



CORNING

Analog Low Power Remote Unit (RAU5x)

User Manual

Warranties

Hardware Warranty

Corning Optical Communications LLC (“Corning”) warrants to the original purchaser (“Customer”) that for the duration of the warranty period, one (1) year, commencing on the date of shipment of the Hardware, unless otherwise agreed in writing by Corning (the “Hardware Warranty Period”), the Hardware furnished by Corning shall be free in all material respects from defects in material and workmanship, and shall conform to the applicable portions of the Specifications, as defined below (the “Hardware Warranty”). If notified by Customer of any such defects in material or workmanship or nonconformity with applicable portions of the Specifications within the Hardware Warranty Period, Corning shall promptly, at its own election and expense, repair or replace any such Hardware proven to be defective under the terms of this Hardware Warranty. Such repair or replacement shall be Customer’s sole remedy and Corning’s sole obligation in the event this Hardware Warranty is invoked. If any components comprising a part of the Hardware are replaced or repaired during the Hardware Warranty Period,

the Hardware Warranty Period for such repaired or replaced components shall extend to the longer of (i) the balance of the Hardware Warranty Period or (ii) three (3) months from the date of repair or replacement. For purposes of this Warranty, “Specifications” shall mean the specifications and performance standards of the Products as set forth in documents published by Corning and delivered to Customer which contain technical specifications or performance standards for the Products.

If Customer invokes this Hardware Warranty, it shall notify Corning promptly of the claimed defect. Customer will allow Corning to inspect the Hardware at Customer’s location, or to return the Hardware to Corning closest repair facility. For Hardware returned to Corning repair facility, Customer shall be responsible for payment of all transportation and freight costs (including insurance) to Corning’ repair facility, and Corning shall be responsible for all transportation and freight costs (including insurance) incurred in connection with the shipment of such Hardware to other repair facilities of Corning and/or its return to Customer.

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CORNING SALES AGENTS OR REPRESENTATIVES ARE NOT AUTHORIZED TO MAKE COMMITMENTS ON WARRANTY RETURNS.

Returns

In the event that it is necessary to return any product against above warranty, the following procedure shall be followed:

1. Return authorization is to be received from Corning prior to returning any unit. Advise Corning of the model, Serial number, and discrepancy. The unit may then be forwarded to Corning, transportation prepaid. Devices returned collect or without authorization may not be accepted.
2. Prior to repair, Corning will advise the customer of our test results and any charges for repairing customer-caused problems or out-of-warranty conditions etc.
3. Repaired products are warranted for the balance of the original warranty period, or at least 90 days from date of shipment.

Limitations of Liabilities

Corning's liability on any claim, of any kind, including negligence for any loss or damage arising from, connected with, or resulting from the purchase order, contract, quotation, or from the performance or breach thereof, or from the design, manufacture, sale, delivery, installation, inspection, operation or use of any equipment covered by or furnished under this contact, shall in no case exceed the purchase price of the device which gives rise to the claim.

Except as expressly provided herein, Corning makes no warranty, expressed or implied, with respect to any goods, parts and services provided in connection with this agreement including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Corning shall not be liable for any other damage including, but not limited to, indirect, special or consequential damages arising out of or in connection with furnishing of goods, parts and service hereunder, or the performance, use of, or inability to use the goods, parts and service.

Reporting Defects

The units were inspected before shipment and found to be free of mechanical and electrical defects. Examine the units for any damage that may have been caused in transit. If damage is discovered, file a claim with the freight carrier immediately. Notify Corning as soon as possible in writing.

Note: Keep all packing material until you have completed the inspection.

Warnings and Admonishments

There may be situations, particularly for workplace environments near high-powered RF sources, where recommended limits for safe exposure of human beings to RF energy could be exceeded. In such cases, restrictive measures or actions may be necessary to ensure the safe use of RF energy.

The equipment has been designed and constructed to prevent, as far as reasonably, practicable danger. Any work activity on or near equipment involving installation, operation or maintenance must be, as far as reasonably, free from danger.

Where there is a risk of damage to electrical systems involving adverse weather, extreme temperatures, wet, corrosive or dirty conditions, flammable or explosive atmospheres, the system must be suitably installed to prevent danger.

Equipment provided for the purpose of protecting individuals from electrical risk must be suitable for the purpose and properly maintained and used. This covers a range of activities including lifting, lowering, pushing, pulling, carrying, moving, holding or restraining an object, animal or person from the equipment. It also covers activities that require the use of force or effort, such as pulling a lever, or operating power tools.

Where some of the above-mentioned activities are required, the equipment must be handled with care to avoid being damaged.

Observe standard precautions for handling ESD-sensitive devices. Assume that all solid-state electronic devices are ESD-sensitive. Ensure the use of a grounded wrist strap or equivalent while working with ESD-sensitive devices. Transport, store, and handle ESD-sensitive devices in static-safe environments.

Regulatory Compliance Information



WARNINGS!

- This is **NOT** a **CONSUMER** device. It is designed for installation by **FCC LICENCEES** and **QUALIFIED INSTALLERS**. You **MUST** have an **FCC LICENSE** or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.
- **ANTENNAS:** Use only authorized and approved antennas, cables and/or coupling devices! The use of unapproved antennas, cables or coupling devices could cause damage and may be of violation of FCC regulations. The use of unapproved antennas, cables and/or coupling devices is illegal under FCC regulations and may subject the user to fines. See section 3.6 of this document.
- **RxU67: Part 90 and Part 20 Signal Booster. THIS IS A 90.219 CLASS B DEVICE WARNING.** This is **NOT** a **CONSUMER** device. It is designed for installation by **FCC LICENSEES** and **QUALIFIED INSTALLERS**. You **MUST** have an **FCC LICENSE** or express consent of an FCC Licensee to operate this device. You **MUST** register PART 90 Class B signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in a significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation. Patent: <http://www.corning.com/worldwide/en/patent-notice.html>

RF Safety

To comply with FCC RF exposure compliance requirement, adhere to the following warnings:

Warning! Antennas used for this product must be fixed mounted on indoor permanent structures, providing a separation distance of at least 50 cm from all persons during normal operation.

Warning! Each individual antenna used for this transmitter must be installed to provide a minimum separation distance of 50 cm or more from all persons and must not be co-located with any other antenna for meeting RF exposure requirements.

Warning! Antenna gain should not exceed 12.5 dBi.

Warning! The design of the antenna installation needs to be implemented in such a way so as to ensure RF radiation safety levels and non-environmental pollution during operation.



ATTENTION!

Compliance with RF safety requirements:

- Corning products have no inherent significant RF radiation
- The RF level on the downlink is very low at the downlink ports. Therefore, there is no dangerous RF radiation when the antenna is not connected.

CAUTION!

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

Laser Safety

- Fiber optic ports of the Corning optical network evolution (ONE™) solution elements emit invisible laser radiation at the 1310/1550 nm wavelength window.
- External optical power is less than 10 mW, Internal optical power is less than 500 mW.
- To avoid eye injury never look directly into the optical ports, patchcords or optical cables. Do not stare into beam or view directly with optical instruments. Always assume that optical outputs are on.
- Only technicians familiar with fiber optic safety practices and procedures should perform optical fiber connections and disconnections of the devices and the associated cables.
- Corning ONE has been tested and certified as a Class 1 Laser product to IEC/EN 60825-1 (2007). It also meets the requirements for a Hazard Level 1 laser product to IEC/EN 60825-2: 2004 to the same degree.
- Corning ONE complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice no. 50 (2007).

Care of Fiber Optic Connectors

- Do not remove the protective covers on the fiber optic connectors until a connection is ready to be made. Do not leave connectors uncovered when not connected.
- The tip of the fiber optic connector should not come into contact with any object or dust.

Company Certification

ISO 9001: 2000 and ISO 13485: 2003

Licensee Contact Information

Industrial Boosters may only be used by FCC licensees or those given express (individualized) consent of license. Corning Optical Communications Wireless certifies all of the VARs listed as licensed installers for Corning. For the list of licensed VARs, please contact the Tech Support Hotline: (US) 410-553-2086 or 800-787-1266.

FCC at (<https://signalboosters.fcc.gov/signal-boosters/>) for Class B devices. FRN contact: Isaac Nissan, FRN# 0027544261

Registration Detail	
FRN:	0027544261
Registration Date:	05/18/2018 02:02:00 PM
Last Updated:	08/26/2019 05:07:44 PM
Business Name:	CorningOptical Comm LLC
Business Type:	Private Sector , Corporation
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Additional Relevant Documents

The following documents are required if the corresponding units are included in your system (these can be downloaded from the Corning partner portal).

Document Name	Part Number
Five- band remote access unit datasheet	CE0009001 Rev A00 and higher
Corning optical network evolution (ONE™) system installation	709C011801 REV A01
Headend Control Module (HCM) and Web Management GUI User Manual	709C014205 Rev. A00 and higher

About This Manual

This user guide provides all the information necessary to understand the architecture and general installation procedures and requirements of the Corning optical network evolution (ONE) solutions convergence infrastructure five-band remote access unit (RAU5x) and plug-in add-on modules, optionally assembled in the RAU enclosure (hot pluggable):

- RxU2325 (supports two additional bands: 2300 MHz WCS and 2500 MHz TDD)
- RXU67 (supports two additional bands: 600MHz and FirstNet 700MHz)
- GEM (Gigabit Ethernet module)

Notes:

1. *The monitoring, management capabilities, and configuration options of the remote access units are described in the Corning ONE Web Management user manual.*
2. *RAU5, and RAU5x (extended bands) models have identical look and connectors, where both can optionally include an external antenna connector.*
3. *GEM can't be installed together with RxU67.*

TABLE OF CONTENTS

1	Introduction	13
1.1	Key Features and Capabilities	13
1.2	Architecture.....	14
1.3	Web Management Application	15
2	Interfaces	16
2.1	RAU5x	16
2.2	RxU2325.....	19
2.3	RxU67.....	20
2.4	GEM	21
3	Installation Guidelines.....	23
3.1	Infrastructure Preparation	23
3.2	Installation Location Requirements	23
3.3	Safety Guidelines.....	23
3.4	Power Requirements	24
3.4.1	Power Input and Consumption.....	24
3.4.2	Cable Gauge Requirements	24
3.4.3	Power, Heat and Rack Specifications	25
3.4.4	Remote End Distance and Power Draw Matrix	25
3.4.5	Power Safety Instructions	27
3.4.6	Circuit Breakers.....	27
3.5	RF Coaxial Cable Guidelines	27
3.5.1	General Cable Installation Procedures	27
3.5.2	RF Rules	27
3.5.3	Coax Cable Lengths and Losses.....	28
3.6	Antenna Specifications and Guidelines	29
3.6.1	Authorized Antennas and Required Specifications	29
3.6.2	General Installation Guidelines	29
3.7	Fiber Optic Requirements	29
3.7.1	Authorized Optic Cables	29
3.7.2	Fiber Optic Rules.....	29

3.8	Power Safety Instructions	30
4	Installation.....	31
4.1	Verify Package Contents.....	32
4.1.1	RAU5x Package	32
4.2	Assemble Relevant Add-ons	32
4.3	Mount the RAU5x.....	33
4.3.1	Standard Standoff Mount Installation	34
4.3.1.1	Mount the standoff mount	34
4.3.1.2	For green-field installation with RxU67.....	35
4.3.1.3	Mount the RAU5x onto the standoff mount	36
4.3.2	Top Bracket (Mid-Mount Installation)	38
4.3.2.1	Package Contents	38
4.3.2.2	Installing Bracket Assembly and Mounting RAU5x.....	39
4.3.2.3	Top Bracket Cap Assembly	44
4.3.3	Wall Bracket Mount	47
4.3.3.1	Package Contents	47
4.3.3.2	Installing Wall Mount Bracket and Mounting RAU5x	48
4.4	Connect the Cables	52
4.4.1	Locate Required Connection Cables	52
4.4.2	Connect the Cables	53
4.4.2.1	Grounding Connection	53
4.4.2.2	Optical Fiber Connection	54
4.4.2.3	Main Power Connections	54
4.4.2.4	RF Connections.....	56
4.4.2.5	Antenna Connections	59
4.5	Verify Normal Operation.....	59
5	RAU5x/RxU2325 Cavity Filter Installation	61
5.1.1	Package Contents	62

5.1.2	(Concrete) Ceiling Mounting Option.....	62
5.1.3	Acoustic Ceiling Mount Installation	63
5.1.4	Wall Mount Installation.....	63
5.1.5	Filter Connections.....	65
6	Appendix A: Bracket Dimensions	66
	Top Bracket	67
	Wall- Mountable Bracket.....	68
7	Appendix B: Upgrades.....	70
7.1	Package Contents.....	70
7.1.1	RxU67 Package.....	70
7.1.2	RxU2325 Package.....	71
7.1.3	GEM Package	71
7.2	Installing the Plug-in Module in the RAU5x	71
7.2.1	Connect RxU2325 and/or GEM to the RAU5x	73
7.2.2	Connect an RxU67 to the RAU5x	74
7.2.2.1	Connect the RxU67 unit to the RAU5x.....	74
7.2.2.2	Assemble the Cavity filter	75
8	Appendix C: Specifications	78
	System Level RF Parameters per Service.....	78
	Optical	79
	Environmental Specifications	79
	Standards and Approvals.....	79
	Component Specifications	79
	Remote Expansion Unit (RxU67)	81
	2300 MHz/2500 MHz Remote Expansion Unit (RxU2325)	81
	Cavity Duplexer for LTE 700 MHz.....	81
	Cavity Duplexer for 800 MHz	82
	Gigabit Ethernet Module (GEM)	83

9 Appendix D: Ordering Information 84

Accessories84

1 INTRODUCTION

The five-band remote access unit (RAU5x) is a fiber fed, multi-service indoor coverage remote solution for Corning® optical network evolution (ONE™) solutions. It enables multiple wireless technologies and operator services to be distributed over a single broadband infrastructure. The RAU5x supports up to five SISO services (model dependent) in various combinations in addition to two MIMO services via an expansion module. The RF services are routed from the headend according to user defined service groups over single-mode fiber and converted for distribution by the specified remotes via an external broadband antenna

Note: RAU5x can be ordered with a preassembled Corning external antenna or can be connected to external omni directional or directional antennas complying with the requirements specified in Section 3.6.1.

The remote unit can host the following additional modules:

- **RxU67** (Remote expansion unit 67) – provides 600MHz and FirstNet 700 support
- **RxU2325** (Remote expansion unit 2325) — provides support for two additional bands: 2300 MHz WCS and 2500 MHz TDD
- **GEM** (Gigabit Ethernet module) – provides Gigabit Ethernet support, enabling offload, expansion and effective use of Wi-Fi resources. Ethernet services from the corporate LAN (received via Ethernet switch) are routed towards the GEM. The optical traffic is then converted to 1GbE by the GEM and distributed to two third party equipment such as access points, Ethernet switch, etc.

Note: RxU67 and GEM cannot be added together.

The RAU5x can be deployed alongside other Corning ONE remotes (e.g., mid-power remote unit – MRU), sharing a common headend and element management system. Management and configuration options are provided for each remote access unit service via a web session to the headend control module (HCM).

1.1 Key Features and Capabilities

- Multi-frequency/ multi-service platform: supports five services: ESMR 800/CELL 850, LTE 700, AWS1/3 1700, and PCS 1900
- Expansion of RAU5x services via RxU2325 plug-in module which supports 2300 MHz and 2500 MHz TDD — support for seven services per coverage area over the same footprint.
- Multi-operator optimized platform — services from a number of operators can be distributed by the same unit
- Operator grade performance — advanced signal handling, RF filtering and management ensures operator grade performance
- Optic fiber savings — all services are routed over a single optic fiber pair
- Expansion module RxU67 providing expansion of two additional bands: 600MHz and FirstNet 700.
- Ethernet support — supports “plug in” GEM providing support for connected IP devices (Wi-Fi APs, IP Phones, etc.) with Ethernet pass through and PoE
- Simple installation and maintenance — provided with easy-to-install mounting bracket; all interfaces located on front panel
- Array of mounting options — various accessory kits available to accommodate different mounting options: wall/ceiling mount, back-to-back wall mount, acoustic ceiling installations
- Management and control — alarm forward to NOC or standard EMS via SNMP, software-controlled output power and optical link auto gain control

1.2 Architecture

The remote access units distribute the wireless and Ethernet services received over the fiber-optic infrastructure from the Corning® optical network evolution (ONE™) solutions headend.

The RAU5x is a service-specific module supporting five SISO services that performs the optical to RF conversion of signals received from the optical interface unit (OIU) at the headend. Signals are automatically filtered, amplified and distributed via external antennas. Uplink signals are then converted to optical signals before being transmitted back to the OIU.

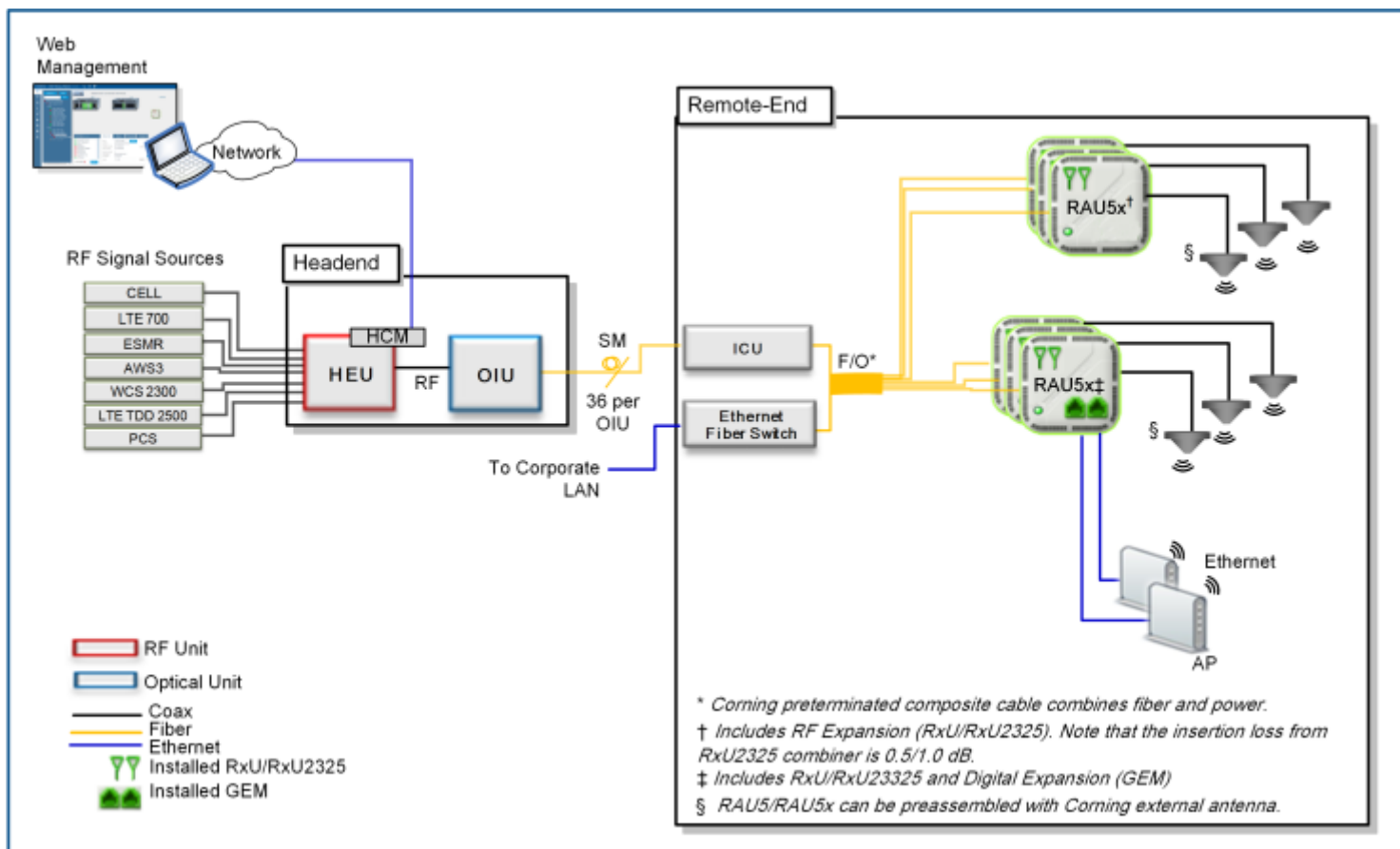


Figure 1-1. Example of Corning Optical Network Evolution (ONE) Solutions Deployment

Acronyms
AP = Access point
GEM = Gigabit Ethernet Module
HCM = Headend control module
HEU = Headend unit
RAU5x = Five-band remote access unit
RxU67, RxU2325 = RF expansion modules
ICU = Interconnect unit
OIU = Optical interface unit

Table 1-1. Acronyms in System Architecture

1.3 Web Management Application

The Corning Optical Network Evolution (ONE™) Solution headend control module (HCM) enables centralized, system-level element management and provides comprehensive end-to-end, single source setup and management of the active RF system components after their physical installation. Management capabilities are provided for both the RAU5x and installed RF expansion module.

Note: Refer to the Corning ONE™ HCM and management GUI user manual for a complete description of the web management application.



Figure 1-2. Example of RAU5x Device Management Window

The RAU5x device management tabs include the following:

Tab	Description
Device Alarms	Module specific alarms used for fault sourcing
Module Info	Provides device version and identification definition
Alarms	Service level alarms
RF Parameters	Includes configurable RF parameters such as output power and service on/off option.
Comments	Used to enter any information relevant to the selected device

Table 1-2. RAU5x Device Management Tabs Descriptions

2 INTERFACES

2.1 RAU5x

Note the following:

- The RAU5x can host additional expansions:
 - RxU67 – expansion module providing expansion of two additional bands: 600MHz and FirstNet 700.
 - RxU2325 — expansion module providing support for two additional bands: 2300 WCS and 2500 TDD bands
 - GEM – provides digital coverage.
- GEM and RxU67 may not be installed together.
- Specific RAU5x models are available with provided external antenna enclosure.

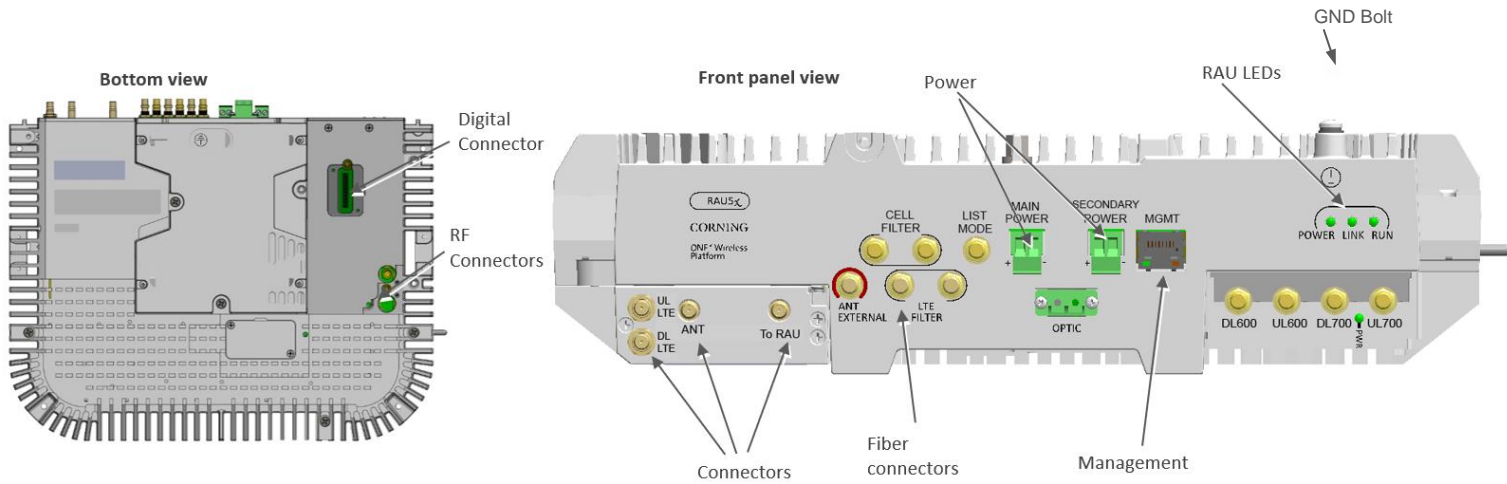


Figure 2-1. RAU5x: Interfaces

RAU5x with External Antenna

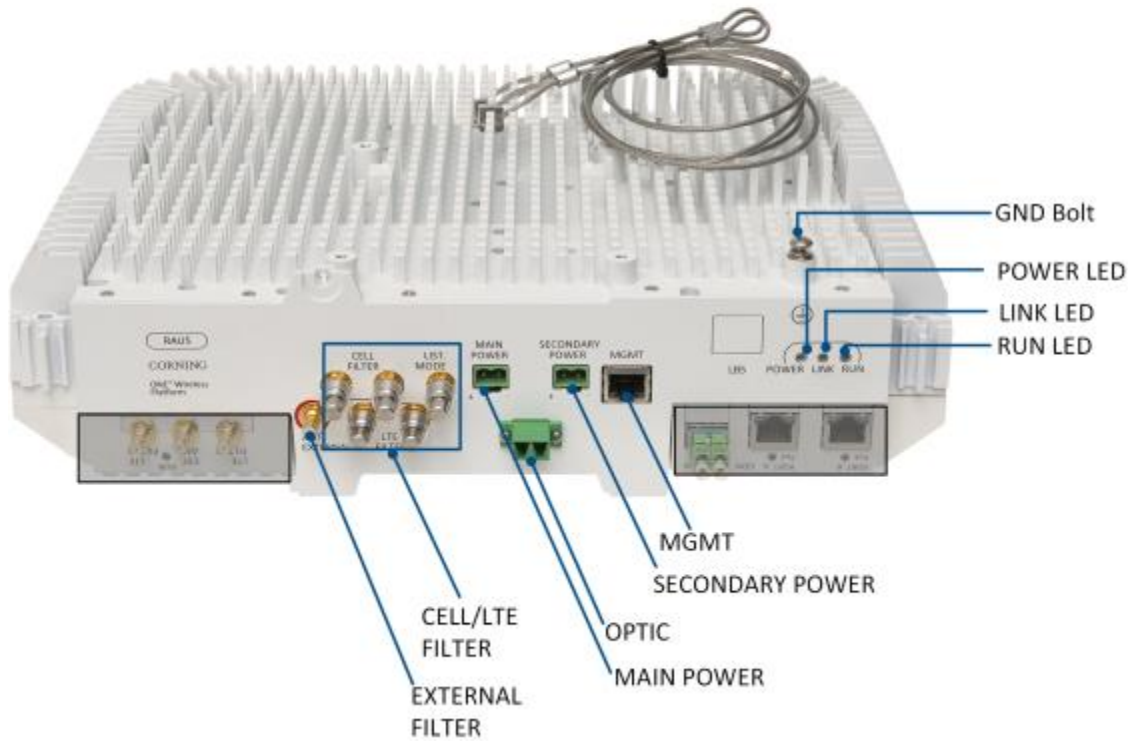


Figure 2-2. RAU5x with GEM: Interfaces

Interface	Description
MGMT	RJ-45 local management connection
MAIN POWER	Main DC input; Input range: 37 – 57 VDC; DC power fed from composite cable; Refer to section 3.4.1 for power consumption
SECONDARY POWER	Secondary DC input required for use in addition to “MAIN POWER” with PoE clients (installations including GEM module); Refer to section 3.4.1 for power input per PoE port and consumption
LIST. MODE	N/A
EXTERNAL ANTENNA	QMA connector for external broadband antenna connection
CELL/LTE FILTER	Two QMA RF connectors (In/Out) per external cavity filter type (i.e. LTE and CELL)
OPTIC	LC APC SM connector for UL and DL fiber optic connection
GROUNDING BOLT	8-32 x 3/8 grounding screw used for connecting RAU5x to earth ground

Table 2-1. Connection Interface Descriptions

LED	Description
POWER	Steady green — power input detected by remote unit Off - no power supplied to remote unit
LINK	Steady green — Optical link power to/from the remote unit is normal Blinking green — Optical power from remote is lower than required Off — no optical link is detected
RUN	Blinking green blinking — software initializing Steady green — boot up sequence complete and module software up and running Off — no power supplied to unit

Table 2-2. LED Descriptions

2.2 RxU2325

The RxU2325 is an add-on module which plugs into the RAU5x and enables support for two additional bands: 2.3 GHz WCS and 2.5 GHz LTE (TDD).

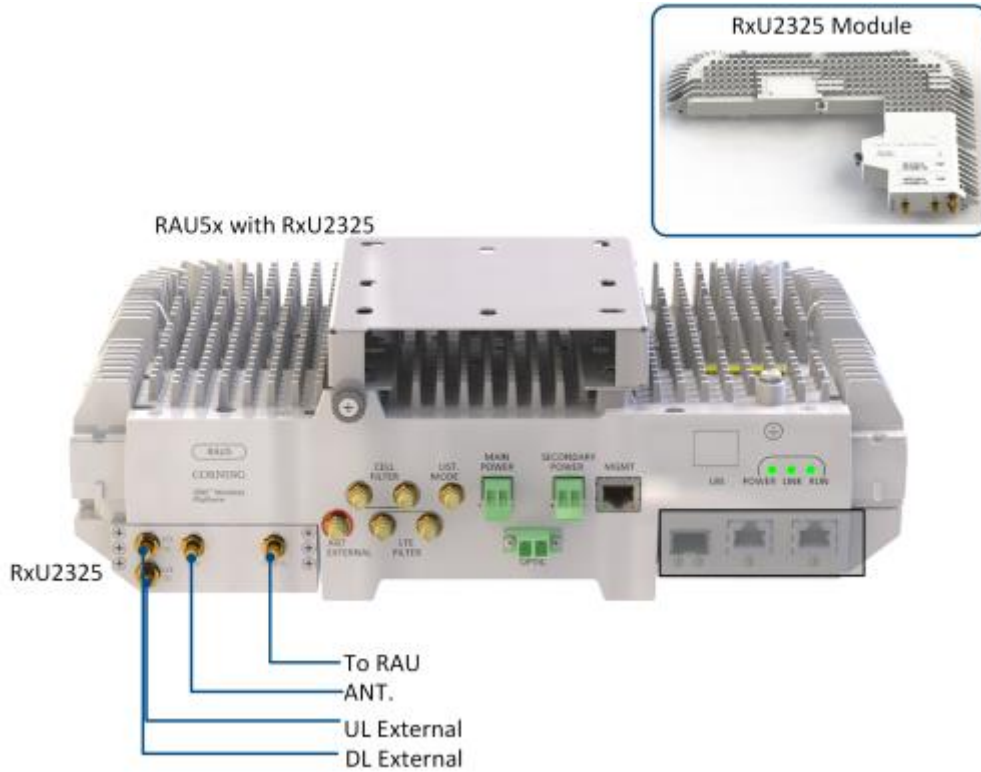


Figure 2-3. RxU2325 Interfaces

Module	Description
To RAU	QMA RF connector; Connects to RAU5x
ANT.	QMA RF connector; Connects to external antenna
UL/DL External	QMA RF ports for external cavity filter use (if required by site planner). For CELL and LTE filters.

Table 2-3. RxU2325 Interface Connections

2.3 RxU67

The RxU67 is an add-on module which plugs into the RAU5x and enables support for two additional bands: 600MHz and FirstNet 700.

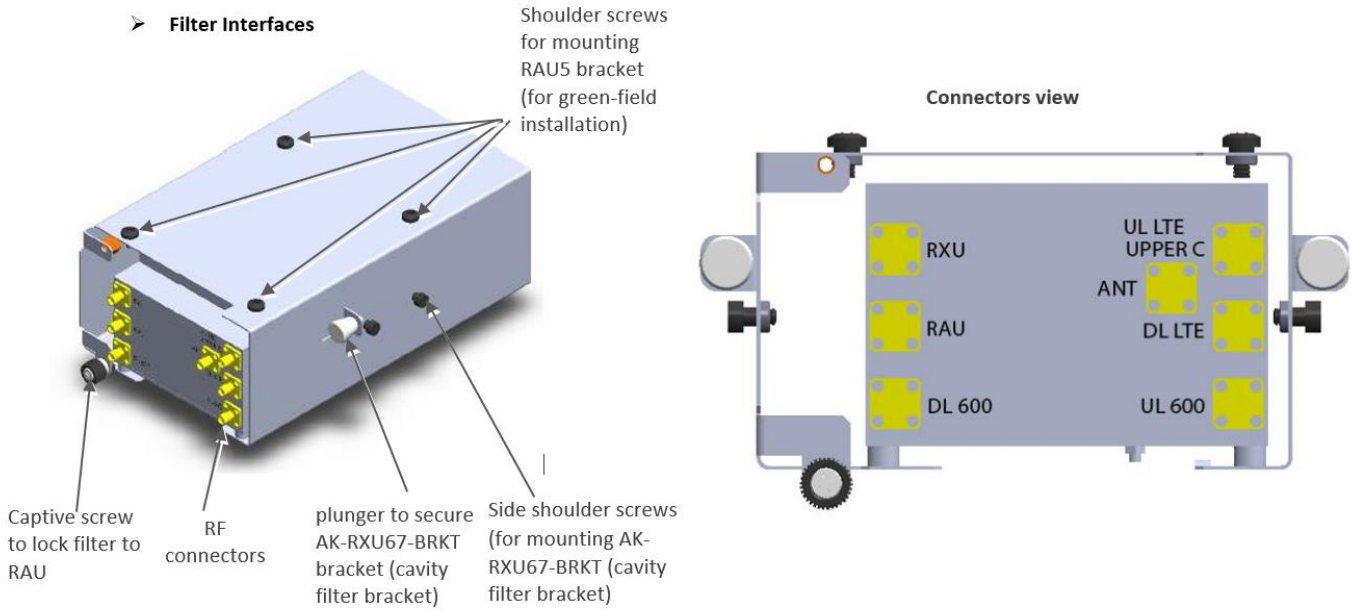
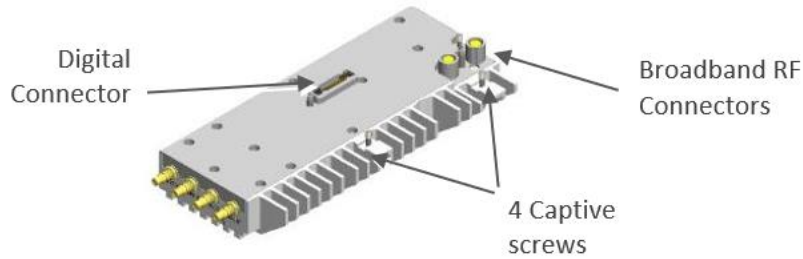


Figure 2-4. RxU67 and Filter Interfaces

Module	Description
External RF Filters	DL600 UL600 DL700 UL700
PWR LED	Indicates power ON.

Table 2-4. RxU67 Front Panel Interface Connections

2.4 GEM

The GEM is an add-on module that provides Gigabit Ethernet support - the received optical signal is converted to two Ethernet digital connections, which can then be routed along with PoE to third party equipment.

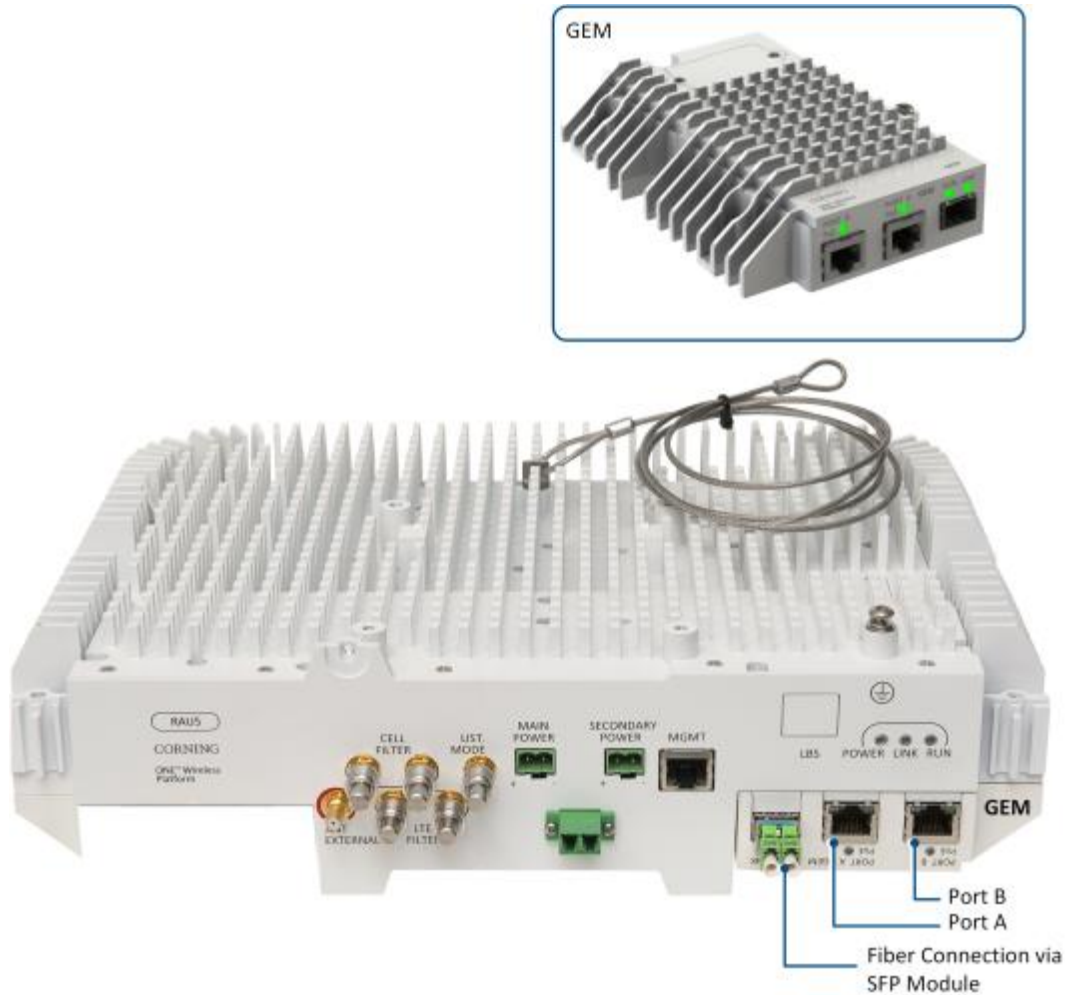


Figure 2-5. GEM Interfaces

Table 2-5 and Table 2-6 provide descriptions of the ports and LED indicators.

Port	Description
PORT A/PORT B	Two 10/100/1000Base-T copper interface with 802.3at compliant Power over Ethernet (PoE+) PSE ports capability for connections to remote access points
FC APC	One 1000BASE-X T Copper port to LC UPC fiber connectors (using SFP – small-form pluggable module) towards Ethernet fiber switch

Table 2-5. GEM Port Interfaces

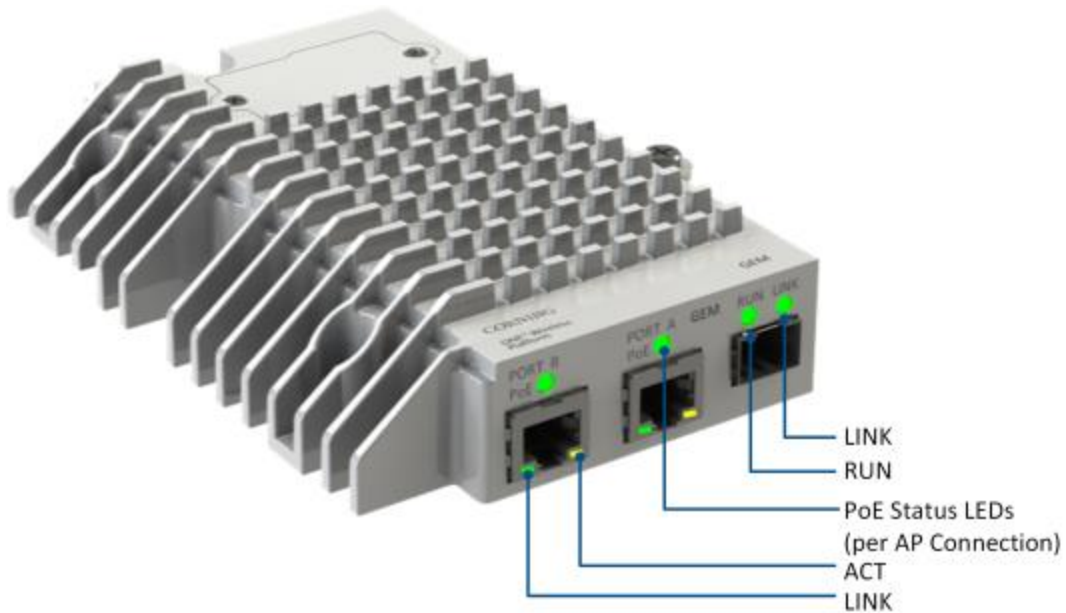


Figure 2-6. GEM LED Description

LED	Description	
PoE (PORT A/PORT B)	Steady green:	Indicates power supplied to connected AP; PoE enabled
	Steady yellow:	Indicates PoE fault
	Off:	Off
SFP LINK	Steady green:	Optical link to/from the connected remote functions within the specifications in both directions.
	Blinking green:	Indicates activity over the optical link
	Off:	No link
RUN	Steady green with short blink every ~10 seconds (heartbeat):	On/Normal
	Steady yellow:	Module fault
LINK	Steady green:	Link
	Off:	No link
ACTIVITY	Blinking yellow:	Activity
	Off:	No activity

Table 2-6. GEM LED Indicator Descriptions

3 INSTALLATION GUIDELINES

The following installation assumes that site survey and installation planning (including power requirements) have been completed. This includes planning the distribution of antennas to provide the required coverage, as well as planning the layout of the devices and cables in the telecom closet or shaft.

3.1 Infrastructure Preparation

The following installation rules are based on the assumption that the site survey and installation planning (including power requirements) have been completed as well as the floor plan determining the distribution of the remote access units on each floor to provide the required coverage

3.2 Installation Location Requirements

- Mounting surface shall be capable of supporting the weight of the equipment.
- In order to avoid electromagnetic interference, a proper mounting location must be selected to minimize interference from electromagnetic sources such as large electrical equipment.
- Working space available for installation and maintenance for each mounting arrangement.
- Ensure unrestricted airflow.
- Ensure grounding connector is within reach of the ground wire.
- Ensure a power source is within reach of the power cord and the power source has sufficient capacity.
- Where appropriate, ensure unused RF connectors are terminated.
- Do not locate the equipment near large transformers or motors that may cause electromagnetic interference.
- Reduce signal loss in feeder cable by minimizing the length and number of RF connections.
- Ensure the equipment will be operated within the stated environment (refer to Appendix C: Specifications or unit datasheet).
- Where appropriate, confirm available of suitably terminated grade of RF and optical fiber.
- Observe handling of all cables to prevent damage.

3.3 Safety Guidelines

Before installing the equipment review the following safety information:

- Follow all local safety regulations when installing the equipment.
- Only qualified personnel are authorized to install and maintain the equipment.
- Ground specified equipment with the provided grounding bolt
- Do not use the grounding bolt to connect external devices.
- Follow electro-static discharge (ESD) precautions.
- Use low loss cables to connect the antennas

3.4 Power Requirements

This section summarizes the RAU5x power requirements and specifications with and without additional modules.

Note: RxU and RxU2325 share the same power requirements and specifications.

3.4.1 Power Input and Consumption

RAU5x + Add-On Modules	Maximum Power Consumption	Power Input Range
RAU5x (alone)	44.5 V; 50 W	-36 to -57 V DC
RAU5x + GEM	44.5 V; 52 W	-36 to -57 V DC
RAU5x + GEM + RxU2325	44.5 V; 78 W	-36 to -57 V DC
RAU5x + RxU2325+ RxU67	44.5 V; 78 W	-38 to -57 V DC

Table 3-1. RAU5 Power and Current Consumption for Main Power Input

Unit	Device	Input Range	Power Consumption
RAU5x	For two PoE ports of 802.3af	43- 57 V DC	46 V; 31.5 W
	For two PoE ports of 802.3at	52- 57 V DC	52.5 V; 62 W

Table 3-2. RAU5x Power and Current Consumption for Secondary Input

Note: The RAU operating voltage range when WITHOUT RxU67 extension: -36 to -57v.

When adding the RxU67, the RAU voltage range changes as follows:

* for single copper pair: operating voltage range is reduced to -38 to -57v

* for two copper pairs: operating voltage range remains the same: -36 to -57v.

3.4.2 Cable Gauge Requirements

Table 3-3 provides the information required to calculate the required power supply for the remote units.

	RAU5x SISO (ft)	RAU5x SISO + GEM (ft)	RAU5x SISO + GEM Supporting PoE	RAU5x SISO + GEM Supporting PoE+ (ft)	RAU5x MIMO (ft)	RAU5x MIMO + GEM (no PoE) (ft)	RAU5x MIMO + GEM Supporting PoE (ft)	RAU5x MIMO + GEM Supporting PoE+ (ft)
22AWG	540	490	410	100	310	290	290	100
20AWG	870	780	650	160	500	460	460	160
16AWG	2200	1900	1600	400	1200	1100	1100	400
14AWG	3500	3100	2650	650	2010	1800	1800	650

Table 3-3. Required Cable Gauge

3.4.3 Power, Heat and Rack Specifications

Table 3-4 provides the power, heat and rack specifications for the remote end ceiling equipment.

Unit	Description	Min-Max Voltage (VDC)	Max Power Draw (Watts)	Heat (BTU/hr)	Dimensions (in)
RAU5x	5-band remote access unit	37 - 57	50	171	Without mounting bracket: 3.2 x 12.9 x 9.8 in (82.1 x 337.3 x 249.4 mm) With mounting bracket: 5.25 x 13.1 x 13.1 in (133.35 x 332.74 x 332.74 mm)
RxU67, RxU2325	Remote Expansion Unit	37 - 57	25	85	1.1 x 12.8 x 9.8
RAU5x + RxU67 + RxU2325	Remote access unit + remote expansion unit	37 - 57	78	267	13.1 x 13.1 x 4
GEM	Gigabit Ethernet module	37 - 57	4	14	1.3 x 3.8 x 5.9
GEM Supporting PoE	For two PoE ports of 802.3af: 43V; 30W				
	For two PoE ports of 802.3at: 52V; 62W				

Table 3-4. Power, Heat and Rack Specifications for Ceiling Equipment (Remote End)

3.4.4 Remote End Distance and Power Draw Matrix

Table 3-5, Table 3-6, Table 3-7 and Table 3-8 provide the distance and power draw specifications for the remote end units.

RAU5x SISO	
Composite 16 AWG Tether Distance (ft.)	Draw (Watts)
10 - 50	36
60 - 270	37
280 - 480	38
490 - 690	39
700 - 850	40
860 - 900	41

*Min/Max VDC = 37/57 @ 1.49 Amps, 85% efficiency

Table 3-5. Remote End Distance and Power Draw for (Standalone) RAU5x SISO

RAU5x+ RxU2325 + RxU67 (MIMO)			
Composite 16 AWG Tether Distance (ft.)	Draw (Watts)	Composite 16 AWG Tether Distance (ft.)	Draw (Watts)
10 – 100	62	570 – 610	70
110 – 170	63	620 – 660	71
180 – 240	64	670 – 710	72
250 – 320	65	730 – 750	73
330 – 380	66	760 – 790	74
390 - 440	67	800 – 830	75
450 - 510	68	840 – 860	76
520 - 560	69	870 - 900	77

*Min/Max VDC = 37/57 @ 1.49 Amps, 85% efficiency

Table 3-6. Remote End Distance and Power Draw for RAU5x + RxU67 (MIMO)

GEM Supporting PoE 802.3af	
Composite 16 AWG Tether Distance (ft.)	Draw (Watts)
10 - 40	31
50 - 340	32
350 - 660	33
670 - 890	34
900	35

*Min/Max VDC = 43/57 @ 1.49 Amps, 85% efficiency

Table 3-7. Remote End Distance and Power Draw for GEM w/PoE.3af

GEM Supporting PoE 802.3at			
Composite 16 AWG Tether Distance (ft.)	Draw (Watts)	Composite 16 AWG Tether Distance (ft.)	Draw (Watts)
10 - 80	64	590 - 620	73
90 - 170	65	630 - 670	74
180 - 230	66	680 - 710	75
240 - 300	67	720 – 750	76
310 - 370	68	760 – 790	77
380 - 420	69	800 - 820	78
430 - 470	70	830 - 850	79
480 - 530	71	860 - 890	80
540 - 580	72	900	81

*Min/Max VDC = 52/57 @ 1.49 Amps, 85% efficiency

Table 3-8. Remote End Distance and Power Draw for GEM w/PoE.3at

3.4.5 Power Safety Instructions

SAFETY WARNINGS! When installing or selecting the power supplies:

- Only use the power cables and any other relevant accessories provided with the unit to connect the power supply to the system components.
- Be sure to disconnect all power sources before servicing.
- Calculate the required power according to the requirements of the specific installation and then determine the configuration of the power supplies. The required DC cables will then be determined by the selected power supply configuration.
- Use only UL approved power supplies
- Install external over-current protective devices for the system according to the requirements described in section 3.4.6.

3.4.6 Circuit Breakers

Calculate the required fuse protection while referring to section 3.4.1. Also, take into account when installing fuse protections for the system that there may be other Corning system elements that require external fuse protection.

3.5 RF Coaxial Cable Guidelines

3.5.1 General Cable Installation Procedures

Note: The installer should be familiar with the ANSI/TIA/EIS-568 Cabling Standard guidelines.

Observe the general cable installation procedures that meet with the building codes in your area. The building code requires that all cabling be installed above ceiling level (where applicable). The length of cable from the risers to each antenna must be concealed above the ceiling.

The cable must be properly supported and maintained straight using velcro cable ties, cable trays and clamps or hangers every 10 feet (where practical above ceiling level). Where this is not practical, the following should be observed:

- The minimum bending radius of the supplied ½" coax cable should be 7-in.
- Cable that is kinked or has a bending radius smaller than 7" must be replaced.
- Cable runs that span less than two floors should be secured to suitably located mechanical structures.
- The cables should be supported only from the building structure.
- All cables shall be weather-resistant type.
- Cable length - determined by the system installation plan. When calculating the cable length, take into account excess cable slack so as not to limit the insertion paths.

3.5.2 RF Rules

- Use coax RG-223, 50 ohm, male-to-male N-type to QMA for RF connections from the RIMs to the BTS/RBS and to the RAU5xs.
- When using the Corning system in an environment in which other indoor coverage systems are installed, it is recommended (where possible) that the antennas are placed at least two meters apart
- When bending coax cables, verify that the bending radius does not exceed the coax specifications.
- Use a VSWR meter (i.e., site master or equivalent) for checking coax cables, including the antennas. (<2). The VSWR must be measured prior to terminating the RAU5xs at the remote locations

3.5.3 Coax Cable Lengths and Losses

Use coax ½-in, 50ohm, male-to-male QMA type, for connecting to RAU5x and external antenna ports.

Note: The required distance between the antennas (installed in the ceiling) depends on the infrastructure and calculated path-loss. For example, if there is free space-loss between the antennas, a minimum distance of 100 ft is required; if there are partitions (loss) between the antennas, a distance of less than 100 ft between them is allowed.

Coax Length	Coax Loss (900 MHz)	Connector Loss	Total Loss
30	0.7	1.5	2.2
40	0.9	1.5	2.4
50	1.1	1.5	2.6
60	1.3	1.5	2.8
70	1.5	1.5	3
80	1.7	1.5	3.2
90	1.9	1.5	3.4
100	2.1	1.5	3.6
110	2.3	1.5	3.8
120	2.5	1.5	4
130	2.7	1.5	4.2
140	2.9	1.5	4.4
150	3.1	1.5	4.6
160	3.3	1.5	4.8
170	3.5	1.5	5
180	3.7	1.5	5.2
190	3.9	1.5	5.4
200	4.1	1.5	5.6

Table 3-9. Coax Cable Lengths and Losses

3.6 Antenna Specifications and Guidelines

Determine the antenna installation configuration, according to the transmission and coverage requirements and the installation site conditions.

3.6.1 Authorized Antennas and Required Specifications

- RAU5x requires external broadband antenna - can be ordered with preassembled external antenna enclosure.
- External antennas - No limitation on any vendor of available external antennas with respect to the following requirements:
 - Omni Directional or Directional
 - Supported frequency range: wideband antennas supporting a range of 700 MHz to 2600 MHz
 - Gain: up to 12.5 dBi
 - Impedance: 50 Ohm
 - Return Loss: +12 dB
 - Number of antennas that can be connected (with cables/splitters) – it is not recommended to connect more than one antenna per connector since 1:1 connectivity is reduced with each split.
 - Types of couplers/splitters – depends on number of splits (not recommended)

3.6.2 General Installation Guidelines

- The RAU5x should be installed at a convenient location, free of metallic obstruction (can also be installed in plenum spaces).
- Install the RAU5x at the designated height and tune it roughly toward the service coverage area.
- Installation of this antenna must provide a minimum separation distance of 20 cm from any personnel within the area.
- Cable and jumper loss is at least 2 dB.

3.7 Fiber Optic Requirements

3.7.1 Authorized Optic Cables

The following specified optic cables are authorized for use with the RAU5/RAU5x:

- Composite Plenum Tether Assemblies
- Fiber: LC APC, 2 – 24 fibers
- Cu: 16 AWG, 14 AWG, and 12 AWG; 2 – 12 Conductors
- Armored, non-armored

3.7.2 Fiber Optic Rules

- Use only LC APC connectors
- UniCam connectors can be used for field termination
- Use only fusion splice for connecting two fibers
- Use minimum splicing/connectors to achieve minimum losses on the fibers (< 0.5 dB)
- Use precaution while installing, bending, or connecting fiber optic cables:
 - Fiber optic cable is sensitive to excessive pulling, bending and crushing forces. Consult the cable specification sheet for the cable you are installing.
 - Do not bend cable more sharply than the minimum recommended bend radius.
 - Do not apply more pulling force to the cable than specified.
 - Do not crush the cable or allow it to kink. Doing so may cause damage that can alter the transmission characteristics of the cable. The cable may have to be replaced.

- Use an optical power meter and light source for checking the fiber optic cables
- Make sure the environment is clean while connecting/splicing fiber optic cables
- All fiber optic connectors should be cleaned prior to connecting to the system
- Fiber connector protective caps should be installed on all non-terminated fibers and removed just before they are terminated.
- LC APC connectors – ensure that you hear a “click”, indicating a secure connection
- Never look directly into the end of a fiber that may be carrying laser light. Laser light can be invisible and can damage your eyes.

3.8 Power Safety Instructions



SAFETY WARNINGS

- When installing or selecting the power supplies:
- Be sure to disconnect all power sources before servicing.
- Calculate the required power according to the requirements of the specific installation and then determine the configuration of the power supplies. The required DC cables will then be determined by the selected power supply configuration.
- Use only UL approved power supplies
- AC and DC power supply cables – only use the power cords supplied with the units
- Install external over-current protective devices for the system according to the requirements described in section 3.4.6.

Types of Power Supplies

Corning supplies various enclosed power supplies (i.e., ICU and PSU6) that can be installed in a rack or mounted on a wall, depending on your configuration.

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4 INSTALLATION

This chapter describes the installation of the RAU5x. For specific guidelines on infrastructure planning, design and installation, please consult with a Corning product line manager or Corning approved Installer.

The installation procedure differs according to your site deployment and add-ons settings, based on the following criteria:

- The add-ons installed in your site (RxU67, RxU2325, GEM)
- The installation position (Wall / Ceiling)
- The number of RAU units per position (single / dual)
- The type of installation (green-field / brown-field)

To install the RAU5x follow these steps:

1. Verify Package Contents
2. Assemble Relevant Add-ons
3. Mount the RAU5x

Note: When RxU67 is added to an already installed RAU5x, the cavity filter is connected differently: on the RAU5x side panel. For this scenario, refer to the on-site expansion instructions.

In each step, refer to the instructions relevant to your specific site deployment

Note: For specific guidelines on infrastructure planning, design and installation, please consult with a Corning product line manager or Corning approved Installer.

The remote end site (RF coverage) installation consists of installing the ICU and RAU5xs.

General Information

1. The RAU5x must always be mounted parallel to the ceiling (horizontal) or wall (vertical) with a 1-in clearance from the surface on the back and front to allow for proper cooling airflow and for heat dissipation.
2. Required ambient temperature:
 - Wall-mount installations (vertical): 45°C [113°F]
 - Ceiling-mount installations (horizontal): 50°C [122°F]
3. The RAU5x is provided with a standoff mount used for mounting on the wall or concrete ceilings (including above acoustic ceiling mounts). Additional mounting accessory kits are available (ordered separately):
 - BR-RAU5US-TOP: "Lift Bracket" for floating ceilings tile, mid-mount installation
 - BR-RAU5US-Wall: Wall-mount bracket; Supports up to two remote access units back-to-back
4. Weight:

Note: Weight applies to both RAU5 and RAU5x units.

- RAU5x alone: 10 lbs (4.54 kg)
 - RAU5x + RxU2325 + GEM: 14.39 lbs (6.5 kg)
 - RAU5x + RxU67 + RxU2325: 14.39 lbs (6.5 kg)
 - External antenna: 3.7 lbs (1.7 kg)
5. A broadband antenna is required for RAU5x models ordered without a preassembled connected antenna (see Table 4-1 for RAU5x models).
 6. External cavity filters are required for installations in which remote access units (excluding RxU67, where the filter of the 700MHz LTE is not relevant) supporting the corresponding CELL and LTE bands are deployed alongside units supporting

the public safety service. Installation instructions are provided with each separately ordered filter (AK-CVT700; AK-CVT800).

4.1 Verify Package Contents

Verify the packages contain all the required elements according to your site deployment:

- RAU5x – see RAU5x Package
- Accessories related to your site deployment:
 - RxU67 – see RxU67 Package
 - RxU2325 – see RxU2325 Package
 - GEM – see GEM Package

Note: Check your package contents to verify that the items in the packing list are included. If any of the listed items are missing, contact your Corning representative

4.1.1 RAU5x Package


Item Description	Quantity	Picture
Five-band Remote Access Unit (RAU5/RAU5x): <ul style="list-style-type: none"> • RAU5XUS • RAU5XUS-A* <i>*Model with preassembled external broadband antenna</i>	1	
Standoff mount (preassembled on RAU5x underside) <i>Note: Standoff mount includes holes in various sizes and locations for flexible installation options. Screws for mounting on surface are not provided.</i>	1	
Safety Cable – preconnected to the RAU5x	1	

Table 4-1 Package Contents

4.2 Assemble Relevant Add-ons

If relevant, install the add-ons relevant to your system deployment.

Note: for a brown-field installation, there is no need to disconnect the unit. Simply connect the add-on.

Refer to the section describing the installation of the expansion unit (add-on) relevant to your system deployment (see Installing the Plug-in Module in the RAU5x):

- For RxU67 add-on installation, see Connect an RxU67 to the RAU5x
- For RxU2325 add-on installation, see Connect RxU2325 and/or GEM to the RAU5x

4.3 Mount the RAU5x

RAUx can be mounted in several methods, as described in the following table. Perform the mounting procedure related to your site deployment.

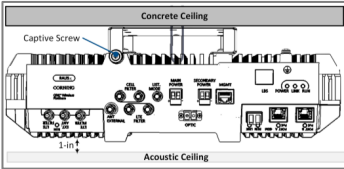
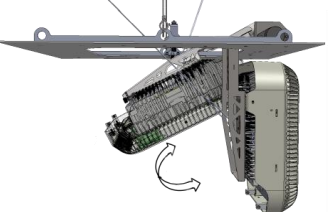
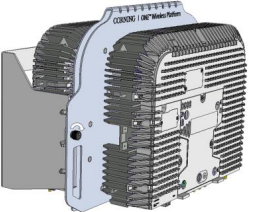
Method name	Description	Illustration	See section...
Standard Standoff (or direct mounting) – ceiling or wall	a single RAU5x is installed directly on the wall or concrete ceiling		Standard Standoff Mount Installation, 4.3.1
Top Bracket	RAU5x is connected onto a mid-mount bracket in an acoustic ceiling		Top Bracket (Mid-Mount Installation), 4.3.2
Wall bracket mount (dual wall mount)	RAU5x units onto the wall-mount bracket and mount assembly onto wall		Wall Bracket Mount, 4.3.3

Table 4-2. RAU5x Mounting Options

4.3.1 Standard Standoff Mount Installation

Note the following:

- The installation procedure for the standoff mount provided with the RAU5x refers to wall and concrete ceiling installations.
- When mounting the bracket on a wall the captive screw (indicated in Figure 4-1) should always be positioned in the same direction as the RAU5x connectors.
- In wall-mount installations the connectors should face downwards.
- If installing above acoustic ceiling, allow for at least one inch above the acoustic ceiling for air flow cooling.

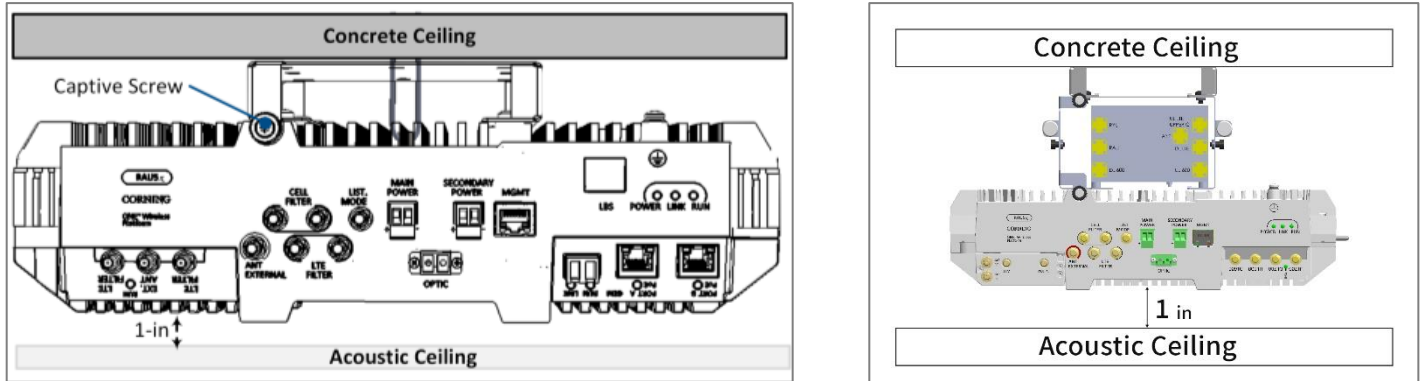


Figure 4-1. Examples of Concrete Ceiling Installation of Mounting Bracket: RAU5x without External Antenna; RAU5x with RxU67 cavity filter.

4.3.1.1 Mount the standoff mount

1. Remove the mount from the RAU5x underside and use to mark and drill appropriate holes for mounting the bracket on the wall or concrete ceiling. Refer to Appendix C for bracket dimensions.
2. Any of the applicable screw holes can be used.
3. Drill the appropriate screws (not provided) through the bracket installation holes and secure to surface.

Note: The RAU5x connectors should face the standoff mount captive screw.

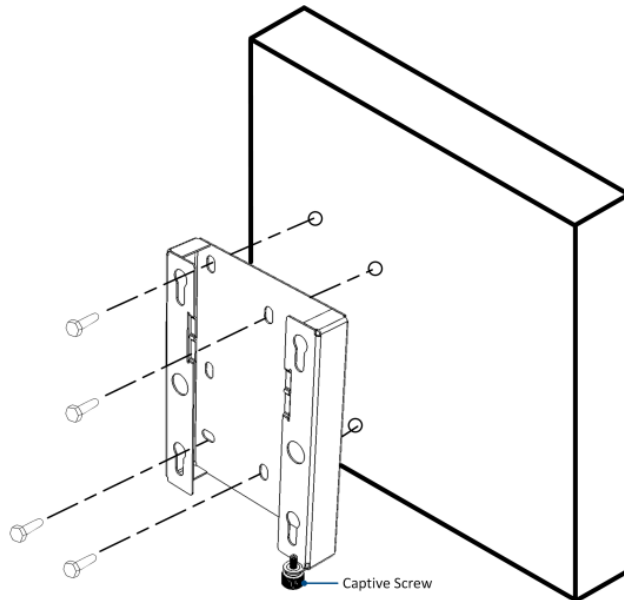
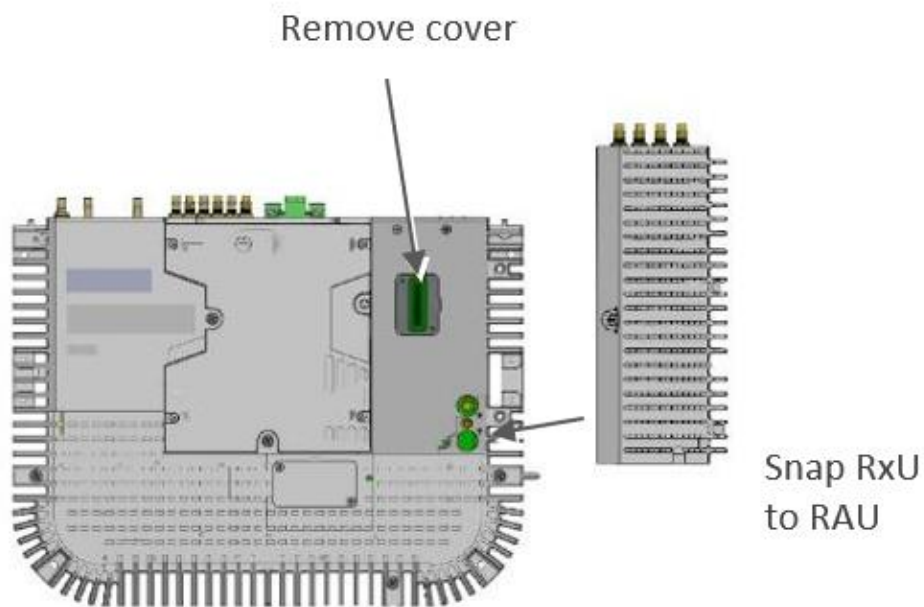


Figure 4-2. Example of Standoff Mount Installation on Wall

4.3.1.2 For green-field installation with RxU67

Connect the cavity filter BEFORE connecting the unit:

1. Locate the following connection cables leading from the cable infrastructure:
 - DC wiring (80Watt required):
 - One pair for MAIN POWER connection
 - Optional: One pair for SECONDARY POWER (if required, to comply with the required 80Watt)
Note: 80 Watt is required. If needed, use the secondary power connection to comply.
 - Fiber pairs (Corning® SMF-28® fiber or compatible): One fiber pair for RAU module
 - Grounding wire: refer to RAU UM, and connect the earth ground to the unit's 8-32 x 3/8 grounding screw
2. Assemble RxU67 on the RAU
 - Remove the cover from the RAU's bottom-side digital connector:



- Attach and snap the RxU67 unit to the RAU bottom's corresponding connectors.
- Use a Philips screwdriver to secure the RxU67 to the RAU by fastening four captive screws.

3. Connect the Filter to the RAU

- Insert the 4 shoulder screws located on the RAU's top into the wide end of the filter bracket dedicated keyholes

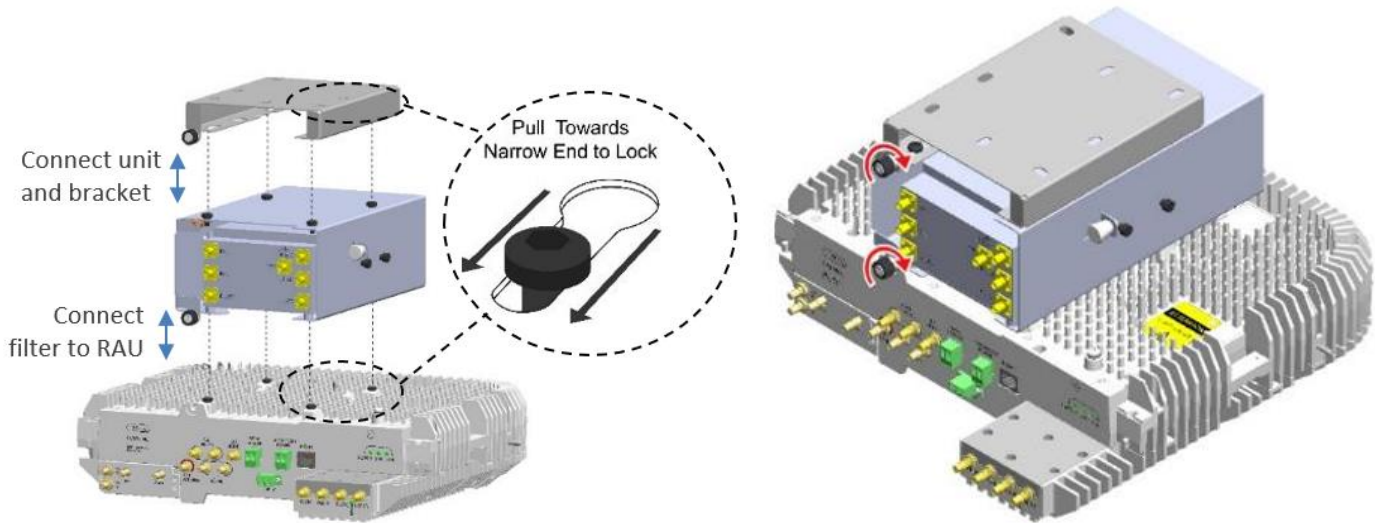


Figure 4-3. Connect Mounting Filter to RAU; Tighten spring-locker

- Slide the filter unit until the screws reach the narrow end of the screw rails.
- Secure by manually tightening the captive screw. (Figure 5)

4.3.1.3 Mount the RAU5x onto the standoff mount

1. Insert the four RAU5x pins into the wide ends of the standoff mount key-holes.
2. Make sure that the captive screw fits into the designated half-slot on the RAU5x.
3. Lock RAU5x pins into the narrow ends of the standoff mount keyholes.

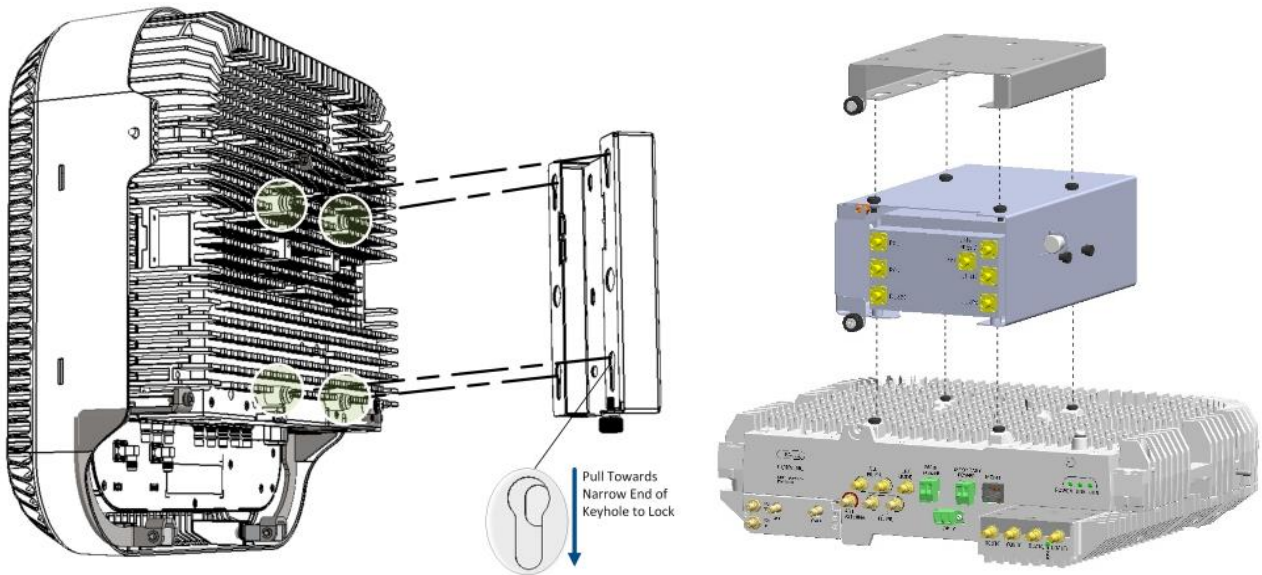


Figure 4-4. Examples of Mounting RAU5x onto Bracket: wall mount; ceiling mount with RxU67 cavity filter

4. Close captive screw to secure RAU5x and standoff mount assembly.

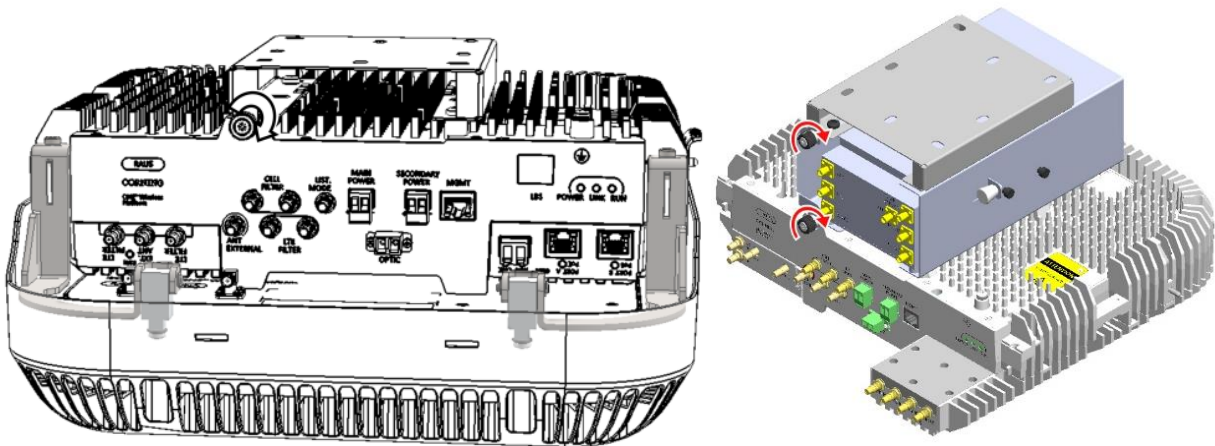


Figure 4-5. Closing Bracket Captive Screw

5. Using the supplied security cable, attach the RAU5x to a permanent structure within the ceiling (e.g., acoustic ceiling grid or concrete ceiling above).

4.3.2 Top Bracket (Mid-Mount Installation)

This section provides instructions on how to assemble the RAU5x onto the mid-mount bracket and install the assembly in an acoustic ceiling.

Note: RxU67 cannot be connected on the top panel in this scenario.

ATTENTION!

- Both the RAU5x and bracket plate must be secured to a permanent structure using safety cables. The RAU5x unit is provided with an attached safety cable;
- A three-inch clearance is required above and below the RAU5x unit from any object such as walls or ceiling to allow airflow cooling.

Note the following:

- The “Top Bracket” plate is designed to replace a standard acoustic ceiling tile.
- It is recommended to perform the RAU5x connections after the unit is secured to the “Lift Bracket” (refer to section 4.4 for cable connections).
- For RAU5x units without external antennas, a cap can be ordered separately and assembled onto the RAU5x and top bracket assembly. See Section 4.2.2.3..

4.3.2.1 Package Contents

The RAU5x “Top Bracket” kit (BR-RAU5-TOP) consists of a plate and Lift Bracket assembly. Refer to Appendix A: Bracket Dimensions for “Top Bracket” dimensions.

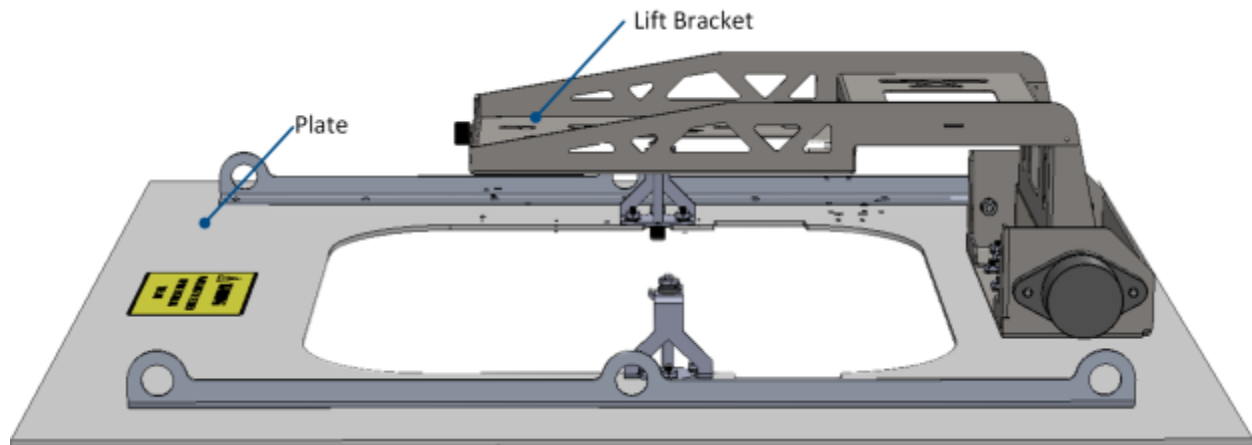


Figure 4-6. “Top Bracket” Assembly Lift Bracket and Plate

4.3.2.2 Installing Bracket Assembly and Mounting RAU5x

Note: The figures in this section, illustrate the top bracket installation with an RAU5x which includes the Corning external antenna.

To install bracket and mount RAU5x

1. Install the plate in the ceiling and using the two safety cables, pre-connected to the middle safety rings of the plate, secure to secure to a permanent structure.

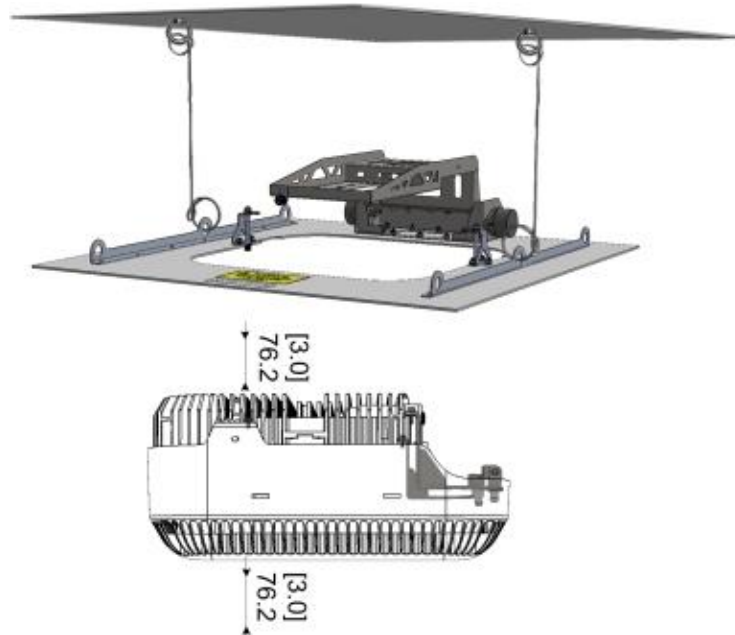


Figure 4-7. Installing “Top Bracket” Plate

ATTENTION!

- Plate must be secured before installing the RAU5x unit!
 - If the bracket is not secured via the two middle safety rings, it must be secured with safety cables via the four remaining safety rings.
 - A 3 in clearance is required from the surface above and below the RAU5x unit to allow for proper cooling airflow and for heat dissipation.
 - The installer is responsible for accommodating the installation to the surface type.
2. (After plate is installed in ceiling) Pull down the Lift Bracket to a vertical position.

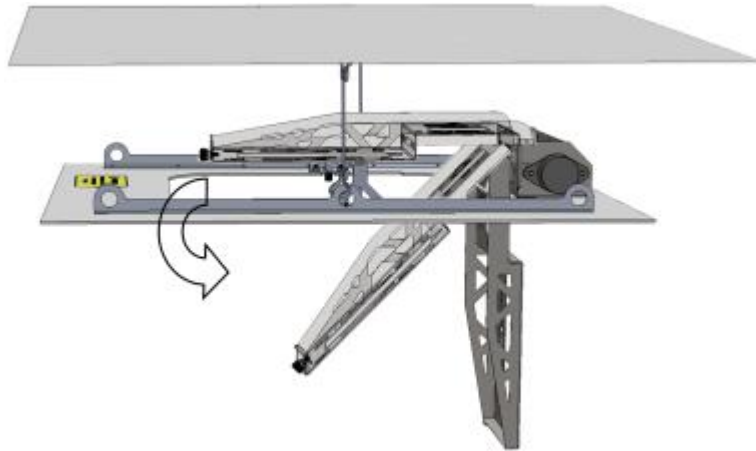


Figure 4-8. Lowering Lift Bracket

3. Referring to Figure 4-9, fit the four pins on the RAU5x underside into the wide end of “Lift Bracket” keyholes and pull down into narrow ends to lock in. Make sure that the RAU5x is secure.

Note: Lift Bracket captive screw must face the RAU5x connectors.

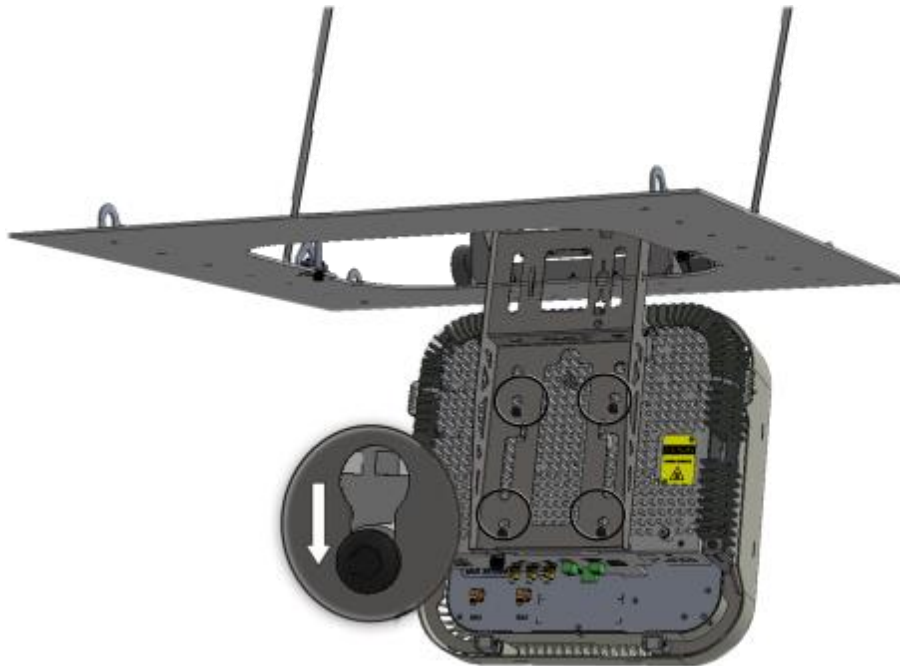


Figure 4-9. Mounting RAU5x onto Lift Bracket

4. Close Lift Bracket captive screw to secure RAU5x in place.

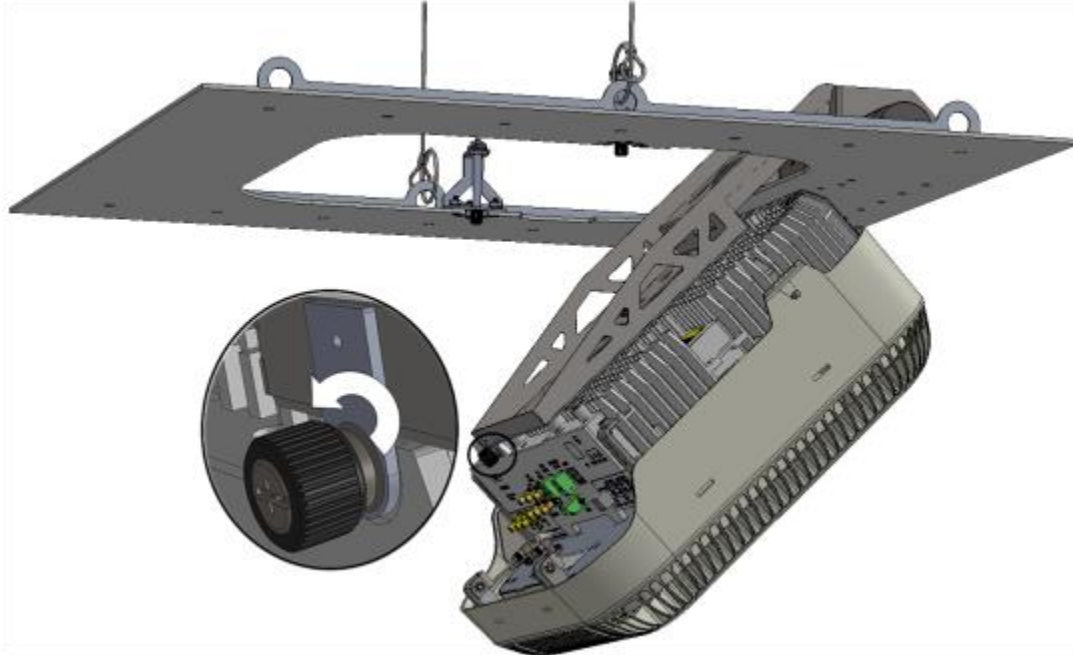


Figure 4-10 Closing Lift Bracket Captive Screw

Note: it is recommended to perform the RAU5x connections after the unit is secured to the Lift Bracket.

5. **MANDATORY!** Secure RAU5x using the attached safety cable to a permanent structure.

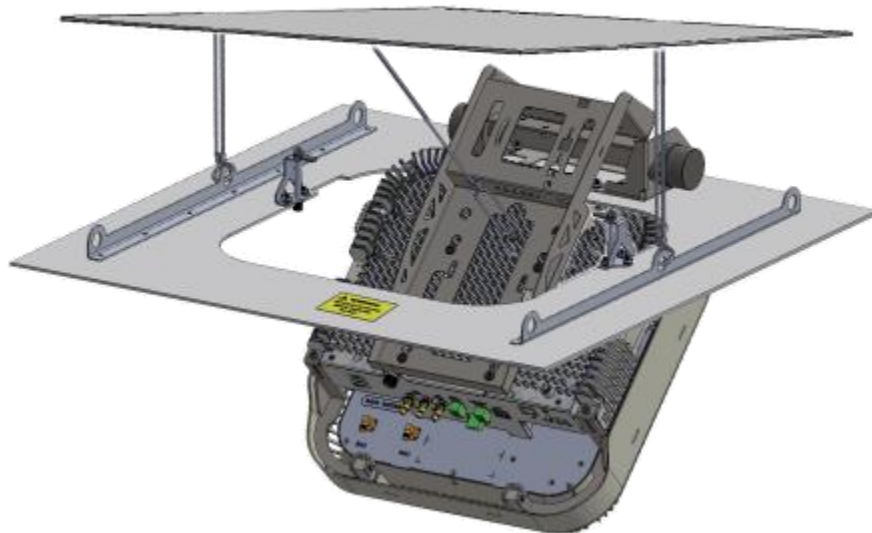


Figure 4-11. Securing RAU5x to Permanent Structure

6. Push up and pull down Lift Bracket into plate and verify that connection cables are not subject to kinking.

Note: The installer is solely responsible for proper cable wiring and routing of the RAU5x unit per instructions provided in relevant Corning documentation.

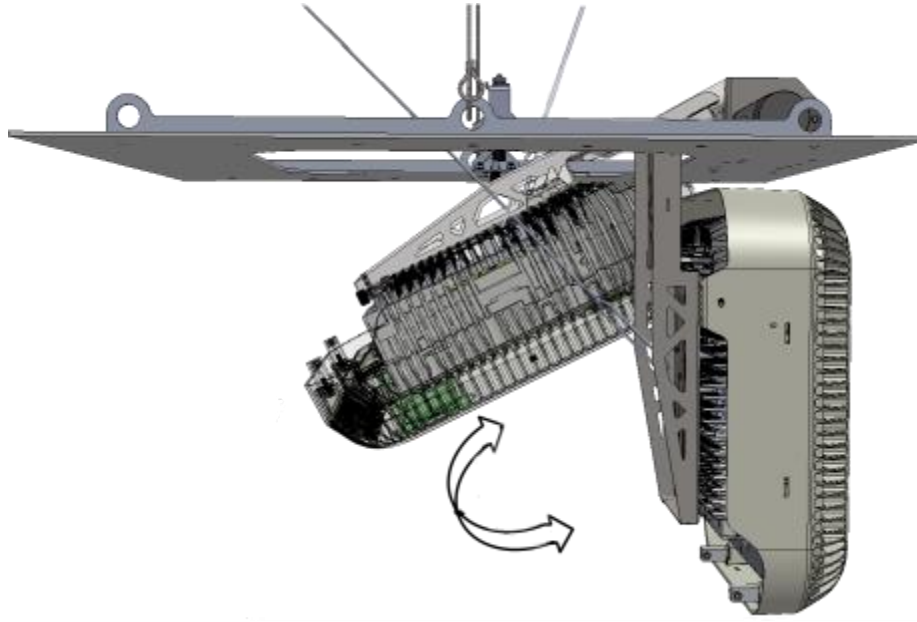


Figure 4-12 Verifying that Cable Path is not Obstructed

7. Lock “Lift Bracket” into plate - push RAU5x and Lift Bracket back up into plate and lock RAU5x into place by closing the rotary knobs in the indicated direction.

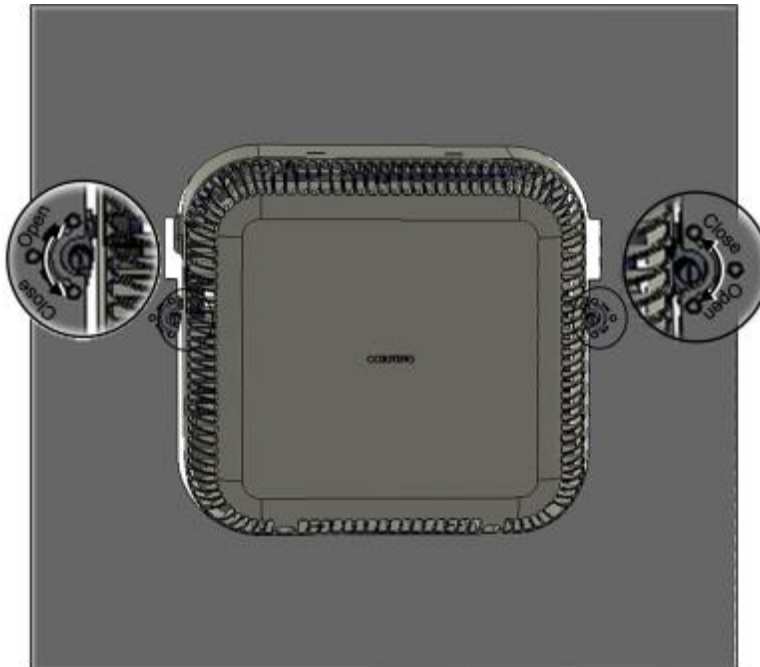


Figure 4-13. Closing Rotary Knobs

8. Fit antenna skirt onto RAU5x.

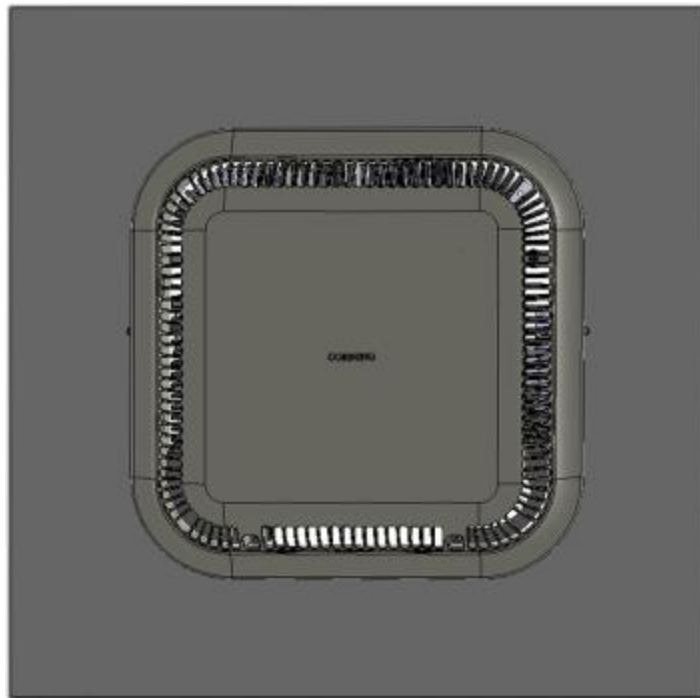


Figure 4-14. Complete Assembled RAU5x

Note: Refer to Section 4.3.2.3 for RAU5x top bracket cap assembly (kit ordered separately) for RAU5x units without Corning external antenna.

4.3.2.3 Top Bracket Cap Assembly

This section provides instructions on how to assemble the cap onto an installed RAU5x and “Top Bracket” assembly which does not include the Corning plug-in external antenna.

Note the following:

- Cap, RAU5x and Top Bracket are each ordered separately.
- **ATTENTION!** In addition to the RAU5x and Top Bracket, the cap must also be secured to a permanent structure using the provided safety cable!
- The cap complies with the 3-in clearance requirement above and below the RAU5x to allow airflow cooling.

Package contents

The BR-TOP-CAP kit consists of the cap for the RAU5x Top Bracket kit.

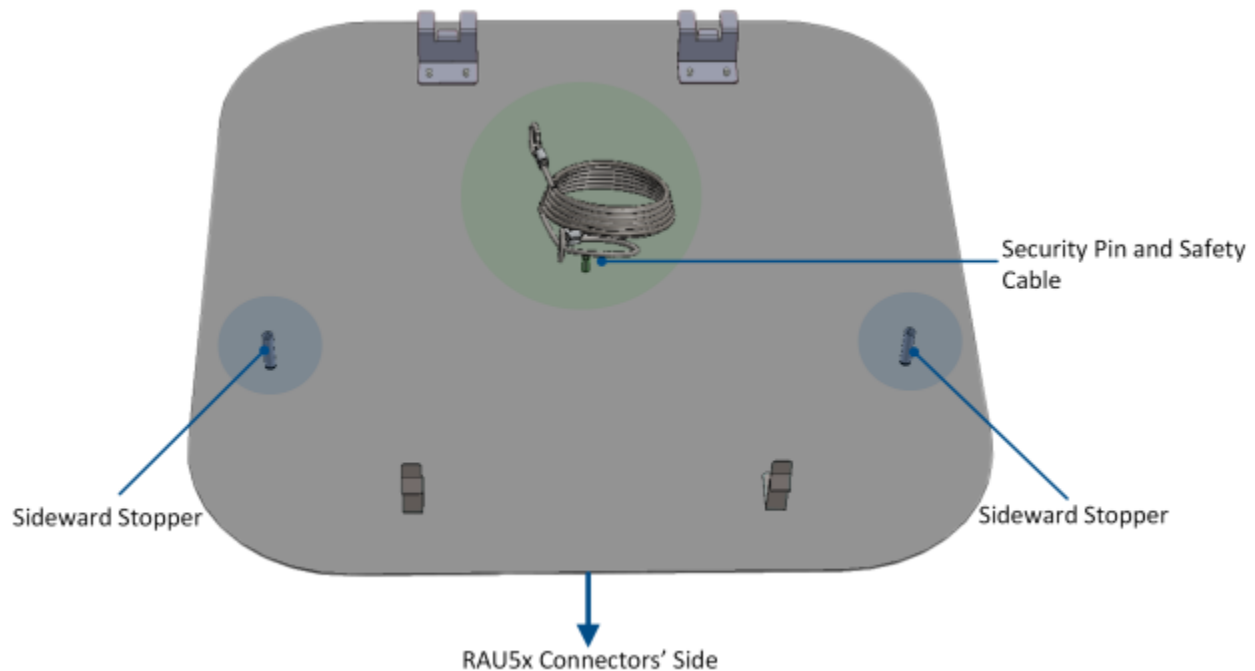


Figure 4-15. BR-TOP-CAP

Additional required items (not provided)

- RAU5x Top Bracket - for installing RAU5x in acoustic ceilings: BR-RAU5US-TOP (ordered separately)
- RAU5x without plug-in external antenna

To assemble the cap

1. Hook wide fasteners onto top bracket plate. Note that the wide fasteners face towards the base of the lift bracket.

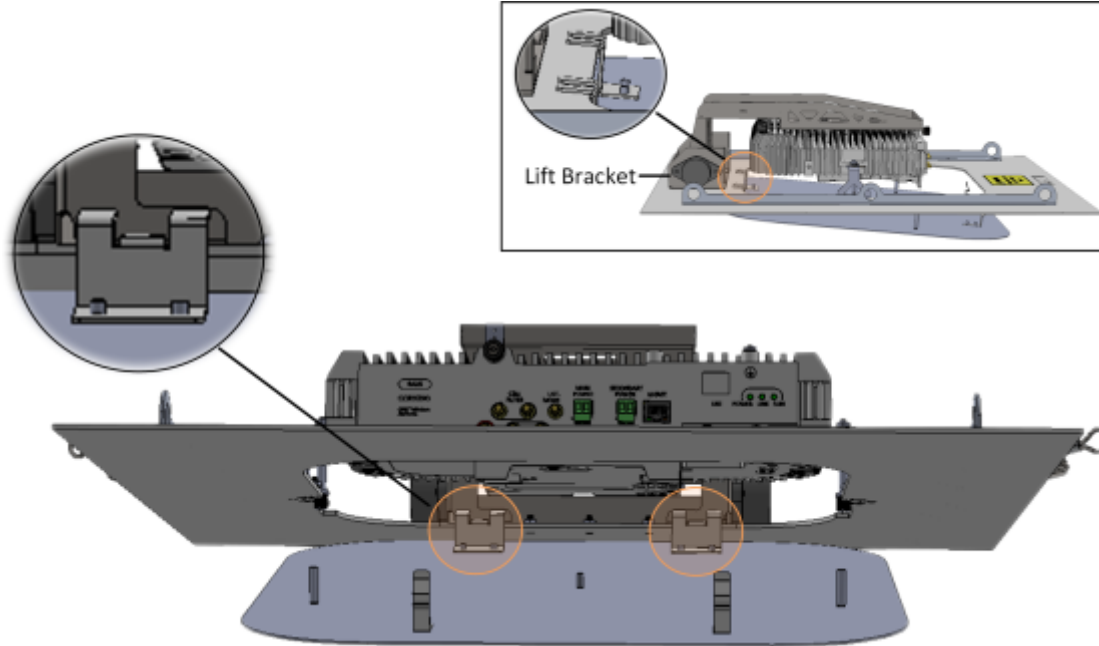


Figure 4-16. Hooking Cap to Top Bracket plate

2. Lift up cap and hook narrow fasteners onto top bracket plate.

IMPORTANT! Before closing cap make sure to secure it to a permanent structure in the ceiling!

⚠ ATTENTION! The site engineer or contracted installer is responsible for all safety issues and procedures on-site!

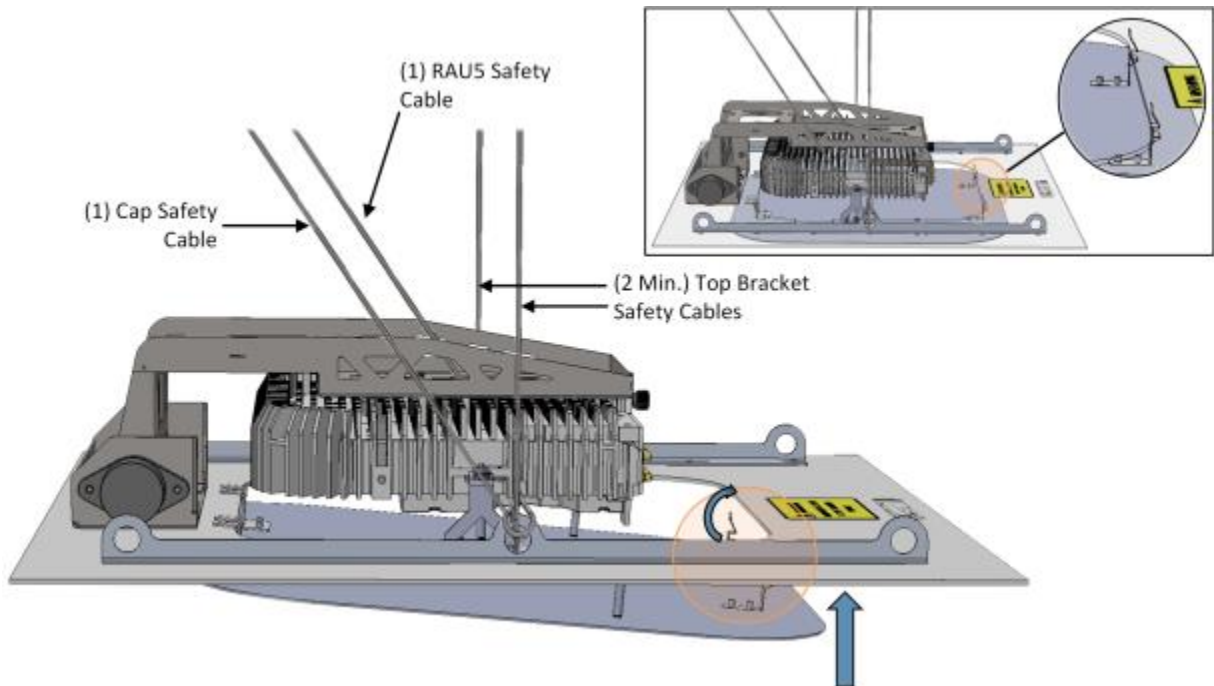


Figure 4-17. Hooking Narrow Fasteners in Place

Corning Restricted

To remove the cap

Refer to following figures for instructions on how to remove cap in order to access the RAU5x.

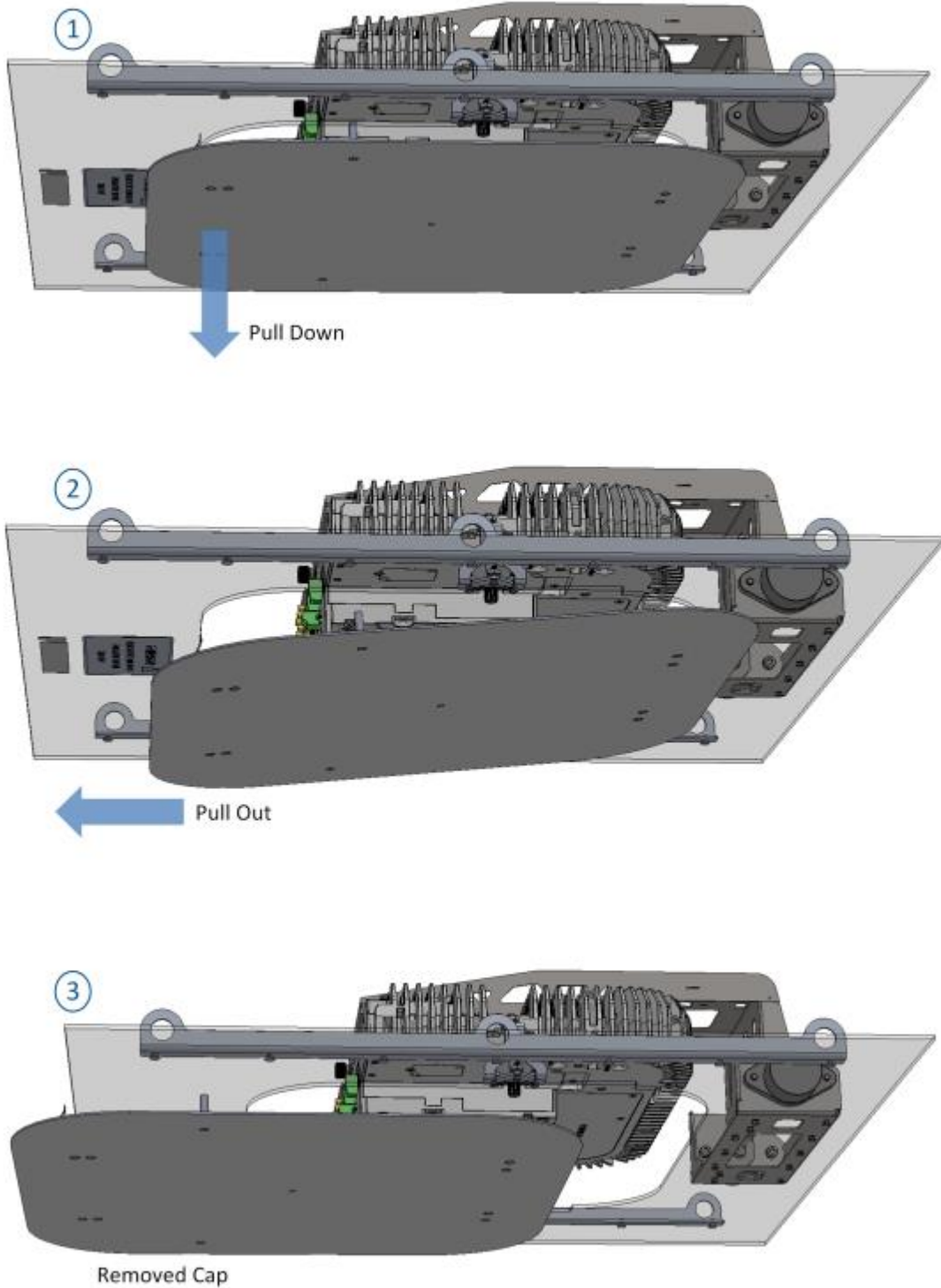


Figure 4-18. Removing Cap

4.3.3 Wall Bracket Mount

This section provides instructions on how to assemble up to two RAU5x units onto the wall-mount bracket and mount assembly onto wall.

Note: In this scenario, RxU67 can only be connected on the side, after completing the mounting.

General Information

- The instructions provided are intended for concrete/brick walls.
- The RAU5x wall-mount bracket is only used with RAU5x models not including the preassembled external antenna.

WARNING: The site engineer or contracted installer is responsible for all safety issues and procedures on-site.

4.3.3.1 Package Contents

The BR-RAU5US-WALL kit consists of the wall-mount bracket and two standard RAU5x brackets preassembled onto each side of the wall-mount bracket door.

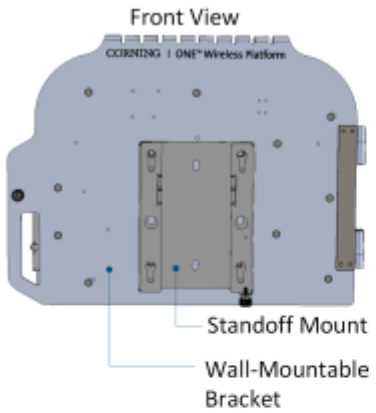
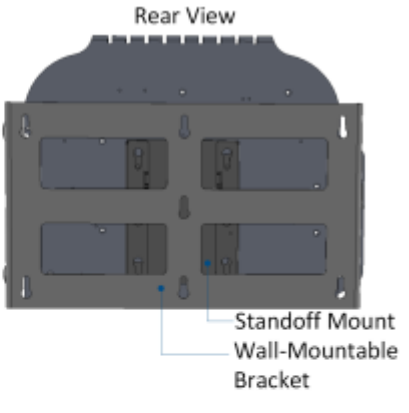
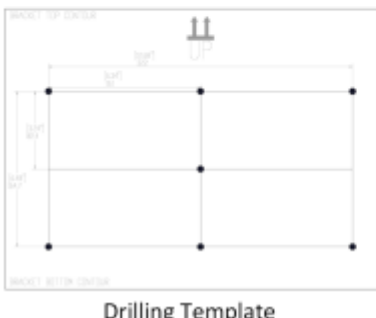
Item	Quantity	
Wall-mount bracket <i>Note: Refer to Appendix A: Bracket Dimensions for wall-mount bracket dimensions.</i>	1	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Front View</p>  </div> <div style="text-align: center;"> <p>Rear View</p>  </div> </div> <div style="text-align: center; margin-top: 20px;">  <p>Drilling Template</p> </div>
Standoff mount (preassembled onto each side of the bracket door)	2	
Drilling template – used for marking holes for drilling	1	

Table 4-3. BR-RAU5US-WALL Kit Package Items

Additional required item (not included):

¼ in bolts (x7) for mounting bracket on wall

4.3.3.2 Installing Wall Mount Bracket and Mounting RAU5x

1. Using the provided drilling template, mark a minimum of four holes to mount the bracket (if drilling only four holes, mark the four outer corner holes).

Note: Image of drilling pattern with required distances also appears in Appendix A: Bracket Dimensions.

IMPORTANT! RAU5x requires 3 in clearing from the surface on the back and front, top and bottom to allow for proper cooling airflow and for heat dissipation.

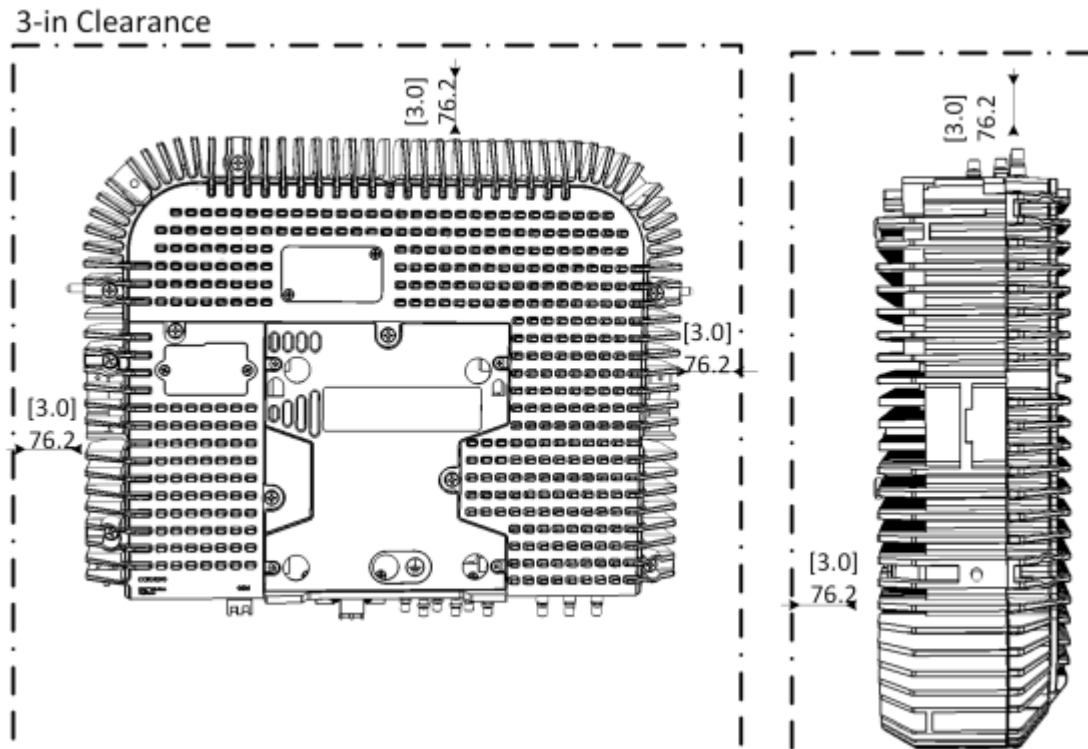


Figure 4-19. Required 3-Inch Clearance from Surface

2. Align bracket with marked holes and drill anchors through bracket keyholes.

ATTENTION! The installer is responsible for accommodating the installation to the surface type.

Note: Insert the bolts in anchors and tighten until bolt head is 0.5" in from surface of wall.

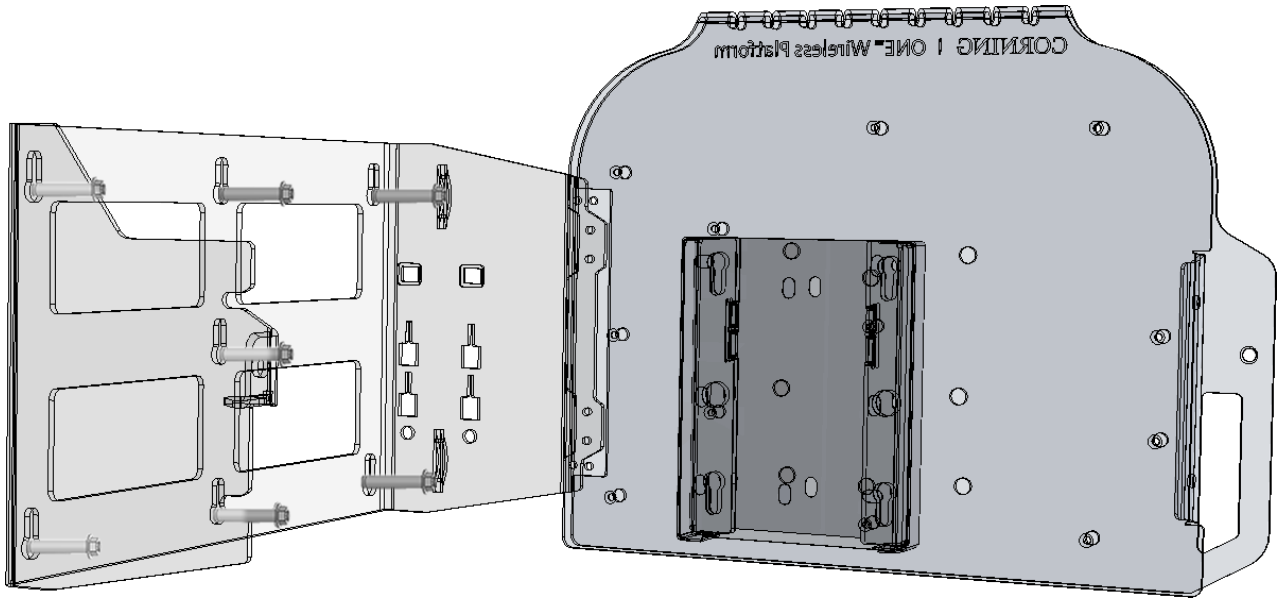


Figure 4-20. Drilling Anchors through Wall-Mountable Bracket Keyholes

3. Hang bracket on anchors and tighten.

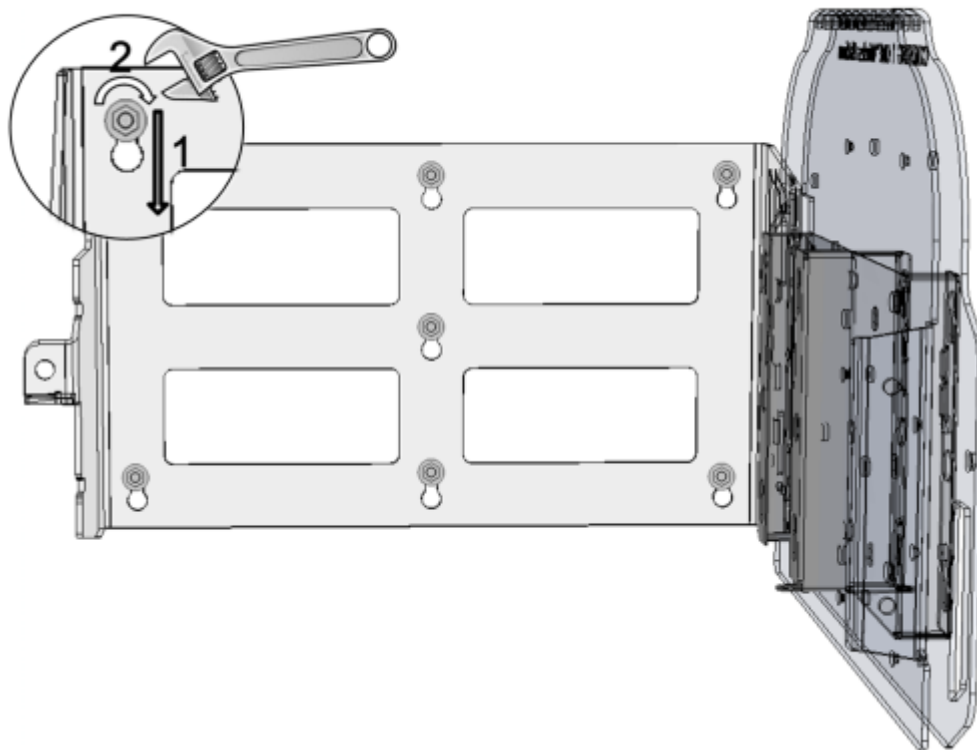


Figure 4-21. Mounting and Securing Bracket to Anchors

4. Mount RAU5x on standoff mount and close captive screw to secure RAU5x to bracket.

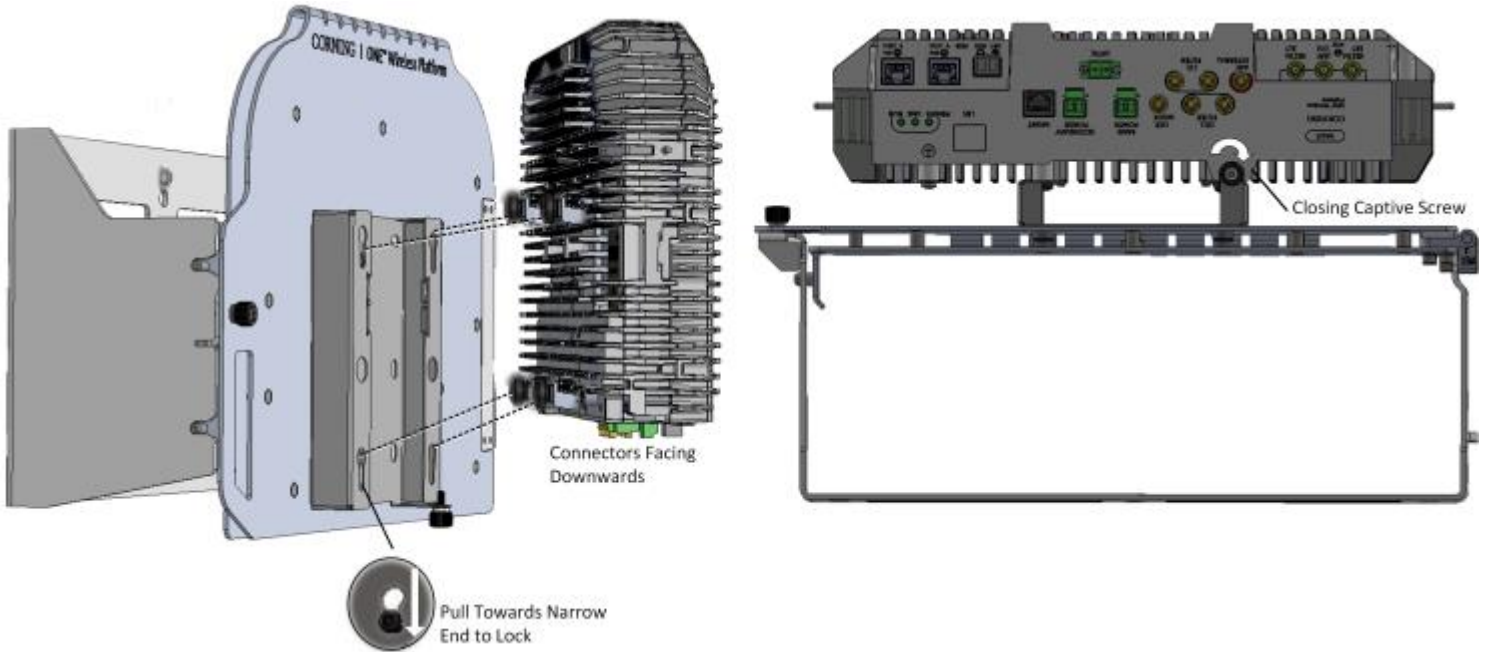


Figure 4-22. Mounting and Securing RAU5x Unit

5. For Second RAU5x – mount on second standoff mount and close captive screw to secure RAU5x to bracket.

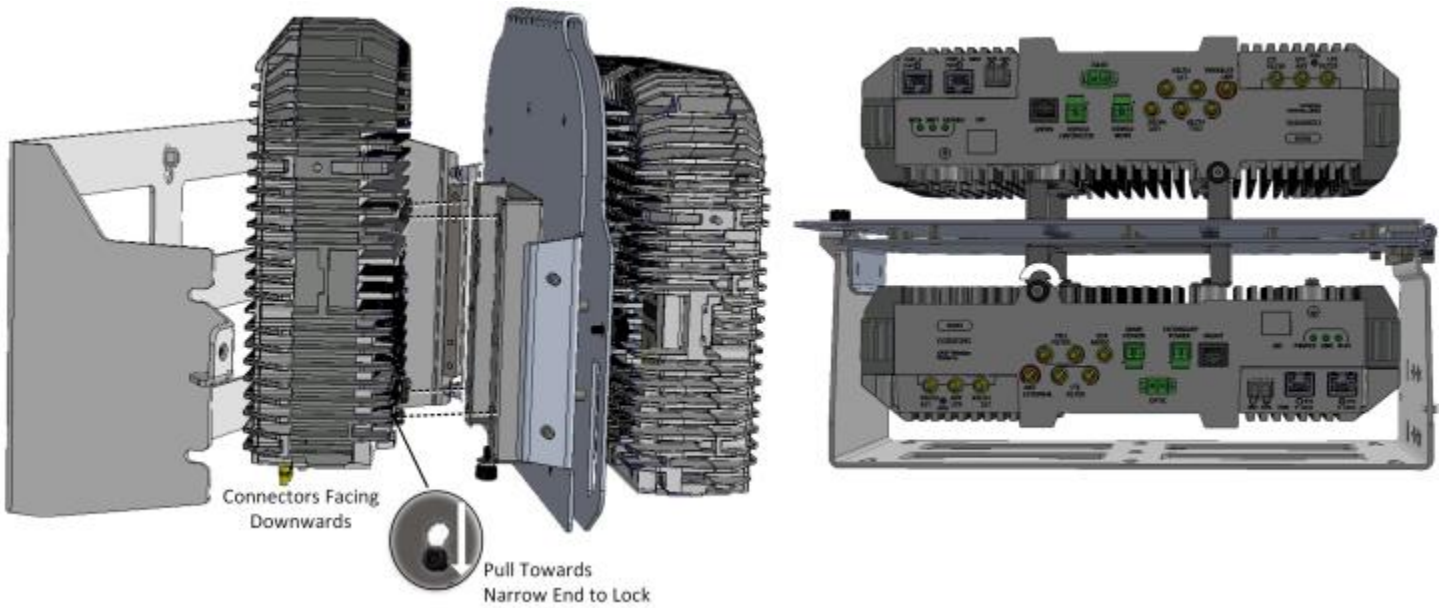


Figure 4-23. Mounting and Securing Second RAU5x

6. Open and close bracket door to verify clearance for routing and connecting cables.

Note: Installer is solely responsible for proper cable wiring and routing of the RAU5x unit per instructions provided in relevant Corning documentation.

7. Lock wall-mount bracket door.

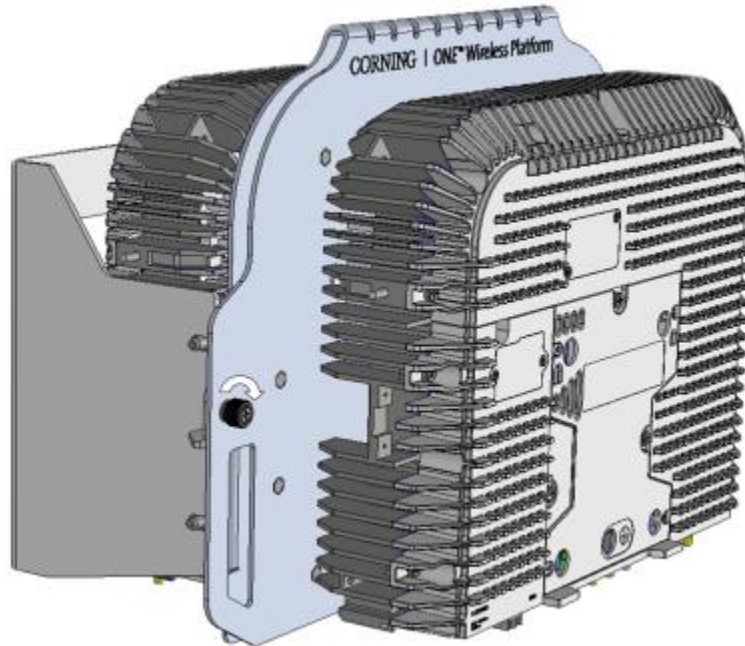


Figure 4-24. Locking Wall-Mount Bracket Door

4.4 Connect the Cables

Note: This section references RAU5x, however connections are performed the same for both RAU5 and RAU5x models.

Note: The cable connections slightly defer for systems with or without add-ons. Refer to the sections relevant to your system deployment.

4.4.1 Locate Required Connection Cables

Locate the following connection cables leading from the cable infrastructure:

- DC wiring:
 - For RAU5x or RAU5x+RxU/RxU2325 configurations - one pair for “Main Power” connection
NOTE: For RAU5x+GEM or RAU5x+ RxU2325+RxU67 configurations- two pairs; one pair for “Main Power” connection. Another pair for “Secondary Power” connection depends on cable AWG and distance from power source, and is according to calculation before the deployment. The RAU will raise an alarm when not enough power to turn on the RxU67.
- Fiber pairs (Corning SMF-28[®] fiber or compatible):
 - For RAU5x module- one fiber pair
 - For RAU5x + GEM — two fiber pairs; one fiber pair for RAU5x and one fiber pair for GEM
- Grounding wire
- For RAU5x models not including external antenna – RF jumper cables from installed external antenna

4.4.2 Connect the Cables

Route the **ground**, **RF**, **fiber** and **power** cables located previously, between the standoff mount bracket and the RAU5x towards the interface connectors.

Note: for each cable connection, two figures are shown: one indicating a configuration without RxU67, and the other showing a greenfield installation WITH Rxu67.

Connect the cables as follows.

- Grounding Connection
- Optical Fiber Connection
- Main Power Connections
- RF Connections
- Antenna Connections

4.4.2.1 Grounding Connection

Connect the earth ground to the unit's 8-32 x 3/8 grounding screw. See Figure 4-25 for location of ground connection.

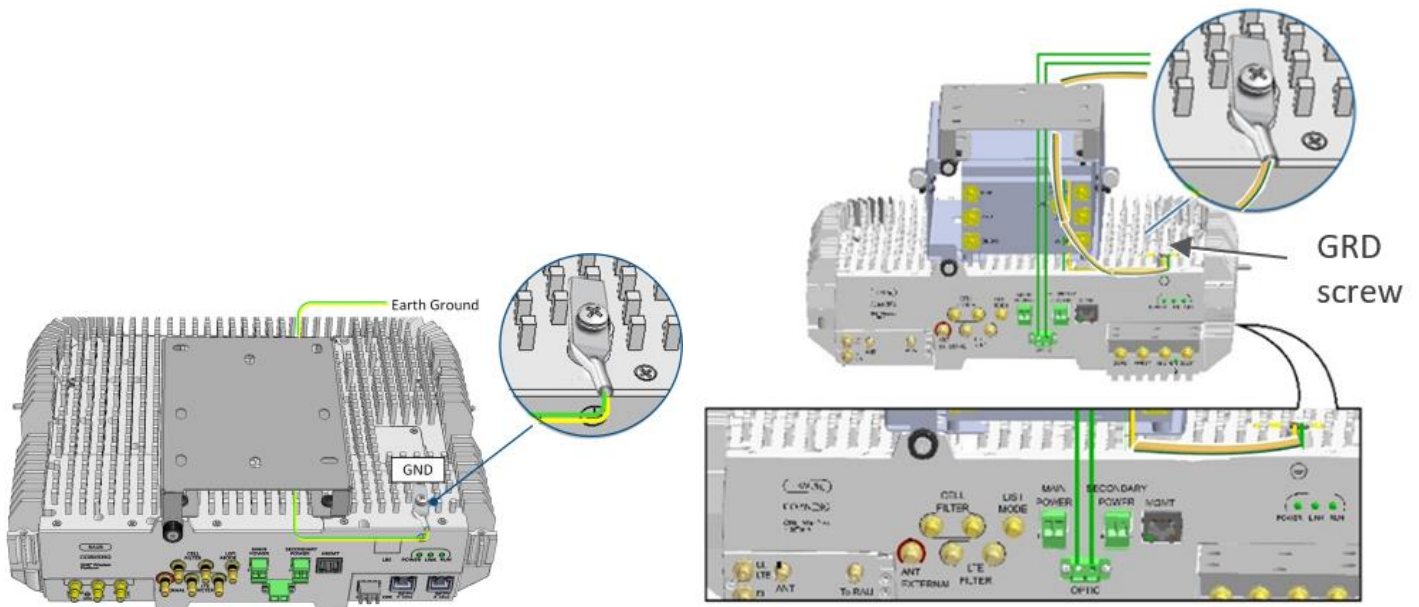
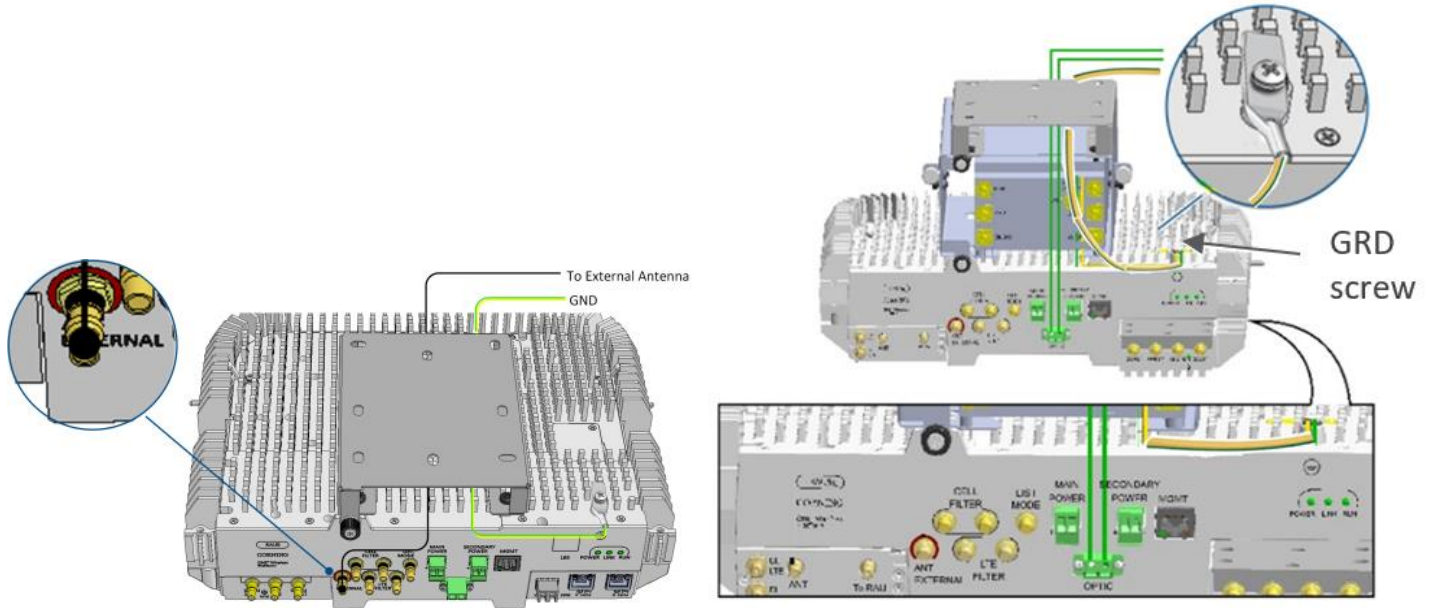


Figure 4-25. RAU5x Grounding and optical fiber pair Connection

4.4.2.2 Optical Fiber Connection

Connect the optical fiber pair to RAU5 module LC APC optical connector (see Figure 4-25)



4.4.2.3 Main Power Connections

Note: The power consumption is the same for both RxU67 and RxU2325 modules.

RAU5x “MAIN POWER” (for RAU5x and RAU5x+RxU67 + RxU2325) DC input power connections (see Figure 4-26)

Connect the DC wire pair to the terminal block connector:

- Power input range: 37 to 57 VDC
- Wire size: 12-30 AWG
- Maximum consumption:
 - RAU5x: 44.5 V; 48 W
 - RAU5x + RxU67: 44.5 V; 73 W

NOTE: Connect the 2nd DC wire pair when there is not enough power!

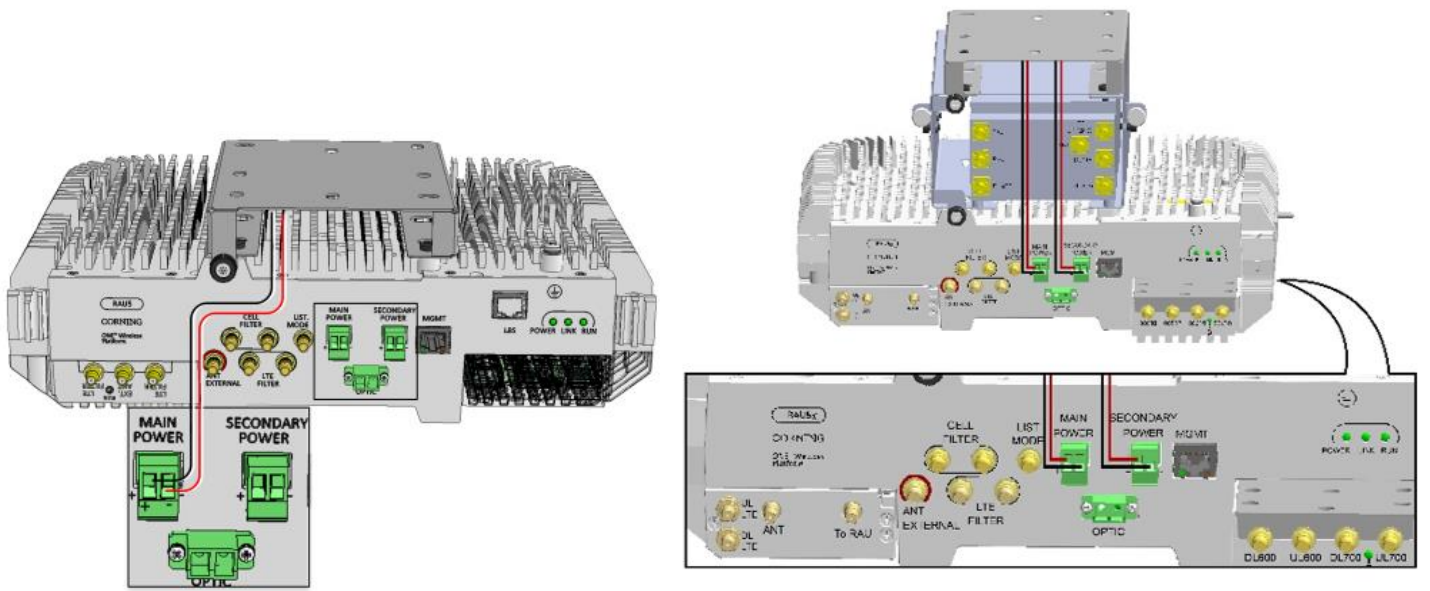


Figure 4-26 RAU5x Main Power DC Connections

4.4.2.4 RF Connections

The RF connections depend on the specific configuration add-ons (with / without RxU67, RxU2325, GEM). Refer to the section relevant to your deployment:

- For Installations that include RxU67 Add-on, 4.4.2.4.1
- For Installations without RxU67, 4.4.2.4.2
- For RAU5x Installations that include RxU2325, 4.4.2.4.3
- For RAU5x Configurations that include GEMs, 4.4.2.4.4

4.4.2.4.1 For Installations that include RxU67 Add-on

Connect the cables between the RxU67 and the cavity Filter

1. Open the RxU67 cable kit
2. Select the cables with the appropriate length for your deployment (cavity on top /on side panels of RAU5x)
3. Connect the cables between the filter and RXU67/RAU according to their color and label

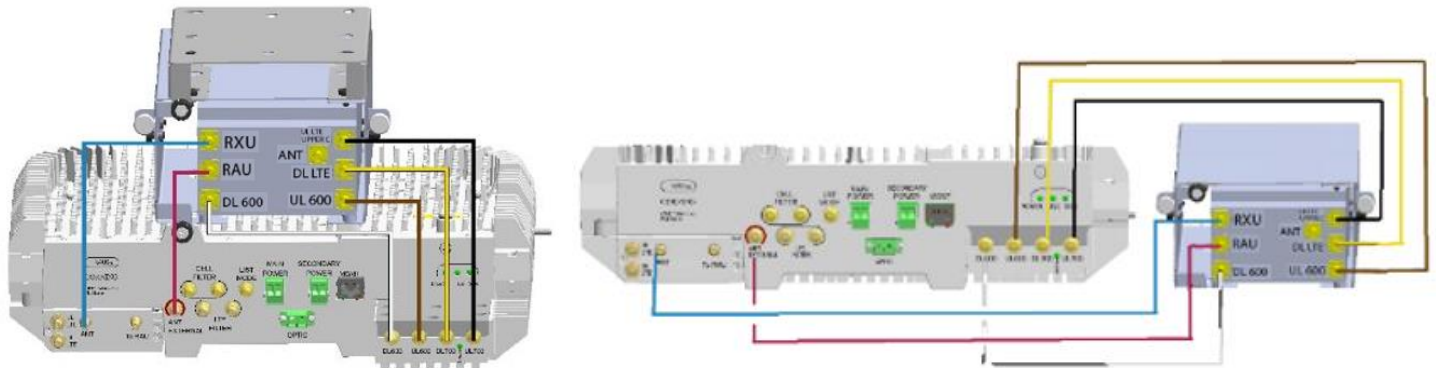


Figure 4-27. RAU5x with RxU67 - Cable Connections to filter

4.4.2.4.2 For Installations without RxU67

Connect optic fiber pair to RAU5x module LC APC optic connector. See Figure 4-28.

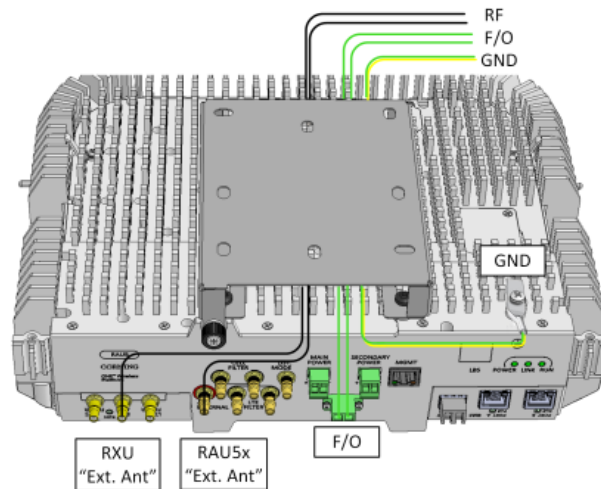


Figure 4-28. Ground, Fiber and RF Cable Connections for RAU5x

4.4.2.4.3 For RAU5x Installations that include RxU2325

- Connect the RxU2325 “ANT.” QMA connector to the external antenna.
- Using the RF jumper (P/N 705A052301), supplied with the add-on, connect the RxU2325 “To RAU” QMA connector to the RAU5x “ANT External” QMA connector.

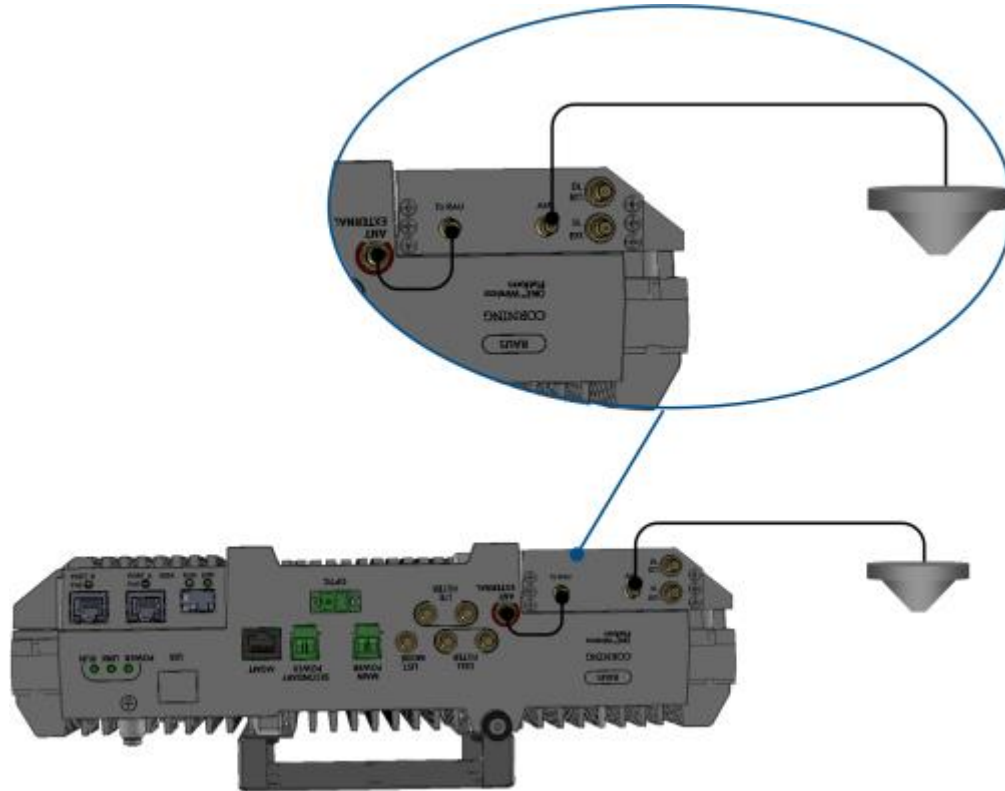


Figure 4-29. RF Connections for RAU5x with RxU2325

- If required by site planner – perform (QMA) UL/DL external connections to external filters.

4.4.2.4.4 For RAU5x Configurations that include GEMs

GEM Connections

1. Connect DC wire pair to the RAU5x Secondary Power DC input connector (see Figure 4-30):

- Wire size: 12-30 AWG
- Maximum consumption:
 - GEM: 4 W (RAU5x: 44.5 V ; 52 W; RAU5x + RxU/RxU2325 + GEM: 44.5 V; 78 W)
 - For 2 PoE ports of 802.3af: 43 V ; 31 W (Input range: 43 – 57 V DC)
 - For 2 PoE ports of 802.3af: 52 V ; 62 W (Input range: 52 – 57 V DC)

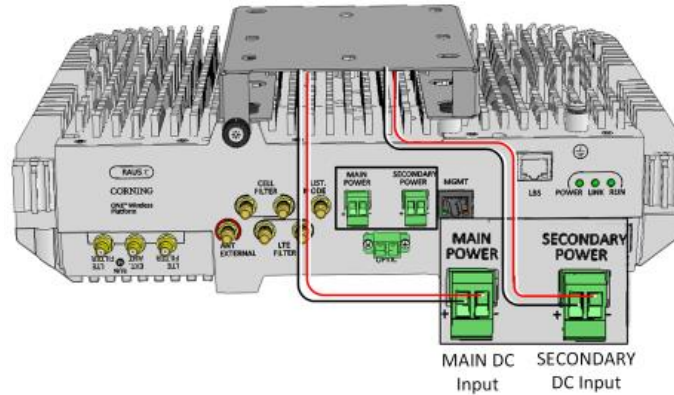


Figure 4-30. RAU5x Main and Secondary DC Input Connections

2. Connect fiber to SFP module ports as follows:

- If using fiber terminated with LC APC (green), connect to pre-inserted APC to UPC adapters
- If using fiber terminated with LC UPC connector (blue), remove pre-inserted APC to UPC adapters and connect directly to SFP module ports.

3. Connect the A and B Ethernet ports to the PoE clients using Ethernet cables.

Note: A and B ports – 10/100/1000 BASE-T with 802.3at compliant Power over Ethernet (PoE+) PSE ports.

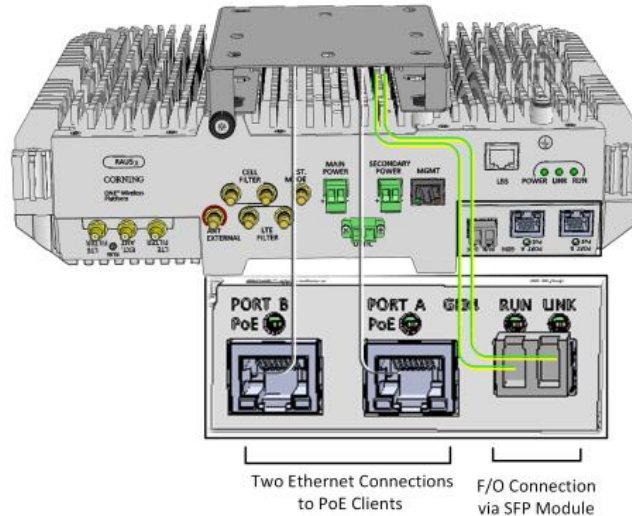


Figure 4-31. GEM Interface Connections

4.4.2.5 Antenna Connections

For RAU5x models not including Corning external antenna:

1. Connect the RAU5x QMA “Ext. Ant.” connector to the external antenna, as illustrated in Figure 4-32.

Note: for RAU5x units installed with RxU2325, the external antenna is connected to the RxU2325 “ANT.” port.

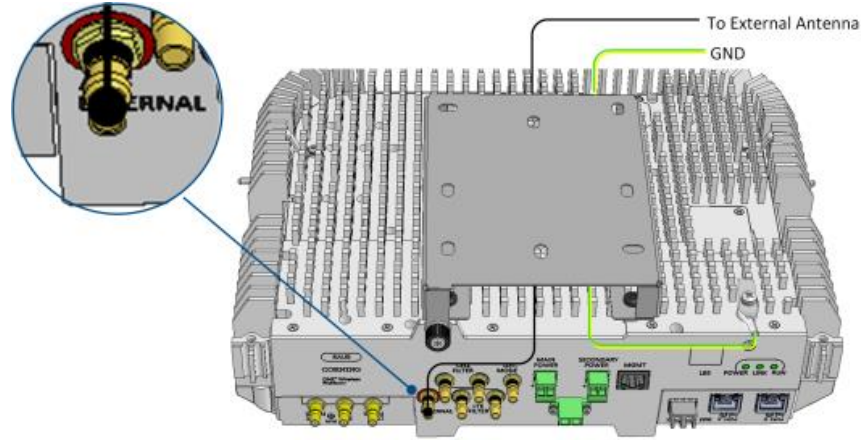


Figure 4-32. RAU5x External Antenna Connection

Note: See Section 3.6 for supported external antenna types.

4.5 Verify Normal Operation

Referring to Figure 4-33 and Table 4-4 verify normal operation of RAU5x, RxU67 and GEM (if installed).

If RxU67 is installed, Verify that the RXU67 LED is lit, indicating it is receiving power.

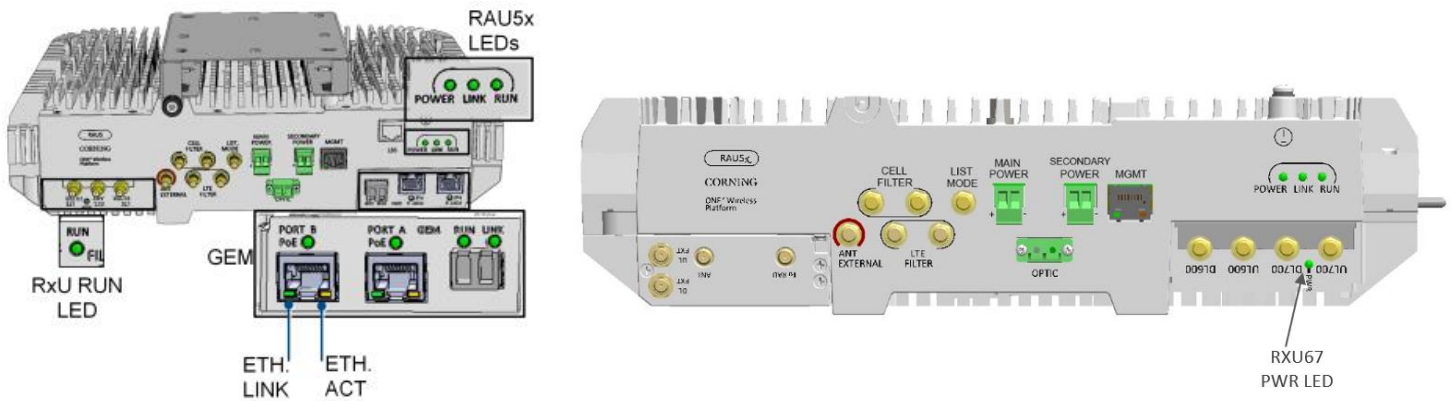


Figure 4-33. RAU5x, RxU67, RxU2325 and GEM LEDs

Module	LED	Description	
RAU5x	LINK	Steady green:	Optical link power to/from the RAU5x is normal
		Blinking green:	Optical power from remote is lower than required
		Off:	No optical link detected
	POWER	Steady green:	Input power detected by RAU5x
		Off:	No power supplied to RAU5x
	RUN	Blinking green:	RAU5x boot up sequence complete and module software up and running
Off:		No power supplied to the unit	
RxU2325	RUN	Blinking green:	RxU2325 boot up sequence complete and module software up and running
		Off:	No power supplied to the unit
RxU67	POWER	green:	RxU67 gets power
		Off:	No power supplied to the unit
GEM	(GEM) RUN/STATUS	Steady green (with short blink every ~ 10 sec):	GEM On/Normal
		Steady yellow:	GEM Fault
	ETHERNET LINK	Steady green:	Link
		Off:	No link
	ETHERNET ACT	Blinking yellow:	Activity
		Off:	No activity
	(SFP) LINK	Steady green:	Link
		Blinking green:	Activity
		Steady yellow:	Fault
		Off:	No link
	(PortA/B) PoE	Steady green:	PoE enabled
		Steady yellow:	PoE fault
		Off:	PoE off

Table 4-4. Normal Operation LED Status Descriptions

The RxU2325 status LED is located on the top side of the module, as shown in Figure 4-34. Verify that the LED shows green, indicating power and normal operation

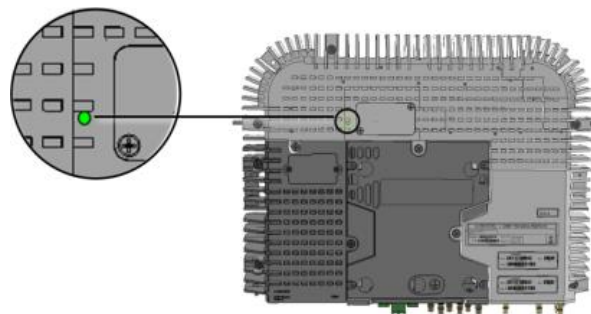


Figure 4-34. RxU2325 Status LED Location

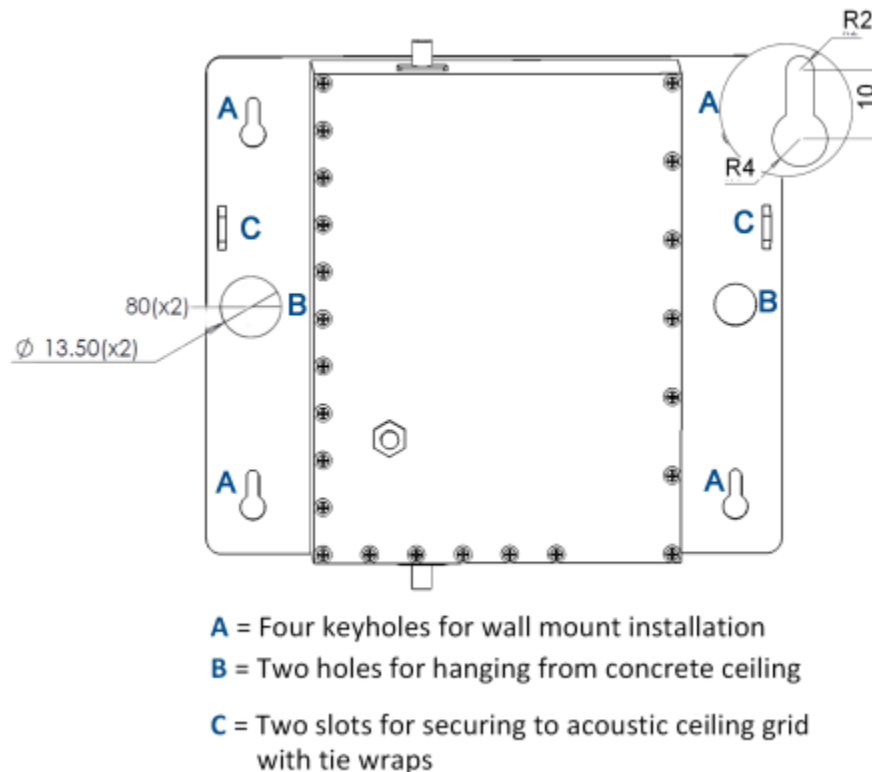
5 RAU5X/RXU2325 CAVITY FILTER INSTALLATION

The external cavity filters are required when the RF services modules supporting the corresponding CELL and LTE bands are deployed alongside units supporting the public safety service.

- The RAU5x supports connections to external CELL and LTE Filters
- The RxU2325 supports connections to an external LTE Filter.
- In cases where an LTE External Filter is required and the RAU5x includes the RxU2325 module – both modules must be connected to an external LTE filter.

Note the following:

- The cavity filter mounting bracket supports wall/ceiling/acoustic ceiling installations. See Figure 5-1.



- A** = Four keyholes for wall mount installation
B = Two holes for hanging from concrete ceiling
C = Two slots for securing to acoustic ceiling grid with tie wraps

Figure 5-1. Cavity Filter Dimensions and Mounting Holes

- Consider the length of the RF jumpers (3 m) and the distance from the RAU5x when determining the installation location.
- For acoustic ceiling installations – use provided safety cable to secure the filter assembly to a permanent structure within the ceiling (e.g., acoustic ceiling grid or concrete ceiling above).

5.1.1 Package Contents

Check your package contents to verify that the items in the packing list are included. If any of the listed items are missing, contact your Corning representative.




Item	Description	Quantity	
Cavity Filter (depends on order)	CVT800 - 836.5MHz; 0.5W; 824-849MHz; IL=1.6 dB max.; SMA	1	 CVT800 CVT700
	CVT700 – LTE; 0.5W; 698-716MHz; 777-787MHz; IL=1.5 dB; SMA		
Mounting Bracket	Provides wall mount and ceiling mount installation options (pre-assembled with filter)	1	
Safety Cable	Required for acoustic ceiling installations	1	
RF Jumpers	SMA to QMA RF jumpers; L=3m; Used for RAUx/RxU filter connections	2	

Table 5-1. Cavity Filter Package Items

5.1.2 (Concrete) Ceiling Mounting Option

To mount Cavity Filter on Concrete Ceiling

- Using the two holes (Item B in Figure 5-1) as a guide, mark the location of the holes to be drilled in the ceiling.
- Drill the holes in ceiling corresponding to the diameter of the toggle anchors to be used (not provided).
- Mount the Cavity Filter as shown in Figure 5-2.

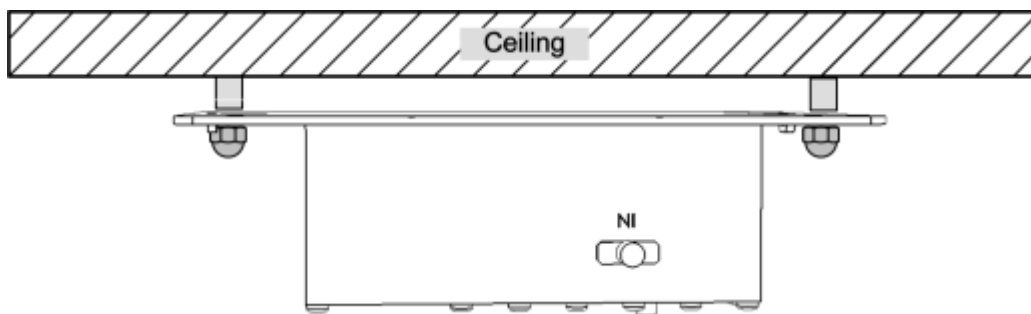


Figure 5-2. Illustration of Cavity Filter Mounted on Ceiling

5.1.3 Acoustic Ceiling Mount Installation

In acoustic ceiling mount installations, the Cavity Filter can be fastened to the grid by slipping tie wraps through slits on the bracket (Item C in Figure 5-1) and securing the assembly to the grid with the provided safety cable. Refer to Figure 5-3.

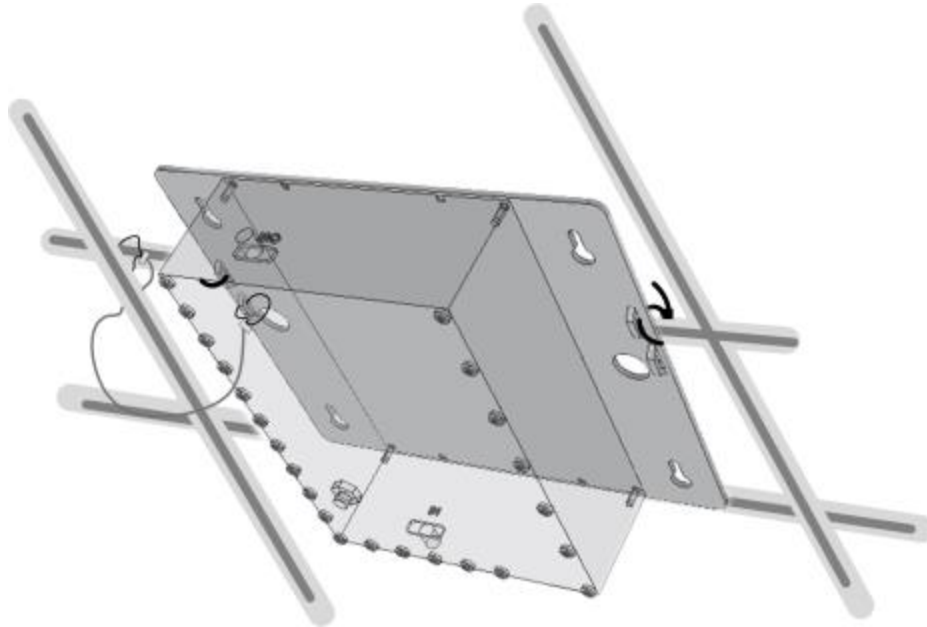


Figure 5-3. Illustration of Cavity Filter Mounted on Acoustic Ceiling Grid

5.1.4 Wall Mount Installation

To mount Cavity Filter on Wall

5. Using the four key holes (Item A in Figure 5-1) as a guide, mark the location of the holes to be drilled in the wall.
6. Drill the holes in the wall corresponding to the diameter of the anchors to be used (not provided).

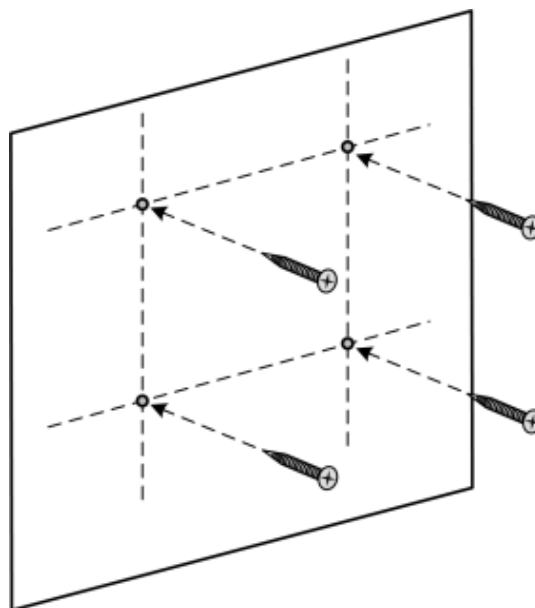


Figure 5-4. Marking and Inserting Anchors in Wall

7. Hang the Cavity Filter on the anchors/screws and pull down to lock in narrow end of key hole. Refer to Figure 5-5.

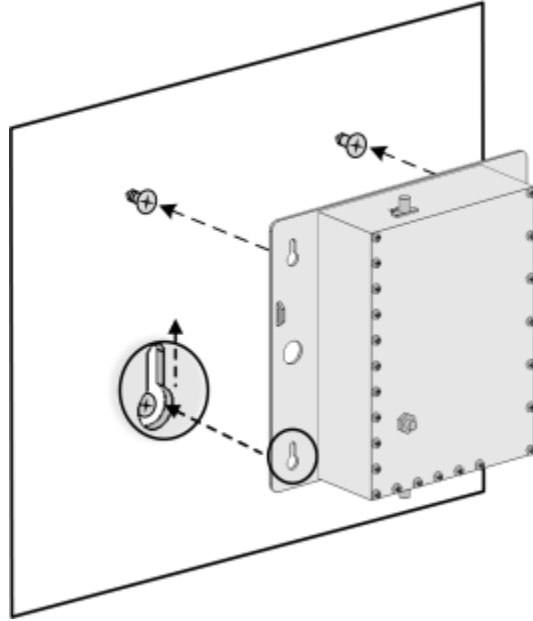


Figure 5-5. Mounting Cavity Filter on Wall

5.1.5 Filter Connections

Using the provided SMA to QMA RF jumpers, connect the Cavity Filter IN and OUT QMA ports to the corresponding filter (CELL/LTE) SMA connectors on the RF module.

Note: In installations where additional units are deployed which support the 700 MHz band and the RAU5x is installed with an RxU – both RAU5x and RxU must be connected to an external LTE filter. See Figure 5-6 and Figure 5-7.

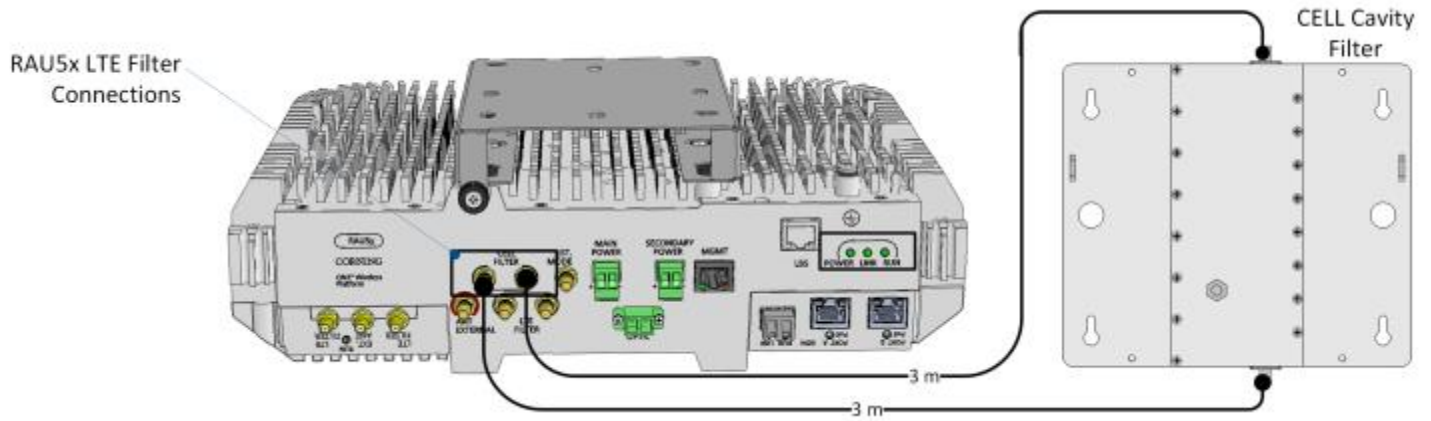


Figure 5-6. Example of RAU5x External CELL Filter Connections

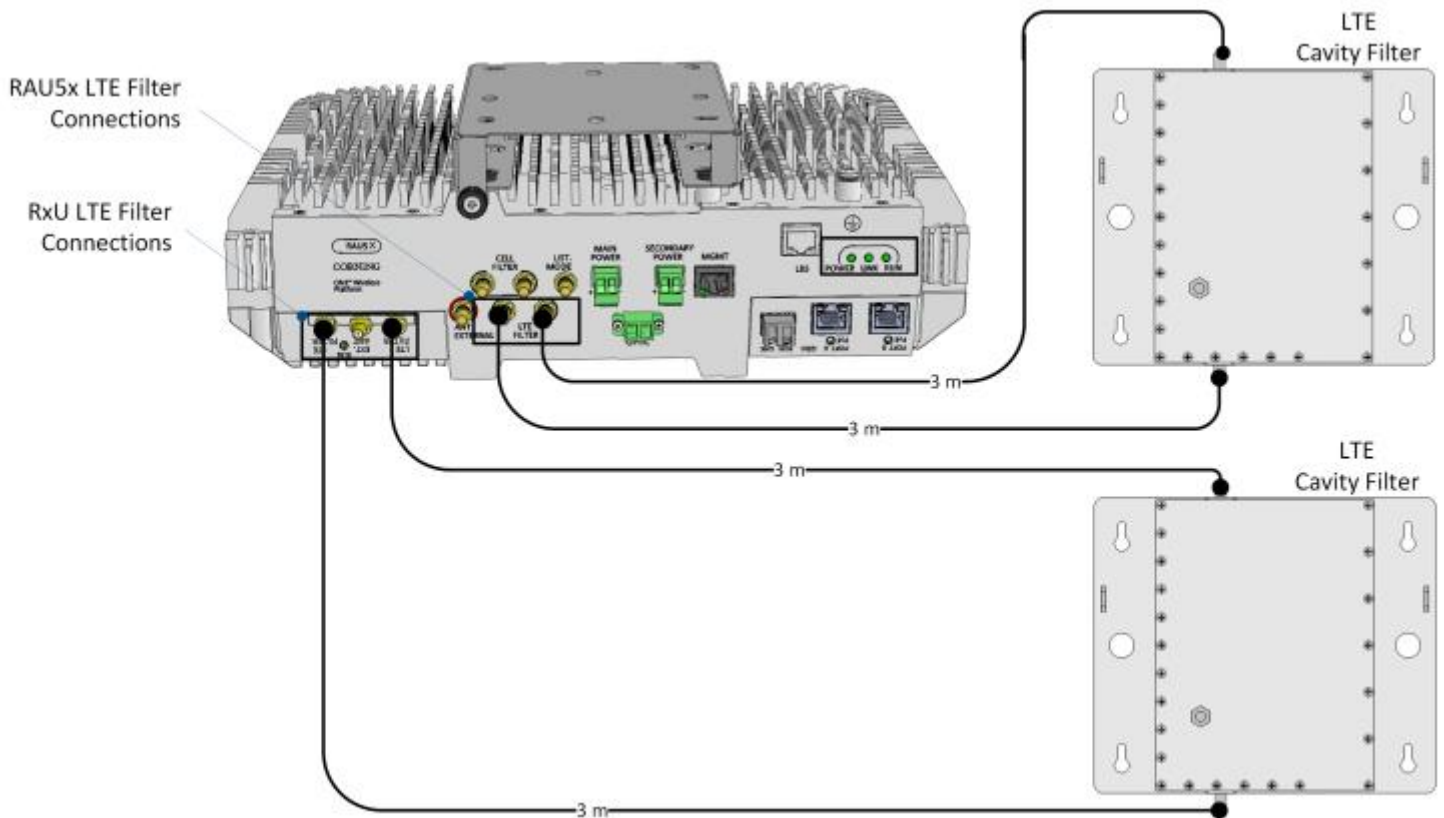


Figure 5-7. Example of RAU5x and RxU External LTE Filter Connections

6 APPENDIX A: BRACKET DIMENSIONS

Standoff Mount

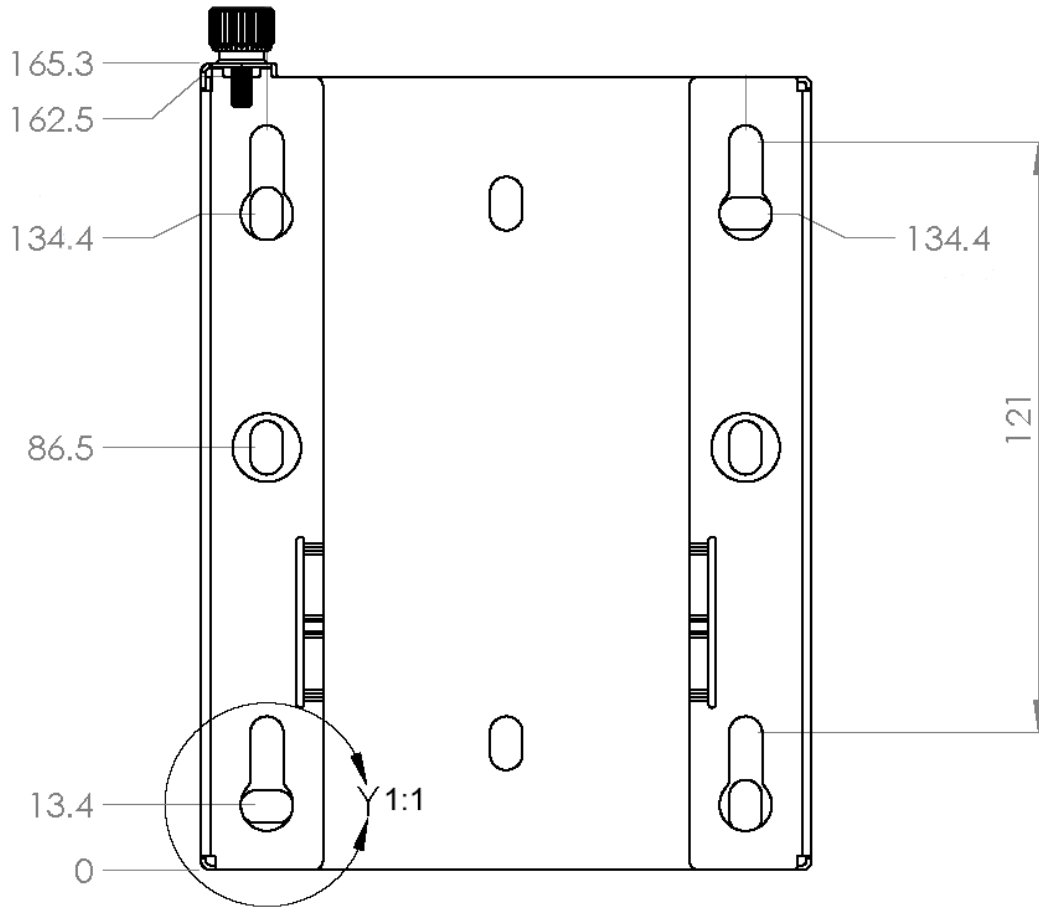


Figure 6-1. Standoff Mount Dimensions

Top Bracket

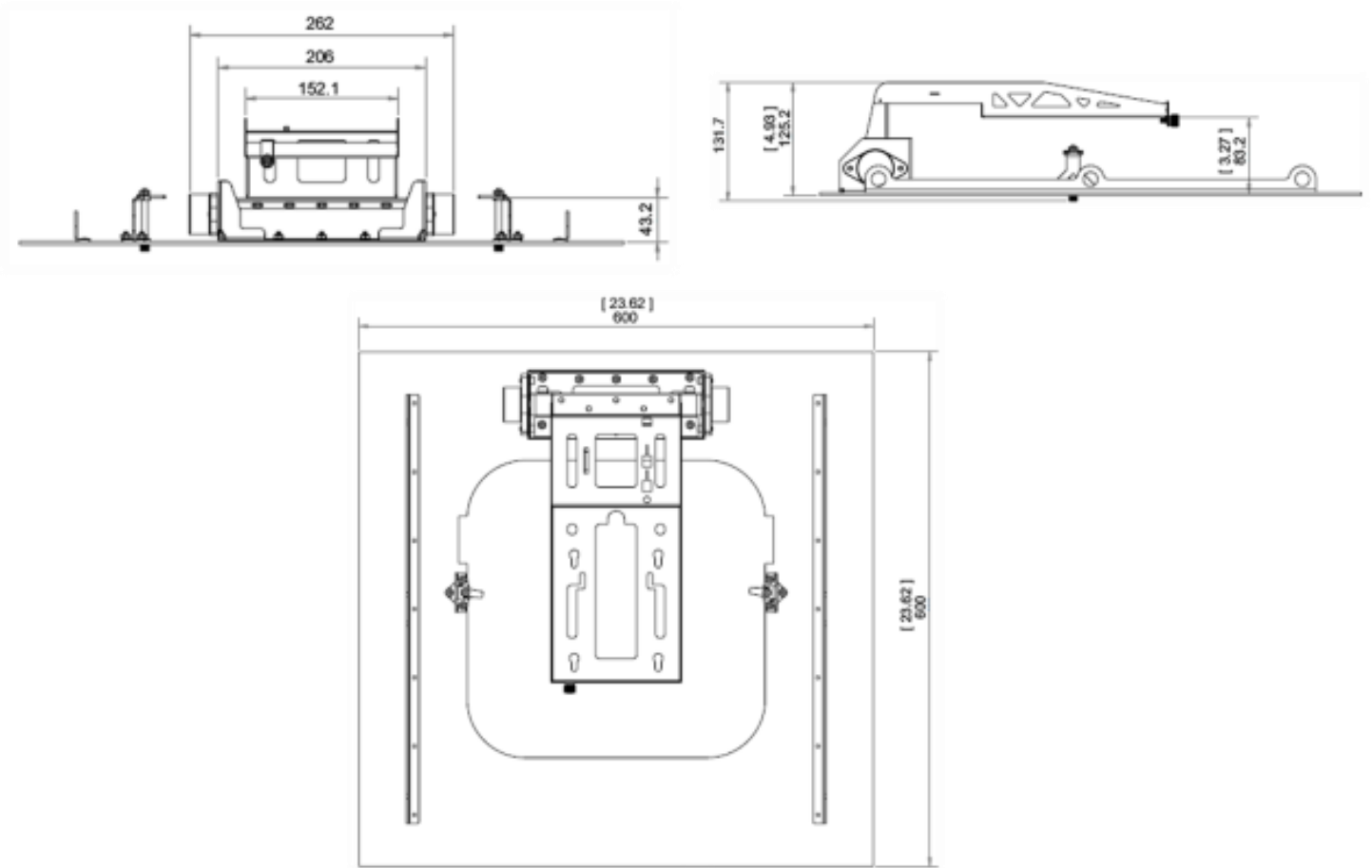


Figure 6-2 RAU5x Top Bracket Dimensions

Wall-Mountable Bracket

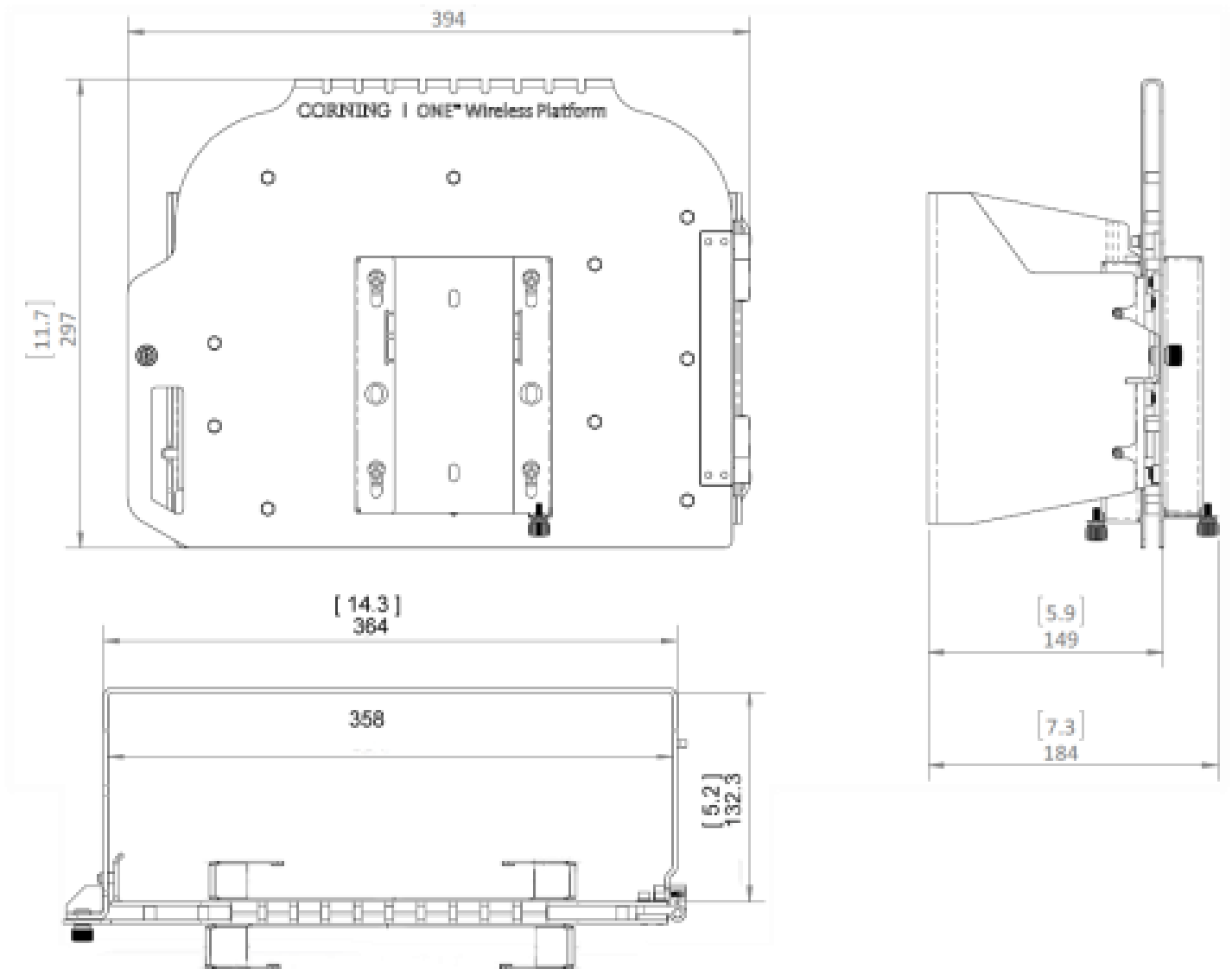


Figure 6-3. RAU5x Wall-Mountable Bracket Dimensions

Wall-Mountable Bracket - Drilling Pattern Dimensions

Note: The drilling pattern template is provided with the wall-mountable bracket kit (P/N: BR-RAU5US-WALL).

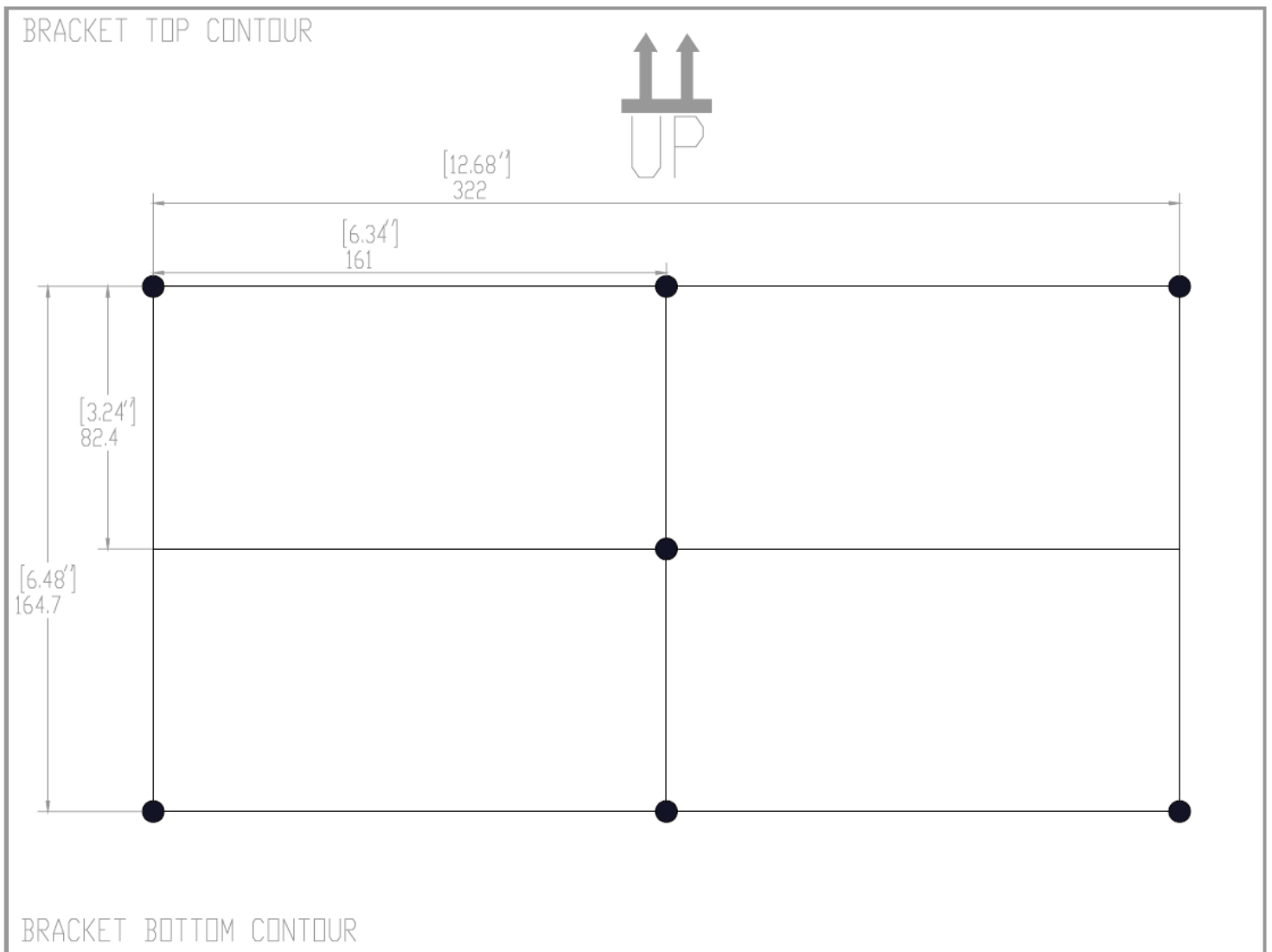


Figure 6-4. RAU5x Wall-Mountable Drilling Pattern Dimensions

7 APPENDIX B: UPGRADES

This section describes how to upgrade the RAU5x with an RxU67, RxU2325, and/or GEM plug-in module for units ordered initially without these modules installed.

7.1 Package Contents

Each plug-in module is ordered separately. Check the package contents for external damage.

7.1.1 RxU67 Package

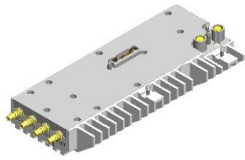

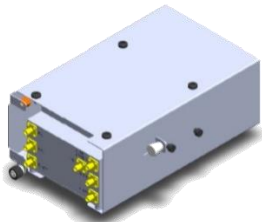
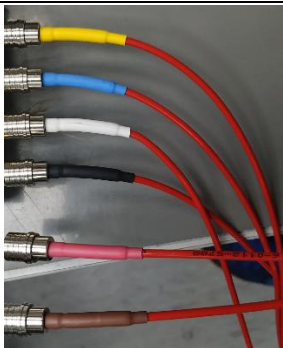
Item Description	Quantity	Picture	P/N
RxU67 module	1		AK-RXU67-Module
RXU67 on RAU Mounting Bracket (for cavity filter)	1		AK-RXU67-BRKT 702A100801
RXU67 cavity filter	1		AK-RXU67-FILTER 702A100801
<p>Cables</p> <p>3 Cable Kits are available, for 3 different cable sizes. Each kit includes 6 RF cables marked by 6 different colors.</p> <ul style="list-style-type: none"> • RXU67 Cable kit ,300mm, QMA o QMA, for top mount installation • RXU67 Cable kit ,520mm, QMA o QMA, for side or top mount installation • RXU67 Cable kit ,800mm, QMA o QMA, for rear, side, top mount /MIMO bracket installation 	6		<ul style="list-style-type: none"> •AK-RXU67-CBL-300 •AK-RXU67-CBL-520 •AK-RXU67-CBL-800

Table 7-1 RxU67 Package Contents

7.1.2 RxU2325 Package


Item Description	Quantity	Picture
Remote Expansion Unit supporting 2300 MHz and 2500 MHz bands (RxU2325)	1	

Table 7-2. RxU2325 Package Contents

7.1.3 GEM Package




Item Description	Quantity	Picture
Gigabit Ethernet module (GEM)	1	
SFP – Fiber UPC Module (pre-inserted)	1	
UPC to APC Adapter	2	

Table 7-3. GEM Package Contents

7.2 Installing the Plug-in Module in the RAU5x

General Information

- There is no need to dismount the RAU5x from mounting surface.
- The RxU67/RxU2325 and GEM are hot-swappable and do not require disconnecting cables leading from the ceiling or power.

Before installing plug-in module

- For RAU5x units mounted with top bracket (described in Section 4.3.2):
 - For installations with cap – remove cap (refer to Section 4.3.2.3)
 - Pull the lift bracket down
- For RAU5x units with assembled broadband antenna – open antenna by pushing in on the pins on both sides of the antenna cover and pulling on the side handles, as show in Figure 7-1.

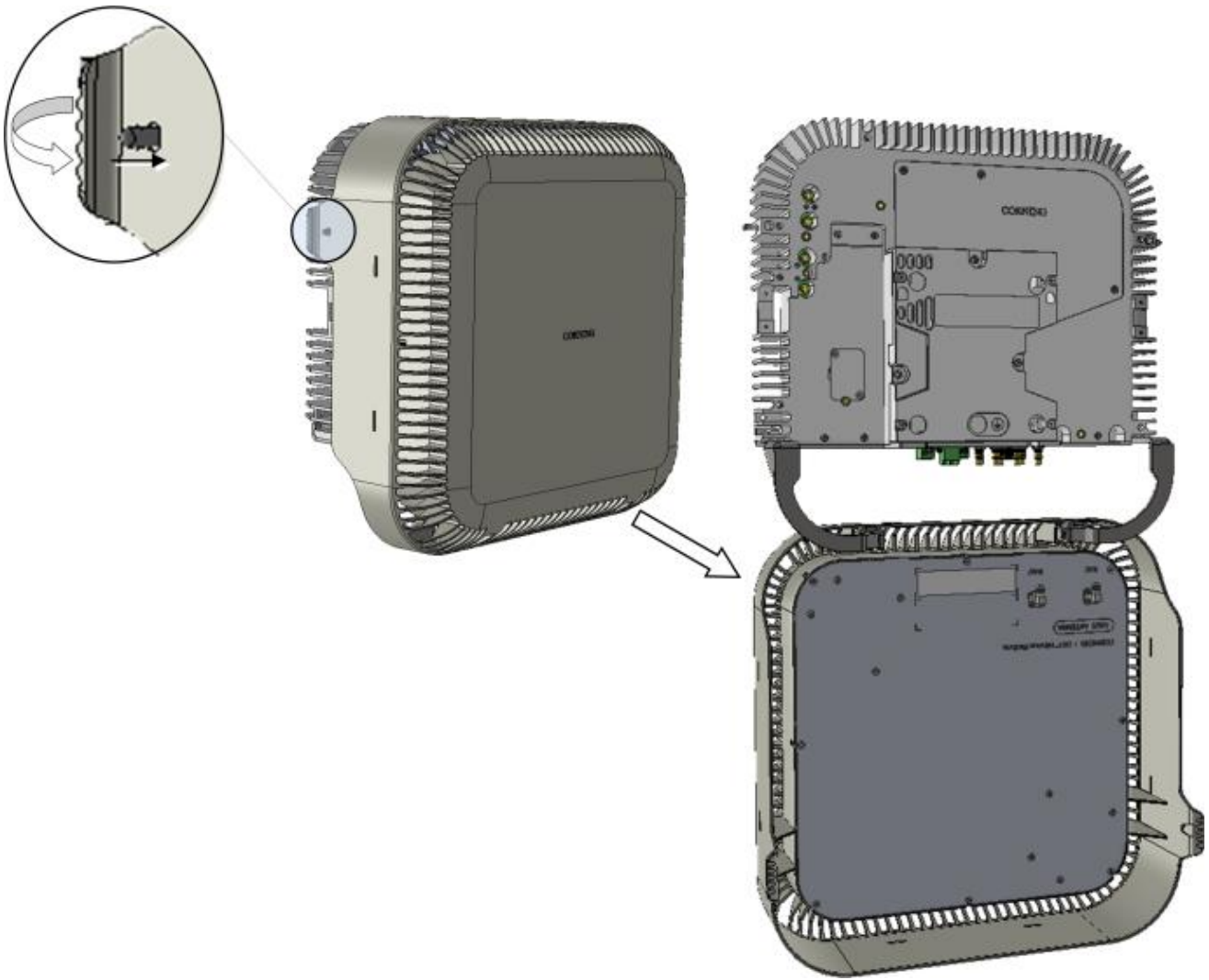


Figure 7-1. Opening RAU5x Antenna

7.2.1 Connect RxU2325 and/or GEM to the RAU5x

To install RxU2325 and/or GEM plug-in module in RAU5x :

1. Plug-in module as follows:

- RxU2325 – plug-in RxU2325 into right side of the RAU5x as indicated in Figure 7-2 (area highlighted in green in inset) and close the two screws to secure in place.
- GEM - plug-in GEM into left side of the RAU5x as indicated in Figure 7-2 (area highlighted in blue in inset) and close the screw to secure in place.

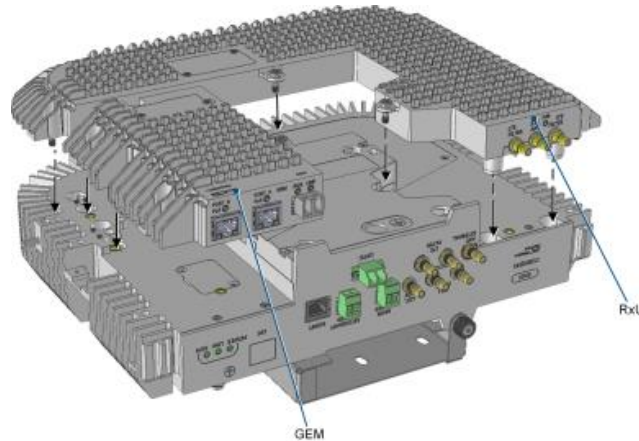


Figure 7-2. Plugging-in RxU2325 and GEM

NOTE: RxU67 is installed instead of GEM

2. For units with broadband antenna – close antenna.

3. For RxU2325:

- With external antennas from other vendor - connect RxU “EXT. ANT.” QMA connector to an external antenna for MIMO coverage
- With Corning external antenna – connect RxU “EXT. ANT.” QMA connector to the external antennas’ “RxU” QMA port using RF jumper.

Note: If cavity filter connections are required for the LTE 700 MHz band – refer to Section 5 for relevant connections.

4. For GEM — refer to Section 4.4.2.4.4 for GEM connections.

5. Verify that RAU5x LEDs on front panel indicate normal operation status:

LED	Description
LINK	Steady green - Optical link power to/from the RAU is normal
	Blinking green - Optical power from remote is lower than required
	Off – No optical link detected
POWER	Steady green - Input power within required range detected
	Off – No power supplied to RAU
RUN	Blinking green – RAU boot up sequence complete and module SW up and running
	Off – No power supplied to unit

Table 7-4. RAU5x LED Descriptions

6. For units installed with top bracket – push lift bracket into place.

7. For units with top bracket cap – replace cap (see Section 4.3.2.3).

Corning Restricted

7.2.2 Connect an RxU67 to the RAU5x

For existing (brown-field) installations, where RxU67 is added to an already installed unit: follow the steps below to connect the RxU67 to the RAU5x.

Note: When RxU67 is added to an already installed RAU5x, the cavity filter is connected differently: on the RAU5x side panel. For this scenario, refer to the on-site expansion instructions.

To install RxU67 plug-in module in RAU5x :

7.2.2.1 Connect the RxU67 unit to the RAU5x

1. Remove the cover from the RAU5x's bottom-side digital connector.
2. Attach and snap the RxU67 unit to the RAU5x bottom's corresponding connectors.
3. Use a Philips screwdriver to secure the RxU67 to the RAU5x by fastening four captive screws.

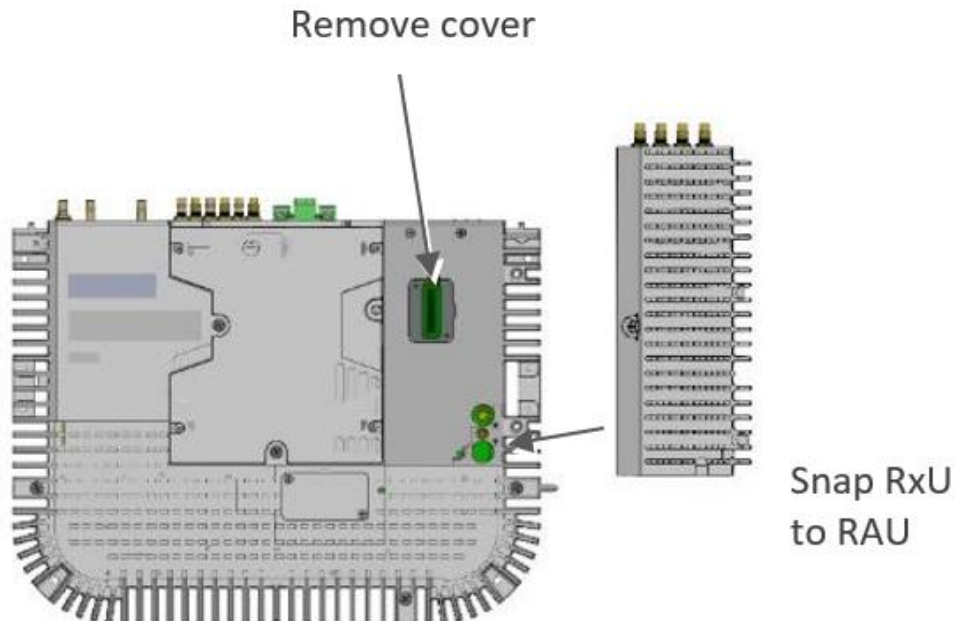


Figure 7-3. Attach RxU67 to RAU5x

7.2.2.2 Assemble the Cavity filter

Note: When performing RAU5x green-field standoff installation (either ceiling or wall), the cavity filter is connected to the RAU5x top.

For wall bracket mount, the cavity filter is connected to the side, after mounting the RAU5x.

7.2.2.2.1 Select cavity filter positioning on the RAU

Select the optimal location for attaching the cavity filter to the RAU (Right, Left or back of the RAU)

- **For dual bracket-wall-mounted RAUs:**
 - For the inner RAU unit (closer to the wall): the cavity filter will be connected to the BACK of the unit
- **For single bracket-wall-mounted RAUs:** the filter can be positioned on either side or back
- **For ceiling mounted RAUs:** the filter can be positioned on either side or back

Note: ensure the filter's connectors are facing the same direction as the RAU and RXU connectors!

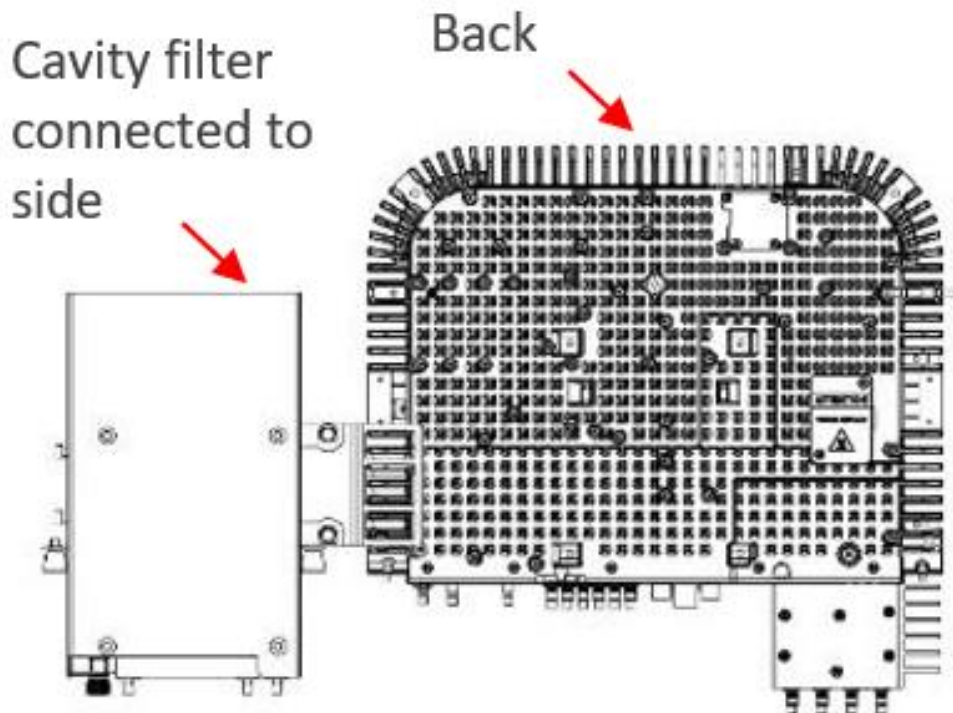


Figure 7-4. Select position for the cavity filter

7.2.2.2.2 Connect the RXU67-on-RAU Mounting Bracket to the RAU

1. Access the RAU (if needed – e.g. for dual-mounted RAUs – open the mounting door).
2. Selected the optimal mounting position (see previous section)
3. Open the RXU67-on-RAU Mounting Bracket by releasing the screw.
4. Slide the bracket on the RAU unit, on top of the fins.
5. Secure the bracket to the RAU by closing the screw manually and firmly.

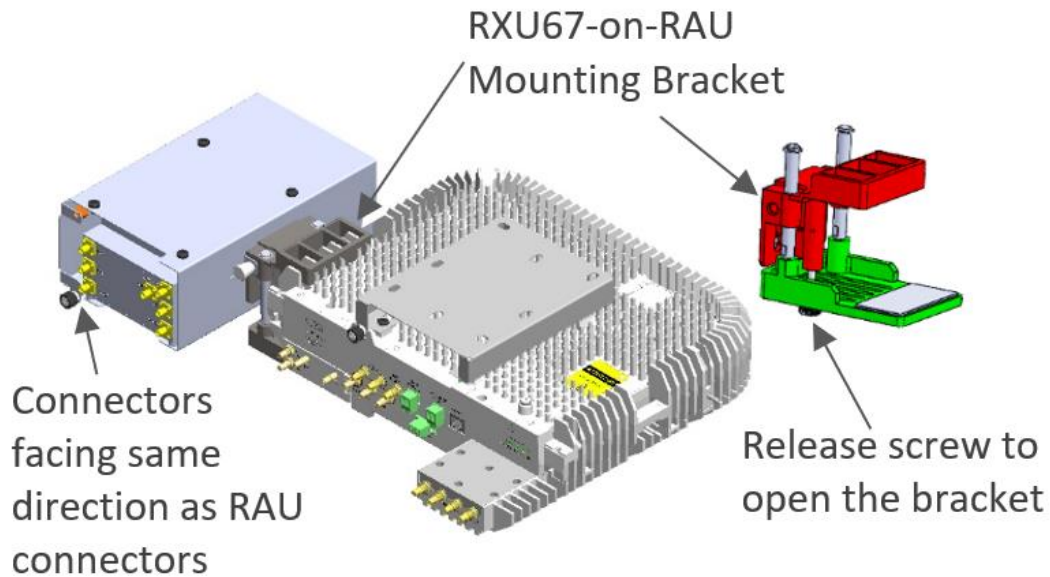


Figure 7-5. Attach cavity filter

7.2.2.2.3 Connect the RXU67-on-RAU Mounting Bracket to the Cavity filter

1. Insert the bracket into the shoulder screws, slide the bracket downwards, and secure with the plunger.
2. Tighten the bracket to the RAU using the manual safety screw.
3. Pull the plunger pin outwards, to allow inserting the bracket.
4. Slide the Cavity filter's shoulder screws into the key holes of the RXU67-on-RAU Mounting Bracket and pull towards the narrow end of the key holes.

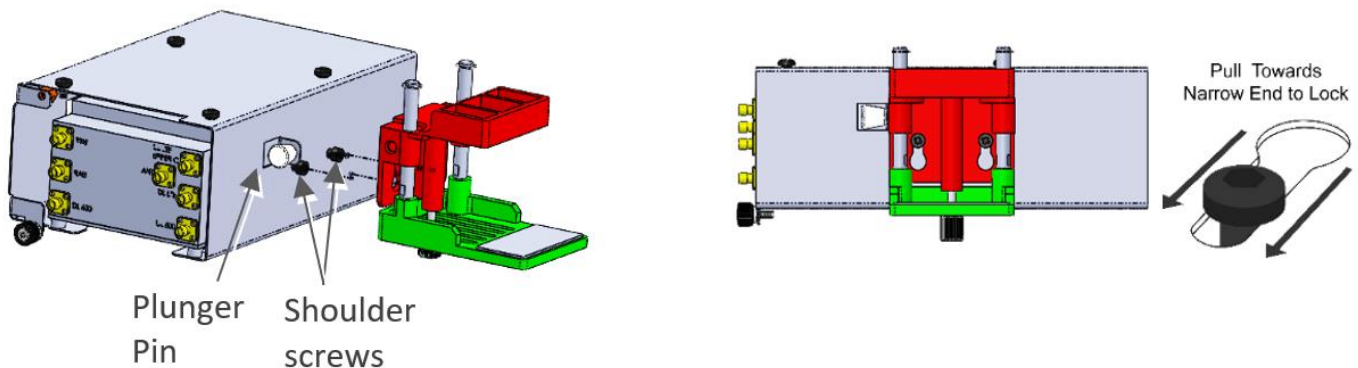


Figure 7-6. Slide bracket on shoulder screws & Secure

5. Release the plunger pin and verify it enters its slot and holds the bracket in its place
6. Secure the bracket in its place by tightening the screw using a flat head screw-driver.

Note: Ensure the RAU connectors are facing the same direction as the RAU connectors!

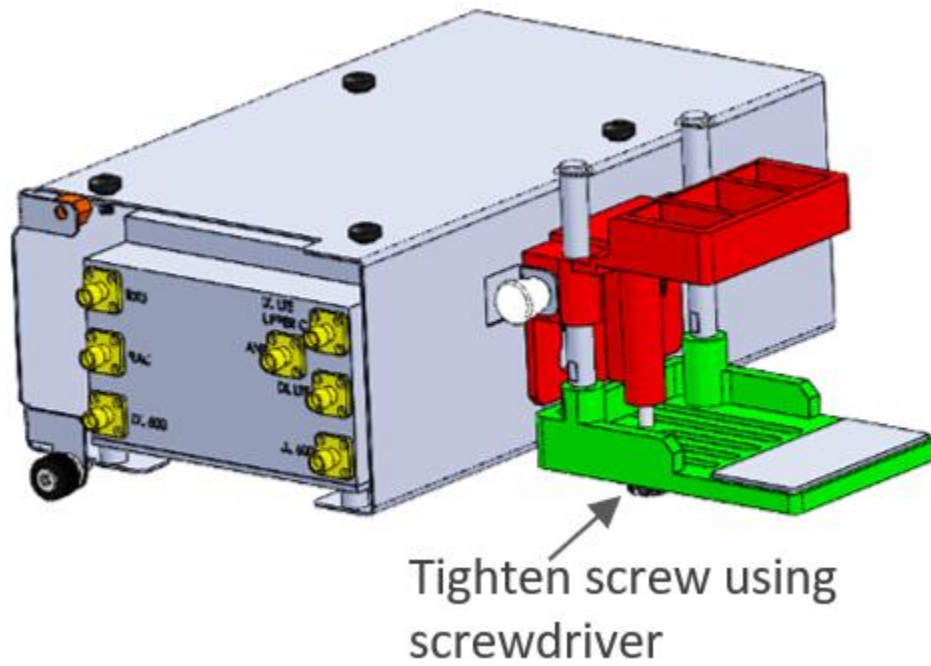


Figure 7-7. Securing Bracket assembled to Cavity filter

8 APPENDIX C: SPECIFICATIONS

System Level RF Parameters per Service

Service/Band	600 MHz		LTE & FN 700 MHz		ESMR800/ CELL850 MHz		PCS 1900 MHz		AWS 1700 MHz		AWS+AWS3 [‡] 1700 MHz		WCS 2300 MHz		LTE 2500 MHz TDD	
	DL	UL	DL	UL	DL	UL	DL	UL	DL	UL	DL	UL	DL	UL	DL	UL
Frequency Range (MHz)	617-652	663-698	729-768	699-716 777-798	862-869/ 869-894	817-824/ 824-849	1930 - 1995	1850 - 1915	2110 - 2155	1710 - 1755	2110 - 2180	1710 - 1780	2350 - 2360	2305 - 2315	2496 - 2690	
Maximum Output Power Per Antenna Port (dBm)**	15		15		15		20		18		20		18 (min) [§]		18 (min) [§]	
Maximum Input Power (dBm)	-11 to 37		-11 to 37		-10 to 37/ 0 to 37		0 to 37		0 to 37		0 to 37		0 to 37		0 to 37	
Typical Antenna Gain (dBi)	0		0		0.5		3		2.5		2.5		2.5		2.5	
Horizontal Polarization Omni @ 34-45 Degree	-2 to 0		-2 to 0		-2 to 0		-1 to 1		-1 to 1		-1 to 1		-1 to 1		-1 to 1	
UL Gain (dB)		-19 to 15		-19 to 15		-19 to 15		-19 to 15		-19 to 15		-19 to 15		-19 to 15		-19 to 15
Input IP3 (dBm) AGC OFF Typical		-5		-5		-5		-5		-5		-5		-6		-6
Input IP3 (dBm) AGC ON Typical		5		5		5		5		5		5		5		5
SFDR [†] (dB)		60		60		64		64		60		60		60		60
Maximum Intermod Distortion [dBm]	-13		-13		-13		-13		-13		-13		-13			
UL NF [†] (dB)		12		12		12		12		12		12		12		12
Gain Flatness/Ripple (dB)	±2.0		±2.0		±2.0		±2.0		±2.0		±2.0		±2.0		±2.0	

* SFDR calculated with bandwidth of 1.23 MHz for the CELL and PCS and with 5 MHz for the LTE and AWS

† Typical for single remote access unit

‡ AWS3 supported by RAU5x models only.

§ 20 dBm if only one of the services is operating.

** Insertion loss from RxU2325 combiner (if installed) = 0.5/1.0 dB.

Optical

Optical Output Power	< 9 dBm
Maximum Optical Budget	5 dB
Back Reflectance	- 60 dB
Optical Connector	LC APC SM
Fiber Type	Corning® SMF-28® fiber or compatible
Wavelength	1310 ± 10nm (@ 25° C)

Environmental Specifications

Operating Temperature	0°C to +50°C (32°F to 122°F)
Storage Temperature	-20°C to 85°C (-4°F to 185°F)

Standards and Approvals

Laser Safety	FDA/CE 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice no. 50 and IEC 60825-1 Class 1M (applicable to FMM/FRM)
EMC/Radio	CE EN 301 489, EN55022, EN 61000 FCC 47 CFR Part 15, 22, 24, 27, 70, 20
Safety	UL 60950 IEC 60825-1:2007 IEC 60825-2:2010 CAN/CSA-C22.2 No.60950-1-03 Fire Safety UL 2043

Component Specifications

RAU5x

RAU5x hosts the following modules:

1. RxU; Remote expansion module, for additional LTE and AWS MIMO service. One module per RAU5x.
2. GEM; Giga bit Ethernet module – upgrade module for the RAU5x. One module per RAU5xGEM;



Interface Connections	<p>Two LC APC SM fiber connectors; UL and DL</p> <p>Two DC power inputs ports; main and secondary in case of PoE clients</p> <p>Two QMA RF ports; for External cavity filter (In/Out) use —LTE and CELL filters</p> <p>One broadband external antenna QMA connector (connected antenna must have a return loss of 12 dB)</p> <p>One RJ45 MGMT (local) connection</p> <p>RxU/RxU2325 module interface – RF</p> <p>GEM Interface –fiberand digital</p>
Antenna	<p>Omni-Directional (15° down from horizon)</p>
Power Consumption	<p>For Main Power Input:</p> <p>Input Range: 37-57 VDC</p> <p>RAU5x only: 44.5 V; 50 W</p> <p>RAU5x + RxU/RxU2325*: 44.5 V; 76 W</p> <p>RAU5x + GEM: 44.5 V; 52 W</p> <p>RAU5x + RxU/RxU2325* + GEM: 44.5 V; 78 W</p> <p><i>*Power consumption is the same for both RxU and RxU2325 modules.</i></p> <p>For Secondary Power Input:</p> <p>For 2 PoE ports of 802.3af: 46 V; 31.5 W (Input range: 43 - 57 V DC)</p> <p>For 2 PoE ports of 802.3at: 52.5 V; 62 W (Input range: 52 - 57 V DC)</p>
Management	<p>Managed via the headend control module (HCM)— software v1.9 and higher</p>
Physical Characteristics (Enclosure and Modules)	<p>Mounting:</p> <p>Wall/ceiling (Horizontal mount)</p> <p>Mounting bracket included in the installation kit</p> <p>Mid-mount (acoustic ceiling) – separately ordered kit</p> <p>Dimensions (H x W x D):</p> <p>Without external antenna: 3.6* x 12.9 x 10.4 in (90 x 327 x 264 mm)</p> <p><i>*3.6 in (90 mm) without standard mounting bracket; 4.4 in (111 mm) with standard mounting bracket</i></p> <p>With external antenna and skirt: 6.1 x 13.1 x 13.1 in (154 x 338 x 338 mm)</p> <p>Weight (applies to both RAU5/RAU5x) :</p> <p>RAU5x only (no external antenna or plug-in modules): 10 lbs (4.5 kg)</p> <p>RAU5x and RxU/RxU2325 and GEM only: 14.39 lbs (6.5 kg)</p> <p>External Antenna: 3.7 lbs (1.7 kg)</p>

Environment

Ambient Temperature:

Wall-mount installations: 45°C (113°F)

Ceiling-mount installations: 50°C (122°F)

Remote Expansion Unit (RxU67)

Supported Services	Upgrade module supporting two services AWS MIMO and LTE 700 MIMO	
Interfaces	Three pins for integration with RAU5/RAU5x(power, control and RF)	
Management	Management via host RAU5/RAU5x	
Physical Characteristics	Mounting:	Plugs into RAU5/RAU5x
	Dimensions (H x W x D):	1.09 x 12.8 x 9.8 in (27.7 x 327.5 x 250 mm)
	Weight:	3.08 lbs (1.4 kg)



2300 MHz/2500 MHz Remote Expansion Unit (RxU2325)

Services	Upgrade module supporting two services 2.3 GHz WCS and 2.5 GHz (LTE) TDD bands	
Insertion Loss (from combiner)	0.5/1.0 dB	
Interfaces	Two QMA RF ports for external LTE and CELL cavity filter connections One broadband external antenna QMA connector (connected antenna must have a return loss of 12 dB)	
Management	Management via host RAU5x	
Physical Characteristics	Mounting:	Plugs into RAU5/RAU5x
	Dimensions (H x W x D):	1.09 x 12.8 x 9.8 in (27.7 x 327.5 x 250 mm)
	Weight:	3.08 lbs (1.4 kg)



Cavity Duplexer for LTE 700 MHz

LTE 700 MHz external cavity duplexer for RAU/RxU modules supporting the LTE band and which are deployed alongside units supporting the public safety service.

Frequency Range	777 MHz ~ 787 MHz
Bandwidth	10 MHz
Insertion Loss (Maximum)	1.5 dB
Passband Ripple (Maximum)	0.8 dB
Return Loss (Minimum)	18.0 dB, all ports



Rejection	55 dB Min @ DC ~ 620 MHz 40 dB Min @ 698 MHz ~ 716 MHz 35 dB Min @ 728 MHz ~ 757 MHz 30 dB Min @ 765 MHz ~ 775 MHz 30dB Min @ 793 MHz ~ 1000 MHz 25 dB Min @ 1396 MHz ~ 1432 MHz 40 dB Min @ 1800 MHz ~ 2700 MHz
Average Power Rating	0.5W CW maximum
In/Out Impedance	50 Ohms nominal
Operating Temperature	-20° C to +85° C
Environmental	RoHS compliant
Interfaces	Two RF SMA connectors
Physical Characteristics	Mounting: Wall, ceiling, acoustic ceiling Dimensions 5.6 x 3.8 x 1.8 in (H x W X D): (144 x 98 x 46 mm)

Cavity Duplexer for 800 MHz

CELL 800 MHz external cavity duplexer for RAU/RxU modules supporting the CELL band and which are deployed alongside units supporting the public safety service.



Frequency Range	817 MHz ~ 849 MHz
Insertion Loss	1.4 dB Typical 1.6 dB Maximum
Ripple	0.9 dB Typical 1.1 dB Maximum
Return Loss (Minimum)	15 dB
Rejection	55 dB Min @ DC ~ 620 MHz 40 dB Min @ 728 MHz ~ 757 MHz 30 dB Min @ 777 MHz ~ 787 MHz 23 dB Min @ 815 MHz 23 dB Min @ 851 ~ 866 MHz 45 dB Min @ 1000 MHz ~ 1300 MHz 50 dB Min @ 1800 MHz ~ 2700 MHz
Average Power Rating	0.5W CW Max.
In/Out Impedance	50 Ohms Nominal
Operating Temperature	-20° C to +85° C

Environmental	RoHS Compliant	
Interfaces	Two RF SMA connectors	
Physical Characteristics	Mounting:	Wall, ceiling, acoustic ceiling
	Dimensions	6.0 x 2.9 x 1.6 in
	(H x W X D):	(159 x 75 x 42 mm)

Gigabit Ethernet Module (GEM)

GEM –Ethernet over fiber-to-copper.

10/100/1000BASE-T Ethernet 1000BASE-X fiber.

Two 802.3 at compliant Power over Ethernet (PoE) PSE ports



Interfaces	GEM – L2 switch contains: One 1000BASE-X fiber SFP Two 10/100/1000BASE-T with 802.3at compliant Power over Ethernet (PoE+) PSE ports	
Throughput	Six Gbps forwarding rate	
Power	Installations with RAU5/RAU5x - powered via RAU secondary power input (see RAU5 power consumption specifications)	
Switching	IPv4 and IPv6 transparent MAC table 512 entries VLAN - unfiltered forwarding between ports IGMP forward to all ports, no snooping	
Physical Characteristics	Mounting:	Plug-in: RAU5/RAU5x upgrade module
	Dimensions	1.28 x 3.79 x 5.95 in
	(H x W x D):	(32.7 x 96.3 x 151.3 mm)
	Weight:	1.1 lbs (0.5 kg)

9 APPENDIX D: ORDERING INFORMATION

RAU5x Remotes

Part Number	Description
RAU5XUS	Remote access unit, five band remote supporting: ESMR 800/CELL 850, LTE 700, AWS+AWS3 1700 and PCS 1900
RAU5XUS-A	Remote access unit, supporting five bands and broad-band antenna. ESMR 800/CELL 850, LTE 700, AWS+AWS3 1700, and PCS 1900; With antenna assembled (P/N: RAU5US-ANT)

Note: for add-ons ordering information (RxU67, RxU2325, GEM), refer to the relevant specs.

Accessories

Part Number	Description
RAU5US-ANT	Broad-band antenna module for RAU5/RAU5x
BR-RAU5US-Wall	Remote bracket for wall mount installation; supports up to two RAU5x units back-to-back
BR-RAU5US-TOP	RAU5/RAU5x bracket for floating ceilings tile, mid-mount installation
BR-RAU5US-CAP	Cover plate for "Top ceiling" RAU5x bracket (BR-RAU5US-TOP) – for installations including RAU5/RAU5x without Corning external antenna

The Corning logo is displayed in white capital letters on a blue square background.

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