

OW70L-Dac

OneWeb LEO User Terminal



Installation & Operation User Guide

Serial number of the product

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This serial number will be required for all troubleshooting or service inquiries.



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Disclaimer

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Chapter 1. Precautions

Prior to installation, read this Installation Guide carefully including the safety warnings and information. Failure to do so could result in serious injury or inoperability of the terminal.

Antenna installation must be provided by a suitably trained professional installation technician or by a qualified antenna installation service. Installation is not to be attempted by someone not trained or experienced in this type of work.

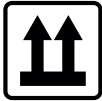


1.1 Warnings, Cautions, and Notes

WARNING, CAUTION, and NOTE statements are used throughout this manual to emphasize important and critical information. You must read these statements to help ensure safety and to prevent product damage. The statements are defined below.

	WARNING WARNING indicates a potentially hazardous situation that if not avoided, could result in death or serious injury.
	CAUTION CAUTION indicates a potentially hazardous situation that if not avoided, could result in minor or moderate injury or damage to equipment. It may also be used to alert users about unsafe practices.
	NOTE A NOTE statement is used to notify people of installation, operation, programming, or maintenance information that is important, but not hazard-related.

1.2 General Precautions

Before you use the antenna, make sure that you have read and understood all safety requirements.

	THIS WAY UP <ul style="list-style-type: none">Place the boxes/crates on the floor with the arrow pointing up.
	FRAGILE <ul style="list-style-type: none">Since the Radome is fragile, handle it with care. Do not apply excessive pressure or shock. These may cause surface cracking or other damage.
	KEEP DRY <ul style="list-style-type: none">Always make sure the antenna is stored on a dry floor.The antenna can withstand ordinary rain. However, water resistance cannot be guaranteed if submerged.Keep the antenna in a dry place with sufficient ventilation. Do not store the antenna wrapped in a tarp, tent, vinyl, and others.

* **DO NOT SHIP VIA RAIL:** Ensure not to ship any system via rail.

- Before you begin a site installation, check the appropriate electrical code requirements and with other regulations governing this kind of installation within the country of use.
- When installing, replacing, or disconnecting any cable components, make sure that each exposed metal connector of the antenna is grounded firmly before the work.
- The outdoor antenna and antenna cables are electrical conductors so transients or electrostatic discharges may occur at the antenna during thunderstorms. If the antenna is not installed properly, the electronic equipment may be damaged and/or cause personal injury or death to persons touching the exposed metal connectors of the electronic equipment.
- Avoid installing antenna near high voltage overhead cables or similar.
- Do not climb the pole during a thunderstorm or in windy, wet, icy, or snowy conditions.
- Do not touch antennas, surge arrestors, or antenna cables during a thunderstorm.
- ODU (Outdoor Unit) must be properly mounted and secured to the pole. Failure to do so could result in detachment of the unit, causing disruption in the unit's operation or could result in the unit falling, which could cause serious injury or death.
- When installing the antenna, remember the following;
 - DO NOT use a metal ladder.
 - DO dress properly: wear rubber gloves, shoes with rubber soles and heels, and a long sleeve shirt or jacket.

Chapter 2. Certifications

This device complies with Part 15 of the FCC Rules [and with Industry Canada licence-exempt RSS standard(s)].

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) L'appareil ne doit pas produire de brouillage;
- (2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

WARNING

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Radiofrequency radiation exposure Information:

This equipment complies with RED and FCC, IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 7.6 m between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note:

- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
 - Reorient or relocate the receiving antenna.
 - Increase the separation between the equipment and receiver.
 - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
 - Consult the dealer or an experienced radio/TV technician for help.
- This RF hazard is calculated using the following calculation.

$$S_{ff} = \frac{P_t G}{4\pi R^2}$$

- S_{ff} : Power density (on axis) in W/m²
- P_t : Power fed to the antenna feed horn in W
- G : Power gain factor in the direction of interest relative to an isotropic radiator
- R : Distance to the point of interest in m

RED Declaration of Conformity (DoC)

We, Intellian Technologies, Inc. located at 18-7, Jinwisandan-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do 17709, Korea declare under our sole responsibility that the product(s) described in the below to which this declaration relates is in conformity with the *essential requirements* and *other relevant requirements* of the Radio Equipment Directive (2014/53/EU).

Product Information:

Product Name(s):	OW70L-Dac
-------------------------	-----------

To provide the presumption of conformity in accordance to Annex III (encompassing Annex II) of Directive 2014/53/EU; the following harmonized standards and normative documents are those to which the product's conformance is declared, and by specific reference to the essential requirements of Article 3 of the Directive 2014/53/EU.

2014/53/EU Article	Standard(s) Applied in Full	Test Report Number	Result
SAFETY (Art 3.1.a)	EN IEC 62368-1:2020+A11:2020 EN 62368-1:2014+A11:2017 EN 62311:2008	OT-217-RSD-022 OT-218-RWD-087	Pass Pass
EMC (Art. 3.1.b)	EN 55032: 2015+A11:2020 EN 61000-3-2: 2014 EN 61000-3-3: 2013 EN 301 489-1 V2.2.3 EN 301 489-12 V3.1.1 EN 55035: 2017 + A11:2020	OT-218-RED-046	Pass
SPECTRUM (Art. 3.2)	EN 303 980 V1.1.1	OT-218-RWD-080	Pass

Supplementary Information:

Testing Organization	ONETECH Corp. 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea
Technical/Compliance File Held by:	Intellian Technologies, Inc. 18-7, Jinwisandan-ro, Jinwi-myeon, Pyeongtaek-di, Gyeonggi-do 17709 Korea
Place and Date of issue:	SAFETY- Gyeonggi-do, Korea on 30 July, 2021 EMC- Gyeonggi-do, Korea on 19 August, 2021 SPECTRUM- Gyeonggi-do, Korea on 20 August, 2021

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Product Information:

Product Name(s):	OW70L-Dac (SSMv2)
-------------------------	-------------------

To provide the presumption of conformity in accordance to Annex III (encompassing Annex II) of Directive 2014/53/EU; the following harmonized standards and normative documents are those to which the product's conformance is declared, and by specific reference to the essential requirements of Article 3 of the Directive 2014/53/EU.

2014/53/EU Article	Standard(s) Applied in Full	Test Report Number	Result
SAFETY (Art 3.1.a)	EN IEC 62368-1:2020 + A11:2020 EN 62368-1:2014+A11:2017 EN 62311: 2008	OT-22D-RSD-018 OT-229-RWD-005	Pass
EMC (Art. 3.1.b)	EN 55032: 2015+A11:2020 EN 301 489-1 V1.9.2 EN 301 489-12 V3.2.1 EN IEC 61000-3-2:2019 EN 61000-3-3: 2013/A1:2019	OT-231--RED-034	Pass
SPECTRUM (Art. 3.2)	EN 303 980 V1.2.1	OT-229-RWD-006	Pass

Supplementary Information:

Testing Organization	ONETECH Corp. 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea
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Place and Date of issue:	SAFETY- Gyeonggi-do, Korea on 21 December, 2022 EMC- Gyeonggi-do, Korea on 02 September, 2022 SPECTRUM- Gyeonggi-do, Korea on 20 August, 2021

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Product Information:

Product Name(s):	OW70L-Dac
Model Number(s):	PS-OW70Pxx

To provide the presumption of conformity in accordance to Annex III (encompassing Annex II) of Directive 2014/53/EU; the following harmonized standards and normative documents are those to which the product's conformance is declared, and by specific reference to the essential requirements of Article 3 of the Directive 2014/53/EU.

2014/53/EU Article	Standard(s) Applied in Full	Test Report Number	Result
SAFETY (Art 3.1.a)	EN IEC 62368-1:2020+A11:2020 EN 62368-1:2014+A11:2017 EN 62311:2008	OT-217-RSD-022 OT-218-RWD-087	Pass Pass
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SPECTRUM (Art. 3.2)	EN 303 980 V1.2.1	OT-218-RWD-080	Pass

Supplementary Information:

Testing Organization	ONETECH Corp. 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea
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Chapter 3. Introduction

3.1 Introduction to OW70L-Dac

The OW70L-Dac is a dual parabolic terminal with a 73 cm reflector size based on a 12.3 dB/K G/T which can be operated in the OneWeb low earth orbit (LEO) satellite constellation. The OneWeb communications network comprises terrestrial gateways positioned around the globe communicating with OneWeb user terminals. A radio link to the satellites is established using the User Terminal (UT) operating in the Ku-band, with uplink frequencies between 14.0 and 14.5 GHz, and downlink between 10.7 and 12.7 GHz.

The User Terminal provides network and Internet access via the OneWeb satellites and OneWeb gateways.

3.2 OW70L-Dac Features

- LEO satellite pointing and tracking algorithm.
- 3-axis stabilization platform with motion drift compensation solutions.
- Fully sealed to protect against the outdoor environment.
- Dual-dome operation for seamless connectivity.
- Simple and suitable industrial design for professional installation.
- Remote monitoring, diagnostics and troubleshooting to resolve issues on site, which is made to the end user via a local management interface.
- Ability to store multiple software versions to fallback to a known good or factory version in case of errors in the current working version of software.

Chapter 4. Planning Installation



CAUTION

- Be sure to complete the pre-installation checklist before you begin installing the antenna. Refer to “11.1 Pre-Installation Checklist” on page 60
- DO NOT OPERATE THE ANTENNA WITHOUT THE RADOME. THIS WILL RESULT IN DAMAGE TO THE ANTENNA AND ABNORMAL OPERATION.

4.1 Installation Precautions

The User Terminal installation requires extreme precaution and safety measures given the installation environment. Failure to follow the correct installation process may lead to injury of the installer and/or cause damage to the system. To maximize the performance of the system, a thorough review of this installation guide is strongly recommended. In addition, you should execute the installation process as it is noted in this manual.

To ensure your own safety and convenience of installation, note the following precautions.

- Review the general safety precautions in the Safety Precautions chapter.
- Familiarize yourself with the antenna and the mounting instructions prior to climbing any roof or ladder.
- Verify that all safety measures for outdoor or rooftop installation are in place.
- Verify all requirements before beginning the actual installation to determine if the equipment and necessary items are available and functioning properly.
- Install the grounding system for the antenna support structure, radio hardware, and surge arrestor before connecting the cable from the equipment to the surge arrestor. This protects the system against lightning strikes during installation.

4.2 Selecting Installation Site

Before installing the antenna system, consider the best place to position the antenna for both performance and safety.

4.2.1 Installation Location for Antenna

The antenna should be placed in an area with no RF signal blockage. A safe mounting place and a restricted access location should be selected.

When the antenna is transmitting, obstacles in the way of the beam path will decrease the satellite signal strength and interrupt the connection. The antenna unit should have direct line-of-sight within 59 degrees from zenith (or above 31 degrees of elevation from local horizon at all directions) without any obstacles in the beam path.

4.2.2 Installation Location for CNX

An ideal location for the CNX should be:

- Within 100 m (300 ft) of the antennas
- In a dry, cool, and ventilated location
- Close to a power source

4.2.3 Minimizing Satellite Blockage

The ideal antenna site should have a clear view of the horizon or of the satellite with all-around clearance. Some examples of obstacles you must avoid for the directional antenna to operate effectively are: neighbouring buildings, trees, or other obstructions and power lines. To minimize the influence of obstacles, signal interference, or reflections, note the following guidelines:

- Avoid trees in the signal path. Seasonal changes such as leaves or hanging icicles can impact signal absorption. Mount the antenna as high as possible above the ground to free up space. In open areas, the ground is the actual surface of the earth.
- To use the basic antenna system you need to install two antennas. Intellian recommended Installing the antenna at least 1.6 m (62.99") away from the other antenna.
- Make sure there are no obstacles within 59 degrees from Zenith. Obstacles can interrupt the satellite signal transmission and reception of the antenna.

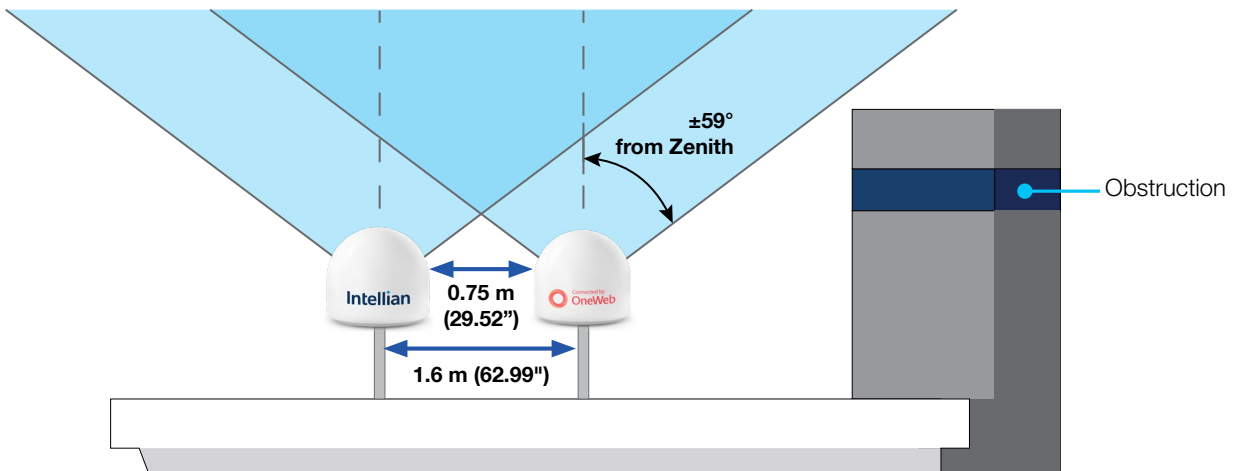
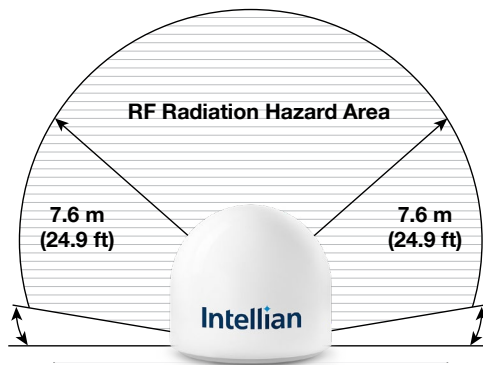


Figure 1: Minimizing Satellite Blockage (example)

4.2.4 RF Hazard Precautions

The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy, which is below the OSHA (Occupational Safety and Health Act) limits. To comply with current FCC RF Exposure limits, the antenna must be installed at or exceeding the minimum safe distance as guided by the antenna manufacturer or supplier.



NOTE

This RF hazard is calculated using the following calculation.

$$S_{nf} = \frac{4\eta P_t}{A}$$

- S_{nf} : Maximum near-field power density in W/m²
- P_t : Power fed to the antenna feed horn in W
- A : Physical (geometrical) area of the aperture antenna in m²
- η : Aperture efficiency (typically 0.5-0.75 for circular apertures)

4.3 System Package

4.3.1 Outdoor Unit (ODU)

The OW70L-Dac operates in a dual parabolic primary and secondary configuration. Each terminal consists of a pedestal, a reflector, RF modules and antenna control modules which are enclosed in a radome.

- Pedestal: 3-axial stabilized platform for the position compensation of the antennas
- RF modules: the antenna consists of a reflector, OMT, feeder and RCM which converts the satellite signals into the IF bands and up-converts IF bands to the forward-link satellite signals. The primary antenna includes the modem module, called SSM, which implements the necessary functionality to transmit and receive signals as well as communicate and command pointing directions to the antenna.
- Control modules: the antenna interface module, called AIM, controls the antenna motion by interfacing with the modem and RF modules.
- Radome: protects the antenna from outdoor environment.



Figure 2: Radomes and Pedestal

4.3.2 Customer Network Exchange (CNX)

The Customer Network Exchange (CNX) must be installed in a weather-protected area. It interfaces with user equipment and provides power and data interconnection to the outdoor unit. The CNX connects to the primary antenna while providing a secure GigE connection to the Baseband Unit. The CNX takes 56 V input but can vary by product variant.

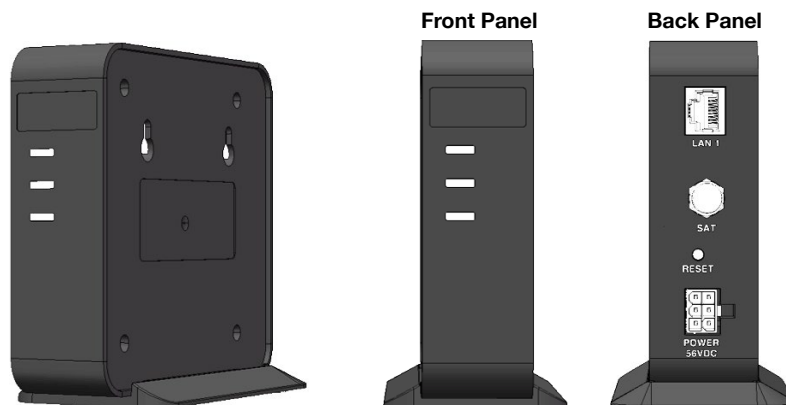


Figure 3: Customer Network Exchange (CNX)

4.3.3 Packing List

Before beginning installation, make sure you have all the included components.

The User Terminal (UT) is composed of the following components.

OW70L-Dac (without Heating Module)

Primary Antenna Package (Box 1)			
Item	Q'ty	Size	Description
Primary Antenna Unit	1		Primary User Terminal
Quick Installation Guide (QIG)	1		Installation Manual
Customer Network Exchange (CNX)	1	114.2 mm x 125 mm x 35.2 mm	To access to OneWeb services
Power Adapter (AC-DC) For CNX	1		To convert 100-240 V AC power to +56 V DC for CNX (250 W)
AC Power Cord (USA)	1	1.5 m	AC Power Cord (110 V)
AC Power Cord (CEE7/7)	1	1.5 m	AC Power Cord (220 V)
Coax Cable (RG 6)	1	30 m	F-type, For CNX power & data connection
Hex Bolt	8	M12 x 40L	Spare Bolt Kit for Mast Assembly
Flat Washer	8	M12	
Spring Washer	8	M12	
Hex-S Bolt SF STS316L	2	M5x8	Spare Grounding screw
RF Hazard Sticker	1		Radiation Safety Distance (13 m) Label
Secondary Antenna Package (Box 2)			
Item	Q'ty	Size	Description
Secondary Antenna Unit	1		Secondary User Terminal
Hex-S Bolt SF STS316L	2	M5 x 8	Spare Grounding screw
RF Cable (LMR400)	2	5 m	For inter-dome RF Rx & Tx connection
Ethernet Cable (CAT 5)	1	5 m	For inter-dome Ethernet connection
Signal Cable (CAT 5)	1	5 m	For inter-dome control signal connection
RF Hazard Sticker	1		Radiation Safety Distance (13 m) Label



NOTE

When designing a mast, consider the minimum and maximum thickness of the mast plate marked on the diagram. If the thickness of the mast plate is different from the recommended size (Min. 8.0mm/ Max. 10.0 mm), choose right size bolts for mounting antenna on the mast according to the table below.

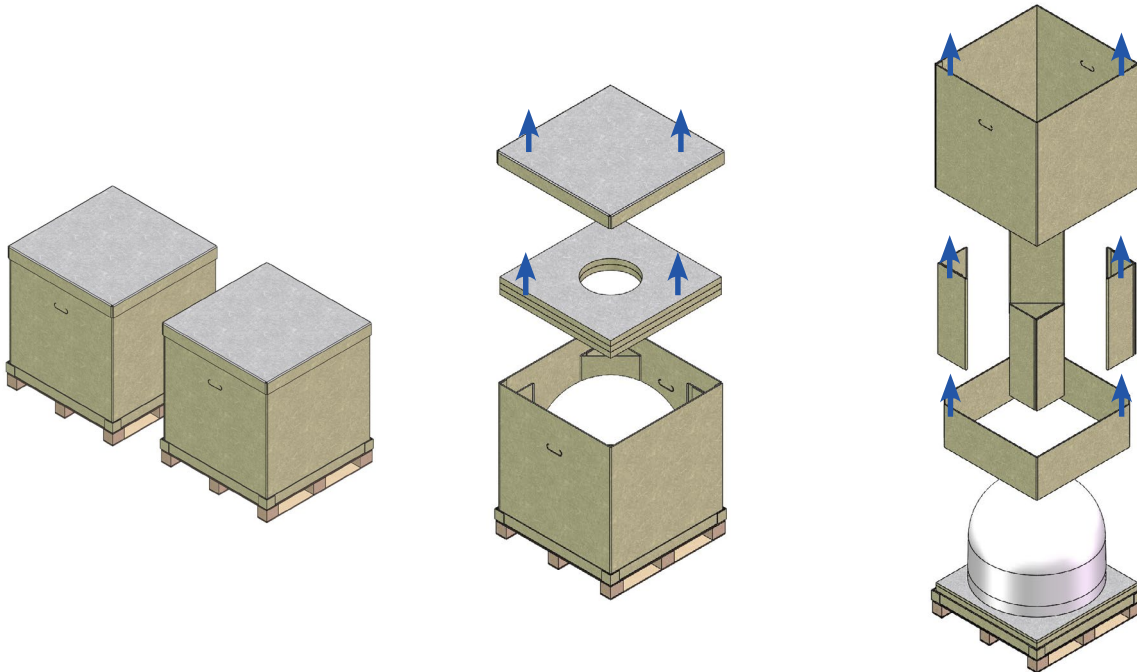
Mast Plate Thickness	Recommended Bolt Size
8 ~ 13 mm	M12 x 40L (Supplied)
13 ~ 18 mm	M12 x 45L
18 ~ 23 mm	M12 x 50L

4.4 Installer/Customer Furnished Equipment

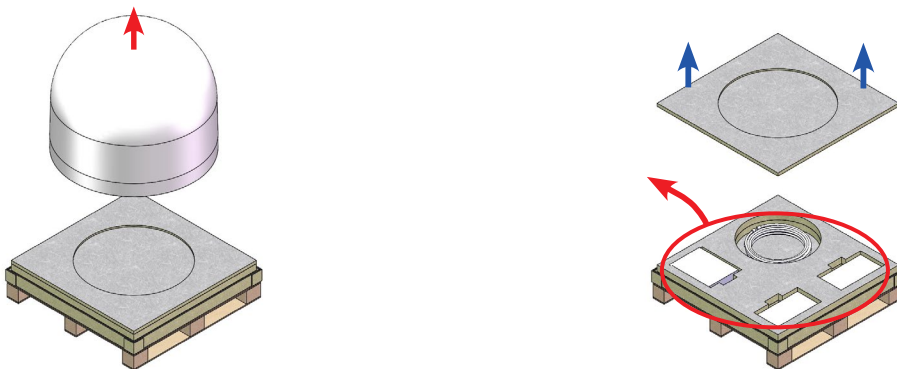
- Country specific power cable and socket for Power Adaptors
- Grounding system that meets the local electrical code requirements
- Waterproofing materials all connections
- Tape or wraps to attach the antenna cable to the support structurer
- Fasteners and other installation tools

4.5 Unpacking System Package

Follow the steps for easy and safe unpacking. The each system package consists of two sub-packages that an antenna package and an accessory package.



1. Place packages in a safe area large enough.
2. Remove the top cover and protection forms as shown.
3. Remove the inside paper supports and body of the box.



4. Take out the Antenna.
5. Remove the bottom cover and take out the items.
 - Refer to the Included items “4.3.3 Packing List” on page 18



NOTE

- Make sure all the parts under the bottom cover (Step 5) are removed before the packaging is discarded.
- Consider keeping the packaging material in case the terminal may need to be relocated in the future.

Chapter 5. Installing Outdoor Unit (ODU)

5.1 General Requirements

5.1.1 Antenna Mounting Requirements

You need to procure or fabricate a suitable mounting plate and pole to support the ODU (Outdoor Unit).

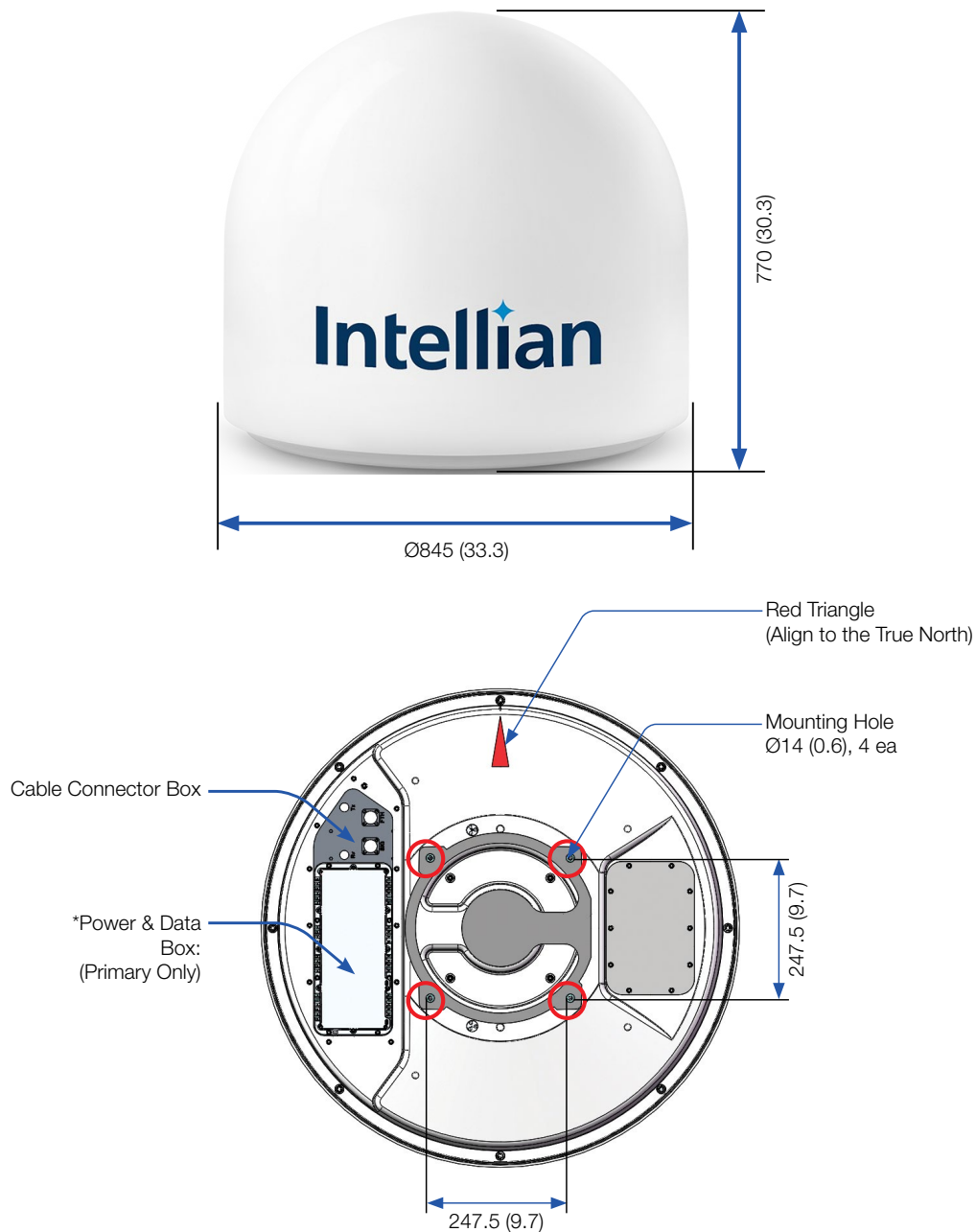
Consider the following factors to select the mounting method:

- The physical size of the unit (770 mm (30.3 inches) high by 845 mm (33.3 inches) diameter).
- The weight of the unit (About 33.6 kg (74.1 lbs) for Primary or 32.5 kg (71.7 lbs) for Secondary).
- The mechanical resonance of the system excited by wind : 5 Hz
- The system operates in primary-secondary mode. Ensure there is < 20 m (10 m or 20 m Inter-dome cable kits are available to purchase separately) separation between the primary and secondary antenna.
- Ensure the antenna is levelled $\pm 2^\circ$ in elevation and $\pm 10^\circ$ from the True North axis.
- The mounting method should be able to preserve antenna pointing calibration under wind load and protect safety of life and safety of property.

5.2 Antenna Dimensions

Before installing the antenna unit, confirm its height and diameter (see figure below). The mounting surface and overall space occupied by the radome must be sufficient for the height and diameter of the fully constructed radome on top of its mounting base. The primary and secondary radome dimensions are the same.

Unit: mm (inches)

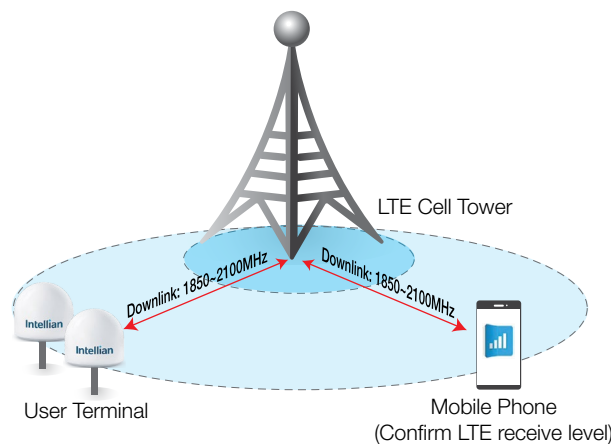


5.3 Installing in the Vicinity of Cellular Communications Towers

The Intermediate frequency (IF) range of the receiver of the User Terminal is 1850-2100MHz. Therefore, should a User Terminal be installed in the vicinity of a Cellular Communications Tower operating on those frequencies, the performance of the User Terminal may be impacted by RF interference from that tower. In addition to satisfying the Field of View requirement, we recommend that the User Terminal is installed at a location where, for example in the case of an LTE interferer, the following requirement is satisfied:

Interference Requirement:

- LTE Frequency Range : Outside 1850~2100 MHz, or
- RSRP Level: -45 dBm or less

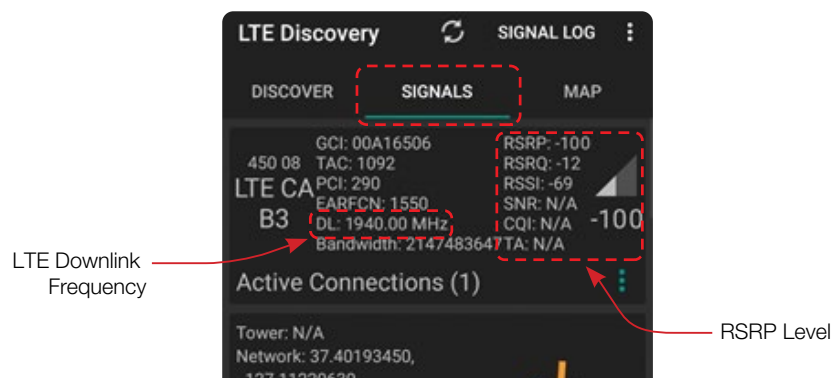


Procedure to check LTE frequency and RSRP level:

1. Download the “LTE Discovery” app on an Android phone (not available on iPhone).



2. Run the app and check the RSRP level and downlink frequency.



3. Install the User Terminal in a location where the Interference Requirement is satisfied (outside 1850~2100 MHz, or RSRP -45 dBm or less).

5.4 Measuring the North point

It needs to calibrate declination angle due to the difference between Magnetic North and True North.

It is recommended to perform with antenna mounting at the same time.

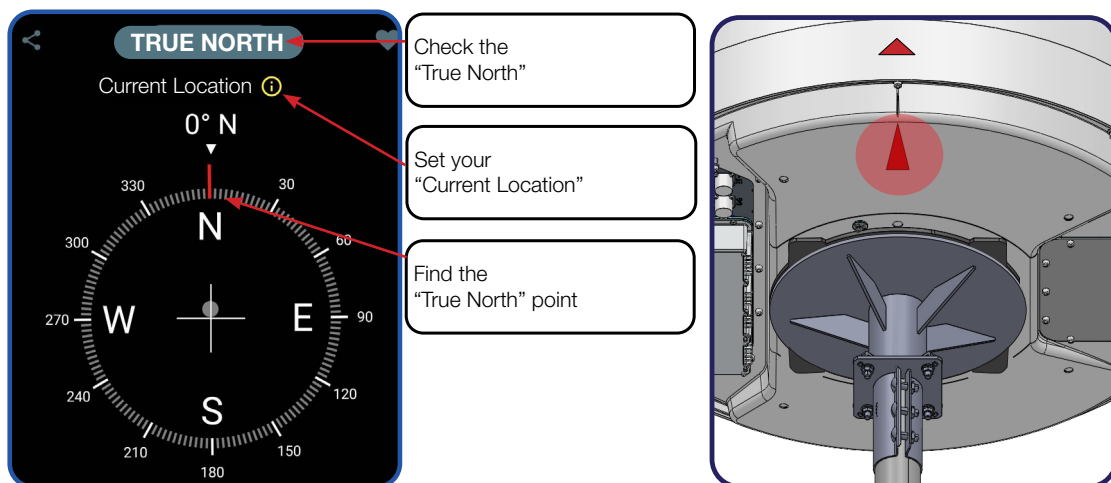
A. When using a magnetic compass

1. Measure the orientation of the magnetic north by using a compass.
2. Mark the magnetic north point.
3. Get the magnetic declination angle at the installation area by the calculator (Refer to the Magnetic Field Calculators on the National Oceanic and Atmospheric Administration (NOAA) website www.ngdc.noaa.gov).
4. Mark the True North point on the mounting plate by including the declination angle.

B. When using a GPS compass (To assist in better alignment of the User Terminal)

1. Check the orientation of the True North indicator.
2. Extending its virtual line from the centre of the User Terminal to the Tip of the True North indicator (Line) by using your own GPS compass (Smartphone applications or devices).
3. Compare with virtual line and “Red triangle” on the bottom of the radome to check any misalignment.

Refer to the below App screen as a reference.



C. When using a LUI


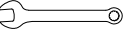

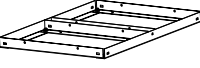

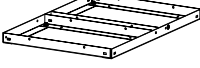










1. Connect an Ethernet cable from the LAN Port on the front panel of CNX to a LAN Port of a PC. The Data LED indicator will turn Green if CNX is connected.
2. Enter the IP address into your web browser's address bar to log in to the Local User Interface (LUI).
 - **IP Address: 192.168.100.1 (Default)**
3. Select the **Antenna** on the main menu then go to the **Antenna Setup → Heading** menu.
4. For setting the true north offset, you need to select a satellite which is trackable in satellite information. When the antenna tracks the selected satellite, true north offset can be calculated.
 - **Heading(°):** Enter the True north Offset Range (-180° ~ +180°).
5. Click the **Submit** button to apply the settings to the system.

The screenshot shows the OneWeb Local User Interface (LUI) for the Antenna Setup page. The interface includes a top navigation bar with the OneWeb logo, a language dropdown set to 'en-US', and tabs for Home, Installation, **Antenna** (highlighted with a red box and callout 1), Modem, Network, Diagnostics, and Management. On the right of the top bar is an 'Auto-Refresh' section with a dropdown set to '0' and a green refresh button. A left sidebar contains a list of menu items: Antenna Status, **Antenna Setup** (highlighted with a red box and callout 2), Installation, RF Cable Setup, Blockage Zone, RCM, Product Information, Software Version, RF Gain Offset, Manufacturing, TILT Calibration, True North Calibration, Download Installation Guide, Download Operations Guide, and Download AIM Logs. The main content area is divided into sections: 'Primary True North Offset' with an 'Azimuth' input field showing '1.00'; 'Secondary True North Offset' with an 'Azimuth' input field showing '1.00'; 'Heading' with a red box and callout 3; 'Heading (°)' with an input field showing '0.00' and a red box and callout 4; and 'Debug Log Level' with a 'Log Flags' input field showing '0x7077'. At the bottom of the main content area is a blue 'Submit' button highlighted with a red box and callout 5.

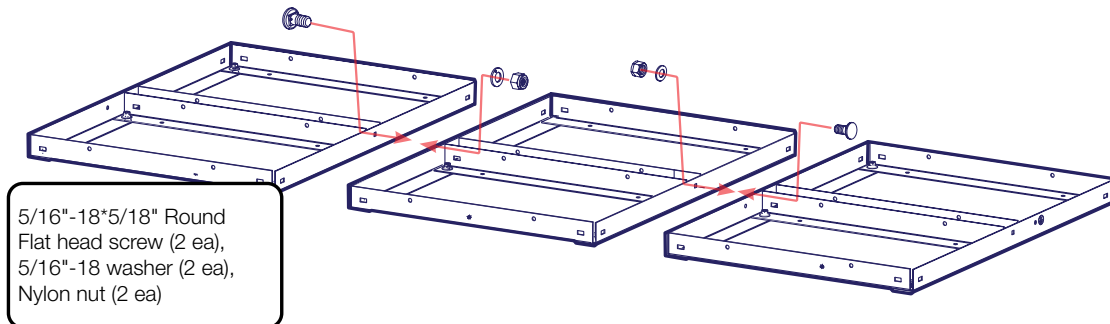
5.5 Designing Pole Mount

5.5.1 Assembling Base Panel of NPM (Non-Penetrating Mount)

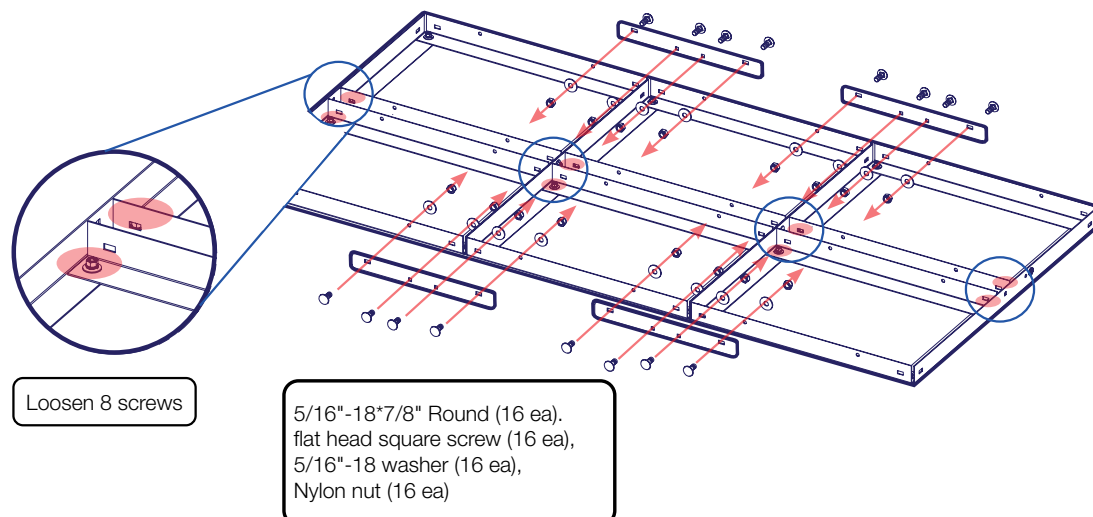
This is generally recommended. Check the requirement tools before assembling the NPM.

FASTENERS				TOOLS	HARDWARE					
NO	ITEM	DESCRIPTION	QTY		DESCRIPTION	QTY	DESCRIPTION	QTY	DESCRIPTION	QTY
1		5/16"-18*5/8" Round flat head Square screw	6	 13mm wrench	A	1	C	8	E	2
2		5/16"-18*7/8" Round head Square screw	16							
3		5/16"-18*3-1/8" hex-head cap screw	8							
4		5/16"-18*3-3/8" hex-head cap screw	2							
5		5/16"-18 washer	42							
6		5/16"-18 nylon nut	32							
7		Ø8.5/Ø12.5*1.60 Bush	2		B	2	D	4		
8		5/16"-18x1-1/4" hex flange screw	2							
9		5/16"-18 keeps k-lock nut	4							
10		#12-3/4" tapping screw	4							

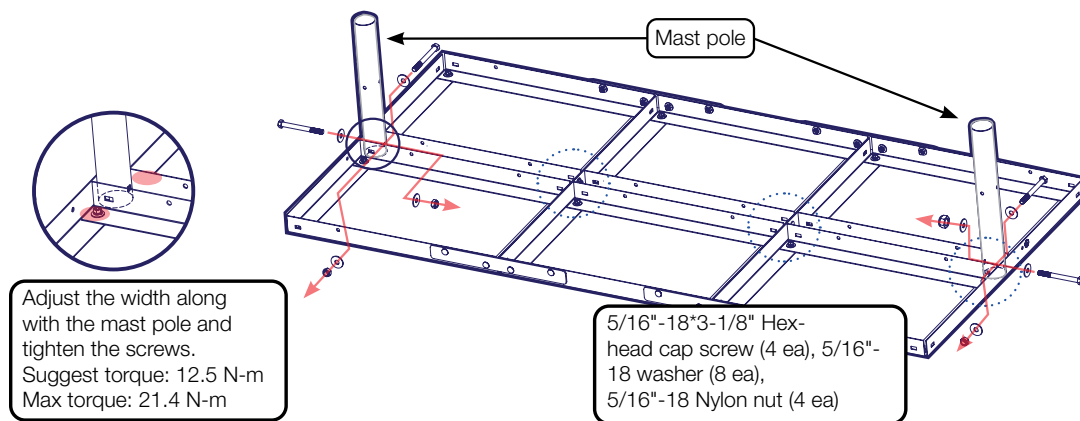
1. Assemble 3 mounting bases with the bolts kits.



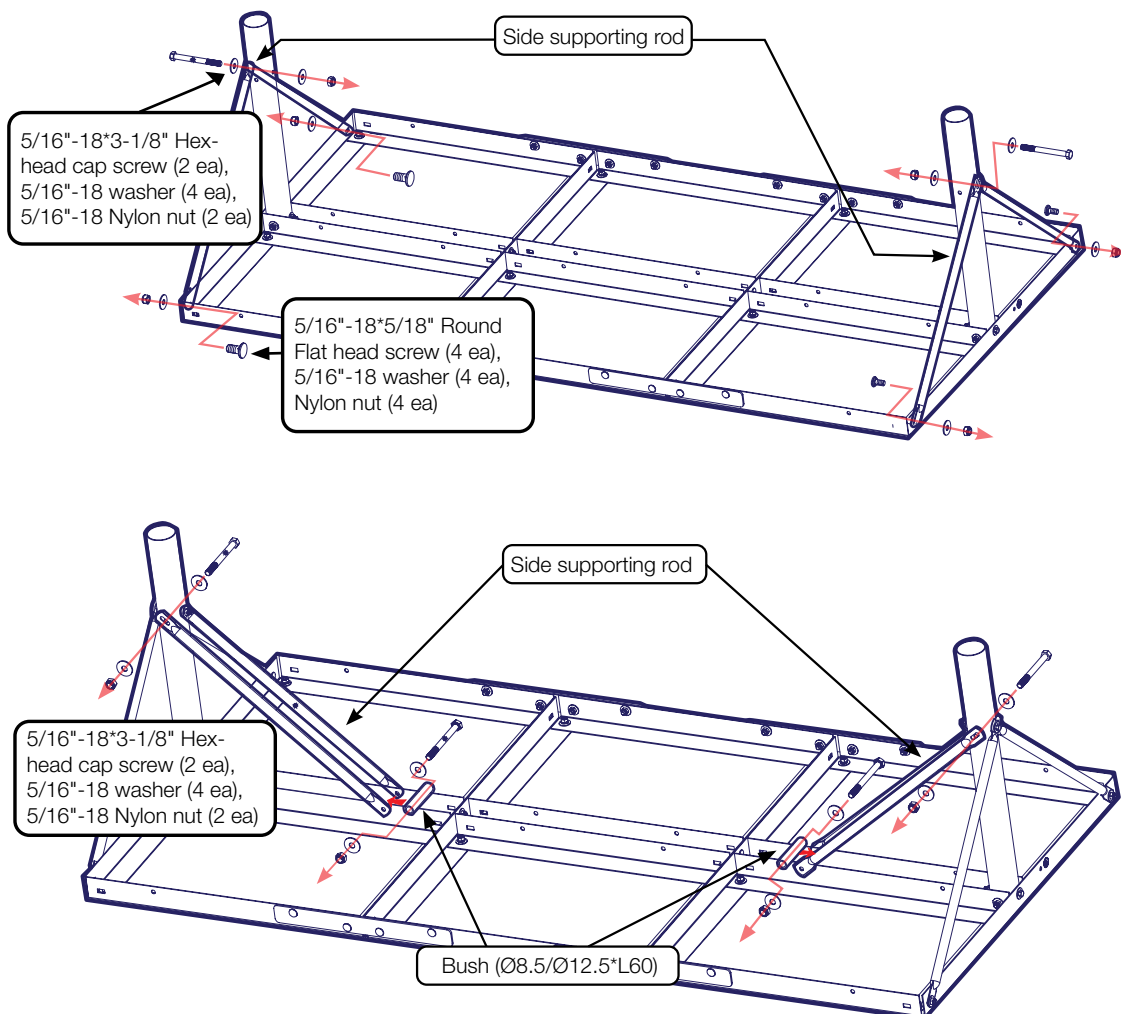
2. Assemble 4 support plates with the bolt kits.



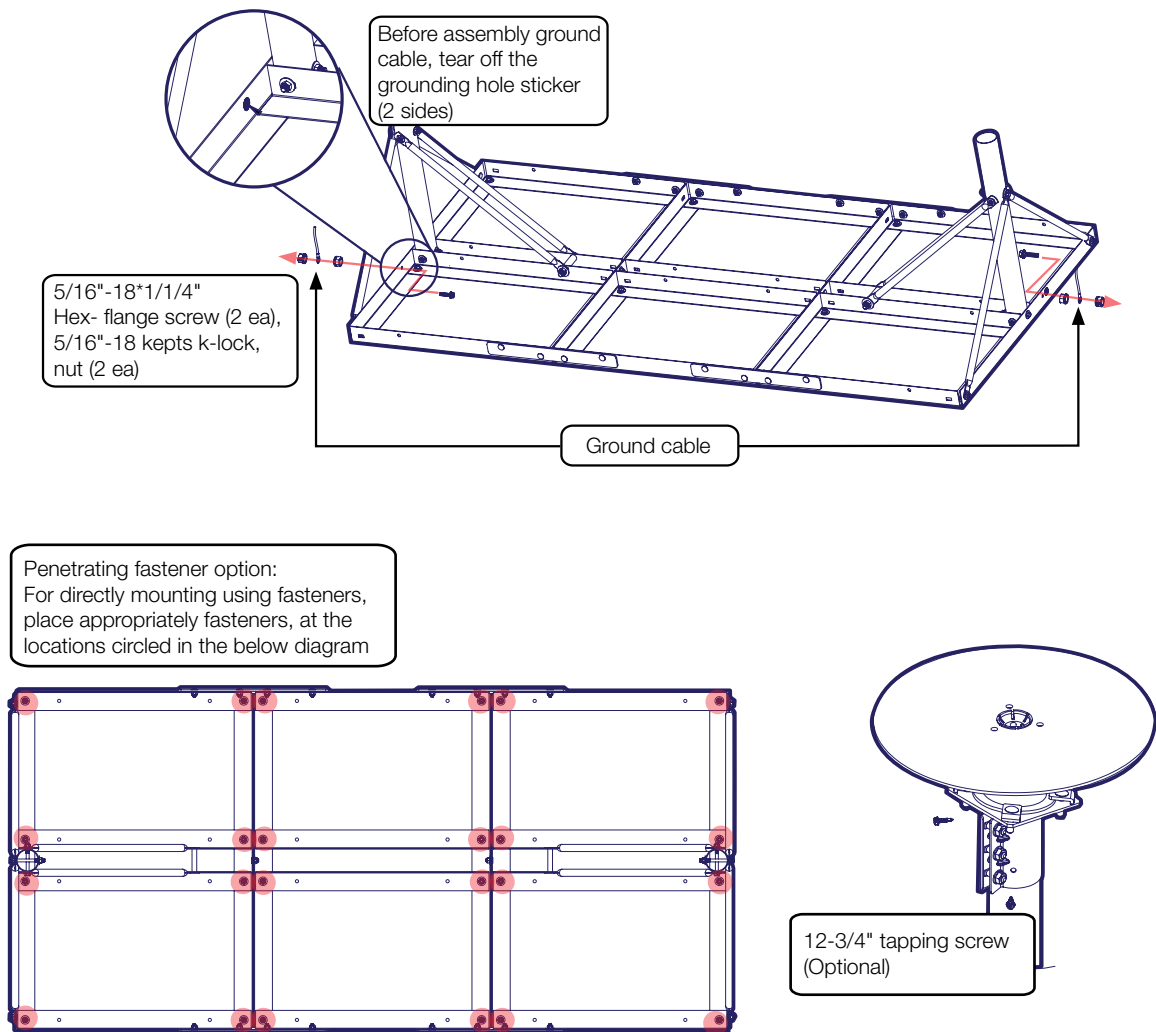
3. Assemble 2 mast poles with bolt kits.



4. Assemble 4 side supporting rods with bolt kits



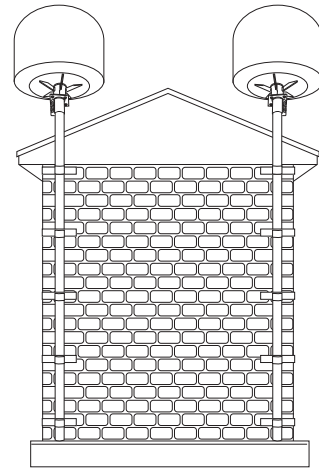
5. Assemble ground cable with bolt kits.



5.5.2 Installing Customized Pole Mount

Customized pole mounts must be correctly installed to ensure a robust enough mount to prevent any flex, vibration, and sway when an external force is exerted on the installed antenna. A minimum of 3 fixtures must be used to assure mount strength.

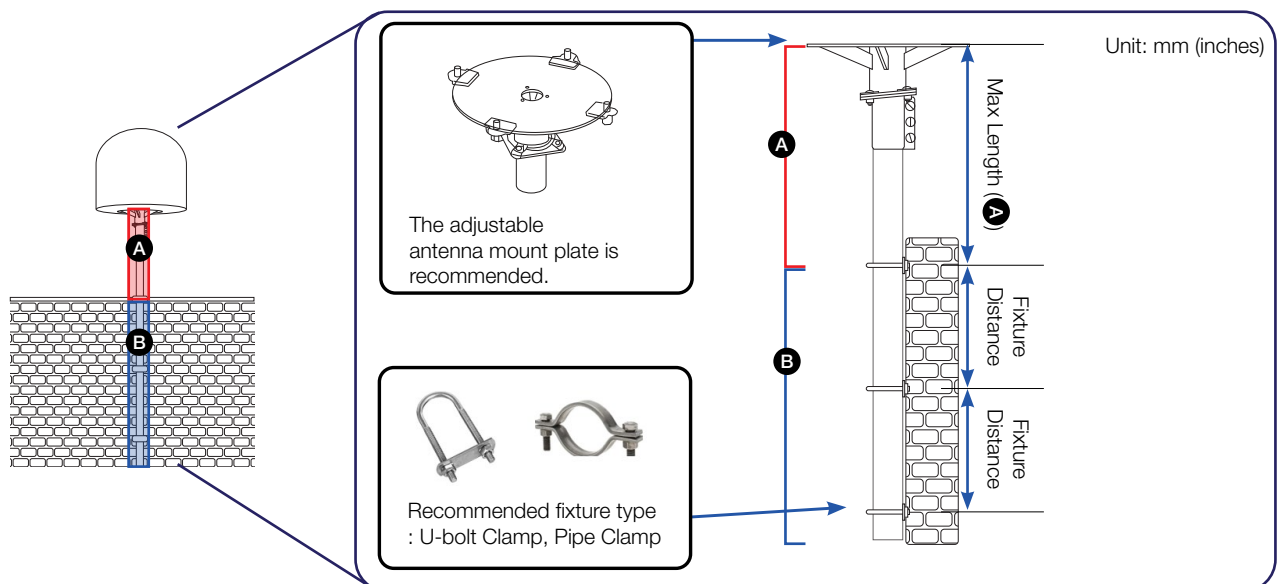
The figure to the right is an example of a proper customized pole mount installation.



Designing the Customized Pole Mount

When designing the pole mount, various pole types and their maximum length must be considered. The Fixture Distance describes the fixture attach points and the maximum distance between them. Refer to the following table for recommended specifications.

Pole Type	Pole Diameter	Pole Thickness	Max Length (A)	Fixture Distance
50A (Recommended)	60.5 mm (2.4")	2 mm(0.1")	500 mm(19.7")	400 mm(15.8")
65A	76.3 mm(3.0")	2 mm(0.1")	650 mm(25.6")	500 mm(19.7")
80A	89.1 mm(3.5")	4 mm(0.2")	900 mm(35.4")	700 mm(27.5")
90A	101.6 mm(4.0")	4 mm(0.2")	1000 mm(39.4")	800 mm(31.5")



- As an example, if a 50A pole type is used for the antenna installation, the maximum length of **A** cannot exceed 500mm. The remaining pole **B** should be fixed with a minimum of 3 fixtures and the distance between them should be 400mm.

- The Max Length of **A** is the length between the top of the last fixture and the top of the mounting plate. To use the tilt adjustable mount plate, it is recommended pole type 50A be used. The recommended **A** length for a 50A pole is 500 mm. If the pole type is different from the recommended types used refer to Table 1 above for recommended lengths.
- The sections of the **B** pole have no length limits but must be installed with sufficient structural integrity to prevent any flex, vibration, and sway from wind or any other external forces. The **B** pole sections can be used as a thicker pole type than the **A** pole type, if needed. The attachment fixtures should be installed at the recommended intervals (see the Fixture Distance in Table 1). The recommended fixture types are U-bolt clamps and pipe clamps.

Mount Leveling

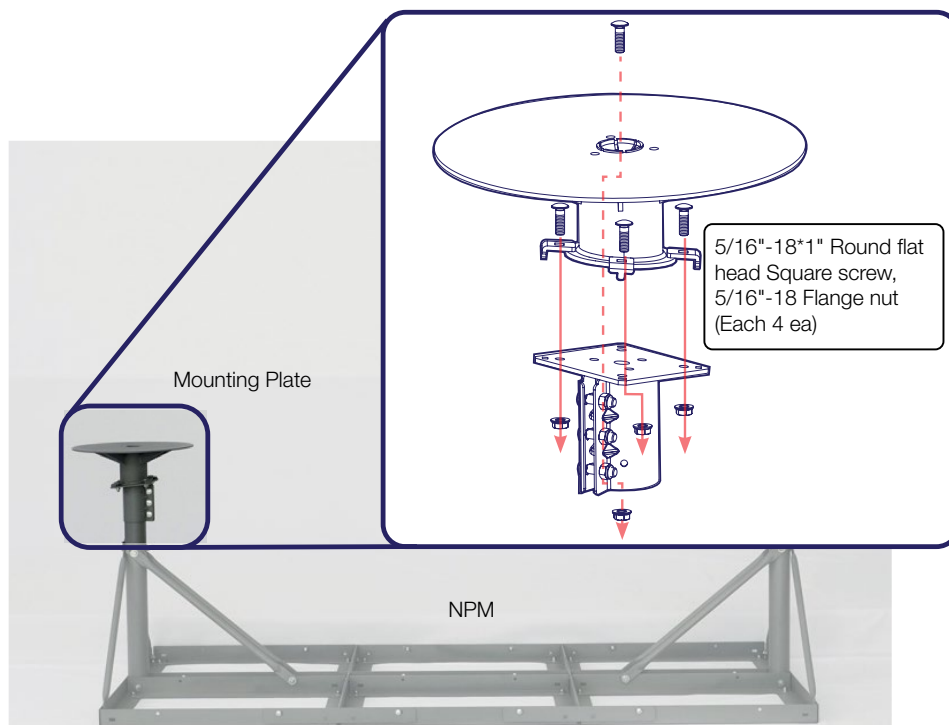
The antenna should be mounted within $\pm 2^\circ$ elevation angle



Mount Plate

To more readily adjust the tilt level, it is recommended that the following Intellian adjustable mount plate is used (Refer to “5.6 Placing Antenna on Fine Tune assembly” on page 31.):






Intellian Part Number	Description
OW-NPM5-1075-ATP	NP Adjustable top plate (1EA)


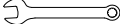



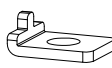
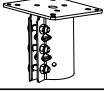
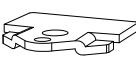

5.6 Placing Antenna on Fine Tune assembly

5.6.1 Assembling the Fine Tune assembly

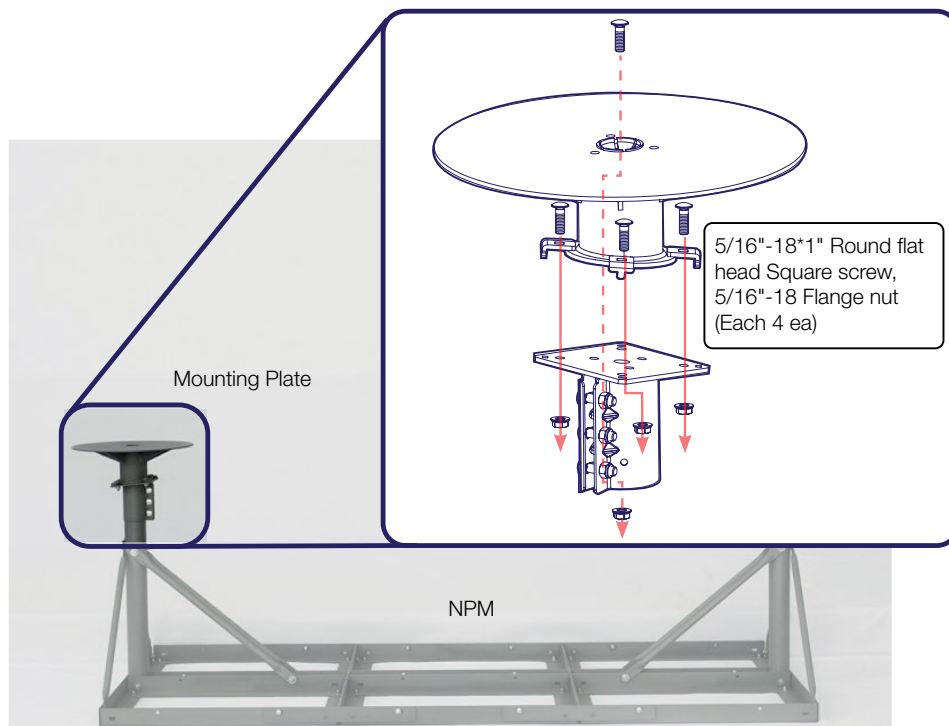
Check the requirement tools before assembling the Fine Tune assembly

FAST ENERS			
NO	ITEM	DESCRIPTION	QTY
1		5/16"-18*1" Round head Square screw	4
2		5/16"-18 Flange nut	4
3		M12*35 hex-head cap screw	4
4		M12 Spring Washer	4
5		M12 Washer	4

T O O L S	
	13mm hexa-wrench
	19mm hexa-wrench

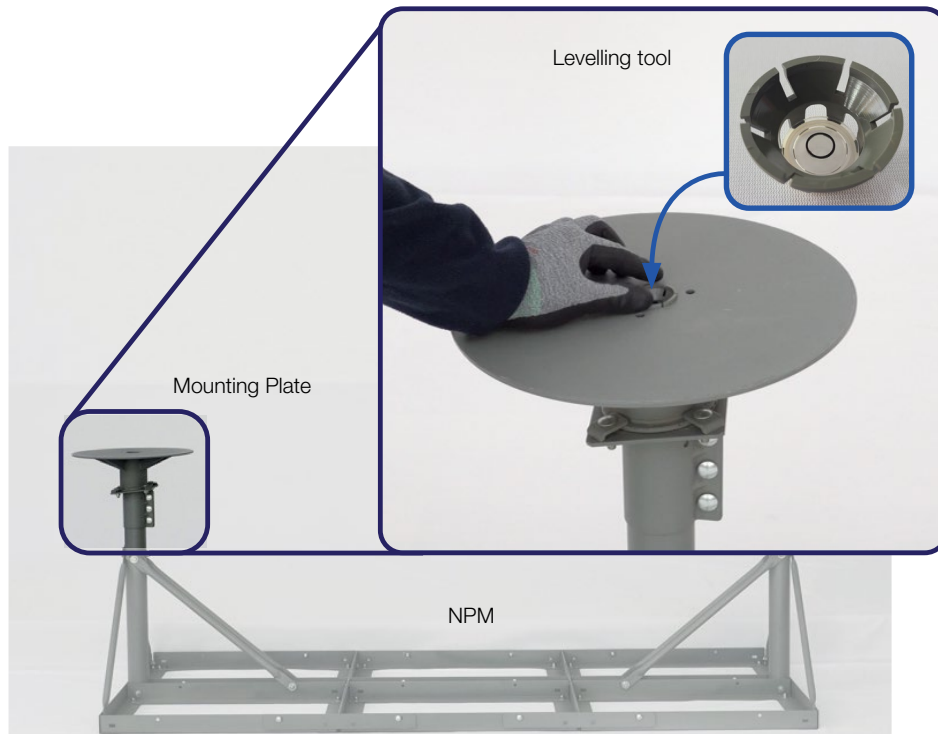
HAR DWARE					
DESCRIPTION	QTY	DESCRIPTION	QTY	DESCRIPTION	QTY
TOP FINE TUNE ASSY. (#A)	1	TOP PLATE CLAMP (#D)	4		
A 		D 			
CLAMP ASSY. (#B)	1	FIX. CLAMP (#E)	4		
B 		E 			
BOTTOM PLATE CLAMP (#C)	4				
C 					

Assemble top fine tune assembly and clamp assembly with bottom plate clamp using an adjustable Hex wrench.

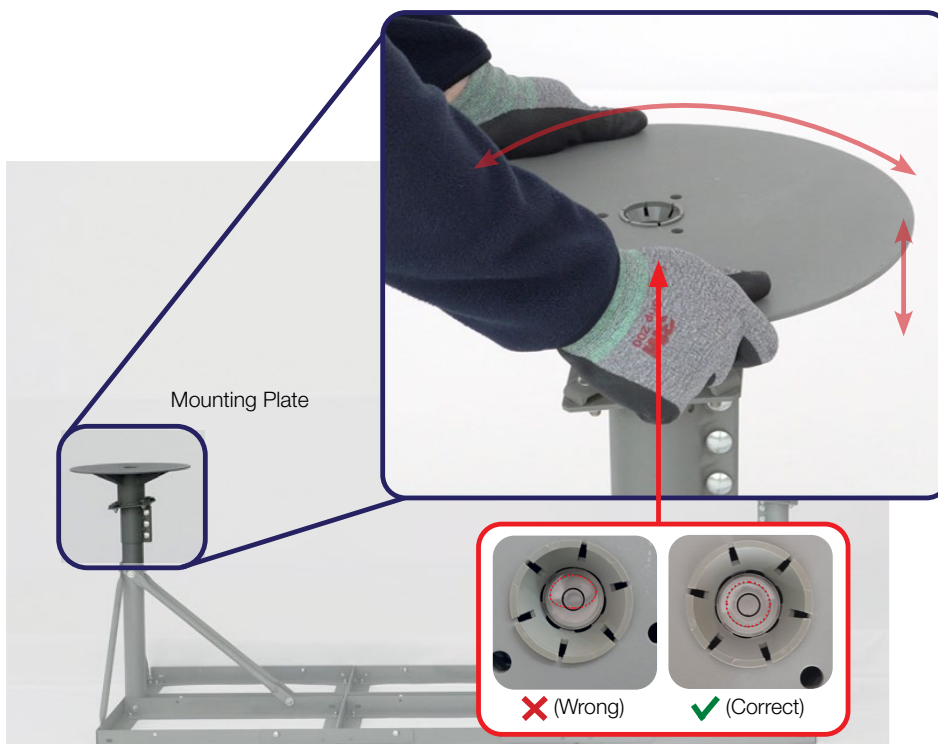


5.6.2 Levelling the Mounting Plate

1. Put a Levelling tool on the centre of the mounting plate.



2. Rotate and adjust up & down the plates until they are perfectly parallel to the ground using the Levelling tool. Check to see whether the bubble is aligned with the guide circle.



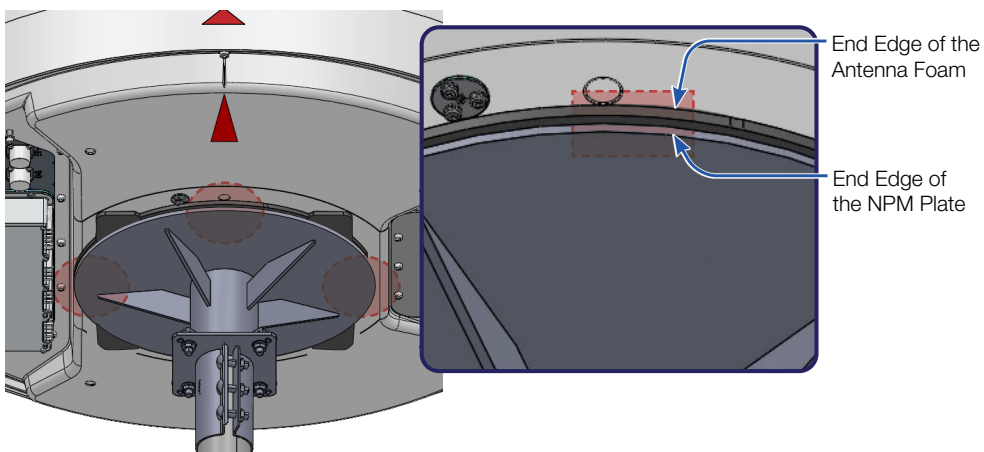
5.7 Mounting Antenna on Mounting Plate

5.7.1 Moving Antenna Above the Mounting Plate

1. Lift the antenna above the plate and carefully lower down the antenna toward the NPM.

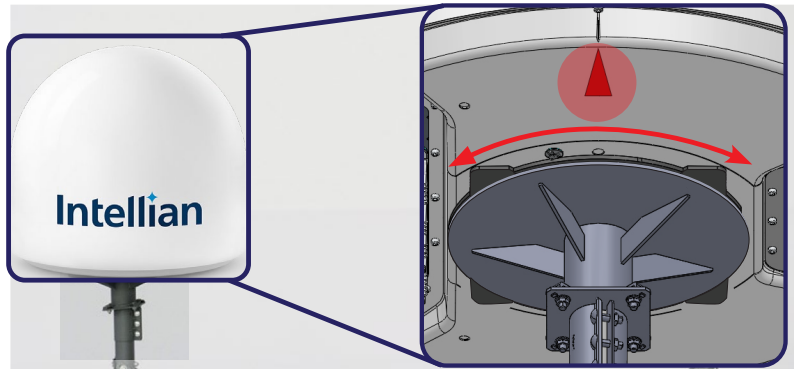


2. Align the end edge of the antenna foam with the end edge of the NPM plate. Make sure the antenna is centered with the NPM plate when mounting the antenna on the NPM.

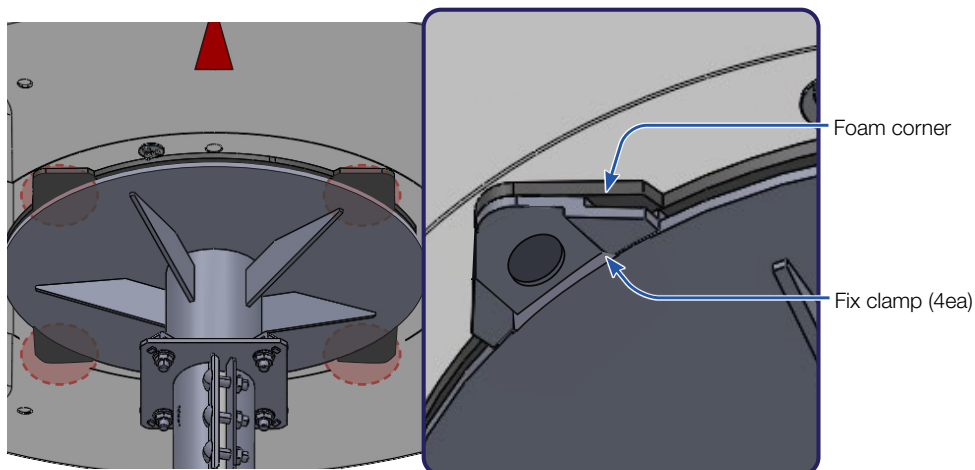


5.7.2 Installing Bolts for Antenna-Mounting Plate Assembly

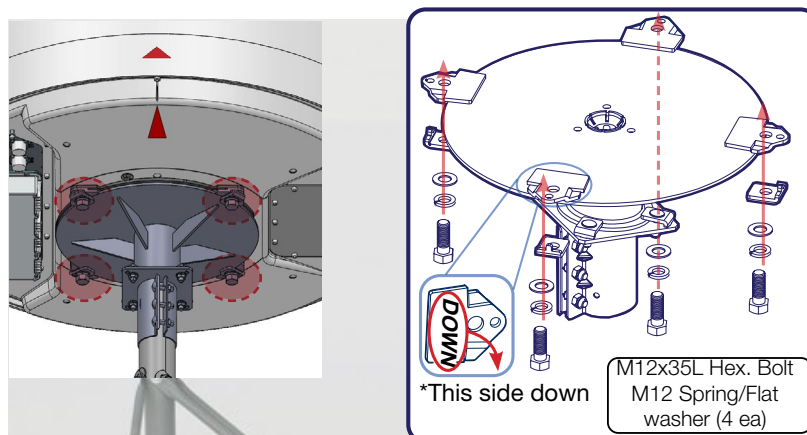
1. Locate the antenna mounting holes and roughly position the “Red triangle” on the radome towards *Magnetic North.



2. The circle markings in the figure indicate where the clamp positions would be installed. Insert the fix clamps between the antenna and NPM. Align the form corners on the antenna bottom with the fix clamps (4 ea). When these are aligned, the holes on the antenna foam and the holes on the clamp line up as well.



3. Find the M12x35L Hex. Bolt M12 Spring and Flat washer (4 ea) from the NPM Install Kit. Position the fixings & bolts into the antenna holes and do not fully tighten at this stage.



NOTE

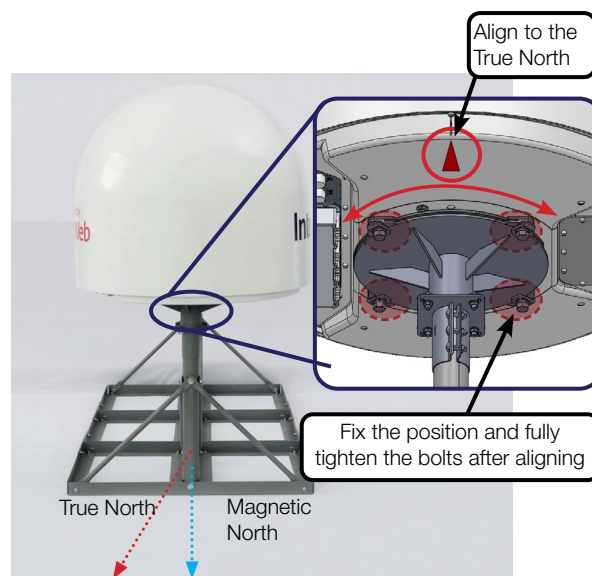
This must be done for both the Primary and Secondary antennas.

5.7.3 Aligning the Antenna to the True North

1. Confirm the red triangle on the bottom of the radome and rotate the antenna to align the middle strut of base.



2. Mark the true north point on the mounting plate by including the declination angle using a True North indicator. (Refer to “5.4 Measuring the North point” on page 24)

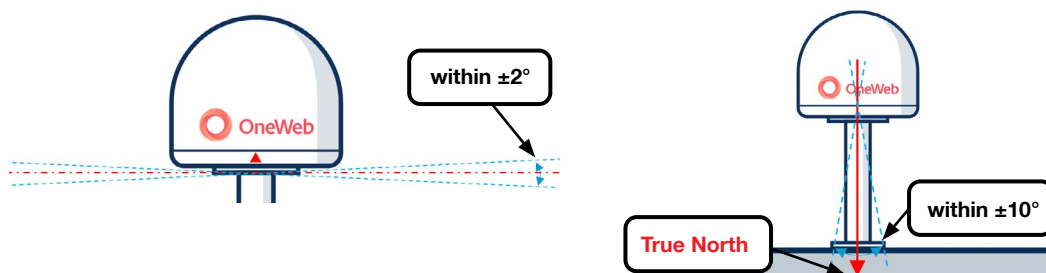


3. Fix the position and fully tighten bolts after aligning the antenna.



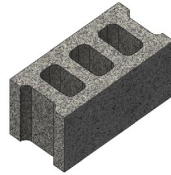
WARNING

- Ensure the antenna is mounted within $\pm 2^\circ$ elevation angle.
- Ensure the antenna is aligned within $\pm 10^\circ$ degrees of True North.



5.7.4 Placing Concrete Blocks on Base Panels

1. Place the concrete blocks on the base panel to hold the weight of the antennas.
One concrete block is 39 x 19 x 19 cm (15.3 x 7.5 x 7.5 inches) /17.56 kg (38.7 lbs).
The area of the assembled base panel is 200 x 90 cm (78.7 x 35.4 inches).



2. Arrange 18 concrete blocks on the base panel in a single layer.
The total weight of 18 concrete blocks is 316.08 kg (696.8 lbs).

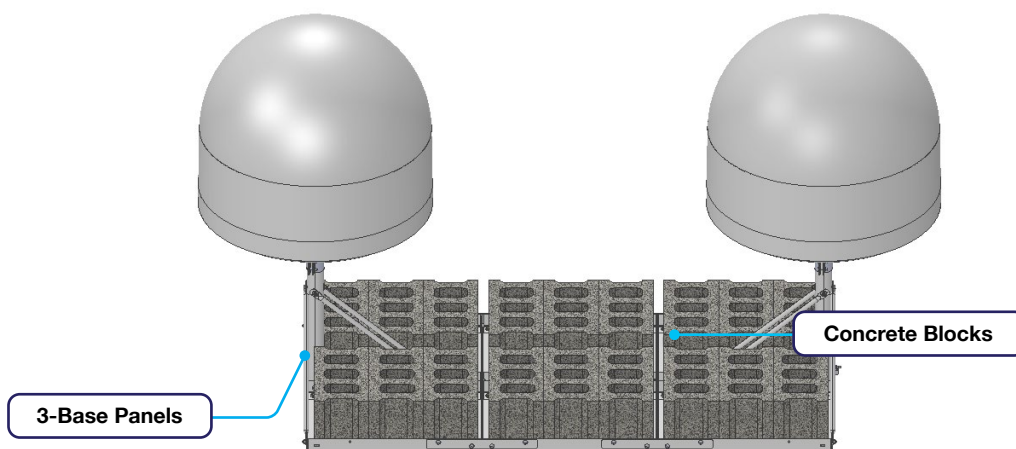


Figure 5: Placing Concrete Blocks on Base Panel of NPM



NOTE

If you want to use alternative weight instead of concrete blocks as shown above, please make sure that total weight of the alternative should meet suggested weight, 316.08 kg (696.8 lbs).

5.8 Connecting Cable to Antenna



NOTE

Make sure of the following before installing system cables.

1. All cables with connectors need to be fully secured and protected from physical damage.
2. Don't acutely bend any cables during installation.
3. To reduce any damage from water (mist) or Ultraviolet Rays (UV), tape over using waterproof and UV protective tape all the connectors located outside.

5.8.1 Connecting Cable to Primary Antenna

Terminate F(M) Connector on each end of RG6 (or RG11) Cable and Connect the F-Connector to the Power & Data connector on each antenna and the CNX Unit. And then secure the cable on the cable bracket on the side of the power & data connector using a cable tie.

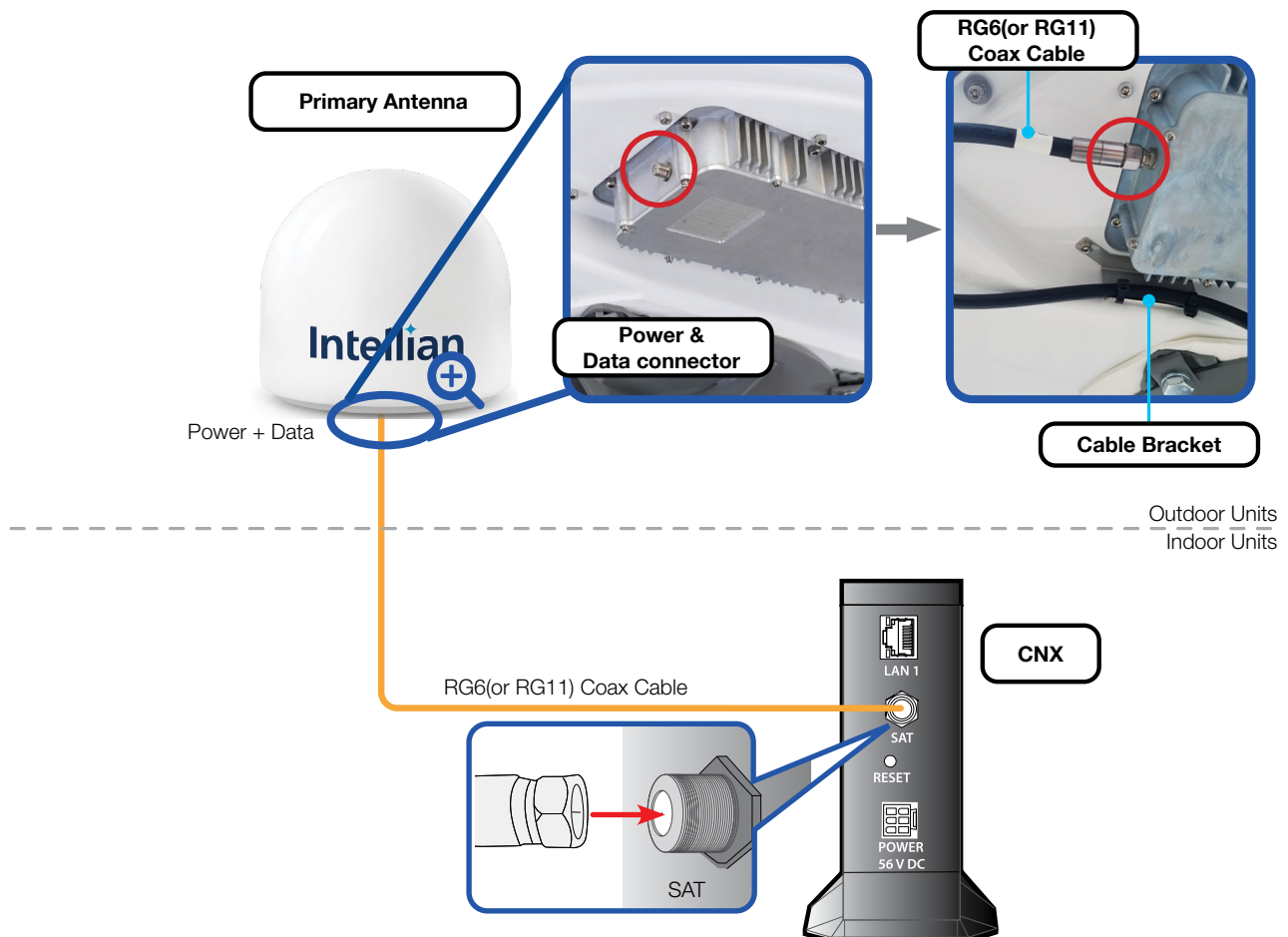


Figure 6: Cable Connection of CNX to Antenna



NOTE

- Choose RG6 or RG11 Coaxial Cable for or connecting the CNX depending on the cable length. The RG6 cable (30 m) is supplied to use to connect the CNX. If you use the RG11, separate purchase of RG11 cable should be needed.
 - RG6 (Supplied) : up to 30m (98.5 ft)
 - RG11 (Customer supplied): up to 100m (328 ft)
- The RG6 cable for connecting the CNX are supplied in the accessory box.
- To prevent cable damage, wrap the cable and connector by using a waterproof tape. (Refer to “11.5 Important Notice of Waterproofing Connector” on page 64.)

5.8.2 Connecting Primary Antenna to Secondary Antenna

1. Connect the RF (Rx) Cable from the Rx Port of the Primary antenna to the Rx Port of the Secondary antenna.
2. Connect the RF (Tx) Cable from the Tx Port of the Primary antenna to the Tx Port of the Secondary antenna.
3. Connect the Ethernet Cable from the ETH (LAN) Port of the Primary antenna to the ETH (LAN) Port of the Secondary antenna.
4. Connect the Signal Cable from the SIG (Signal) Port of the Primary antenna to the SIG (Signal) Port of the Secondary antenna.



CAUTION

- DO NOT over-tighten the connector, nuts, or screws when mounting the antenna to prevent any damage.
- DO NOT leave any cables loosen and non-fixed, especially for those installed outside of the antenna.
- Make sure all cables are fully secure and cables are tied off correctly to prevent trip hazard and damage.

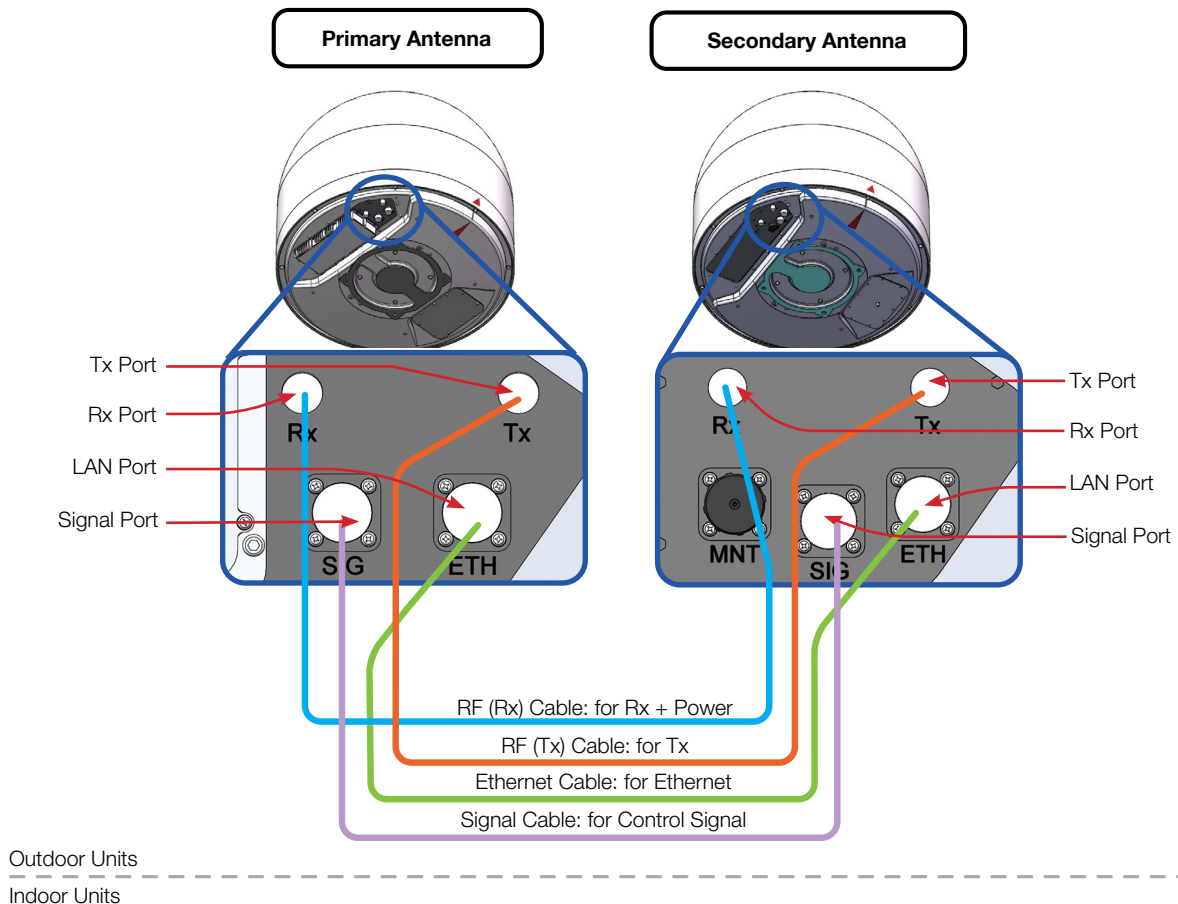


Figure 7: Cable Connection Between Two Antennas



NOTE

Intellian supplies the standard 5M Inter-dome cable kit (Two 5M RF Cable, One 5M Ethernet Cable and One 5M Signal Cable) to connect two antennas. If you need a longer cable than included, contact Intellian to purchase a 10M or 20M Inter-dome cables kit.

5.9 Grounding Antenna

Direct grounding for the antenna is very important for safety. Your radio hardware must be protected from lightning strikes or static electricity by grounding. When establishing your grounding system, it must comply with the safety standards in your country.

Ground all the antennas in use separately.

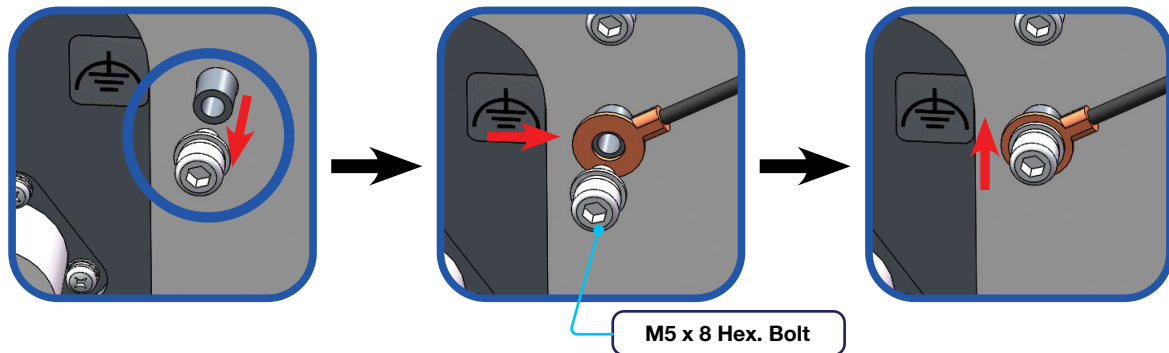


Figure 8: Grounding Antenna

Chapter 6. Installing Indoor Unit (IDU)

6.1 CNX Dimensions

Confirm the dimensions of the CNX before installing it.

Unit: mm (inches)

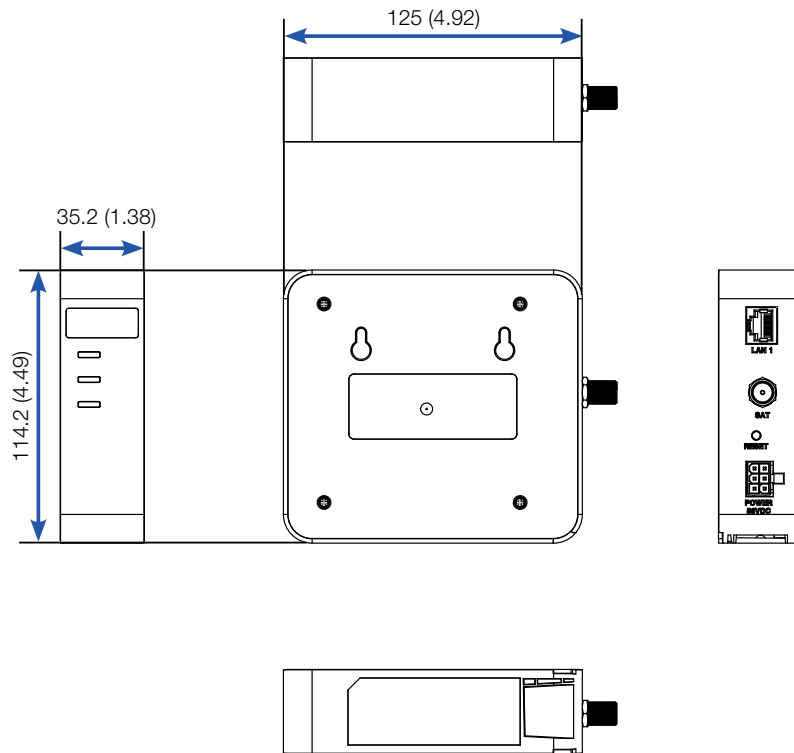


Figure 9: CNX Dimensions



CAUTION

- This equipment design typically applies to commercial or industrial equipment expected to be installed in locations where only adults are normally present.
- This product is intended to be supplied from Intellian by a Listed Power Adapter, rated 56 V DC, 4.48 A minimum, if need further assistance, please contact OneWeb for further information.
- Ensure to connect the power cord to a socket-outlet with earthing connection.
- Never open the equipment. For safety reasons, the equipment should be opened only to qualified service personnel. This appliance classification of use by a Skilled person.

6.2 Antenna System Configuration

For the proper operation of your satellite communication system, it must be connected with all the provided components as shown in the figures below.

The basic antenna system consists of two antennas and a CNX.

The Primary Antenna Includes the SSM Module, which is capable of controlling and managing two antenna systems simultaneously.

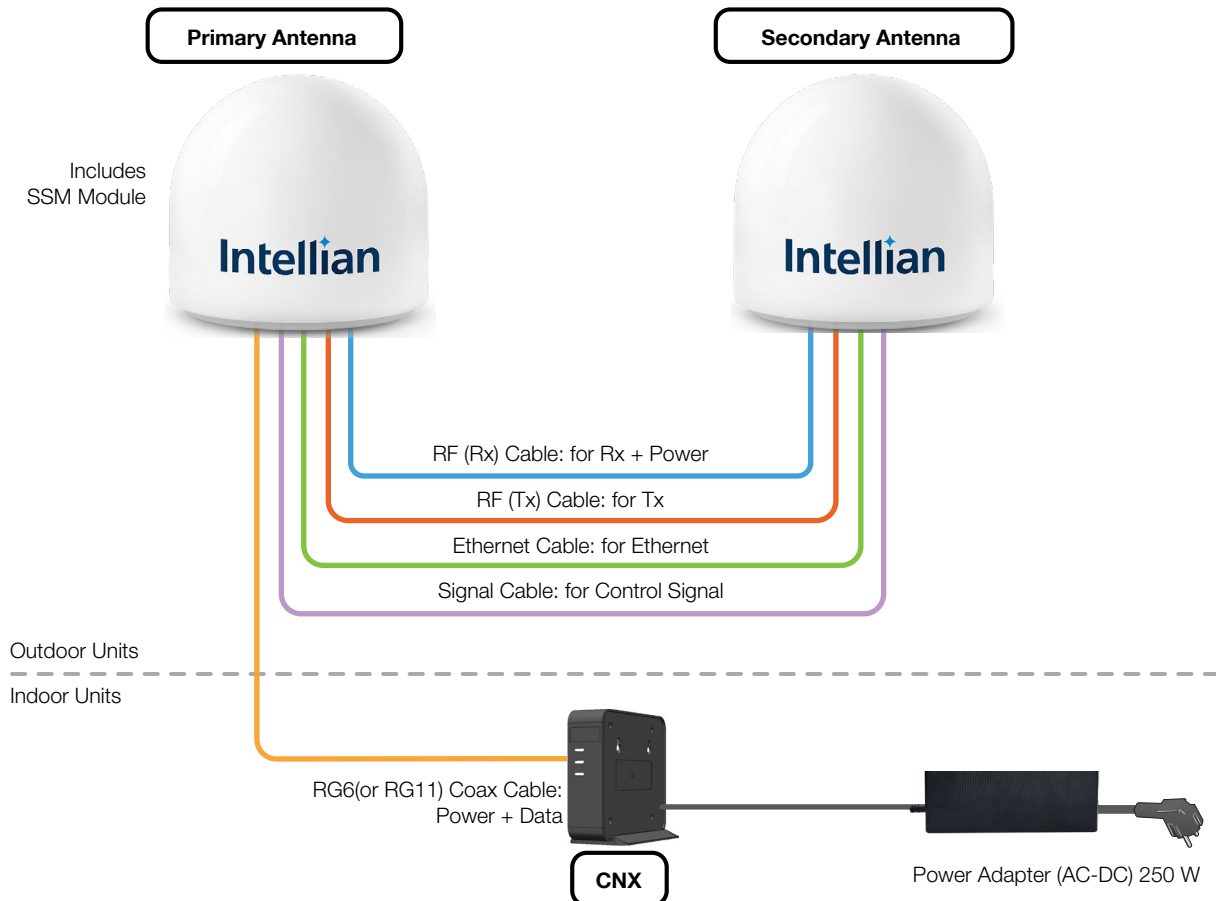


Figure 10: Dual Antenna System Configuration of OW70L-Dac (Standard)



NOTE

- Choose RG6 or RG11 Coaxial Cable for or connecting the CNX depending on the cable length. The RG6 cable (30 m) is supplied to use to connect the CNX.
 - RG6 (Supplied) : up to 30m (98.5 ft)
 - RG11 (Customer supplied): up to 100m (328 ft)
- The RG6 cable for connecting the CNX are supplied in the accessory box.

6.3 CNX Cable Connection

6.3.1 CNX Back Panel Connectors

The following figure shows the CNX back panel connectors.

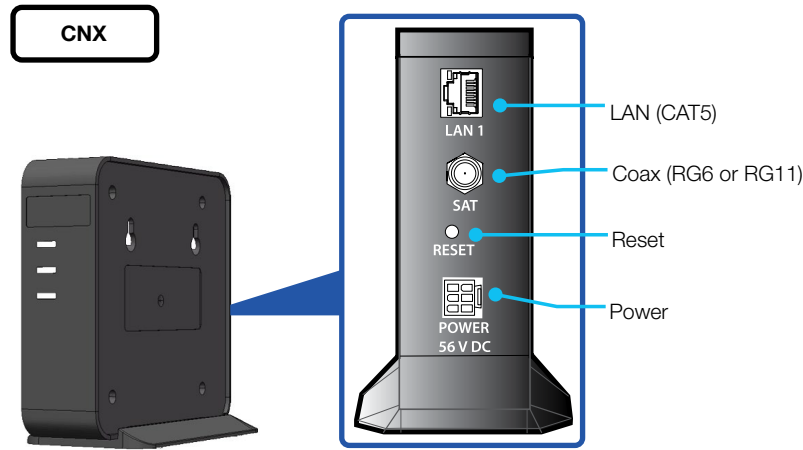
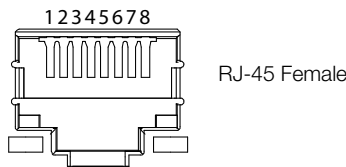


Figure 11: Back Panel Connectors

6.3.2 CNX Connector Pinout Guide

Reference the following connector pinout information for the connection Ports of the CNX.

LAN Connector



RJ-45 Female

Pin	Signal
1	BI_DA+
2	BI_DA-
3	BI_DB+
4	BI_DC-
5	BI_DC+
6	BI_DB-
7	BI_DD+
8	BI_DD-

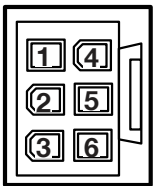
Coax Connectors



RF F Type Female

Conductor	Function
Inner	Power + Data
Outer	GND

Power Connector



6 Contact Power Plug Male

Pin	Signal
1	Return
2	GND
3	Return
4	+56V DC
5	NC
6	+56V DC