



OW70L-Rac/OW70L-Rdc

OneWeb LEO User Terminal

Installation & Operation User Guide

Serial number of the product

--

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



© 2023 Intellian Technologies, Inc. All rights reserved. Intellian and the Intellian logo are trademarks of Intellian Technologies, Inc., registered in the U.S. and other countries. The OW70L-Rac/OW70L-Rdc is a trademark of Intellian Technologies, Inc. Intellian may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from Intellian, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property. All other logos, trademarks, and registered trademarks are the property of their respective owners. Information in this document is subject to change without notice. Every effort has been made to ensure that the information in this manual is accurate. Intellian is not responsible for printing or clerical errors.

Disclaimer

The information in this user guide is subject to change without prior notice out the product life cycle. The printed version of the guide is periodically updated, but it may contain inaccuracies or omissions compared to the most recent product information. The most up-to-date information is always available on our website at intelliantech.com.

Table of Contents

Chapter 1. Precautions	8
1.1 Warnings, Cautions, and Notes	8
1.2 General Precautions	9
Chapter 2. Certifications	10
Chapter 3. Introduction	11
3.1 Introduction to OW70L-Rac/OW70L-Rdc	11
3.2 OW70L-Rac/OW70L-Rdc Features	11
Chapter 4. Planning Installation	12
4.1 Installation Precautions	12
4.2 Selecting Installation Site	12
4.2.1 Installation Location for Antenna	12
4.2.2 Installation Location for CNX	12
4.2.3 Minimizing Satellite Blockage	13
4.2.4 RF Hazard Precautions	14
4.3 System Package	15
4.3.1 Outdoor Unit (ODU)	15
4.3.2 Customer Network Exchange (CNX)	15
4.3.3 Packing List	16
4.4 System Cables	18
4.4.1 Antenna Power+Data Cable	18
4.5 Installer/Customer Furnished Equipment	18
4.6 Unpacking System Package	19
Chapter 5. Installing Outdoor Unit (ODU)	20
5.1 General Requirements	20
5.1.1 Antenna Mounting Requirements	20
5.2 Antenna Dimensions	21
5.3 Installing in the Vicinity of Cellular Communications Towers	22
5.4 Measuring the North point	23
5.5 Designing Pole Mount	25
5.5.1 Assembling Base Panel of NPM (Non-Penetrating Mount)	25
5.5.2 Installing Customized Pole Mount	28
5.6 Placing Antenna on Fine Tune assembly	30
5.6.1 Assembling the Fine Tune assembly	30
5.6.2 Levelling the Mounting Plate	31
5.7 Mounting Antenna on Mounting Plate	32
5.7.1 Moving Antenna Above the Mounting Plate	32
5.7.2 Installing Bolts for Antenna-Mounting Plate Assembly	33
5.7.3 Aligning the Antenna to the True North	34
5.7.4 Placing Concrete Blocks on Base Panels	35

5.8 Connecting Cable to Antenna	36
5.9 Connecting power cable for Heating Module (Optional)	37
5.10 Grounding Antenna	38
Chapter 6. Installing Indoor Unit (IDU)	39
6.1 CNX Dimensions	39
6.1.1 CNX Dimensions	39
6.2 Antenna System Configuration	40
6.3 CNX Cable Connection	42
6.3.1 CNX Front Panel View	42
6.3.2 CNX Back Panel View	43
6.3.3 CNX Connector Pinout Guide	43
6.3.4 Connecting to a Wi-Fi network through the Wi-Fi Dongle	45
Chapter 7. Starting Dual Antenna System	46
7.1 Configuration of Dual Antenna System	46
7.2 Accessing LUI	46
7.2.1 Setting the Compound UT#2 (Secondary)	47
7.2.2 Setting the Compound UT#1 (Primary)	48
7.3 Starting Install Menu (Install Wizard)	50
7.4 Monitoring Dual Antenna System	55
Chapter 8. Using Local User Interface (LUI)	56
8.1 Introduction	56
8.2 Turning On System	56
8.3 Accessing Webpage	56
8.3.1 TCP/IP Connection through LAN Port	56
8.4 Webpage Layout	57
8.4.1 Navigation bar	57
8.4.2 Home Page	58
8.4.3 Footer	59
8.5 Antenna	60
8.5.1 Antenna Info	60
8.5.2 Massage stats	61
8.5.3 Modem ↔ Antenna Latency	61
8.5.4 Blockage zones	62
8.5.5 Antenna status	62
8.5.6 Antenna Setup	63
8.5.7 IMU Offset	65
8.5.8 Installation	66
8.5.9 RF cable setup	66
8.5.10 Blockage zone	66
8.5.11 RCM	67
8.5.12 Product Information	67

8.5.13 Software Version	68
8.5.14 RF Gain Offset	68
8.5.15 TILT Calibration	69
8.5.16 True North Calibration	69
8.5.17 Download Complete Logs	69
8.5.18 Download AIM Logs	69
8.6 Modem	70
8.6.1 Antenna Info	70
8.6.2 APN Info	70
8.6.3 Modem status	71
8.6.4 Modem Control Panel	71
8.6.5 OneWeb Extension	72
8.6.6 GNSS Status	73
8.6.7 PPS status	76
8.7 Network	77
8.7.1 Network info	77
8.7.2 Packet Graphs	78
8.8 Diagnostic	79
8.8.1 UT status	79
8.8.2 Host Processor Logs	80
8.8.3 Event Logs	80
8.8.4 UT Configuration	81
8.8.5 UT Advanced Configuration	82
8.8.6 Fault Management	83
8.8.7 CNX Manager	84
8.8.8 MoCA Info	85
8.8.9 System Monitor status	86
8.8.10 System Monitor status	87
8.8.11 System Monitor status	88
8.8.12 Self Test Results	89
8.8.13 TWAMP	90
8.8.14 Compound UT Information	91
8.9 Management	93
8.9.1 Management Status	93
8.9.2 Switch UT Software	94
Chapter 9. Specification	95
9.1 Technical Specification	95
9.1.1 RF Specification	95
9.1.2 System Specification	95
9.1.3 Mechanical Specification	96
9.1.4 Package Specification	96
9.2 Customer Network Exchange (CNX) Specification	97
9.3 Environmental Specification	97

Chapter 10. Warranty.....99

Chapter 11. Appendix.....100

 11.1 Pre-Installation Checklist.....100

 11.2 Tightening Torque Specification.....101

 11.3 Checking separately sold items.....102

 11.4 Important Notice of Waterproofing Connector.....103

 11.4.1 Introduction.....103

 11.4.2 Outline of Taping.....103

 11.4.3 Procedure.....103

List of Figures

Chapter 4. Planning Installation	12
Figure 1: Minimizing Satellite Blockage (example)	13
Figure 2: Radomes and Pedestal	15
Figure 3: Front Panel of CNX	15
Figure 4: Back Panel of CNX	15
Chapter 5. Installing Outdoor Unit (ODU)	20
Figure 5: Antenna Dimension	21
Figure 6: Placing Concrete Blocks on Base Panel of NPM	35
Figure 7: Cable Connection of CNX to Antenna	36
Figure 8: Grounding Antenna	38
Chapter 6. Installing Indoor Unit (IDU)	39
Figure 9: CNX Dimensions	39
Figure 10: Dual Antenna System Configuration (Standard)	40
Figure 11: Dual Antenna System Configuration with Heating Module	41
Figure 12: Front Panel View	42
Figure 13: Back Panel View	43
Figure 14: Back Panel Wi-Fi Dongle Connection	45
Figure 15: Setting up a Wi-Fi network on a PC	45
Chapter 7. Starting Dual Antenna System	46
Figure 16: Front Panel LAN Port Connection with CNX	46
Chapter 8. Using Local User Interface (LUI)	56
Figure 17: Front Panel LAN Port Connection with CNX	56

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 Place the boxes/crates on the floor with the arrow pointing up.
	FRAGILE 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 - 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 damage 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 7.5 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.

Chapter 3. Introduction

3.1 Introduction to OW70L-Rac/OW70L-Rdc

The OW70L-Rac/OW70L-Rdc 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-Rac/OW70L-Rdc Features

- LEO satellite pointing and tracking algorithm.
- 3-axis stabilization platform with motion drift compensation solutions.
- Fully sealed to protect against outdoor environment.
- Dual-dome operation for seamless connectivity.
- Simple and suitable industrial design for professional installation.
- Wideband GNSS antenna improves location precision.
- 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 100
- 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. Here, there should be references to the “Site pre-requisite survey” document for more details.

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 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.

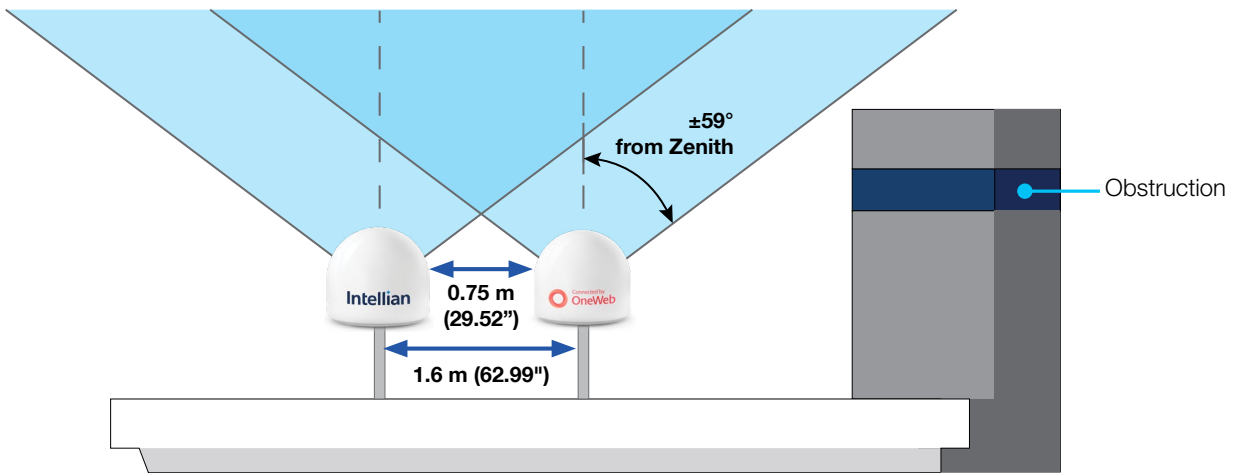


Figure 1: Minimizing Satellite Blockage (example)

4.2.4 RF Hazard Precautions

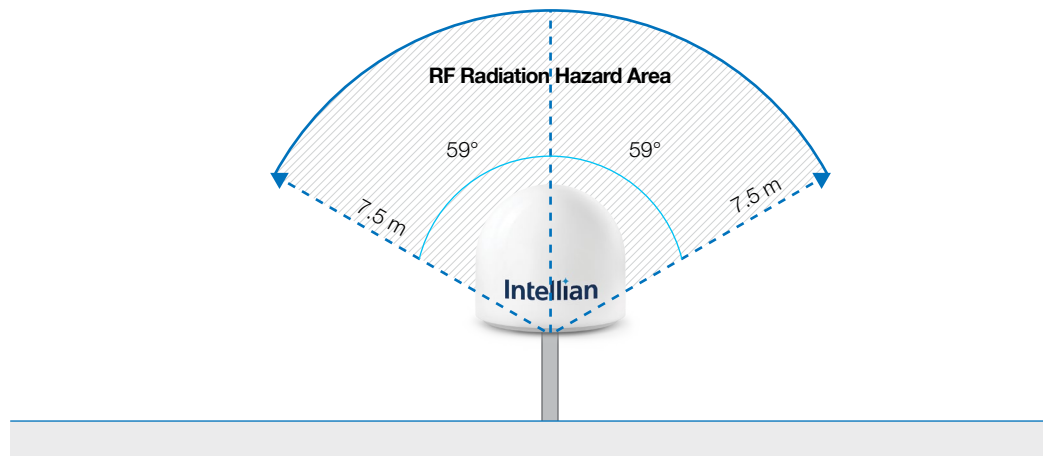
The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy, which is below the OSHA (Occupational Safety and Health Act) limits. To comply with current FCC RF Exposure limits, the antenna must be installed at or exceeding the minimum safe distance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



WARNING

Exposure to radio frequency energy (RF) from the antenna may cause thermal injuries including tissue damage from increased heating and body temperature. Keep everyone (operators, pedestrians) and windows, doors at a safe distance from the antenna when the system power is ON. Personnel must maintain a minimum distance of A (refer to the function below) and installers must place the ODU (Outdoor Unit) transmitter in a manner to maintain minimum spacing requirement. Failure to do so could result in exposure to radio frequency energy (RF) transmitted from the ODU (Outdoor Unit) that could result in serious injury or death.

The value of the table applies to persons in the general population who are in an uncontrolled environment.



4.3 System Package

4.3.1 Outdoor Unit (ODU)

The OW70L-Rac/OW70L-Rdc operates in a dual parabolic two antennas 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. Each 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 above deck unit. The CNX connects to two antennas while providing secure GigE connection to the Baseband Unit.

Front/Back Panel of CNX



Figure 3: Front Panel of CNX



Figure 4: Back Panel of CNX

4.3.3 Packing List

OW70L-Rac/OW70L-Rdc Packing list

The ADU Packages (2 ea) and CNX Package (1 ea) are provided in each package box.

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

The components are packaged in each package box as listed in the tables below.

OW70L-Rac/OW70L-Rdc (without Heating Module)

Antenna Package (Without Heating Module)			
Item	Q'ty	Size	Description
Antenna Unit	1		User Terminal
Quick Installation Guide (QIG)	1		Installation Manual
RG-6 Coaxial Cable F(M) - F(M)	1	30 m	Coaxial Cable F(M)-F(M) for CNX Power & Data Connection
AC Power Cord (USA)	1	1.5m	CNX Power Cord (110V)
AC Power Cord (CEE7/7)	1	1.5m	CNX Power Cord (220V)
Hex Bolt_STS316L	5	M12x40	Bolt kit for antenna-mast assembly
Spring Washer_STS316L	5	M12	
Flat Washer_STS316L	5	M12	
Hex-S Bolt_SF_STS316L	2	M5x8	Spare Grounding screw
RF Hazard Sticker	1		Radiation Safety Distance (13 m) Label

OW70LH-Rac/OW70LH-Rdc (with Heating Module)

Antenna Package (With Heating Module)			
Item	Q'ty	Size	Description
Antenna Unit	1		User Terminal
Quick Installation Guide (QIG)	1		Installation Manual
RG-6 Coaxial Cable F(M) - F(M)	2	30 m	- Coaxial Cable F(M)-F(M) for CNX Power &Data Connection - Coaxial Cable F(M)-F(M) for the heating module
AC Power Cord (USA)	2	1.5m	CNX Power Cord (110V)
AC Power Cord (CEEE7/7)	2	1.5m	CNX Power Cord (220V)
Hex Bolt_STS316L	5	M12x40	Antenna Mounting Bolt Kit
Spring Washer_STS316L	5	M12	
Flat Washer_STS316L	5	M12	
Hex-S Bolt_SF_STS316L	2	M5x8	Spare Grounding screw
RF Hazard Sticker	1		Radiation Safety Distance (13 m) Label
F-type Connector Adaptor	1	-	Power Adaptor Connector F(M) for RG6 or RG11 Coaxial Cable
Power Adapter (AC-DC) For Heating Module	1		To convert AC 100-240V to DC +56V for Heating Module (250W)

**NOTE**

The Heating Module are assembled and tested at the antenna during production.

CNX Package (1 ea)			
Item	Q'ty	Size	Description
Customer Network Exchange (CNX)	1	442 mm x 250 mm x 44.4 mm	To access to OneWeb services
CNX-E Wi-Fi dongle	1		For Wi-Fi connection (TL-WN823N)
Rackmount Plate	2		19inch Rack Mount Kit
Pan Head Screw (with Spring & Flat Washer)	8	M4 x 16 L	

4.4 System Cables

4.4.1 Antenna Power+Data Cable

Intellian recommends using the RG6 or RG11 cable types to connect the antenna and CNX. The use of different type of cables can cause problems. If you need a cable that runs longer than the maximum cable length recommended, contact Intellian Technical Support for assistance.

Cable Type	Cable Length
RG6 (Supplied)	UP to 30m
RG11 (Customer Supplied)	UP to 100m

**NOTE**

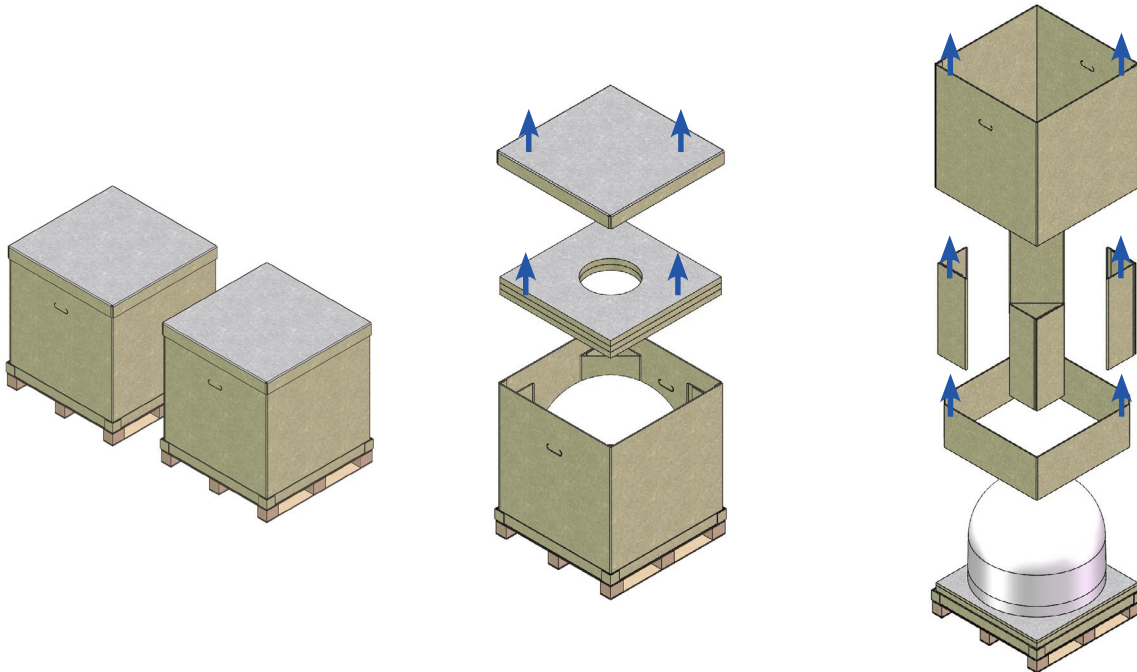
Optimal tightening torque for F type RF connector: 1.5 N-m

4.5 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 structure
- Fasteners and other installation tools

4.6 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 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 16



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 each antenna is about 33.6 kg (74.1 lbs).
- The mechanical resonance of the system excited by wind : 5 Hz
- Ensure there is Max ~ 100 m (depends on its RG cable applied, ~ 30m for RG6, ~ 100m for RG11) separation between two antennas.
- The preferred installation orientation is East to West.
- 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.

Unit: mm (inches)

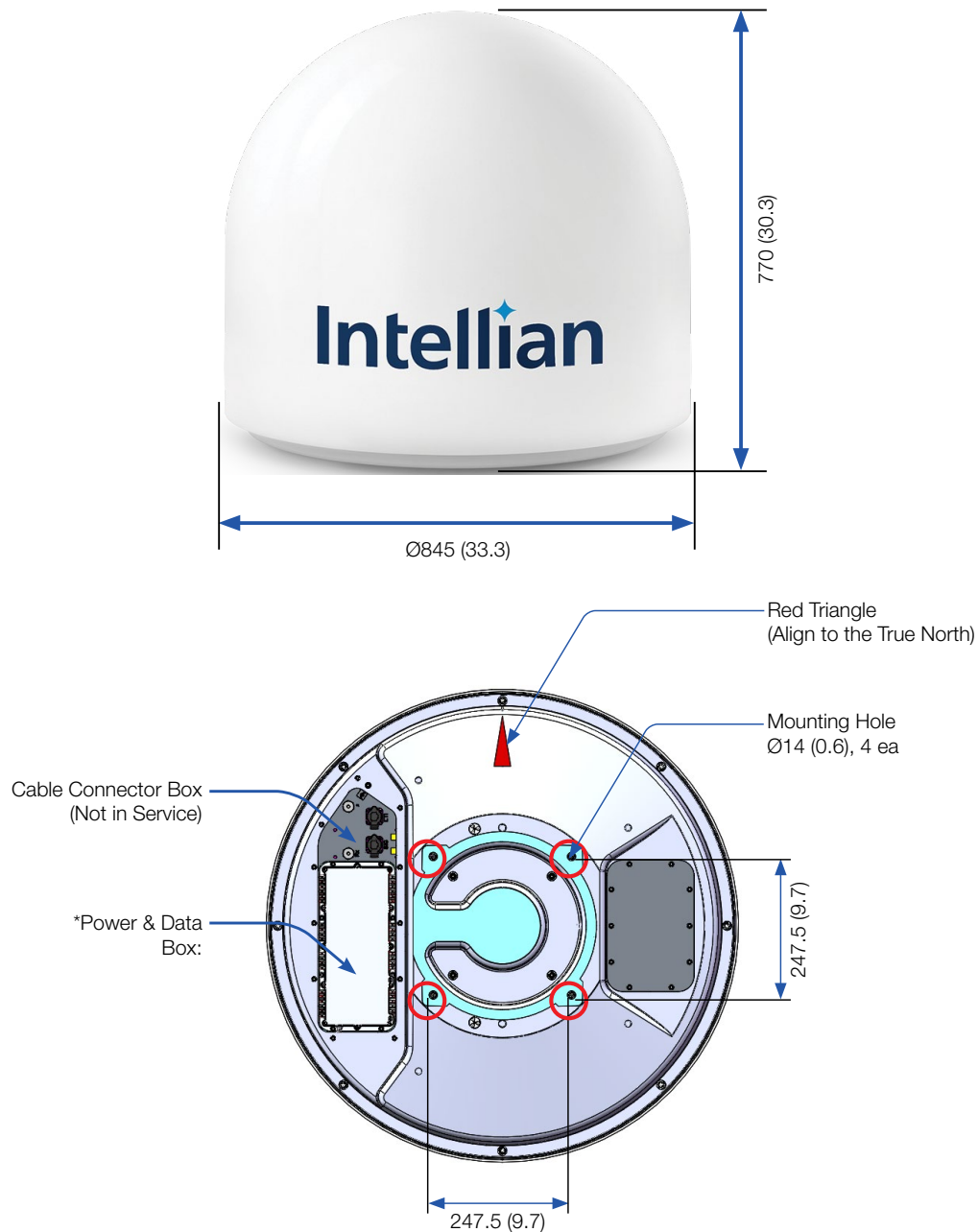


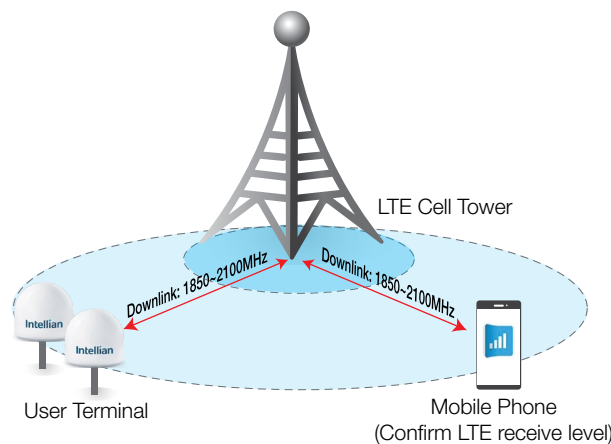
Figure 5: Antenna Dimension

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

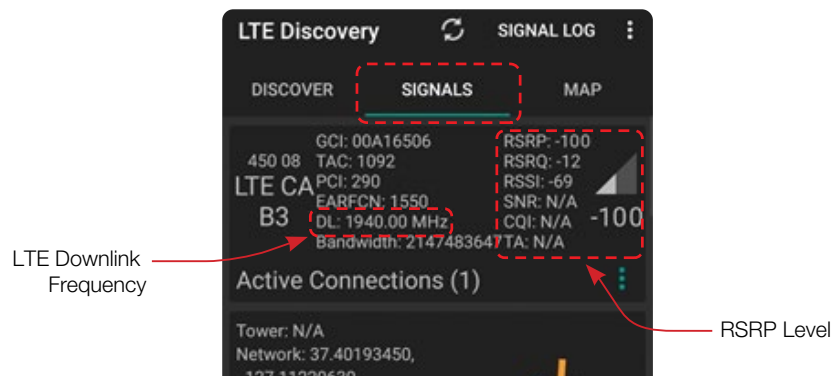


Procedure to check LTE frequency and RSRP level:

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.

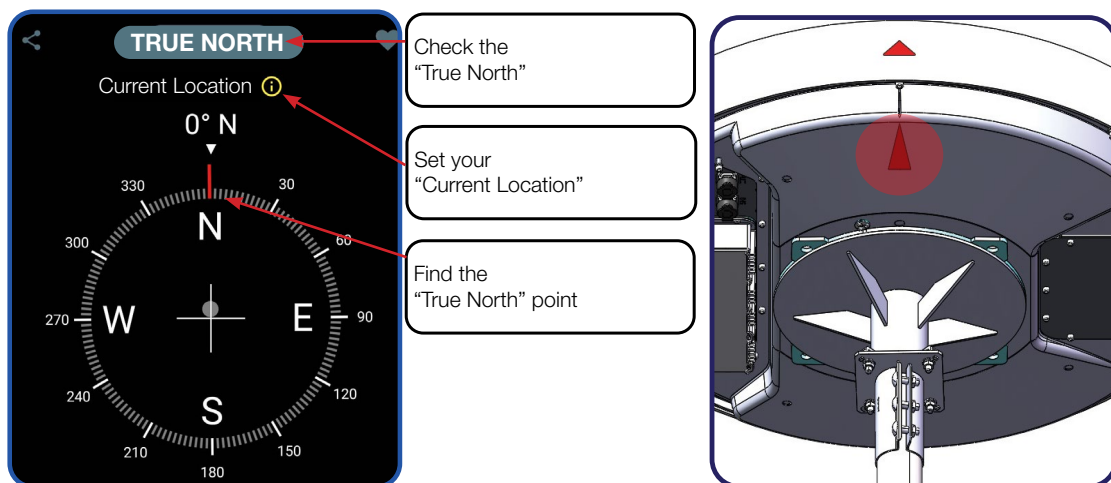
A. When using a magnetic compass

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 (Smart phone applications or devices).
3. Compare with virtual line and “Red triangle” on the bottom of 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 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 LUI interface. At the top, there is a 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 navigation 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 blue 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 titled 'Antenna Setup' and contains several sections: 'Primary True North Offset' with an 'Azimuth' input field set to '1.00'; 'Secondary True North Offset' with an 'Azimuth' input field set to '1.00'; 'Heading' with a 'Heading (°)' input field set to '0.00' (this section is highlighted with a red box and callout 3, and the input field has callout 4); and 'Debug Log Level' with a 'Log Flags' input field set to '0x7077'. At the bottom of the main content area is a blue 'Submit' button (callout 5).

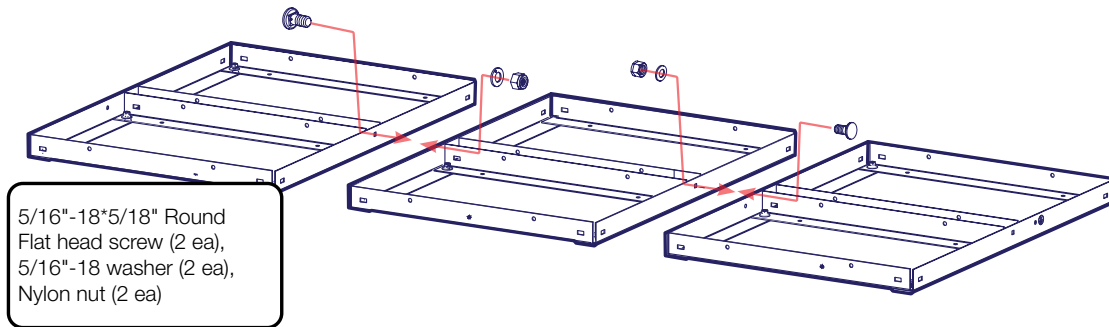
5.5 Designing Pole Mount

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

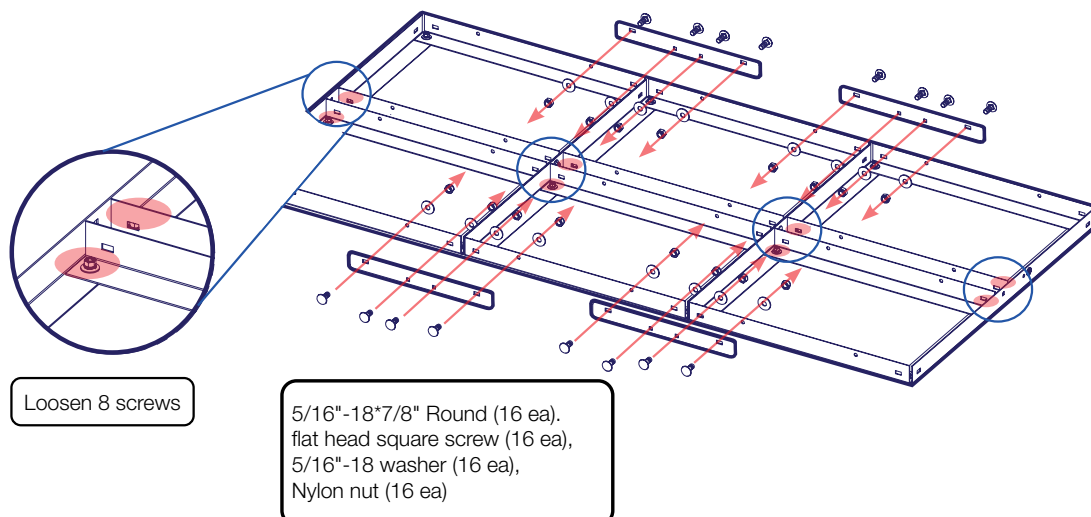
This is generally recommended. Check the requirement tools before assembling the NPM

FASTENERS				TOOLS	HARDWARE			
NO	ITEM	DESCRIPTION	QTY		DESCRIPTION	QTY	DESCRIPTION	QTY
1		5/16"-18*5/8" Round flat head Square screw	6		A	1	C	8
2		5/16"-18*7/8" Round head Square screw	16			8	E	2
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"-18*1-1/4" hex flange screw	2			4		
9		5/16"-18 keps k-lock nut	4					
10		#12-3/4" tapping screw	4					

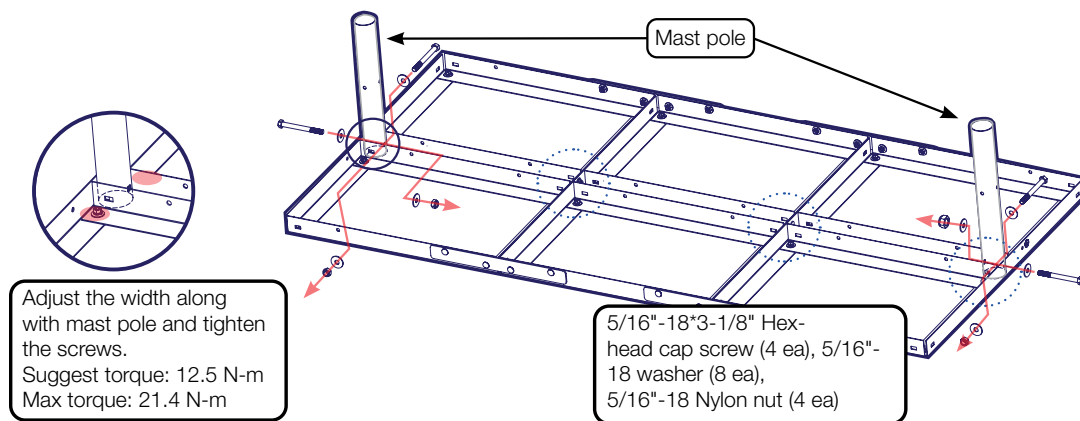
1. Assemble 3 mounting bases with the bolts kits.



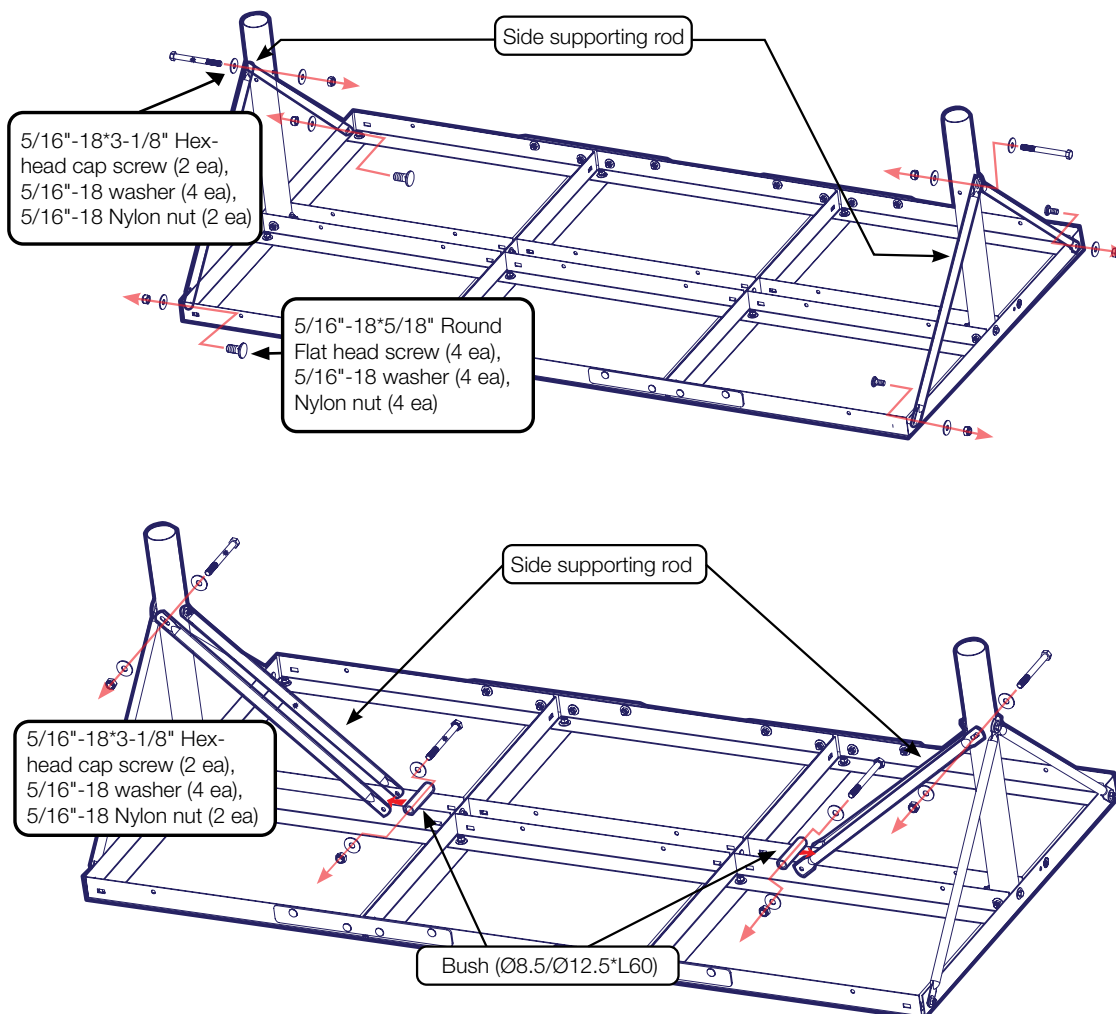
2. Assemble 4 support plates with the bolt kits.



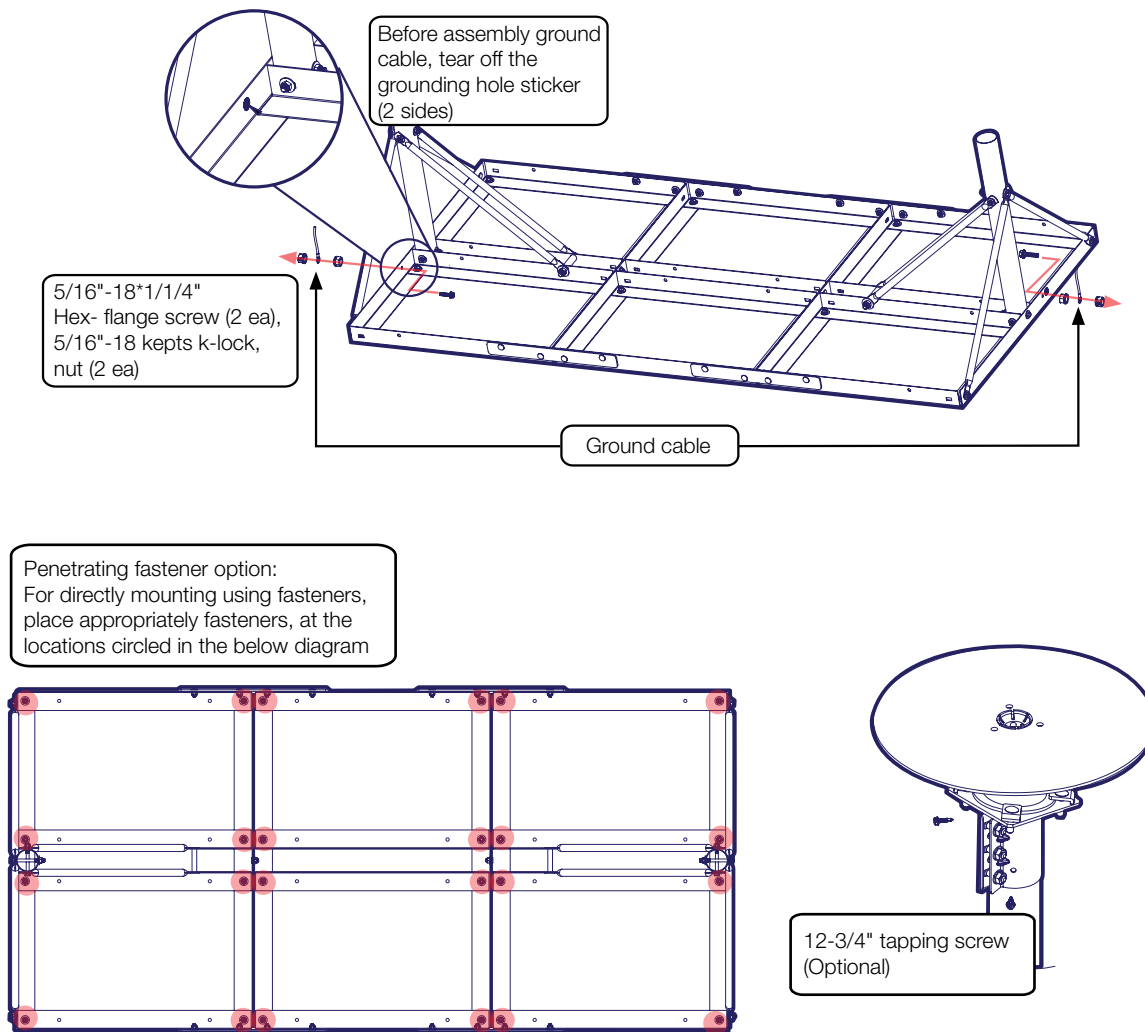
3. Assemble 2 mast poles with bolt kits.



4. Assemble 4 side supporting rods with bolt kits



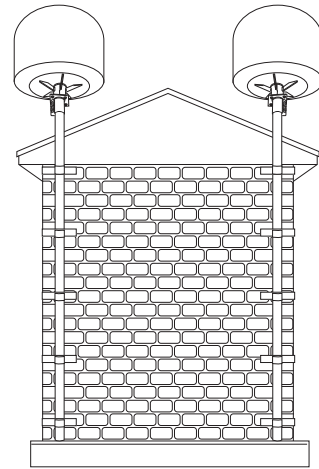
5. Assemble ground cable with bolt kits.



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.

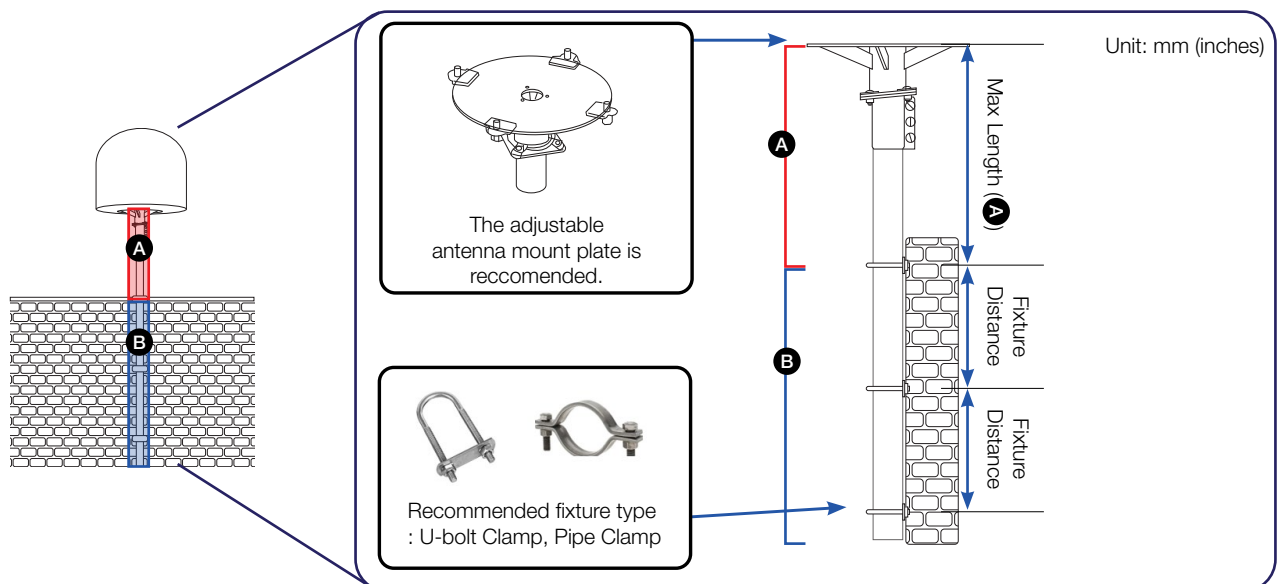
The figure to the right is an example of a proper customized pole mount installation.



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 a different pole type is different from the recommended type, 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

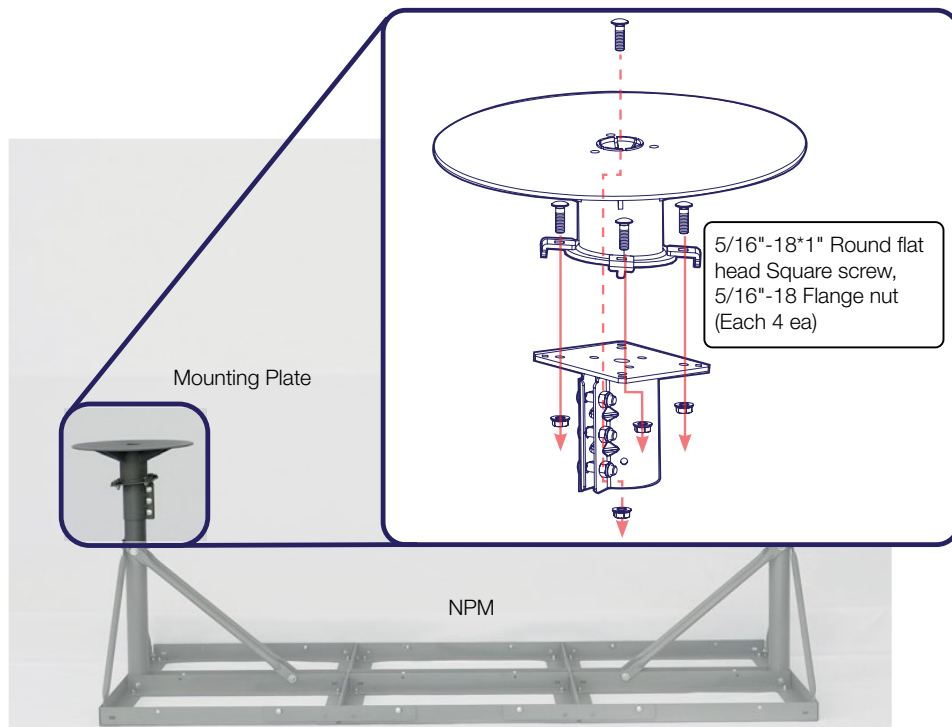
The antenna should be mounted within $\pm 2^\circ$ elevation angle



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

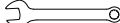
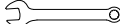
5.6.1 Assembling the Fine Tune assembly

Check the requirement tools before assembling the Fine Tune assembly

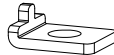
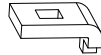
FAST ENERS

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

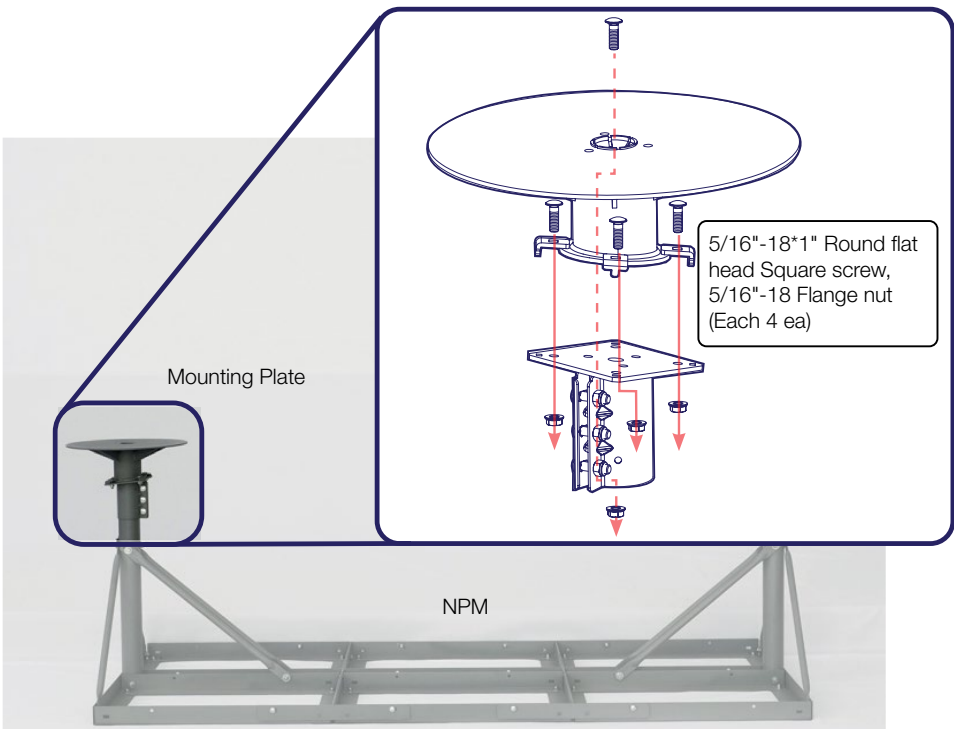
TOOLS


13mm hexa-wrench

19mm hexa-wrench

HARDWARE

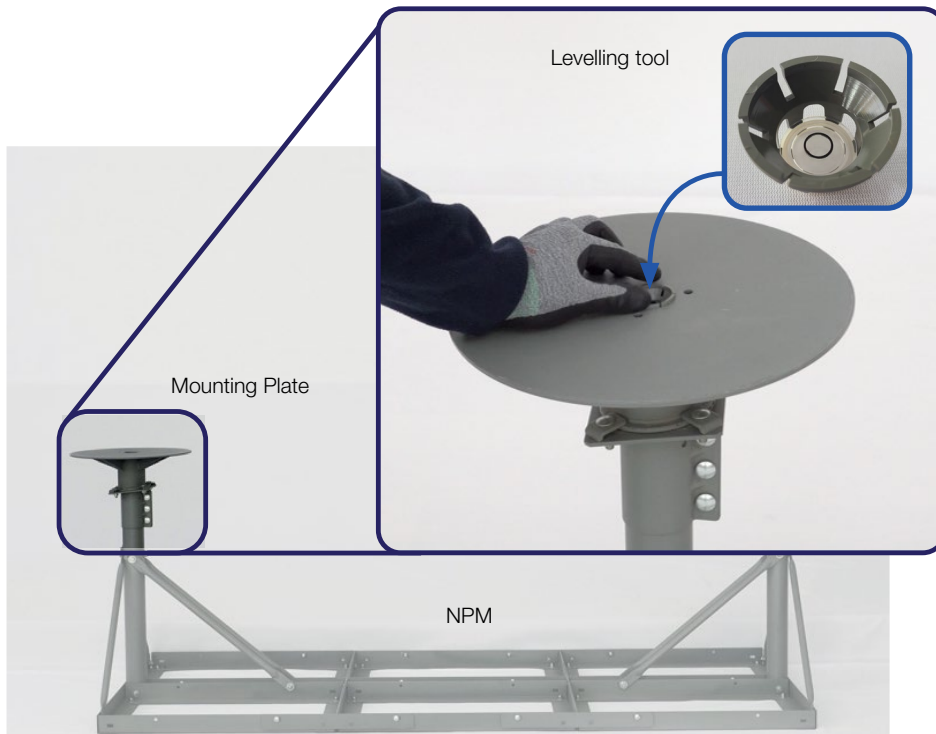
DESCRIPTION	QTY	DESCRIPTION	QTY	DESCRIPTION	QTY
TOP FINE TUNE ASSY. (#A)	1	TOP PLATE CLAMP (#D)	4		
A		D			
DESCRIPTION	QTY	DESCRIPTION	QTY	DESCRIPTION	QTY
CLAMP ASSY.(#B)	1	FIX. CLAMP (#E)	4		
B		E			
DESCRIPTION	QTY	DESCRIPTION	QTY	DESCRIPTION	QTY
BOTTOM PLATE CLAMP (#C)	4				
C					

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

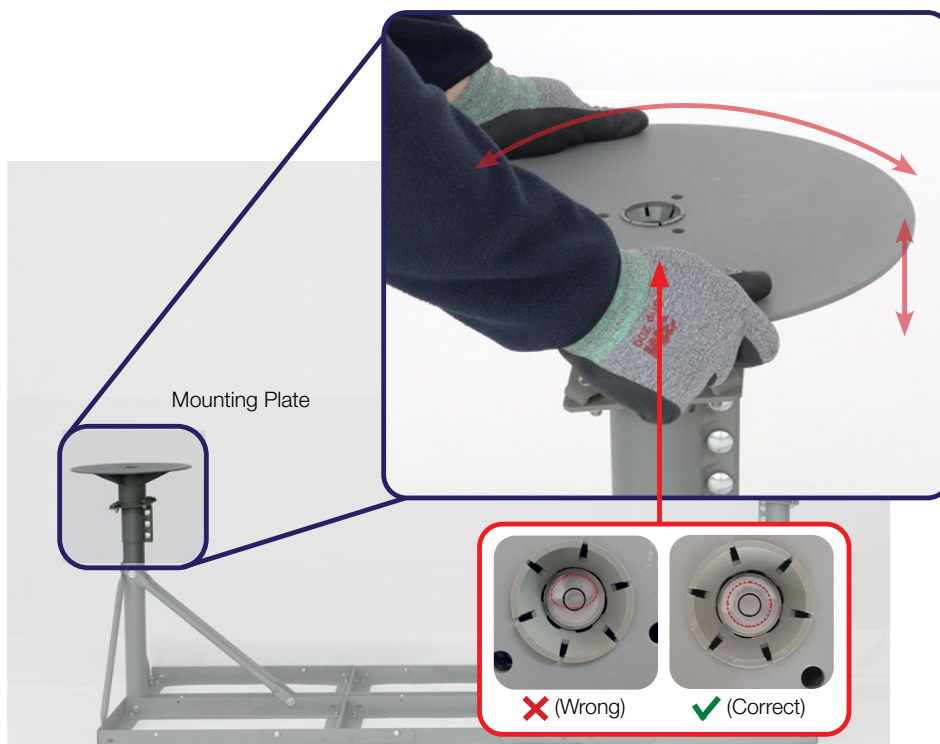


5.6.2 Levelling the Mounting Plate

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.



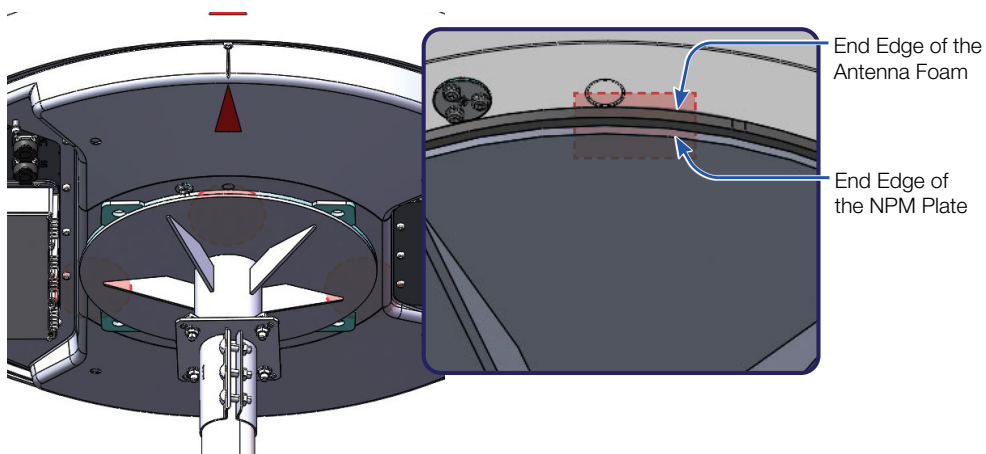
5.7 Mounting Antenna on Mounting Plate

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.

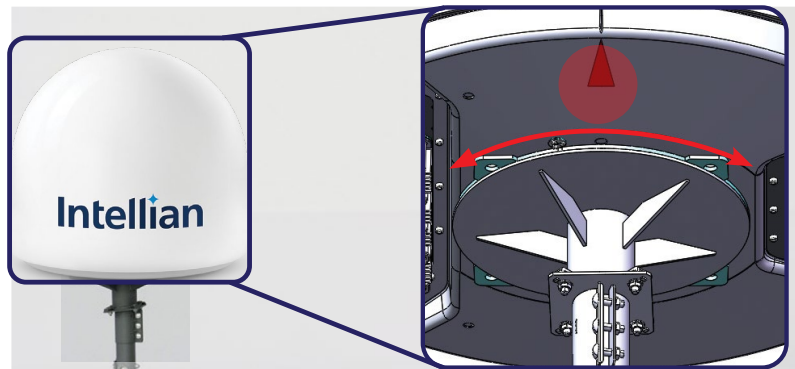


2. Align the end edge of the antenna foam with the end edge of the NPM plate. Make sure the antenna is centered with the the NPM plate when mounting the antenna on the NPM.

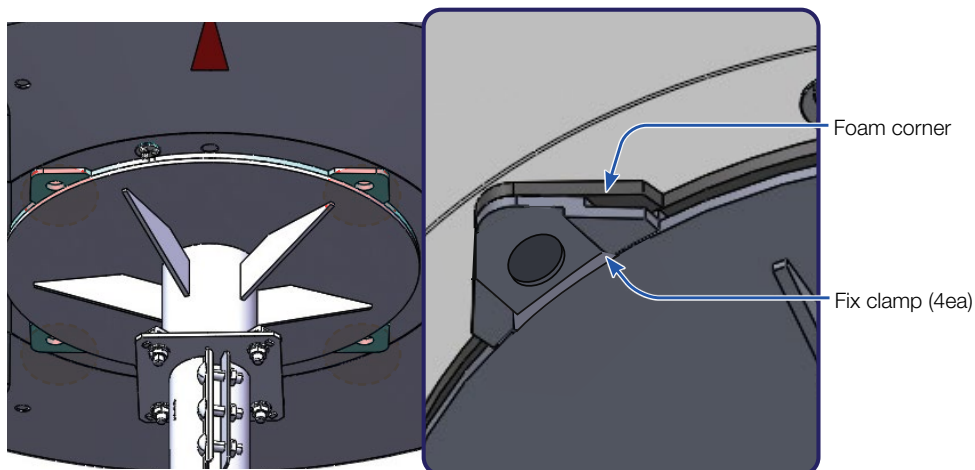


5.7.2 Installing Bolts for Antenna-Mounting Plate Assembly

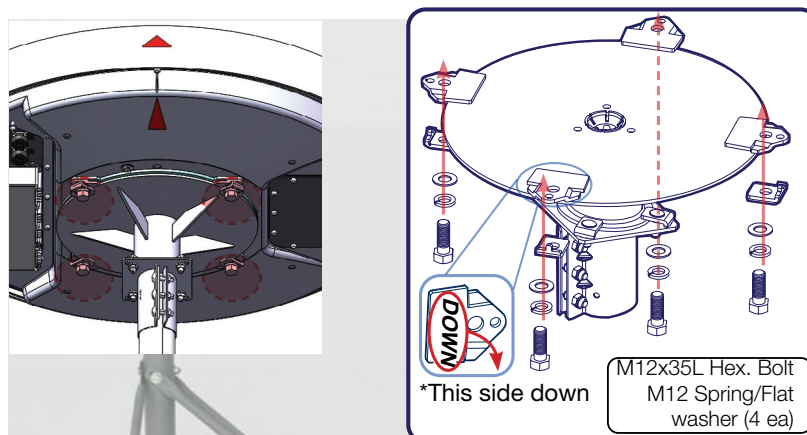
1. Locate the antenna mounting holes and roughly position the “Red triangle” on the radome towards *Magnetic North.



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

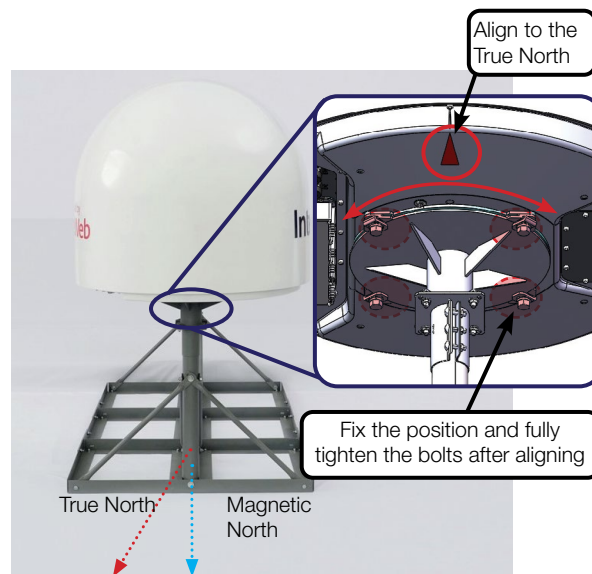
This must be done for both the two antennas.

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 with 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 23)

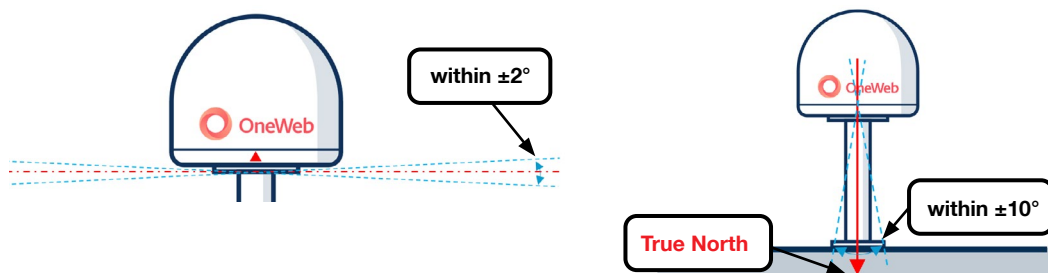


3. Fix the position and fully tighten bolts after aligning the antenna.



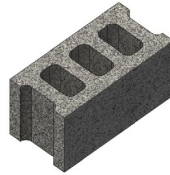
WARNING

- 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).

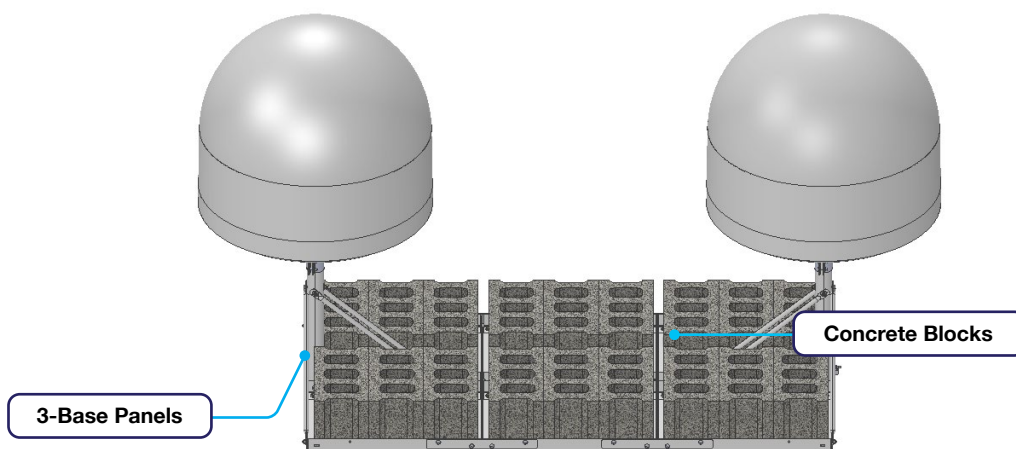


Figure 6: Placing Concrete Blocks on Base Panel of NPM



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.

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 in side of the power & data connector using a cable tie.

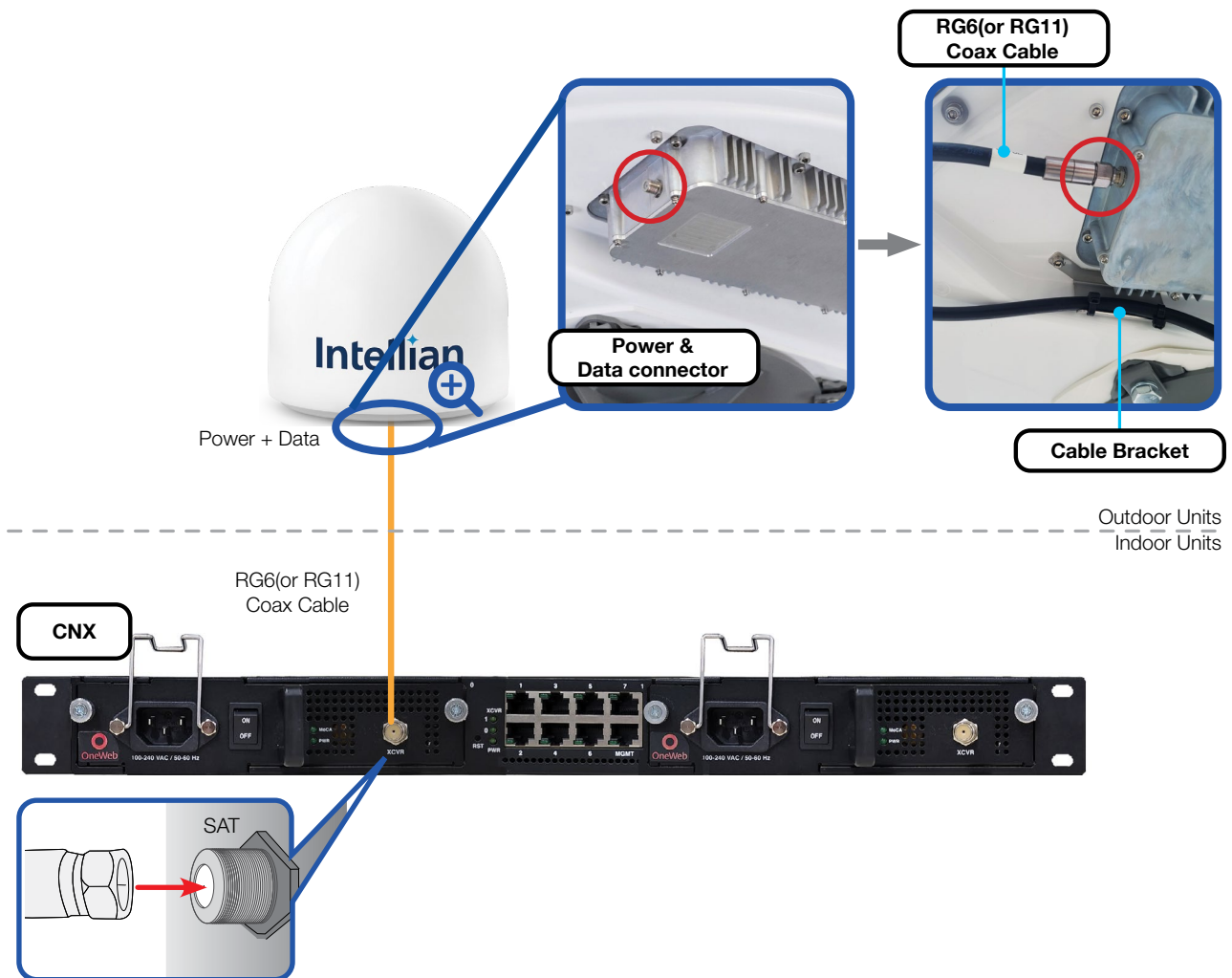


Figure 7: Cable Connection of CNX to Antenna



NOTE

- Choose RG6 or RG11 Coaxial Cable for connecting the CNX depending on the cable length. The RG6 cable is supplied in the accessory box. 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)
- 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 103.)
- DO NOT REMOVE THE PORT CAPS FOR UNUSED CONNECTORS TO AVOID FAILURE.

5.9 Connecting power cable for Heating Module (Optional)

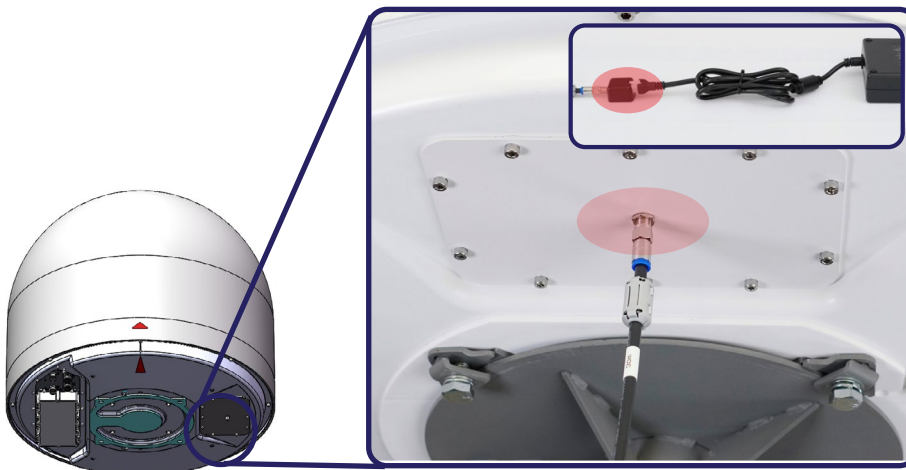
There are two kinds of OW70L-Rac/OW70L-Rdc versions, one is without Heating Module. and the other is with pre-fitted Heating Module version. You can purchase among them and cannot buy the Heating Module kit separately. Therefore, choose the model appropriately consider your circumstances.

The below steps are described for connecting cable for Heating Module.

1. Recognize the location of Heating Module connector location on two antennas bottom of the Radome as picture below.



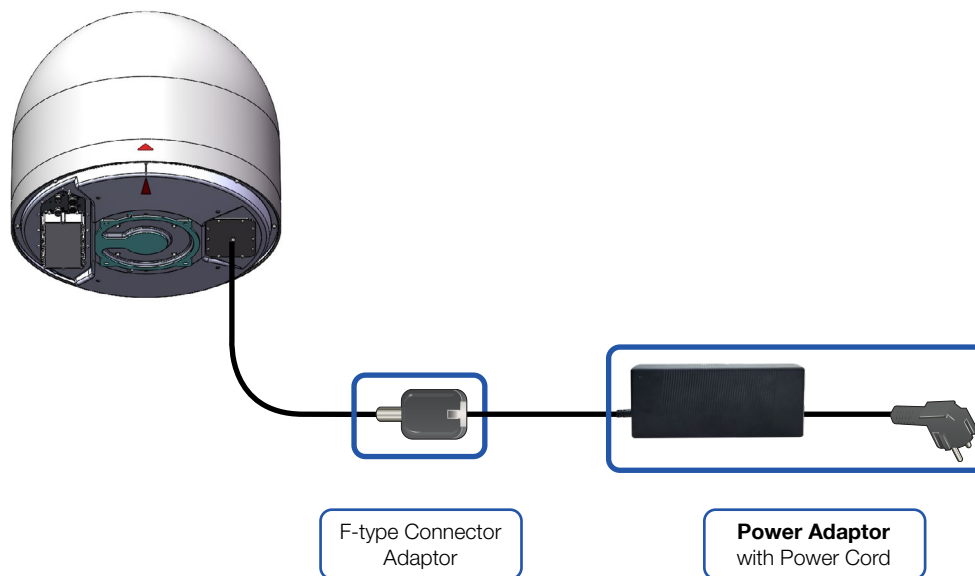
2. Connect the RG6/RG11 Coax cable to the Heating Module connector. To convert connector type, use a F-type connector adaptor between the Heating Module and a power adapter.



NOTE

- Choose RG6 or RG11 Coaxial Cable for heating module depending on the cable length. The RG6 cable is supplied in the accessory box. If you use the RG11, separate purchase of RG11 cable should be needed. The RG11 cable gives you the higher performance.
 - RG6 (Supplied): up to 30m (98.5 ft)
 - RG11 (Customer supplied) : up to 100m (328 ft)
- The Power Adaptor (250W) and F-type adaptor connector are supplied in the accessory box.

3. Connect the power adapter and the power cord that is appropriate in your country.



5.10 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.

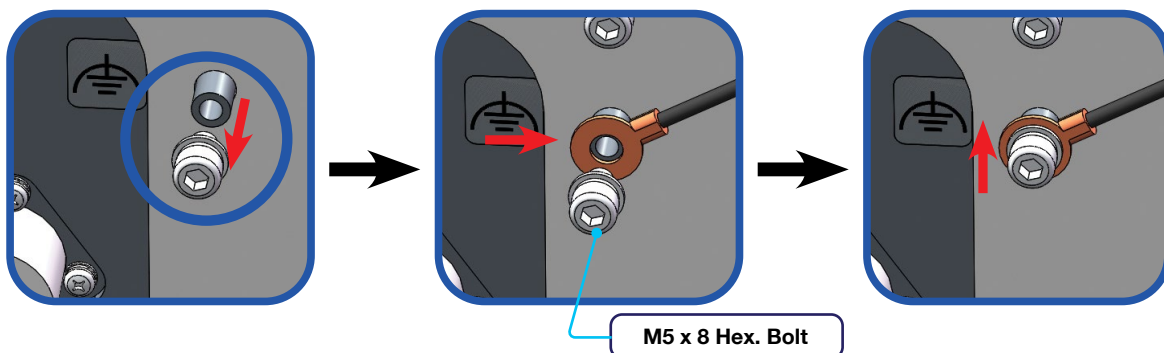


Figure 8: Grounding Antenna

Chapter 6. Installing Indoor Unit (IDU)

6.1 CNX Dimensions

Confirm the dimensions of the CNX before installing it.

6.1.1 CNX Dimensions

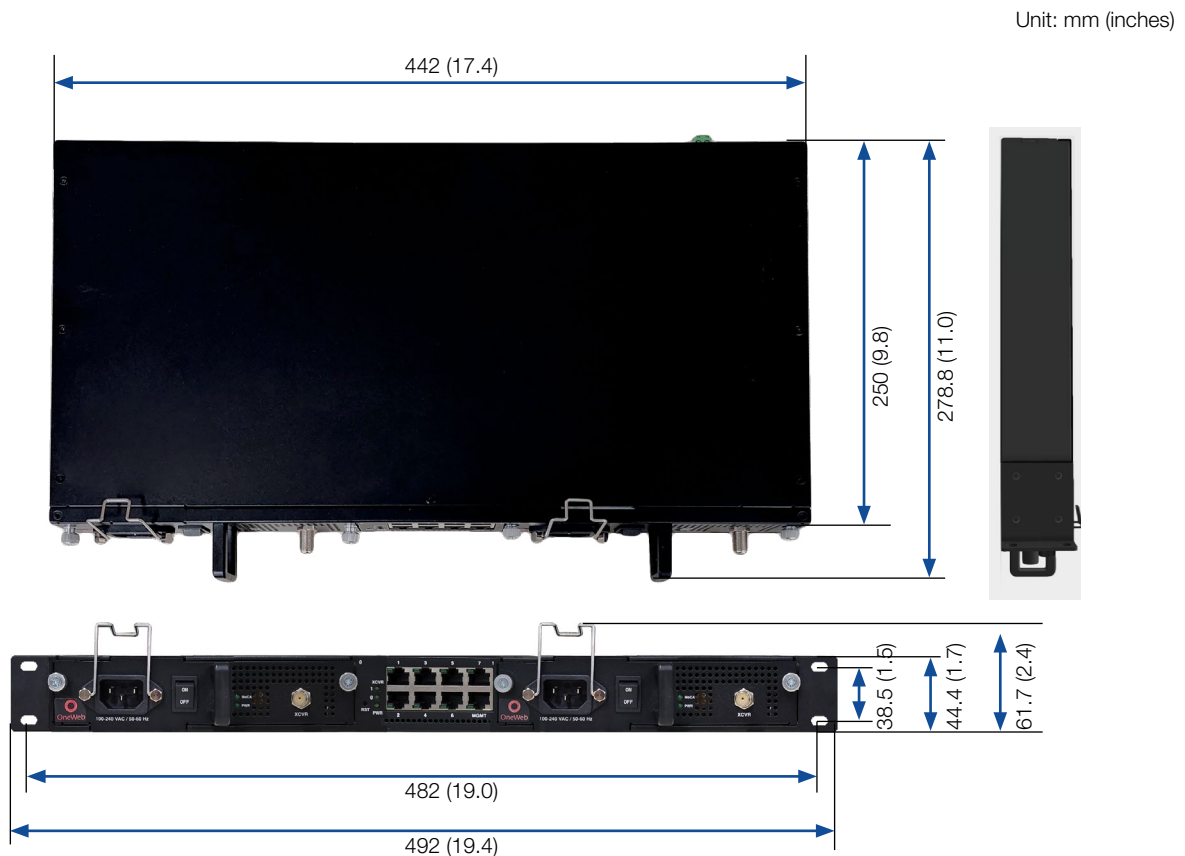


Figure 9: CNX Dimensions



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 rated 56V DC, 4.48 A maximum, if need further assistance, please contact OneWeb for further information.
- Never open the equipment. For safety reasons, the equipment should be opened only qualified service personnel. This appliance classification of use by 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 User Terminal consists of two antennas and a CNX.

The antenna includes the SSM module, which is capable of controlling and managing two antenna systems simultaneously.

Antenna System Configuration with CNX

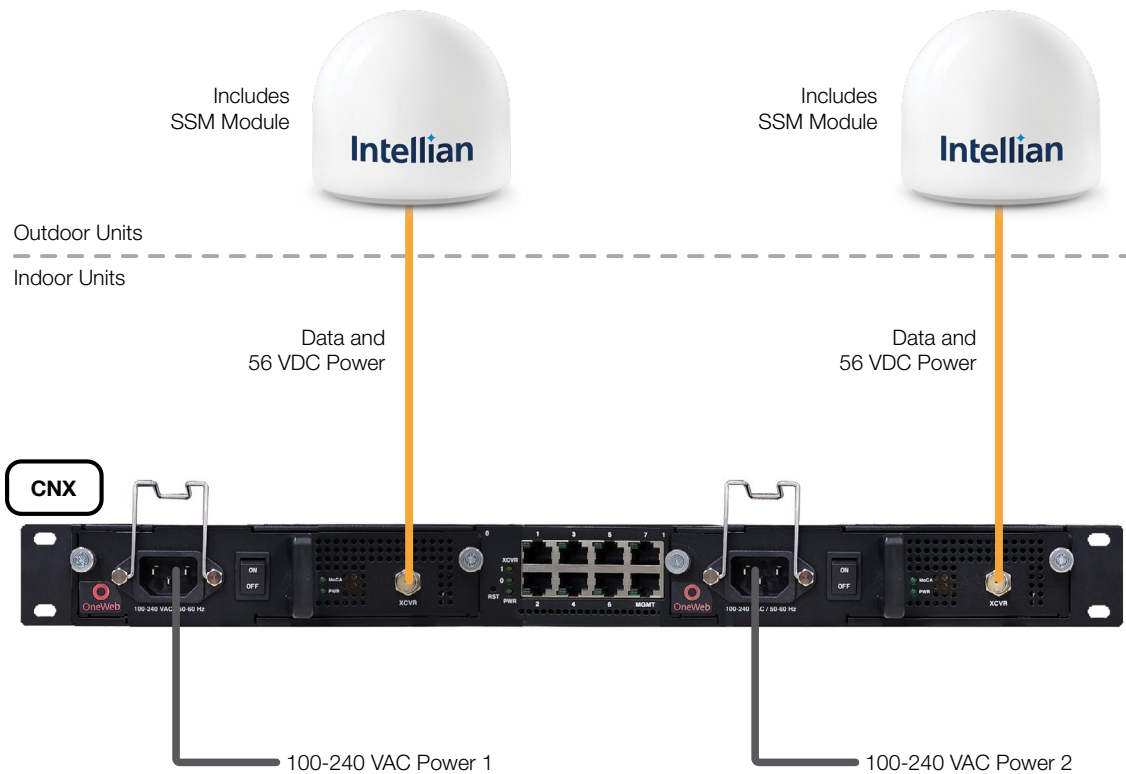


Figure 10: Dual Antenna System Configuration (Standard)



NOTE

- Choose RG6 or RG11 Coaxial Cable for connecting the CNX depending on the cable length. The RG6 cable is supplied in the accessory box. 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)

Antenna System Configuration and Heating Module with CNX

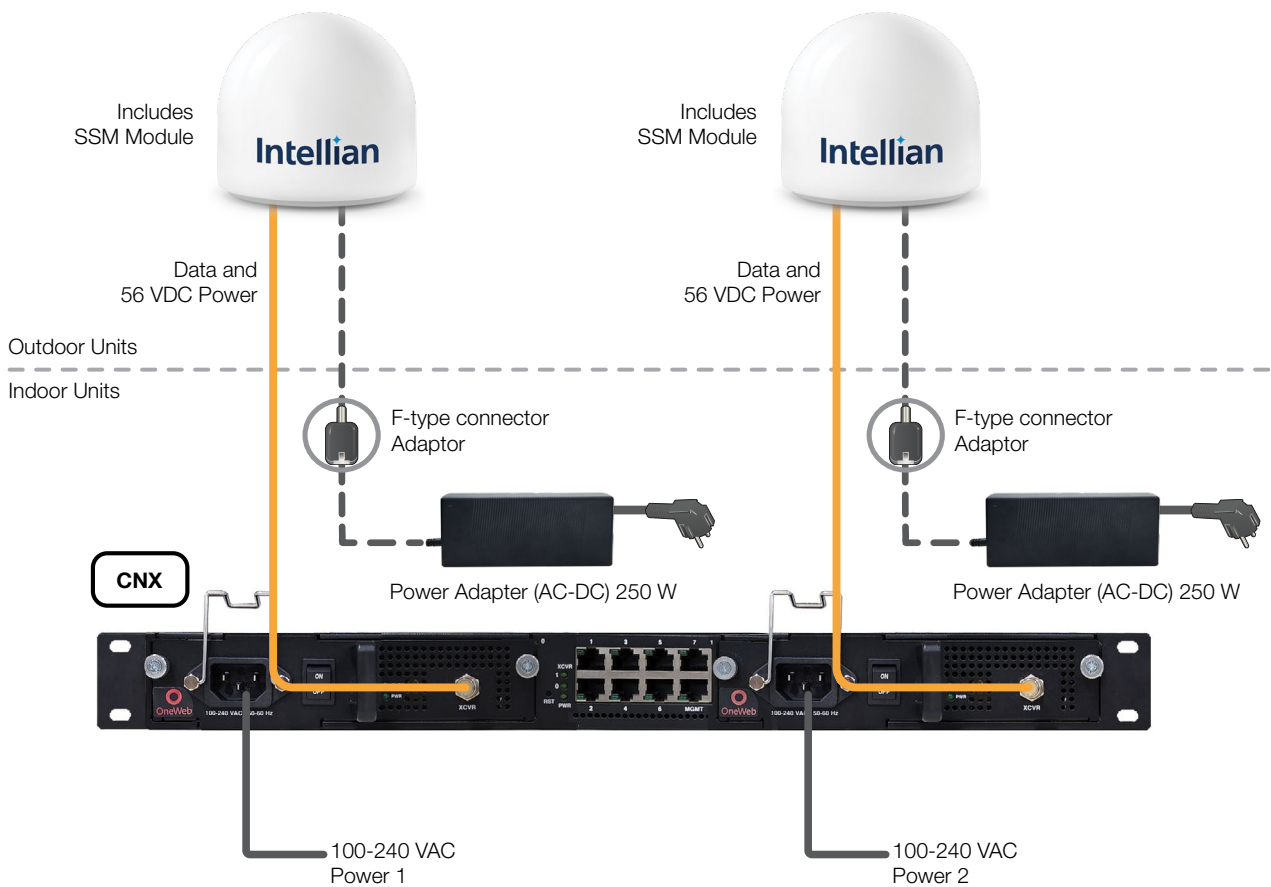


Figure 11: Dual Antenna System Configuration with Heating Module

**NOTE**

- Choose RG6 or RG11 Coaxial Cable for connecting the CNX or heating module depending on the cable length. The RG6 cable is supplied in the accessory box. If you use the RG11, separate purchase of RG11 cable should be needed. The RG11 cable gives you the higher performance.
 - RG6 (Supplied): up to 30m (98.5 ft)
 - RG11 (Customer supplied) : up to 100m (328 ft)
- The Power Adaptor (250W) and F-type adaptor connector are supplied in the accessory box.
- Refer to the **“5.9 Connecting power cable for Heating Module (Optional)”** on page 37 for more details.

6.3 CNX Cable Connection

6.3.1 CNX Front Panel View

The following figure shows the CNX Front panel connectors.

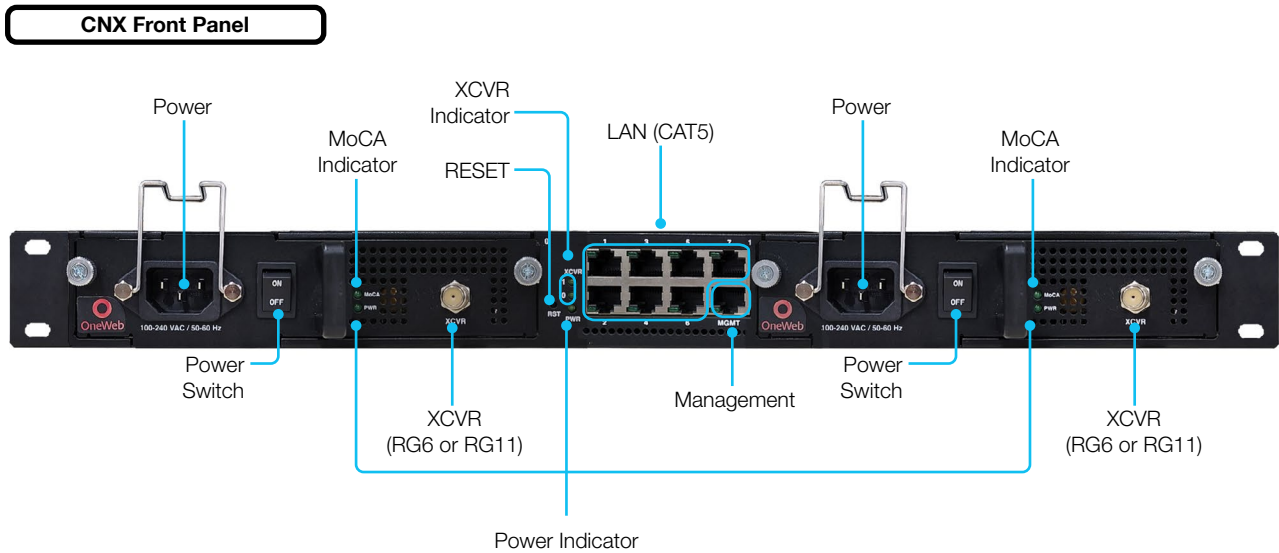


Figure 12: Front Panel View

The following table shows status indicators on the CNX.

LED Display	Color	Description
POWER	■ Steady Green	The CNX is powered on.
	■ Off	The CNX is powered off.
MoCA	■ Steady Green	The user network is ready.
	■ Blinking Green	The user network is connected.
	■ Off	The user network is not connected.
XCVR	TBD	TBD

6.3.2 CNX Back Panel View

The following figure shows the CNX back panel.

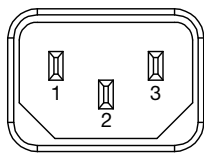


Figure 13: Back Panel View

6.3.3 CNX Connector Pinout Guide

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

Power Connector for CNX



IEC 320 C14 Plug Male

Pin	Signal
1	NEUTRAL
2	FG
3	LIVE

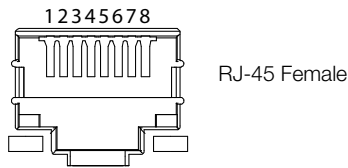
Coax Connectors



RF F Type Female

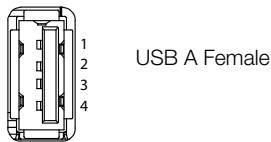
Conductor	Function
Inner	Power + Data
Outer	GND

LAN Connector



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-

Wi-Fi Dongle USB Connector



Pin	Signal
1	+5 V
2	DATA-
3	DATA+
4	GND

6.3.4 Connecting to a Wi-Fi network through the Wi-Fi Dongle

We provide the Wi-Fi Dongle for Wi-Fi connection to LUI. You can connect a PC to the CNX via Wi-Fi for easy management and control whenever you are on the vessel.

Setting up the CNX to access Wi-Fi

1. Connect an Ethernet cable from the Management LAN port on the front panel of CNX to a LAN port of a PC. The network connection is established automatically. (This step is not strictly needed)
2. Find the Wi-Fi Dongle in the accessory box, and then insert the Wi-Fi Dongle into the USB port on the back panel of CNX.



Figure 14: Back Panel Wi-Fi Dongle Connection

Setting up the PC in order to access Wi-Fi

1. Select the Network icon (🌐/📶) on the taskbar.
2. Choose the **cnxaabb** (Default), then select **Connect**.
("aabb" means last 4 digits of the CNX MAC address)
3. Type the network security key and then select **Next**.
 - **Key: cnx_aabb(Default)** ("aabb" means last 4 digits of the CNX MAC address)

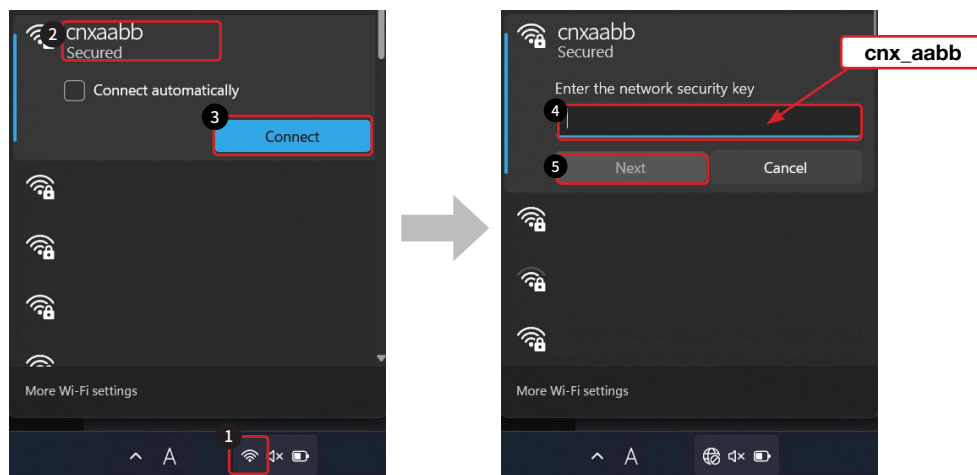


Figure 15: Setting up a Wi-Fi network on a PC

4. Make sure you can open the IP address **192.168.100.1 (Default)**



NOTE

There are two ways to obtain a MAC address.

- The Mac address can be obtained on the CNX printed label.
- Before connecting to a Wi-Fi network, the MAC address can be found using the LUI (Refer to the "**8.7.1 Network info**" on page 81 for more information.).