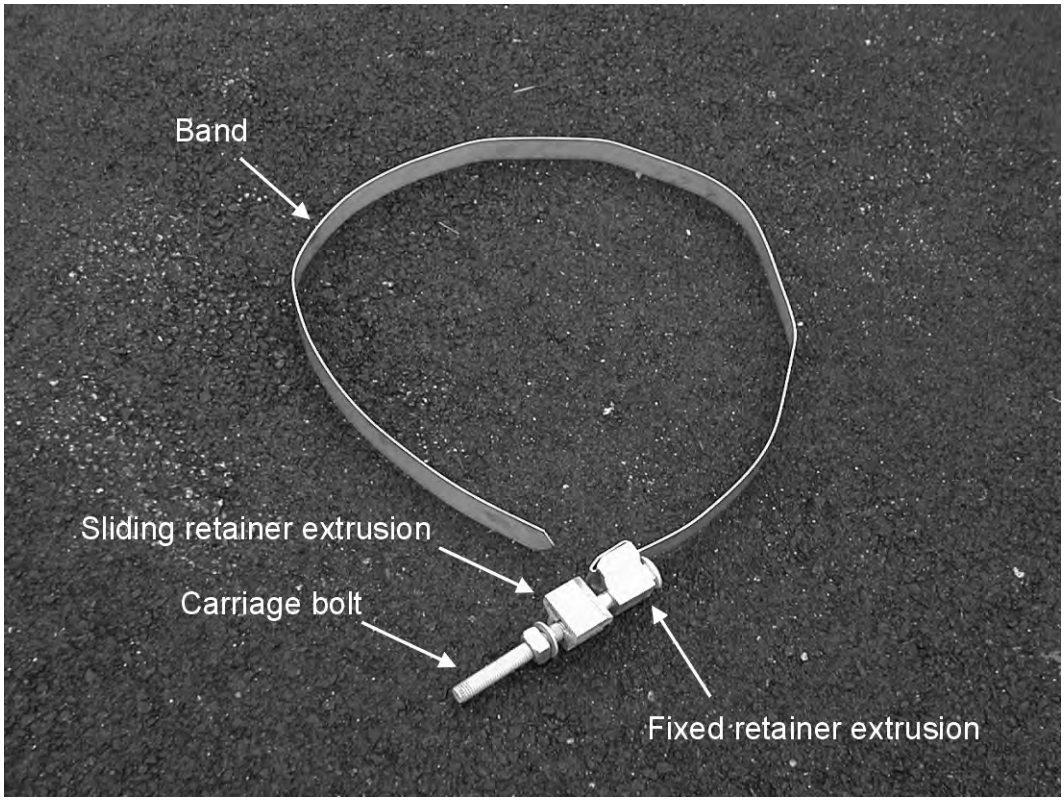
There are two types of pole mounting installations:

1. Pole brackets and pole bands
2. Pole brackets with (customer supplied) through bolts

Pole brackets are available in low profile or standard. Standard pole brackets provide a greater standoff from pole for additional cable clearance.

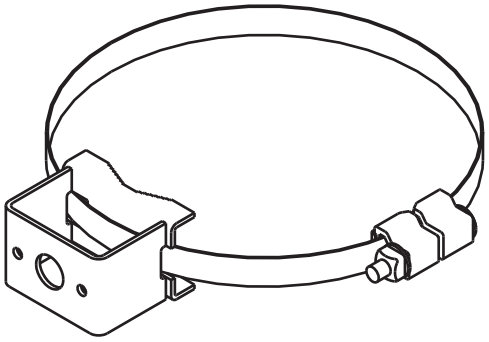
Pole mounting weldment and pole band components

Each pole mounting band consists of a fixed retainer extrusion, a sliding retainer extrusion, a carriage bolt, and a band, as shown in the following figure



To mount equipment pole brackets - standard or low profiles - must be threaded on to the band.

The following figure shows both, low profile and standard weldment:



Standard Poleband

Note: Pole band weldment assemblies must be created for both upper and lower bands at the same time.

To mount hardware to pole with pole bands

Purpose

This section describes the procedures to be followed when installing the RRH on a 152 mm to 380 mm diameter pole with pole brackets.

WARNING

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Before you begin

The following mounting hardware is required to mount up to the RRH on a pole:

- Pole mounting bands (qty. 2)
- Pole brackets (qty. 2)
- Wall Mounting Brackets
- M10 bolts, lock washers, and flat washers (four).

Measure and mark pole and pole bands

Perform the following procedure to measure and mark the upper and lower pole band locations and the pole bands.

1 Use a tape measure to determine and mark the position of the upper and lower pole bands 350 mm (14.37 in) apart for RRHs. Refer to specific cell site engineering information for measurement details.

2 Measure the circumferencee (distance around the pole) at the heights of the bands to be installed.

3 Measure the distances you calculated in Step 2 on the pole bands from the fixed retainer extrusion as shown in the following figure.

4 Mark the bands at that point.

5 Use a nail and a chalked plumb line or plumb bob to mark a vertical line on the pole so that the upper and lower brackets will be aligned.

END OF STEPS

Place weldment(s) on pole bands

Perform the following procedure to place the pole weldment on the upper and lower pole bands.

1 Remove the sliding retainer extrusion from the pole bands.

2 Thread the weldment(s) onto the pole bands.

3 Replace the sliding retainer extrusion on each pole band so that the beveled ends of extrusion faces the open end of the band.

END OF STEPS

Bend the bands

Perform the following procedure to bend the upper and lower pole bands.

1 Bend the bands at the previously marked spot so that the pointed end of the band will be inside the band after installation.

2 Strike the bands with a hammer to create a sharp radius that allows the retainer to lock into place.

3 Make a 90 degree bend at the base of each retainer extrusion to allow the retainers and carriage bolt to properly align and lock into place.

END OF STEPS

Install pole bands on pole

Perform the following procedure to install the upper and lower pole bands on the pole.

1 Place the pole bands around the pole at the determined height.

2 Insert the carriage bolt through both retainers, making sure that the head of bolt properly locks into the fixed retainer.

3 Install the nut and tighten it just enough so that the band and weldment(s) maintain their position on the pole. Do not fully tighten the nut.

4 Adjust the position of the weldment(s) so that they are centered on the horizontal and vertical lines marked on the pole.

5 Adjust bands so that they are snug and do not slide down pole (bands may need adjustment when attaching wall mounting brackets.

6 Attach wall mounting bracket using four M10 hex bolts, lockwasher, and flatwasher.

7 Torque each bolt 32.2 Nm (25 ft/lb.).

8 Fully tighten each band.

END OF STEPS

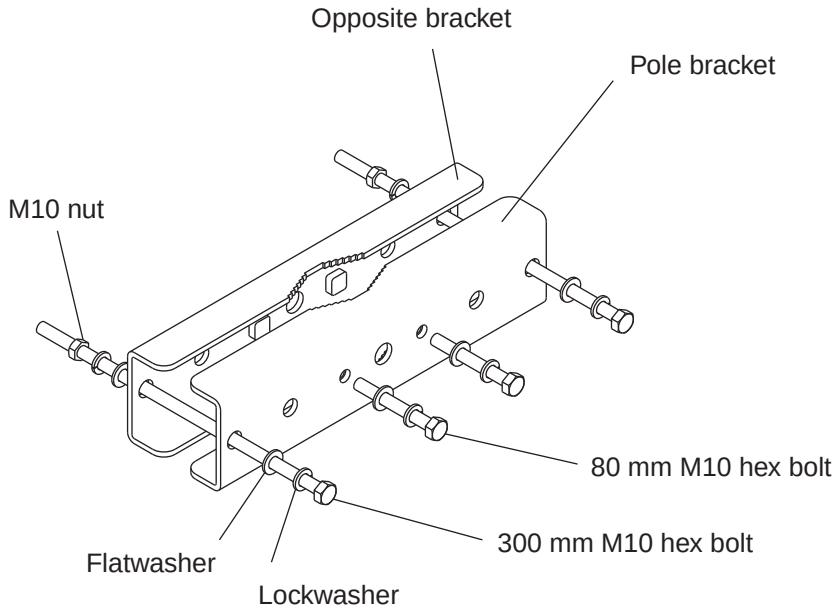
To mount hardware to pole with pole brackets

Purpose

This section describes the procedures to be followed when installing the RRH on a 50 mm to 152 mm diameter pole with pole brackets.

Pole brackets for small diameter poles

The figure shows a complete pole bracket assembly.



WARNING

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Before you begin

The following mounting hardware is required to mount up to the RRH on a small diameter pole:

- Pole mounting brackets (qty. 2x2)
- 300 mm M10 hex nut bolts (qty. 4)
- 80 mm M10 hex nut bolts (qty. 4)

- lock washers (qty. 12), flat washers (qty. 12), for M10 bolts
- M10 nuts (qty. 4)
- Wall Mounting Brackets (equipped with RRH).

Measure and mark pole and attach pole brackets

1 Use tape measure to determine and mark the position of upper pole bracket.

2 Attach upper pole bracket to the wall mount bracket using two 80mm long M10 hex bolts, lock washers, flat washers. Insert bolts through inner holes of the wall mount bracket panel.

Repeat for lower pole bracket

3 Insert a 300 mm, M10 long hex bolt, equipped with lock washer, and flat washer, through the upper left-most hole in the bracket panel, through the attached pole bracket.

4 Insert opposite bracket over threaded portion of the 300 mm bolt, and secure with flat washer, lockwasher, and hex nut.

5 Adjust to estimated pole diameter

6 Lift sub-assembly to marked height

7 Insert 300 mm long, M10 hex bolt, lock washer, and flat washer through the right- most upper hole in mounting bracket panel, through the attached pole bracket and the opposite bracket, and secure with lock washer, flat washer and hex nut

8 Equally tighten hardware

9 Install opposite end of lower pole bracket using 300 mm, M10 long hex bolts, lock washers, and flat washers

10 Equally tighten hardware

END OF STEPS

How to continue

Continue hardware installation with the installation of the RRH: “To install RRH on pole weldment assemblies” (p. 5-25)

To install RRH on pole weldment assemblies

Purpose

This section describes the procedures to be followed when installing the RRH to pole weldment assemblies.

WARNING

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Before you begin

Make sure you have read and understood the section "Transport and mount the RRH" (p. 5-3).

Install RRH on pole weldment assemblies

Perform the following procedure to install the RRH on the mounting hardware.

1 Attach the hoisting mechanism chains.

2 If you have not already done so, attach the lifting harness to the two lifting points (eye bolts) of the RRH.

3 Carefully raise the RRH into position using the hoisting mechanism, if required.

4 Loosely attach the two side top M10 hex bolts, flat washers, and lock washers to the RRH as supplied with the wall mounting kit. Do not tighten yet, install only halfway. Tape the washers to the bolts.

Note: When lifting the RRH, do not rest the bottom side of the RRH on the ground.

5 At the upper corners of the RRH, pull the washers to the sides. Position the M10 hex bolts on the RRH in the top mounting slots of the bracket.

6 Remove the sling.

7 Install the two bottom side M10 hex bolts, flat washers, and lock washers through the wall mount bracket.

Remove tape from top hardware.

8 If necessary, level brackets to insure that the RRH will be mounted level. Use a level to level the top of the RRH.

9 Tighten all the M10 hex bolts and use a torque wrench to tighten all the nuts to 32.2 Nm (25 ft/lb).

10 Install tamper proof screws.

END OF STEPS

To ground the RRH

Purpose

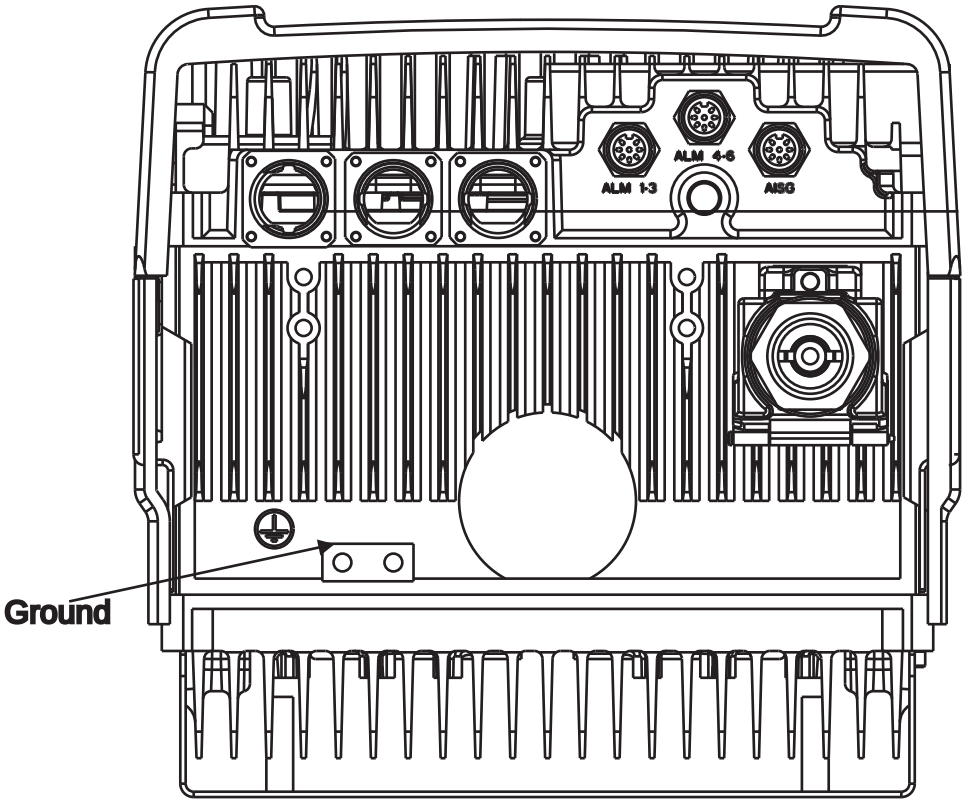
This topic describes how to ground the RRH.

To ground the RRH, a minimum of one connection to the grounding system is required.

The grounding position is located on the top of the RRH.

Ground area at RRH

The following figure shows the grounding area on the RRH.



Ground the RRH

To ground the RRH, perform the following steps.

1 Route the 16 mm^2 (#6 AWG) ground cable pigtail from the ground system (installed during site preparation) to the RRH.

2 At the RRH end, cut the cable to proper length and strip the cable's end.

3 Crimp the supplied ground lug on the end of the cable. Clean the contact surface area and use antioxidant to avoid oxidation.

4 Connect each ground lug to the RRH using the supplied M6 screws, lock washers, and flat washers. Use antioxidant at the grounding pads.

5 Torque each screw to 5.6 Nm (50 in-lb).

END OF STEPS

6 Connect interface and DC cables

Overview

Purpose

This chapter provides instructions for routing and connecting the following cables to the RRH:

- User alarm cables
- ALD cable
- Fiber optics cables.
- DC cable

Contents

Route and connect user alarm cables

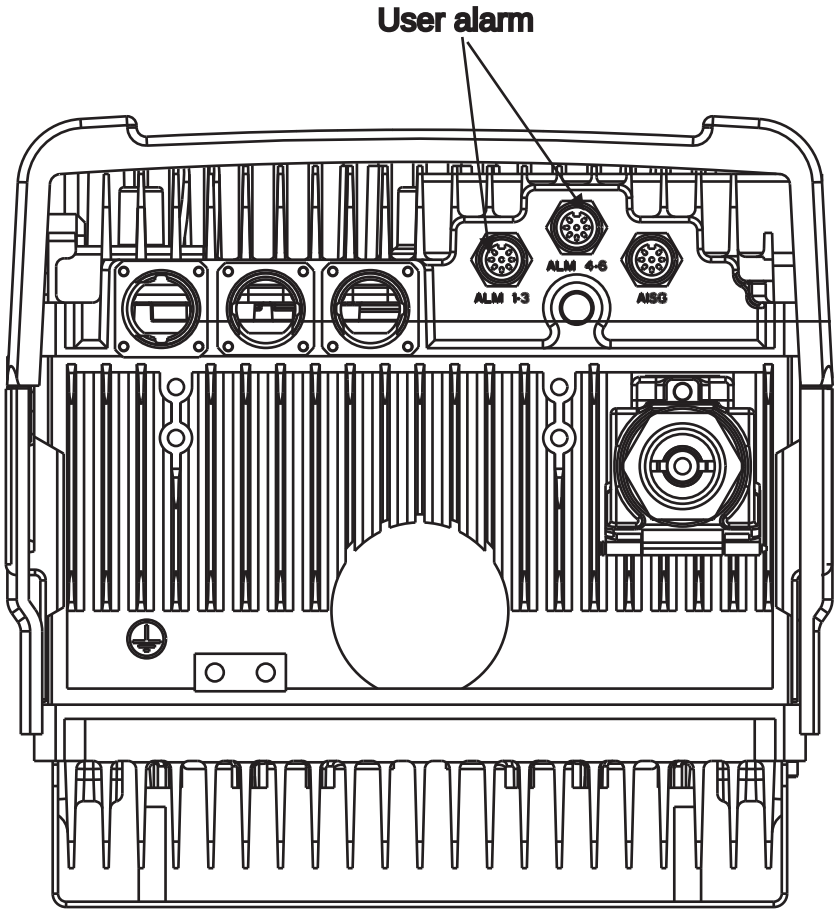
Purpose

This topic provides all necessary information and procedural instructions to route and connect the user alarm cables to the Remote Radio Head (RRH).

User alarm cables

The RRH manages and reports 4 external alarms to the OMC. The alarm cable can be connected to the User alarm interface of the RRH.

User alarm cable connections



The following table shows the connector type on the user alarm cable.

Cable	Connectors type
User alarms	8-pin Circular Male connector

Cable	Connectors type

User alarms wire colors and punchdown positions

Refer to table below for RRH wire color-coding and punch down information.

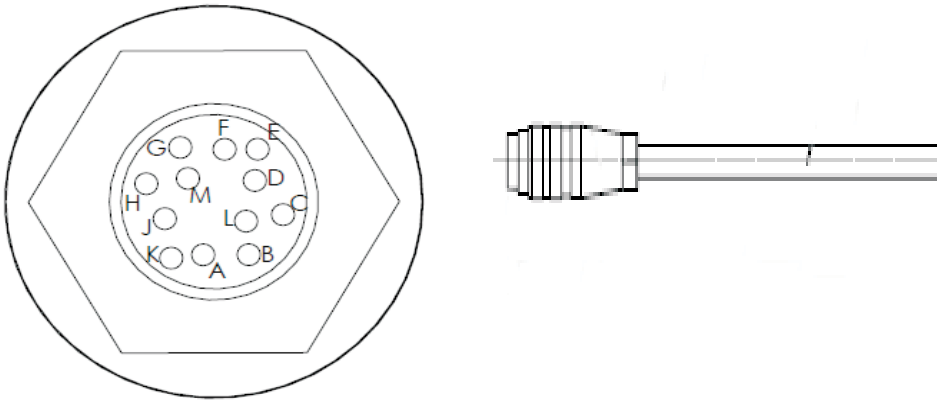
Pin #	Function	Wire Color
1	N/C (No Connect	N/A
2	ALARM 3 RTN (N)	BLACK
3	ALARM 1 (P)	BROWN
6	ALARM 2 RTN (N)	GREEN
4	ALARM 2 (P)	RED
5	N/C	N/A
7	ALARM 3 (P)	BLUE
8	ALARM 1 RTN (N)	WHITE

Route and connect the alarm cable

Perform the following steps to route and connect the alarm cable..

1 Route the external alarm cable from RRH to the alarm Distribution Frame.

2 Connect the alarm cable to the distribution block. Refer to the following figure.



3 Route the alarm cable in the cable way under the RRH.

4 Remove the protective cover and check the continuity of the wires between the distribution frame (alarm Distribution Frame) and the connector pins using a multimeter.

Note: This measurement is performed on the alarm cable connector (RRH side) with a loop back of each pair (one by one) on the alarm DF side. Using a multimeter, check that no short circuit appears between each pair and the shielding wires.

5 Screw the alarm connector in RRH.

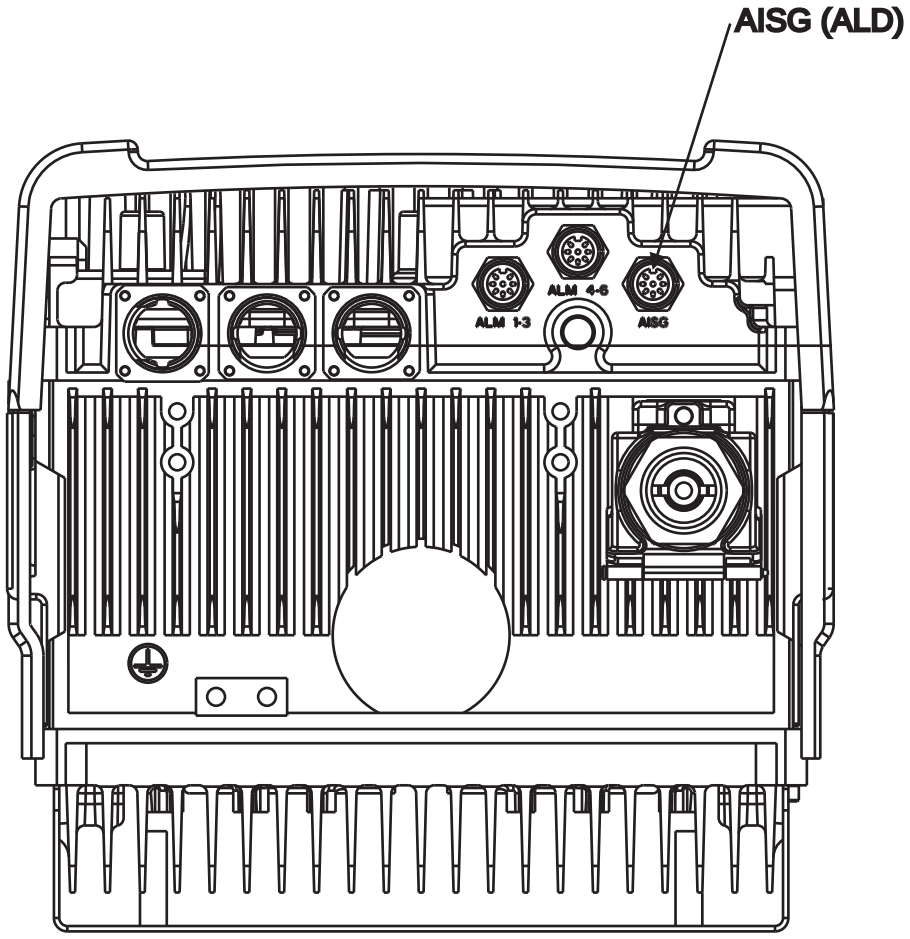
END OF STEPS

Route and connect ALD cable (Optional)

Purpose

This topic provides all necessary information and procedural instructions to route and connect the ALD cable to the Remote Radio Head (RRH).

ALD cable connection



Route and connect the alarm cable

Perform the following steps to route and connect the alarm cable.

1 Route the ALD cable under the RRH, use a ty rap to fix this cable.

2 Remove the cap from ALD connector.

3 Screw the ALD connector on the RRH connector.

END OF STEPS

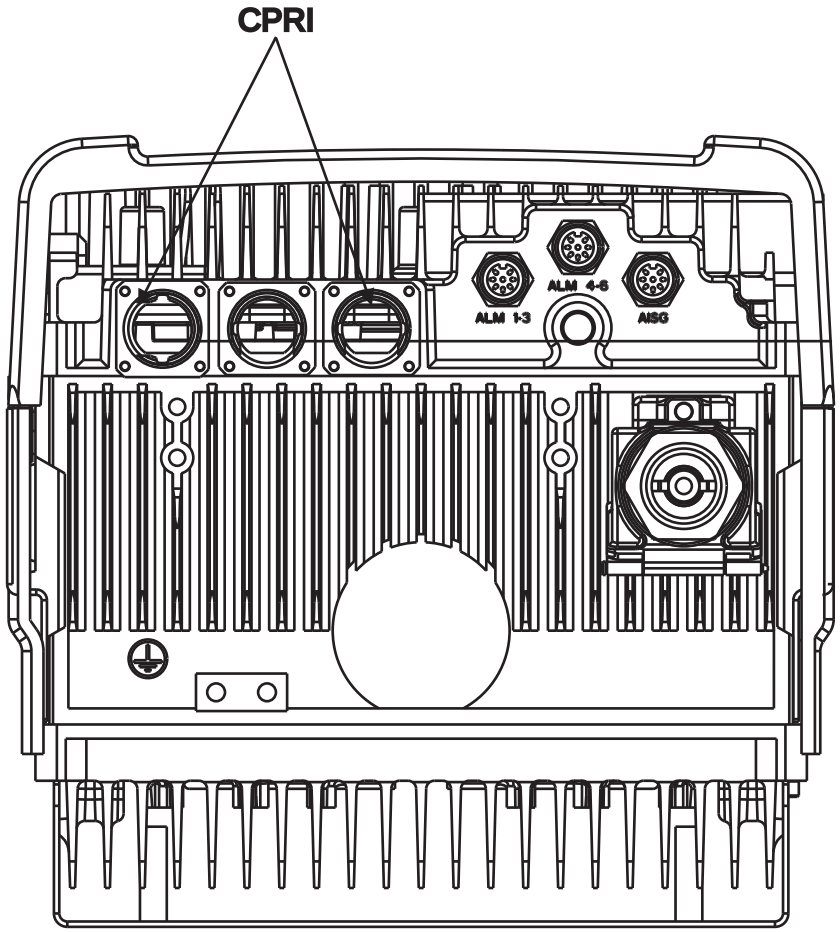
Route and connect optical fiber cables

Purpose

This topic provides all necessary information and procedural instructions to route and connect the optical fiber cables to the Remote Radio Head (RRH).

CPRI connections

The fiber optic cables are connected at the bottom of the RRH as shown in the following figure.



Cable functions

Cable	Use	Cable type	Number of lines per cable	Max. Cables	Connec-tor type
Fiber optic	Base Band Unit connection	single mode	2	1	LC

Cable	Use	Cable type	Number of lines per cable	Max. Cables	Connec-tor type
Fiber optic	Daisy chain connection between two RRHs	single mode	2	2 for Slave / Master	LC

Identify CPRI Configuration

Remote Radio Heads can be connected to the Base Band Unit in different ways. Make sure which configuration is applicable.

Depending on the actual site configuration, there can be

- up to three RRHs individually connected
- one daisy chain, containing three RRHs
- two daisy chains, each containing three RRHs
- three daisy chains, each containing two RRHs

Each individual connection or daisy chain is connected to one CPRI port of the Base Band Unit. Depending on the actual configuration the RRHs may need to be interconnected too.

Route and connect fiber cable

NOTICE

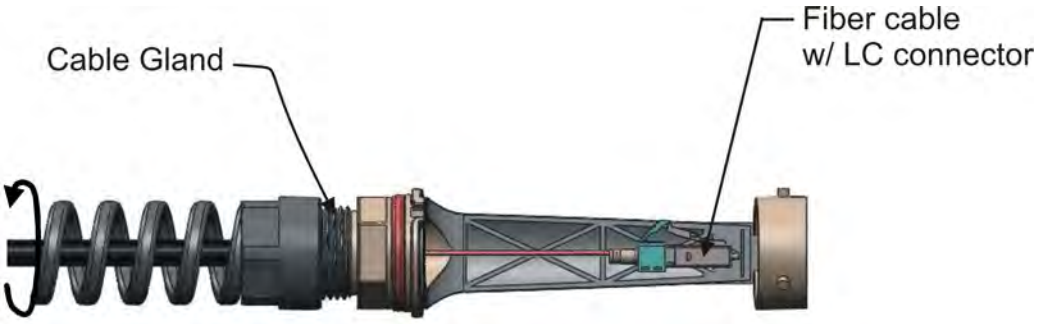
Protect fiber cable

.

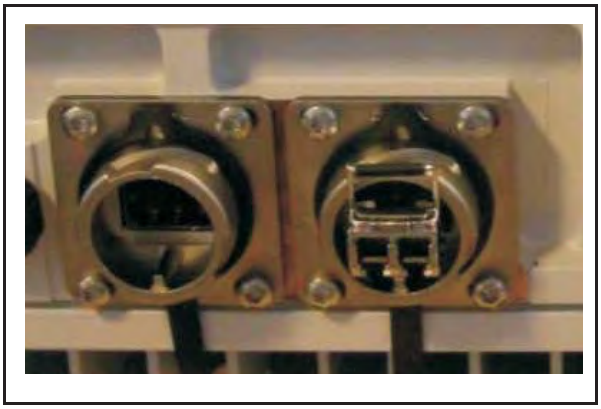
The optical fiber should be protected in solid pipe to proximate of RRH, use twine to secure the optical fiber in the cable way (neither use tie rap), neither cut this cable on site, the exceed length should be coil in side and protected in box. The fiber optic connector should be protected by cap when not being used. Respect the bending radius during the manipulation of optic cable (82.5mm).

Perform the following steps to connect the fiber optic cables to the RRH.

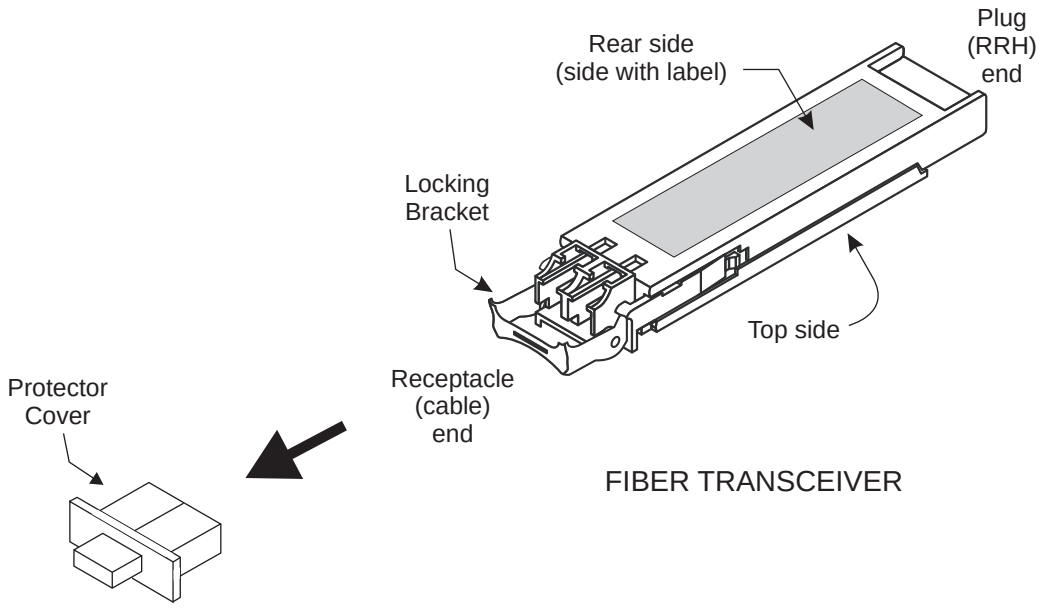
1 Locate the fiber optic cable connections for the RRH. Refer to “CPRI connections” (p. 6-7) -- and Loosen the cable gland to allow pulling of the fiber cable.



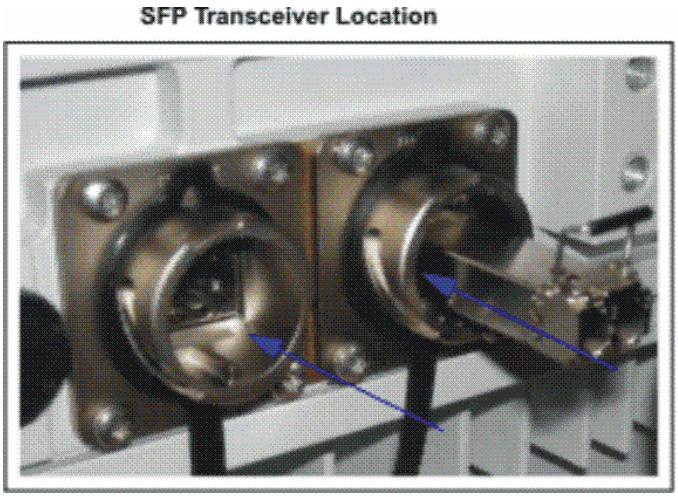
2 On the RRH, remove the protective cap from the CPRI connector.

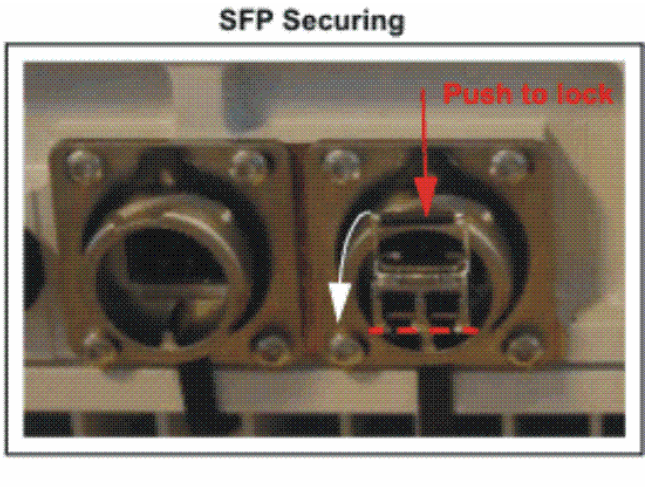


3 Remove protector cover from transceiver. Refer to the following figure.



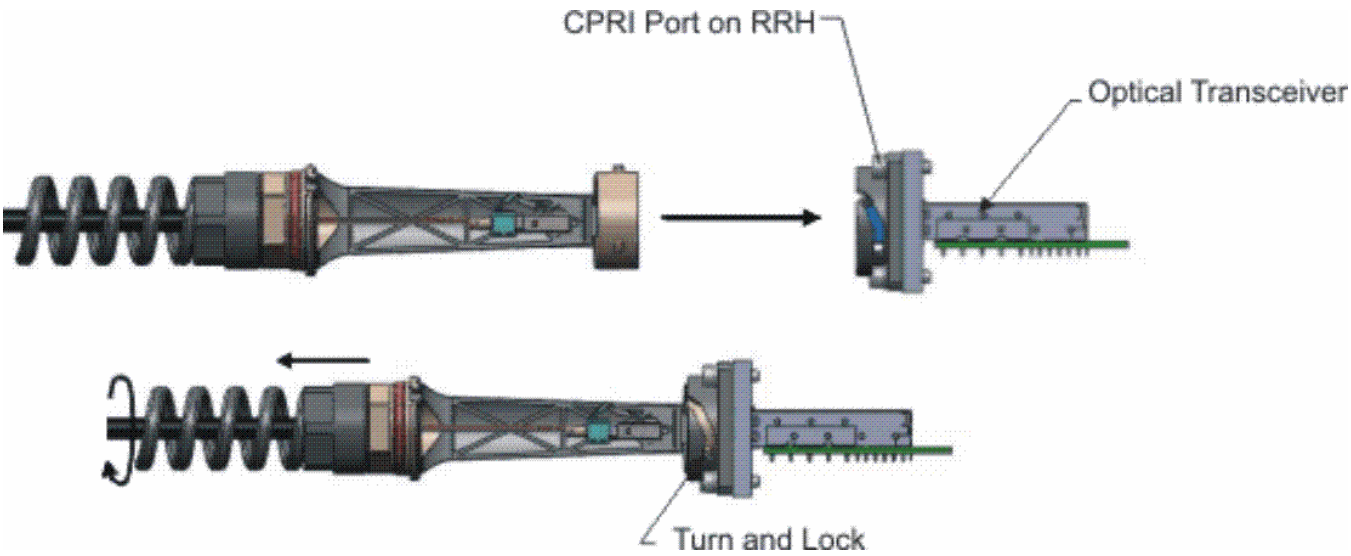
4 Insert the SFP optical transceiver in the appropriate location and lock them.





5 Connect the Radial connector side to the RRH in the CPRI PRI port.

6 Connector the cable to the RRH -Turn clockwise to secure the Radiall connector.



7 Secure the coupling nut and locked to the receptacle.

END OF STEPS

Fiber distribution unit (optional)

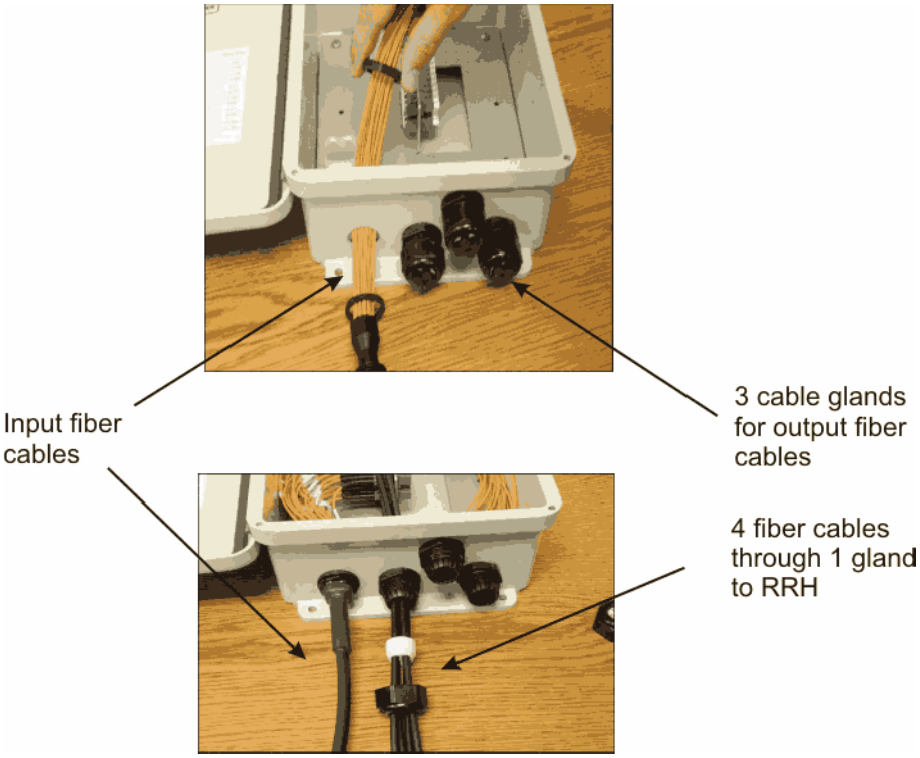
Overview

This topic describes the optional fiber distribution unit and its connection to the RRHs.

Requirements and specifications

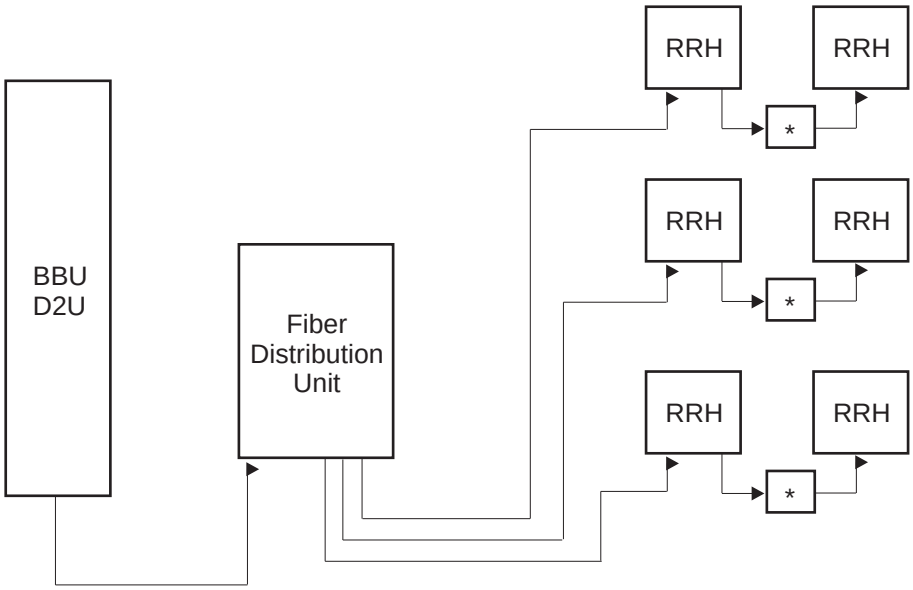
The fiber distribution unit is required when an RRH is pole or wall mounted and has the following requirements and capabilities:

- Can be sited up to a distance of 14 km from the RRH
- Can connect via 3 output glands to a maximum of 12 RRHs.



Connection of 6 RRHs (3x2) via a fiber distribution unit

This example configuration shows 3 RRHs connected directly from the fiber distribution unit and 3 RRHs connected by daisy chain



* Customer supplied optional Fiber Splice/Management enclosure

To route and connect DC power cables

Purpose

The following section covers the procedures for connecting DC and power alarm cables.

DC cable connections

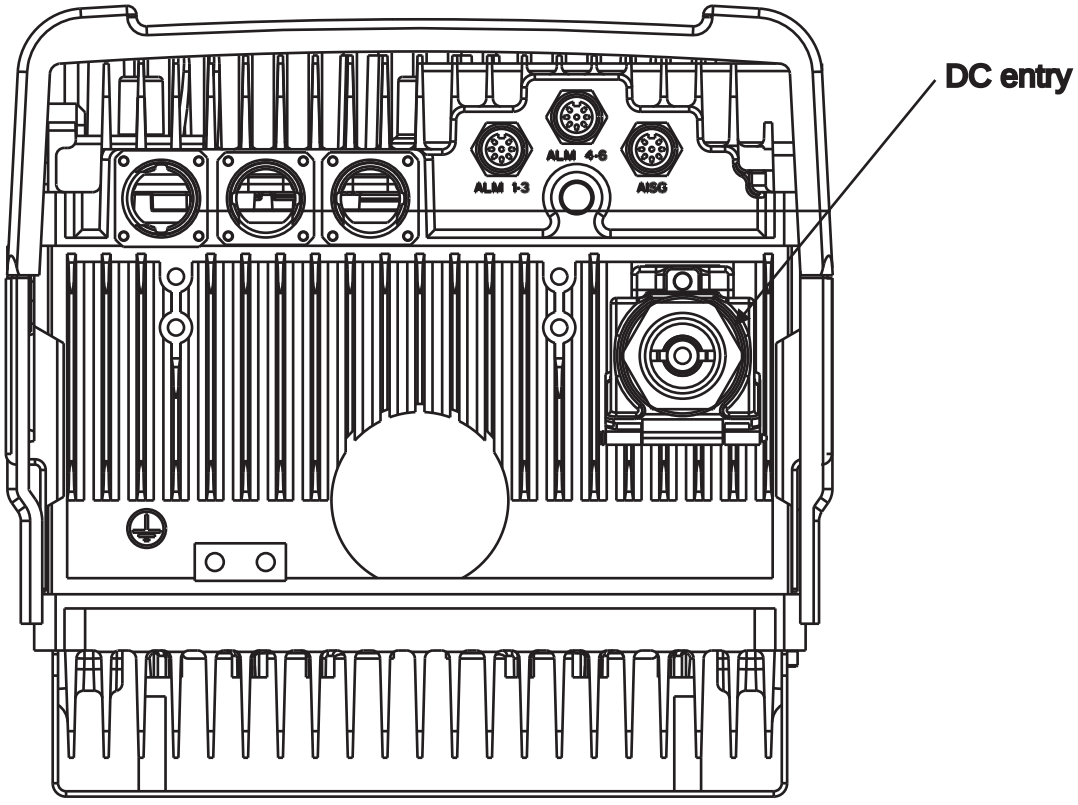
The following table provides information about the DC feeder cables for the RRH.

Purpose	Wire size [mm² (AWG)]
-48 V DC Feeder	16 (6)

Conduit for DC feeder cables (outdoor)

For outdoor installation, the DC feeder and power alarm cables are routed through the same 1-inch rigid or liquid-tight flexible metal conduit. For indoor installation, conduit is not required for the cables.

DC power connection



Before you begin

Make sure power at DC source is turned off and secured against turn-on.

Route and connect DC power cables to the RRH

WARNING

Turn OFF circuit breaker

Risk of injury or/and equipment damage by electricity.

The circuit breaker dedicated to the RRH must be DISCONNECTED.

Perform the following procedure to connect the DC power cables to the RRH:

1 Route the DC power cables to the RRH.

Remove the protective cap from the DC connector.

2 Screw the DC cable to the DC connector.

3 Connect the other side of the DC cable to the power plant.

The cables must be connected with respect to the following polarity:

- Blue to -48V
- Black to 0V

END OF STEPS

Phoenix copper power distribution unit (optional)

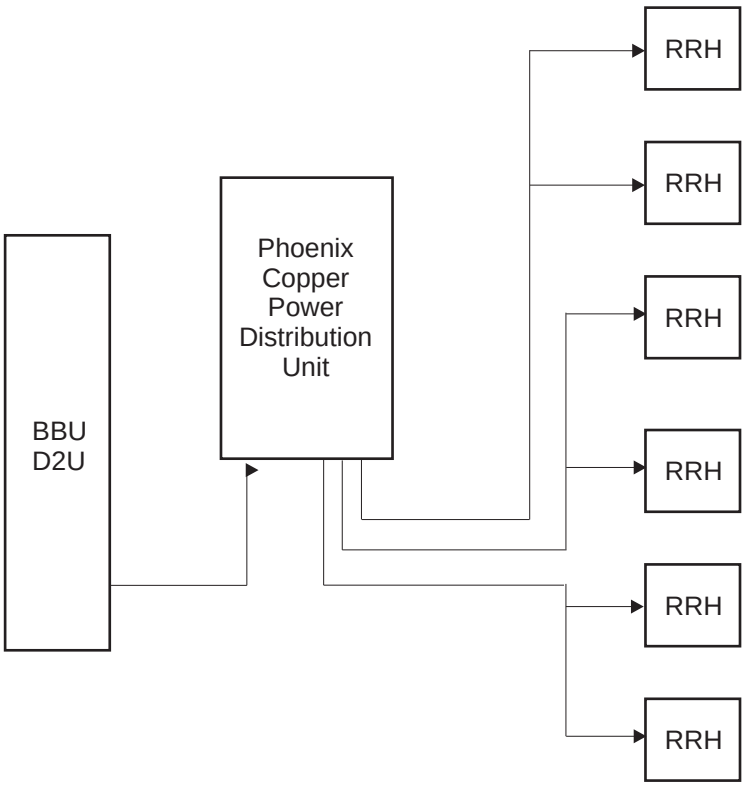
Overview

This topic describes the optional Phoenix copper power distribution unit and its connection to the RRHs.

Requirements and specifications

The power distribution unit is required when an RRH is pole or wall mounted:

- Can connect to a maximum of 6 RRHs
- Can be sited at a distance as required per calculation of voltage drop to the RRH



7 Finish the installation

Overview

Purpose

This chapter details the procedures for connecting RF cables to the RRH. In the standard configuration, there are two RF jumper cables. Final actions to finish the RRH installation are described.

Contents

To route and connect RF jumper cables

Jumper cable and connector stripping tools

The following table describes the stripping tools that can be used to prepare jumper cables and connectors:

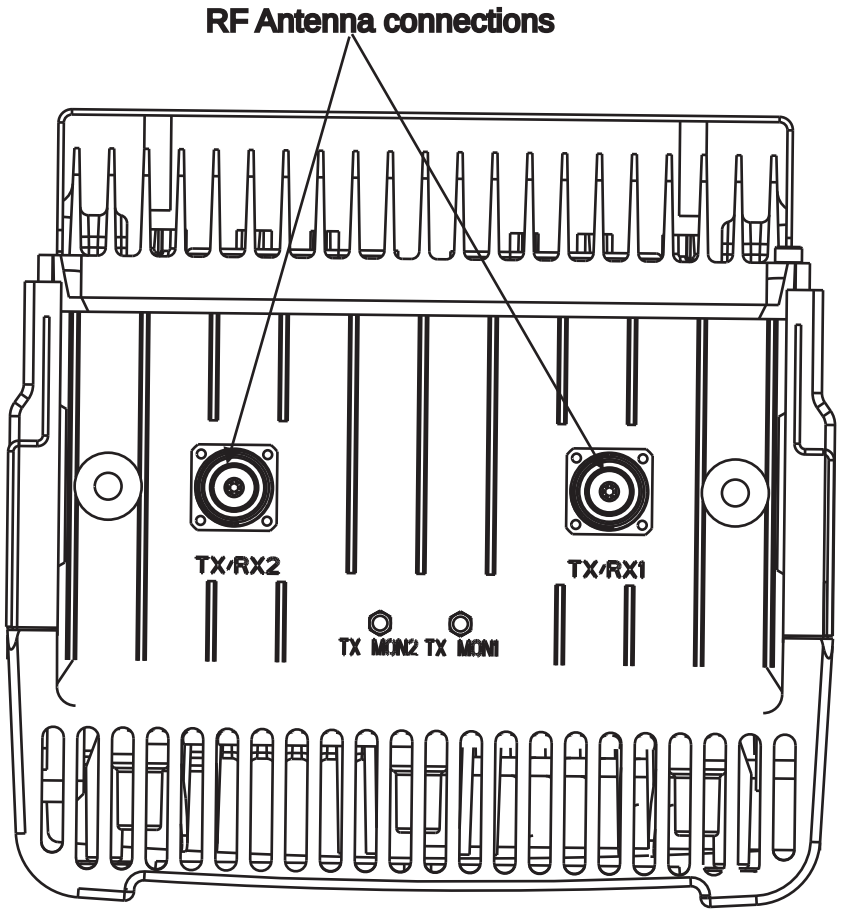
Cable Assembly Manufacturer	Cable Manufacturer	Connector Manufacturer	Stripping Tool Part Number	
			Manufacturer Part Number	Alcatel-Lucent Part Number
Andrew	Andrew	Andrew	Andrew Part Number: CPT-L4ARC1	ITE-7189
Huber-Suhner	Andrew	Huber-Suhner	Huber-Suhner Part Number 74Z-0-12-15	R-6042
RFS	RFS	RFS	RFS Part Number: TRIM-L12-A	R-6096
Amphenol	• RFS • Leoni	Amphenol	RFS Part Number: TRIM-L12-A	R-6096

Notes:

1. The “R” or “ITE” prefix identifies tools that can be borrowed from a centralized location by Alcatel-Lucent personnel only.

RF connector location

There are two RF connectors at the top of the RRH:



Before you begin

This procedure assumes the following requirements have been met.

- Cable shield grounding has been completed for all antenna cables at a point outside of the Node B.

The RF jumper cables must be labeled at both ends so they can be properly connected.

Tools

The following tools are required:

Quantity	Description
1	Open end wrench, 22 mm
1	Open end wrench, 32 mm

Materials

The following materials are expected to be present:

Quantity	Description
2 per sector	RF jumper cable One 7/16, DIN male connector supplied installed at one end. One 7/16, DIN male connector supplied loose for other end.
2 per sector	In case of Tower Top mounted Low Noise Amplifiers (TTLNAs) installed: Y-Bias-T (9-PIN D-SUB to SMA (Outdoor)/ SMB (Indoor))

Notes:

1. All RF cable connectors must be at least IP67 rated. (IP67 rating requirement, as defined by IEC 60529, calls for total protection against dust and protection against submersion in water.)
2. Since the RF cable connectors are at least IP 67 rated, no additional weatherproofing of the connectors is required if these are torque to the recommended value of 221 lbf in.. However, if customer wants to weather proof the connectors at the RRH or outside, optional 'Weather proofing kit' from Alcatel-Lucent may be used.

The RF jumper cables connect the external antenna cables to the RF transmit and receive connectors on the RRH. The minimum bending radius for the RF jumper cables is 125 mm (5 inches).

Important! The RF jumper cables must be connected before initial start-up and testing can take place. *Do not connect the RF jumper cables if testing is going to be performed immediately*.

Install Bias-T connectors

In case TTLNAs are installed, a Bias-T connector has to be installed to each RRH RF antenna port used:

1 Install Y-Bias-T connector to RRH port.

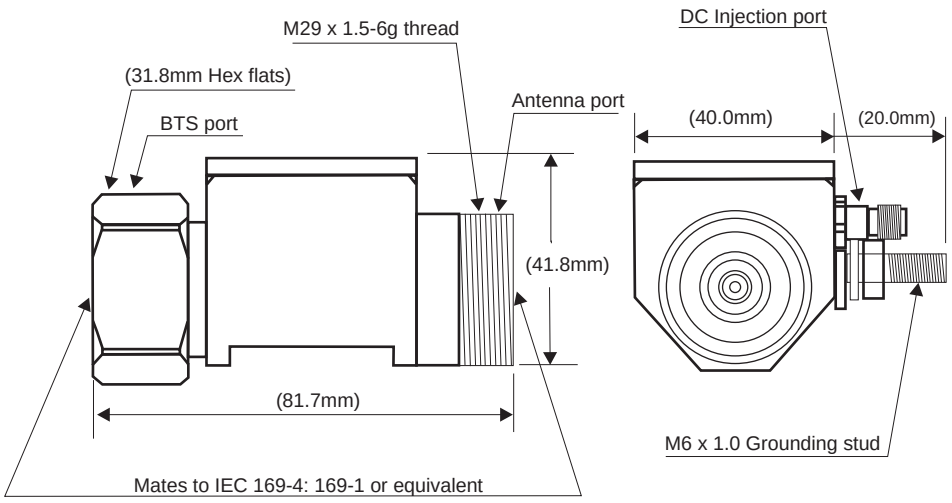
2 Connect each SMA connector to Bias –T

3 Route the 9-pin D-Sub through cable gland at the bottom of RRH and connect at ALD port

4 Ground the M6x10 grounding stud at Bias-Ts with customer provided grounding system.

END OF STEPS

Y-Bias-T connector



Route and connect RF jumper cables to the RRH

Use the following procedure to connect the RF jumper cables to the RF ports on top of the RRH

1 Label both ends of each cable with receive diversity number.

2 Connect the RF jumper cable(s) to the RRH port(s) and route them from the RRH to the RF antenna.

3 Providing adequate slack, cut each cable so it reaches its corresponding RF antenna connector or, if applicable, its corresponding RF surge protector.

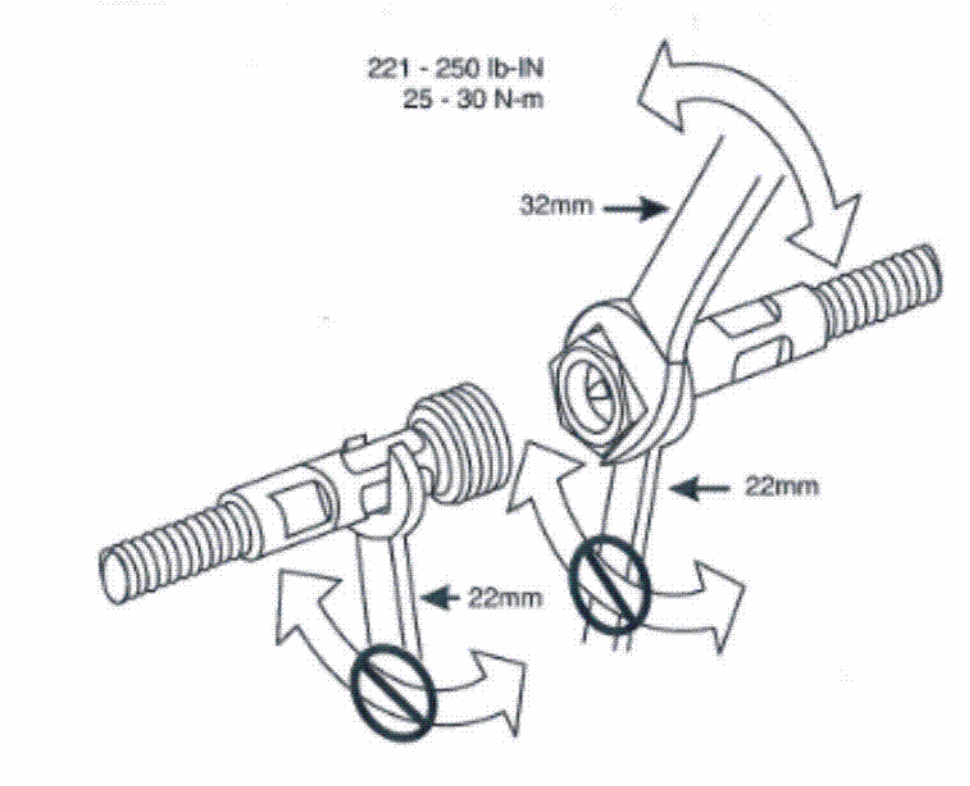
Re-mark each RF jumper cable if the cable marking has been removed.

4 Terminate the end of each cable with the supplied 7/16 DIN connector. (Use the appropriate stripping tool. Refer to "Jumper cable and connector stripping tools" (p. 7-2)for the appropriate tool required for installation).

5 Connect each RF jumper cable to its corresponding RF antenna cable.

Important! RF surge protectors are optional.

6 Torque each 7/16, male DIN connector to 25 Nm (221 in lb), as shown in the figure below.



Important! When connecting the 7/16, DIN male connector (on the RF jumper cable) to the 7/16, DIN female connector (on the antenna cable) two wrenches must be used. The rotating coupling nut on the 7/16, male connector is tightened with a 32 mm end wrench while the 7/16, male connector on the RF jumper cable is held with a 22 mm end wrench. Refer to the figure below.

END OF STEPS

To finalize RRH installation

Initial start-up and system test procedures

The actual procedures for initial start-up and test are not covered in this document.

Before initial start-up and test

To perform initial start-up and system test, the RF jumper cables will be temporarily disconnected at the RRH by the personnel who perform initial start-up and system test.

After performing initial start-up and system test, the personnel will permanently connect the RF jumper cables to the RRH.

System test

Following installation of the RRH, the system should be tested before being put it into operation. System test procedures are not covered in this installation document. Information concerning system test and integration is contained in *Alcatel-Lucent Installation Engineering Handbook 401*.

Final actions after initial start-up and test

NOTICE

RF hazard!

If it is necessary to disconnect an RF jumper cable, make sure there is no transmit signal in the RF jumper cable.

1 Once initial start-up and test have been completed, make sure the RF jumper cables are properly connected to the RRH.

2 Torque each RF connector at the radio RRH to 25 Nm (221 in-lb).

Important! Hold the body of the connector (part connected to the entry cable) with a 22 mm open-end wrench. Torque the rotating nut with a 32 mm open-end wrench.

3 Secure the RF jumper cables along their route.

4 Inspect site for loose tools, materials, and parts. Remove all such loose tools, materials, and parts.

5 Verify that all the exterior conduit and cable connections are secure.

END OF STEPS

Appendix A: Product conformance statements

Overview

Purpose

This section presents the product conformance statements that apply to the FDD RRH.

In regions such as North America and the European Union, the statements that are required are determined primarily by national or multi-national regulations. However, in some regions, contract terms determine which statements are required.

The presence of the statement indicates that the product does comply with that statement wherever it is required to do so.

Contents

Canada

Introduction

The statements that follow are the product conformance statements that apply to the FDD RRH when deployed in Canada.

Industry Canada

ICES-003: Interference-Causing Equipment Standard Digital Apparatus

This Class A digital apparatus complies with Canadian ICES-003.

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

IC CS-03: Specification for Terminal Equipment, Terminal Systems, Network Protection Devices, Connection Arrangements and Hearing Aids Compatibility

This product meets the applicable Industry Canada technical specifications.

RF approval

- RSS-132: Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz

  The term “IC” before the certification/registration number only signifies that the Industry Canada technical specifications were met.
- RSS-133: PCS Radio Standards Specifications

  The term “IC” before the certification/registration number only signifies that the Industry Canada technical specifications were met.

Product safety conformance

This product is safety certified for Canada by a laboratory accredited by the Standards Council of Canada (SCC), such as CSA, UL, or others. The product bears this certification mark of this certification laboratory on its main nameplate label. Should the local authority having jurisdiction (AHJ) require prior or additional verification of this certification, a product certificate of compliance can be obtained from the specific certification laboratory by the business/product unit Applicant for the product.

Any modifications to this equipment are not permitted without review and written official authorization from the specific certification laboratory. Unauthorized changes may violate the product safety certification. Modifications or changes authorized by official CN/CNN are assumed to have received prior approval from this Lab.

Antenna exposure

Antenna installations for the FDD RRH shall be performed in accordance with all applicable manufacturer's recommendations, and national laws and regulations. To ensure correct antenna installation, the antenna installer shall perform all necessary calculations and/or field measurements to evaluate compliance with applicable national laws or

regulations regarding exposure to electromagnetic fields. The supplier of radio equipment, the supplier of antenna equipment and the integrator and builder of the site must provide sufficient information so that the limits of the exclusion zones can be determined. Any changes to the antenna or other equipment in the transmit path may require re-evaluation of the exposures to electromagnetic fields.

Human exposure

Pursuant to Health Canada Safety Code 6, Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, all installations must be evaluated against the Maximum Exposure Limits as described in Chapter 2, Health Canada 99-EHD-237.

Optical transmitters

Alcatel-Lucent declares that FDD RRH complies with the International Electrotechnical Commission (IEC) standards IEC 60825-1 Edition 2.0 (2007) and IEC 60825-2 Edition 3.1 (2007). It is a Class I/1 laser optical fiber communication systems "product" under the IEC classifications.

This product is designed to ensure that personnel operating the product are not endangered by laser radiation during normal operation and fault conditions. This product does not present a risk of eye injury because it is fully enclosed and does not contain embedded lasers greater than Class I/1 unless otherwise noted.

CAUTION

Laser hazard

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

Do not view directly into the laser beam with optical instruments such as a fiber microscope because viewing of laser emission in excess of Class 1 limits significantly increases the risk of eye damage.

Never look into the end of an exposed fiber or an open connector as long as the optical source is switched on.

Ensure that the optical source is switched off before disconnecting optical fiber connectors.

Packaging collection and recovery requirements

Countries, states, localities, or other jurisdictions may require that systems be established for the return and/or collection of packaging waste from the consumer, or other end user, or from the waste stream. Additionally, reuse, recovery, and/or recycling targets for the return and/or collection of the packaging waste may be established.

For more information regarding collection and recovery of packaging and packaging waste within specific jurisdictions, please contact the Alcatel-Lucent Services - Environmental Health and Safety organization. For installations not performed by Alcatel-Lucent Technologies, please contact the Alcatel-Lucent Customer Support Center at:

Technical Support Services, within Canada: +1 630 224 4672, prompt 2

China

Introduction

The statements that follow are the product conformance statements that apply to the FDD RRH when deployed in China.

EMC Compliance

The equipment complies with the following electromagnetic compatibility specifications:

- CISPR 22 Class B

Product safety conformance

The equipment complies with the following product safety specifications:

- IEC 60950-1

Optical transmitters

Alcatel-Lucent declares that FDD RRH complies with the International Electrotechnical Commission (IEC) standards IEC 60825-1 Edition 2.0 (2007) and IEC 60825-2 Edition 3.1 (2007). It is a Class I/1 laser optical fiber communication systems "product" under the IEC classifications.

This product is designed to ensure that personnel operating the product are not endangered by laser radiation during normal operation and fault conditions. This product does not present a risk of eye injury because it is fully enclosed and does not contain embedded lasers greater than Class I/1 unless otherwise noted.

CAUTION

Laser hazard

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

Do not view directly into the laser beam with optical instruments such as a fiber microscope because viewing of laser emission in excess of Class 1 limits significantly increases the risk of eye damage.

Never look into the end of an exposed fiber or an open connector as long as the optical source is switched on.

Ensure that the optical source is switched off before disconnecting optical fiber connectors.

Packaging collection and recovery requirements

Countries, states, localities, or other jurisdictions may require that systems be established for the return and/or collection of packaging waste from the consumer, or other end user, or from the waste stream. Additionally, reuse, recovery, and/or recycling targets for the return and/or collection of the packaging waste may be established.

For more information regarding collection and recovery of packaging and packaging waste within specific jurisdictions, please contact the Alcatel-Lucent Services - Environmental Health and Safety organization. For installations not performed by Alcatel-Lucent Technologies, please contact the Alcatel-Lucent Customer Support Center at:

Technical Support Services, within China : +1 630 224 4672, prompt 2

Material content compliance

The People's Republic of China Ministry of Information Industry has published a regulation (Order #39) and associated standards regarding restrictions on hazardous substances (China RoHS). Currently, the legislation requires all Electronic and Information Products (EIP) to comply with certain labeling and documentation requirements. Alcatel-Lucent products manufactured on or after 1 March 2007, that are intended for sale to customers in the China market, comply with these requirements.

In accordance with the People's Republic of China Electronic Industry Standard “Marking for the Control of Pollution Caused by Electronic Information Product” (SJ/T11364-2006), customers may access Alcatel-Lucent's Hazardous Substances Table information at either of the following URLs (for the convenience of our diverse customer base):

- Access via the Alcatel-Lucent Corporate web site at:
  http://www.alcatel-lucent.com/cn
- Access via the Alcatel Shanghai Bell web site at:
  http://www.alcatel-sbell.com.cn/product_solution/in4.asp

European Union

Introduction

The statements that follow are the product conformance statements that apply to the FDD RRH bearing the CE Marking and when deployed in the European Union.

Declaration of Conformity for radio and telecommunication terminal equipment under the scope of Directive 1999/5/EC

Hereby, Alcatel-Lucent declares that the equipment documented in this publication is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

The technical documentation as required by the Conformity Assessment procedure is kept at the Alcatel-Lucent location which is responsible for this product. For more information please contact your local Alcatel-Lucent Customer Service Organization.

CE marking

This product has been CE-marked in accordance with the following European Directive:

- Radio and Telecommunication Terminal Equipment (R&TTE) 1999/5/EC

EMC and radio spectrum compliance for the 850 MHz product

The equipment complies with the following EMC and radio spectrum specifications:

- EN 60950-1
- EN 60215

EMC and radio spectrum compliance for the 450 MHz product

The equipment complies with the following EMC and radio spectrum specifications:

- ETSI EN 301 449 V1.1.1 (2005-05)
- ETSI EN 301 489-1 V1.6.1 (2005-09)
- Code of Federal Regulations FCC part 24(E)
- IS 3GPP2 - C.S0010-B

Product safety conformance

The equipment complies with the following product safety specifications:

- EN 60950-1:2001
- EN 60215:1989

Telecommunications Standards

The equipment complies with the following telecommunication specifications:

- Technical Basis Regulation TBR 13

Antenna exposure

Antenna installations for the FDD RRH shall be performed in accordance with all applicable manufacturer's recommendations, and national laws and regulations. To ensure correct antenna installation, the antenna installer shall perform all necessary calculations and/or field measurements to evaluate compliance with applicable national laws or regulations regarding exposure to electromagnetic fields. The supplier of radio equipment, the supplier of antenna equipment and the integrator and builder of the site must provide sufficient information so that the limits of the exclusion zones can be determined. Any changes to the antenna or other equipment in the transmit path may require re-evaluation of the exposures to electromagnetic fields.

Pursuant to

- European Council Recommendation 1999/519/EC “On the limitation of exposure of the general public to electromagnetic fields” dated 12 July 1999 and
- ICNIRP (International Commission on Non-Ionising Radiation Protection) “Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields”,

all installations must be evaluated against the Reference Levels, and if necessary exclusion zones for public and installation workers defined.

The following information on Alcatel-Lucent supplied equipment is available from customer representatives:

- Output power and antenna characteristic, if the product is equipped with an integral antenna.
- A detailed description of at least one typical normal configuration, including antenna system (feeders, connectors, combiners, antennas etc.), if the product is intended to be used with external antennas.
- Limit distances for general public and occupational exposure. If the product is intended for use with external antennas, limit distances shall be given for the given typical system configurations.
- Information how to specify exposure levels and limit distances for any optional system configuration not specified in detail.
- Information on how to install the equipment/system or the external antennas in order to ensure that the separation between the radiating antenna and general public are exceeding the maximum allowed distances.

Information on the methodology used for the determination of RF safety compliance distances and exclusion zones, and the results of the compliance evaluation shall be available for inspection by officials of the governing authorities.

Optical transmitters

Alcatel-Lucent declares that FDD RRH complies with the CENELEC standards EN 60825-1 Edition 1994 and its amendment 1 (2002) and amendment 2 (2001) and EN 60825-2 Edition 2004. It is a Class I/1 laser optical fiber communication systems "product" under the IEC classifications.

This product is designed to ensure that personnel operating the product are not endangered by laser radiation during normal operation and fault conditions. This product does not present a risk of eye injury because it is fully enclosed and does not contain embedded lasers greater than Class I/1 unless otherwise noted.

CAUTION

Laser hazard

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

Do not view directly into the laser beam with optical instruments such as a fiber microscope because viewing of laser emission in excess of Class 1 limits significantly increases the risk of eye damage.

Never look into the end of an exposed fiber or an open connector as long as the optical source is switched on.

Ensure that the optical source is switched off before disconnecting optical fiber connectors.

Packaging collection and recovery requirements

Countries, states, localities, or other jurisdictions may require that systems be established for the return and/or collection of packaging waste from the consumer, or other end user, or from the waste stream. Additionally, reuse, recovery, and/or recycling targets for the return and/or collection of the packaging waste may be established.

For more information regarding collection and recovery of packaging and packaging waste within specific jurisdictions, please contact the Alcatel-Lucent Services - Environmental Health and Safety organization. For installations not performed by Alcatel-Lucent Technologies, please contact the Alcatel-Lucent Customer Support Center at:

Technical Support Services, from all other countries: +1 630 224 4672, prompt 2

Recycling / take-back / disposal of product

Electronic products bearing or referencing the symbol shown below when put on the market within the European Union, shall be collected and treated at the end of their useful life, in compliance with applicable European Union and local legislation. They shall not be disposed of as part of unsorted municipal waste. Due to materials that may be contained in the product, such as heavy metals or batteries, the environment and human health may be negatively impacted as a result of inappropriate disposal.

Important! In the European Union, a solid bar under the crossed-out wheeled bin indicates that the product was put on the market after 13 August 2005.

Moreover, in compliance with legal requirements and contractual agreements, where applicable, Alcatel-Lucent will offer to provide for the collection and treatment of Alcatel-Lucent products bearing the logo at the end of their useful life, or products displaced by Alcatel-Lucent equipment offers. For information regarding take-back of equipment by Alcatel-Lucent, or for more information regarding the requirements for recycling/disposal of product, please contact your Alcatel-Lucent Account Manager or Alcatel-Lucent Takeback Support at:

takeback@alcatel-lucent.com.

Material content compliance

European Union (EU) Directive 2002/95/EC, “Restriction of the use of certain Hazardous Substances” (RoHS), restricts the use of lead, mercury, cadmium, hexavalent chromium, and certain flame retardants in electrical and electronic equipment. This Directive applies to electrical and electronic products placed on the EU market after 1 July 2006, with various exemptions, including an exemption for lead solder in network infrastructure equipment. Alcatel-Lucent products shipped to the EU after 1 July 2006 comply with the EU RoHS Directive.

United States

Introduction

The statements that follow are the product conformance statements that apply to the FDD RRH when deployed in the United States.

Federal Communications Commission

Important! Changes or modifications not expressly approved by Alcatel-Lucent, Inc. could void the user's authority to operate the equipment.

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FCC Part 15

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Part 15 Class A (as marketed)

Important! This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protections against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's expense.

FCC Part 15 Class B (as marketed)

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

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

FCC Part 68

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA. On the cabinet assembly of this equipment is a label that contains, among other information, a product identifier in the format of AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

- FIC 04DU9-1SN
- SOC 6.0N

The T1 network interface on this equipment is hard wired to a punchdown block , which meets the FCC specifications.

If this equipment FDD RRH causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. However, if advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

FCC regulations prohibit the connection of customer-provided equipment to central office implemented systems. Connection to party lines is subject to tariffs; users should contact their state public utility commission, public service commission, or corporation commission for information.

If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

If trouble is experienced with this equipment repair or warranty information may be obtained by contacting:

Technical Support Services, within the United States: +1 630 224 4762, prompt 2

RF approval

This equipment complies with Part 2, Subpart J - Equipment Authorization Procedures, of the FCC Rules.

This equipment complies with Part 27 - Miscellaneous Wireless Communications Services.

FDA/IEC optical transmitter product compliance

Alcatel-Lucent declares that FDD RRH complies with the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) regulations 21 CFR 1040.10 and 1040.11. It is a Class I/1 laser optical fiber communication systems "product" under the FDA.

This Product is designed to ensure that personnel operating the product are not endangered by laser radiation during normal operation and fault conditions. This product does not present a risk of eye injury because it is fully enclosed and does not contain embedded lasers greater than Class I/1 unless otherwise noted.

CAUTION

Laser hazard

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

Do not view directly into the laser beam with optical instruments such as a fiber microscope because viewing of laser emission in excess of Class 1 limits significantly increases the risk of eye damage.

Never look into the end of an exposed fiber or an open connector as long as the optical source is switched on.

Ensure that the optical source is switched off before disconnecting optical fiber connectors.

Product safety conformance

This product is safety listed for the United States of America by a Nationally Recognized Test Laboratory (NRTL) accredited by the US Department of Labor, Occupational Safety and Health Administration (OSHA), such as UL, CSA, or others. The product bears this certification mark of this certification laboratory on its main nameplate label. Should the local authority having jurisdiction (AHJ) require prior or additional verification of this certification, a product certificate of compliance can be obtained from the specific certification laboratory by the business/product unit Applicant for the product. “Any modifications to this equipment are not permitted without review and written official authorization from the specific certification laboratory. Unauthorized changes may violate the product safety certification. Modifications or changes authorized by official CN/CNN are assumed to have received prior approval from this Lab.

Antenna exposure

Antenna installations for the FDD RRH shall be performed in accordance with all applicable manufacturer's recommendations, and national laws and regulations. To ensure correct antenna installation, the antenna installer shall perform all necessary calculations and/or field measurements to evaluate compliance with applicable national laws or regulations regarding exposure to electromagnetic fields. The supplier of radio equipment, the supplier of antenna equipment and the integrator and builder of the site must provide sufficient information so that the limits of the exclusion zones can be determined. Any changes to the antenna or other equipment in the transmit path may require re-evaluation of the exposures to electromagnetic fields.

Pursuant to 47 CFR Part 1, Subpart I, subject to the provisions of section 1.1307, all installations must be evaluated for requirements contained in Table 1, “Limits for maximum permissible exposure,” in section 1.1310.

Packaging collection and recovery requirements

Countries, states, localities, or other jurisdictions may require that systems be established for the return and/or collection of packaging waste from the consumer, or other end user, or from the waste stream. Additionally, reuse, recovery, and/or recycling targets for the return and/or collection of the packaging waste may be established.

For more information regarding collection and recovery of packaging and packaging waste within specific jurisdictions, please contact the Alcatel-Lucent Services - Environmental Health and Safety organization. For installations not performed by Alcatel-Lucent Technologies, please contact the Alcatel-Lucent Customer Support Center at:

Technical Support Services, within the United States: +1 630 224 4762, prompt 2

Material content compliance

The following notification applies to Alcatel-Lucent products distributed for sale, resale or use.

This product, part, or both may include a lithium-manganese dioxide battery, which contains very small amounts of a perchlorate substance. Special handling may apply.

For California:

Perchlorate Material - special handling may apply.

See *http:\\www.dtsc.ca.gov/hazardouswaste/perchlorate/*

Appendix B: Acronyms

Overview

Purpose

This appendix lists abbreviations used in this document.

Contents

Acronyms

0-9

4G fourth generation

A

AWS Advanced Wireless Services

B

BS Base Station

C

CCM Channel Control Module

CEM Channel Element Module

CIC Customer Information Center

CPRI Common Public Radio Interface

CSA Canadian Standards Association

D

d2U digital 2U-height box

E

eCCM enhanced Channel Control Module

eCEM enhanced Channel Element Modem

eNodeB (eNB) evolved NodeB

F

FDD frequency division duplex

G

GPS Global Positioning System

H

Hz Hertz

I

ISO International Standards Organization

L

LTE Long Term Evolution

LTE RAN (eUTRAN, E-UTRAN) Long Term Evolution radio access network

M

MHz megahertz

N

NE network element

O

OLCS Online Customer Support

R

RRH Remote Radio Head

T

TRDU Transmit Receive Duplex Unit

Tx Transmit

U

UE user equipment

W

WAN wide area network

X

XMS eXtended Management System

Index