Intellian

OW70L-Dac

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.

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.

Doc. No. UG-KL1002-V1.9

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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.

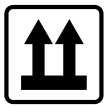
1.1 Warnings, Cautions, and Notes

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 • 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-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 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 Appendix A. Pre-Installation Checklist” on page 56

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 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.

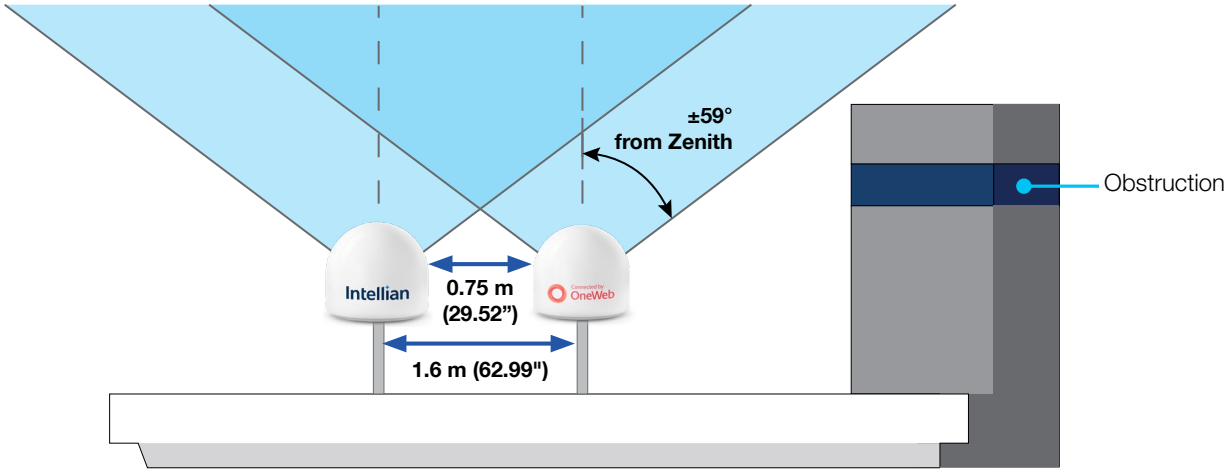


Figure 1: Minimizing Satellite Blockage (example)

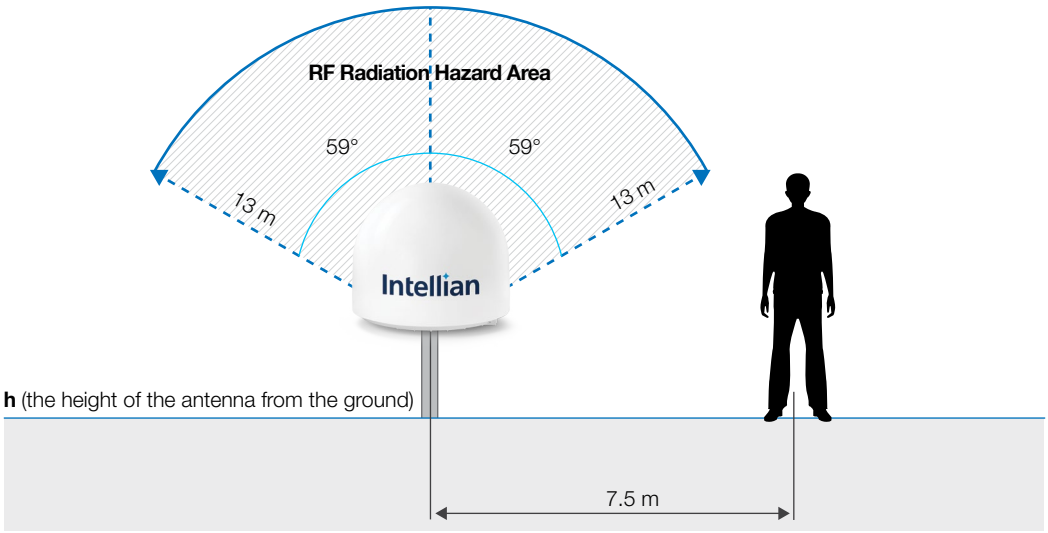
4.2.4 RF Hazard Precautions

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-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 primary antenna while providing secure GigE connection to the Baseband Unit. The CNX takes 56 V input but can vary by product variant.

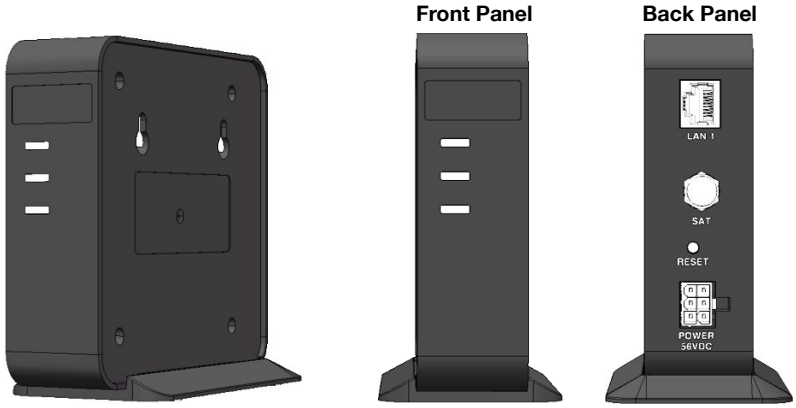


Figure 3: Customer Network Exchange (CNX)

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 (CEEE7/7)	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 sized 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

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

The following components are added to (with Heating Module) each package.

Heating Module Accessories for OW70LH-Dac (with Heating Module)

Primary Antenna Package (Box 1)			
Item	**Q'ty**	**Size**	**Description**
F-type Connector Adaptor	1		Convert Power Adaptor connector to F-Type (Female Coax connector for RG11)
Power Adapter (AC-DC) For Heating Module	1		To convert 100-240 V AC power to +56 V DC for Heating Module (250 W)
AC Power Cord (USA)	1	1.5 m	AC Power Cord (110 V)
AC Power Cord (CEEE7/7)	1	1.5 m	AC Power Cord (220 V)
Primary Antenna Package (Box 2)			
Item	**Q'ty**	**Size**	**Description**
F-type Connector Adaptor	1		Convert Power Adaptor connector to F-Type (Female Coax connector for RG11)
Power Adapter (AC-DC) For Heating Module	1		To convert 100-240 V AC power to +56 V DC for Heating Module (250 W)
AC Power Cord (USA)	1	1.5 m	AC Power Cord (110 V)
AC Power Cord (CEEE7/7)	1	1.5 m	AC Power Cord (220 V)

NOTE

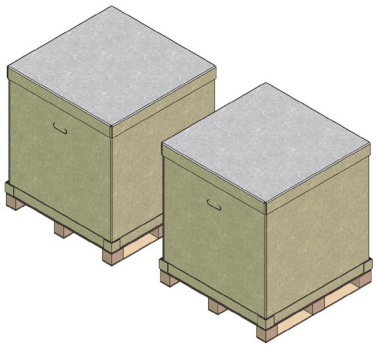
- The Heating Module are assembled and tested at the Primary and Secondary Antenna during production.
- The accessories of heating module are packed in each package box.
- The separate purchased RG11 Coax cable are necessary to connect the Heating Module and the Power adapter.

4.4 Installer/Customer Furnished Equipment

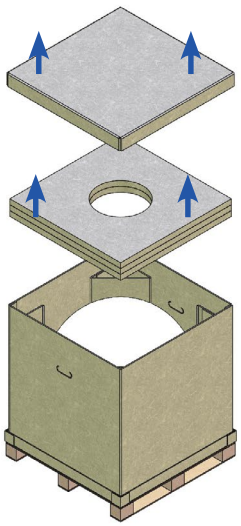
- Country specific power cable and socket for Power Adaptors
- Grounding system that meets the local electrical code requirements
- Waterproofing materials all connections
- Tape or wraps to attach the antenna cable to the support structurer
- Fasteners and other installation tools

4.5 Unpacking System Package

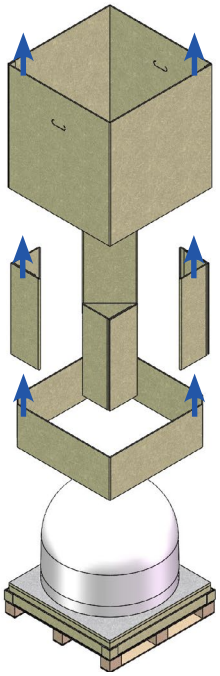
Follow the steps for easy and safe unpacking. The system package consists of two packages containing the Primary Antenna Package (Box 1) and Secondary Antenna Package (Box 2).



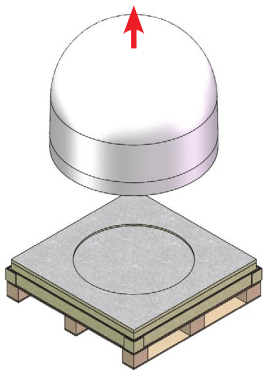
1. Locate System Packages (Primary Antenna Package (Box 1) and Secondary Antenna Package (Box 2).



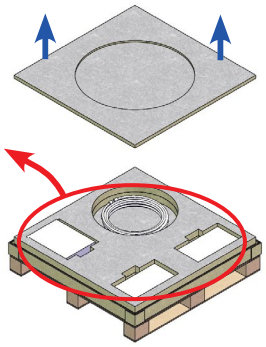
2. Remove the top cover and protection forms as shown.



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 15

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.
- The preferred installation orientation is East to West.
- Ensure the antenna is levelled ±1° in elevation and ±10° 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)

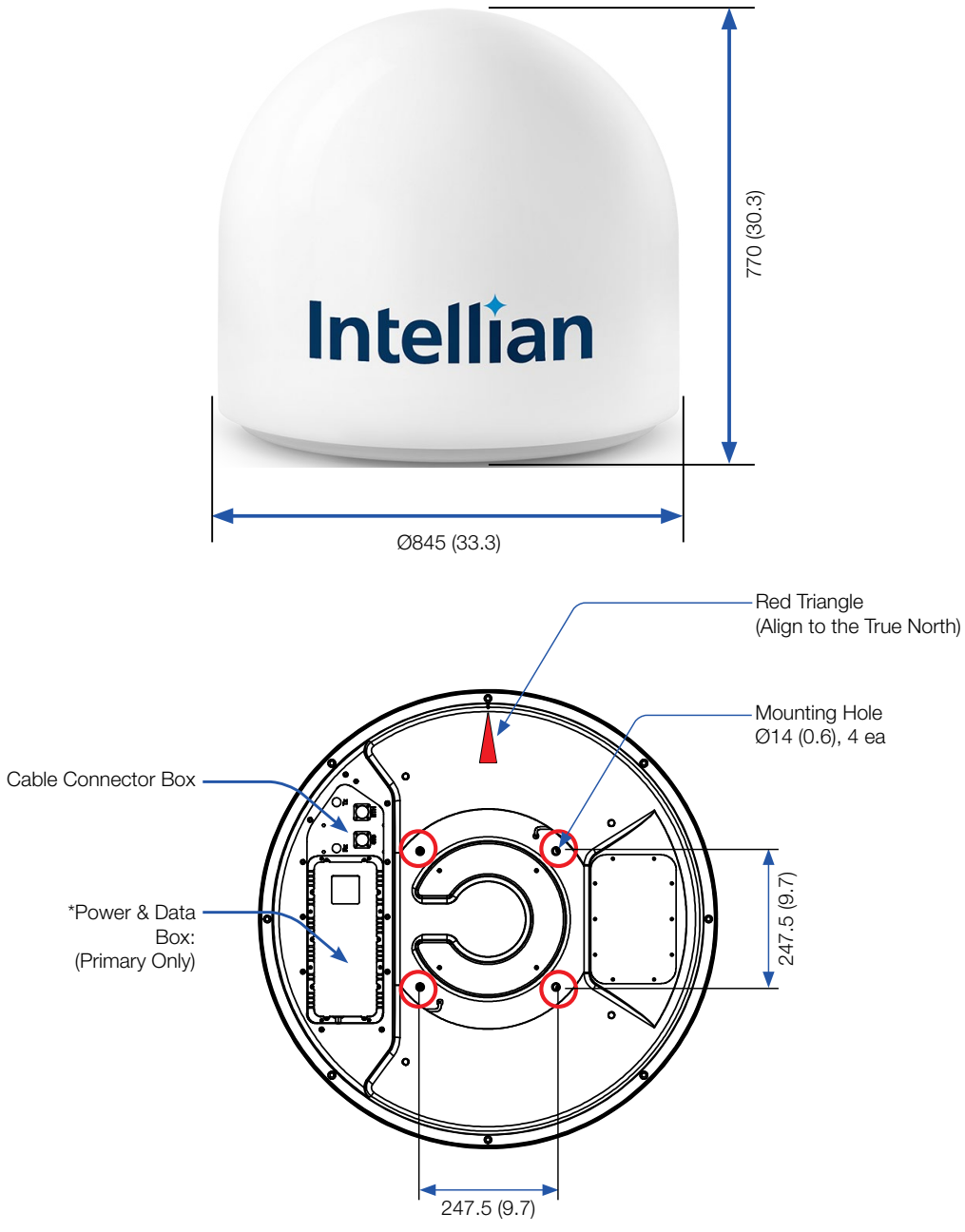


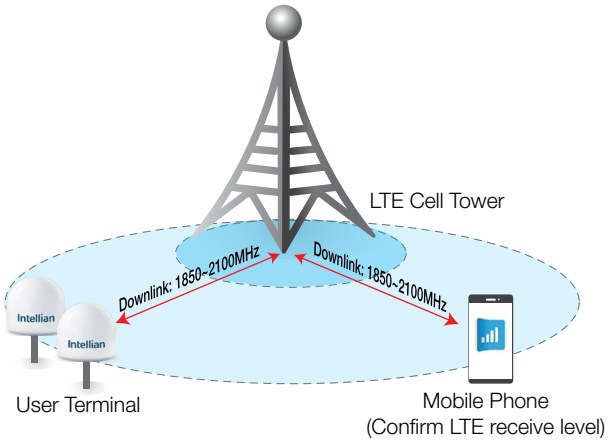
Figure 4: Antenna Dimension

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 by 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:

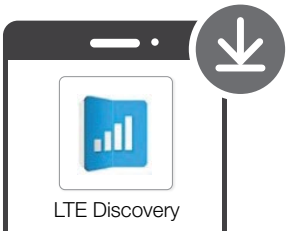
Interference Requirement:

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

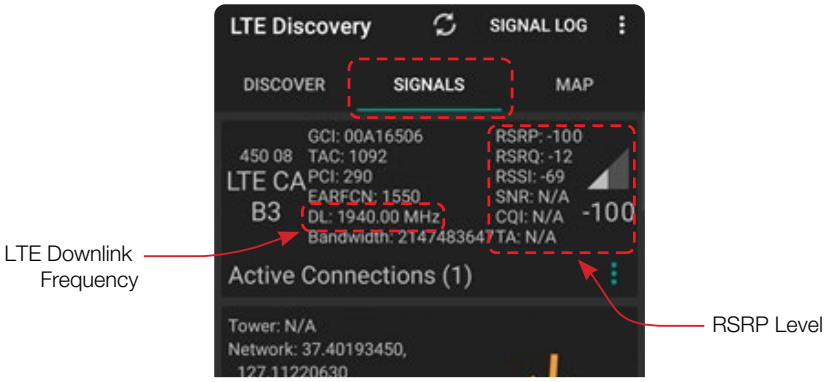


Procedure to check LTE frequency and RSRP level:

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.



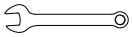
3. Install the User Terminal in a location where the Interference Requirement is satisfied (outside 1850~2100 MHz, or RSRP -45 dBm or less).

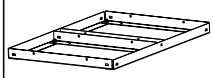
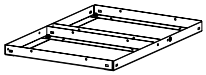
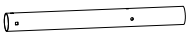
5.4 Placing Antenna on NPM (Non-Penetrating Mount)

5.4.1 Assembling Base Panel of NPM

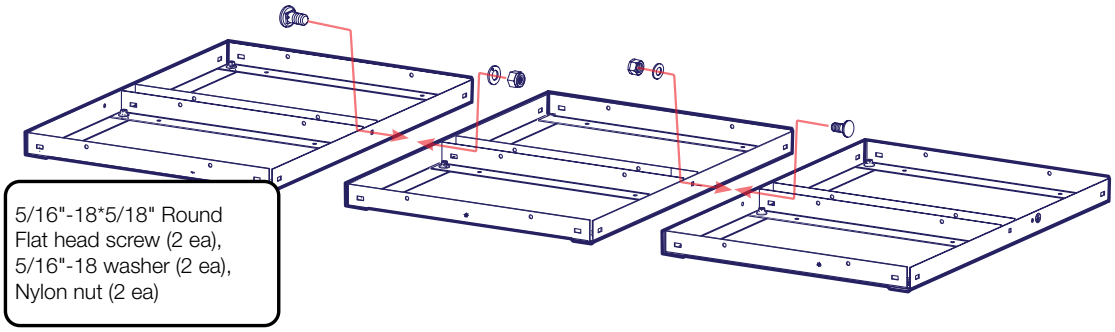
Check the requirement tools before assembling the NPM

FASTENERS			
NO	ITEM	DESCRIPTION	Q'TY
1		5/16"-18*5/8"Round flat head Square screw	6
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"-18x3-3/8" hex-head cap screw	2
5		5/16"-18 washer	42
6		5/16"-18 nylon nut	32
7		Ø8.5/Ø12.5*L60 Bush	2
8		5/16"-18x1-1/4" hex flange screw	2
9		5/16"-18 kepts k-lock nut	4
10		#12-3/4" tapping screw	4

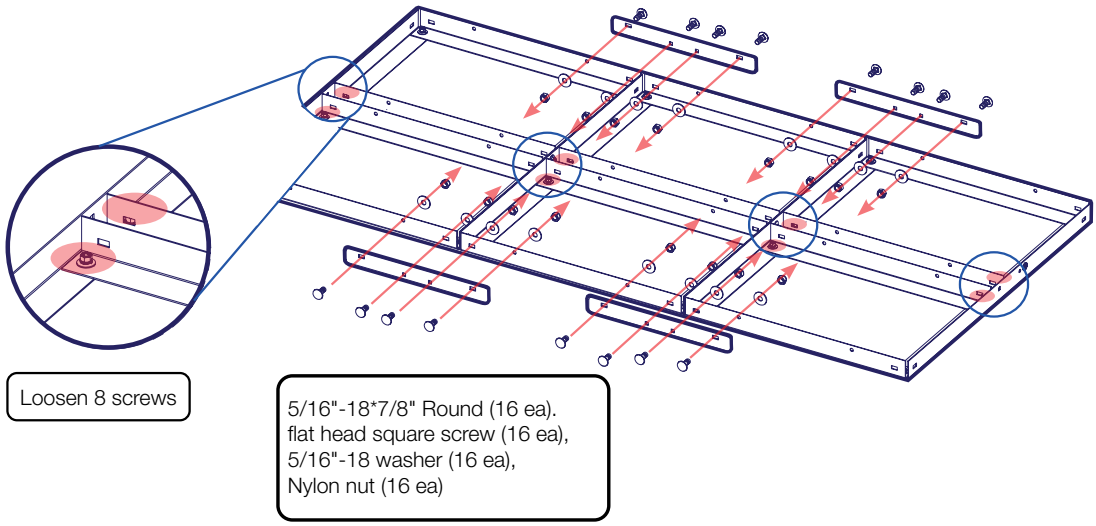
TOOLS

13mm wrench

HARDWARE					
DESCRIPTION	Q'TY	DESCRIPTION	Q'TY	DESCRIPTION	Q'TY
Mounting Base(#A)	1	Side Supporting Rods(#C)	8	Ground Mounting Base(#E)	2
A 		C		E 	
DESCRIPTION	Q'TY	DESCRIPTION	Q'TY	DESCRIPTION	Q'TY
Mast Pole(#B)	2	Support Plate(#D)	4		
B 		D 			

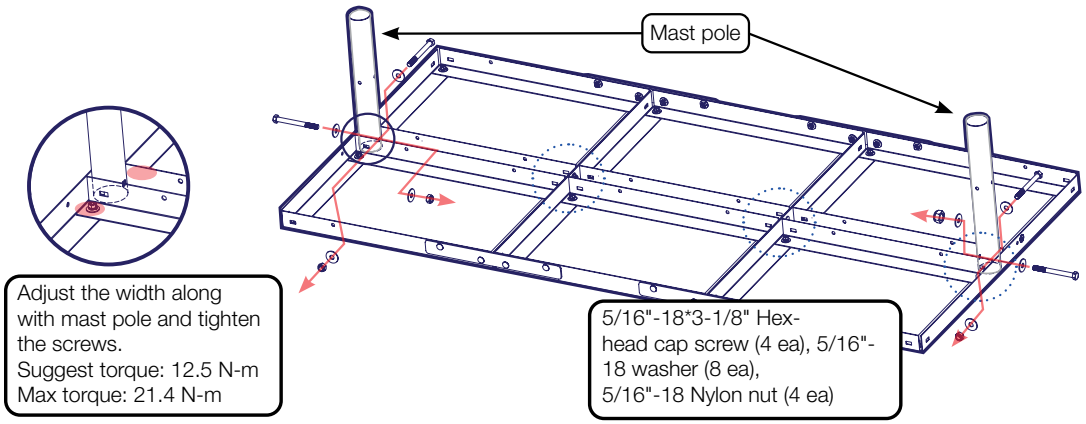
1. Assemble 3 mounting bases with the bolts kits.



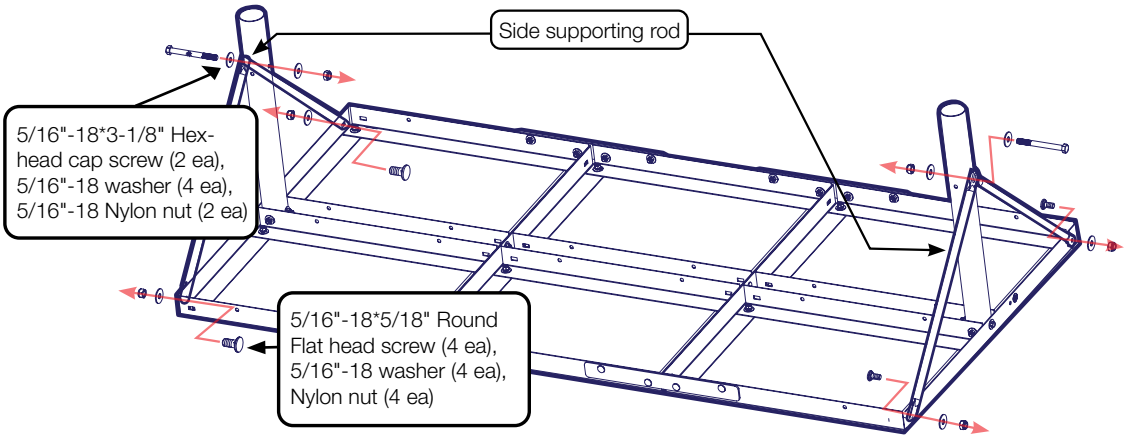
2. Assemble 4 support plates with the bolt kits.

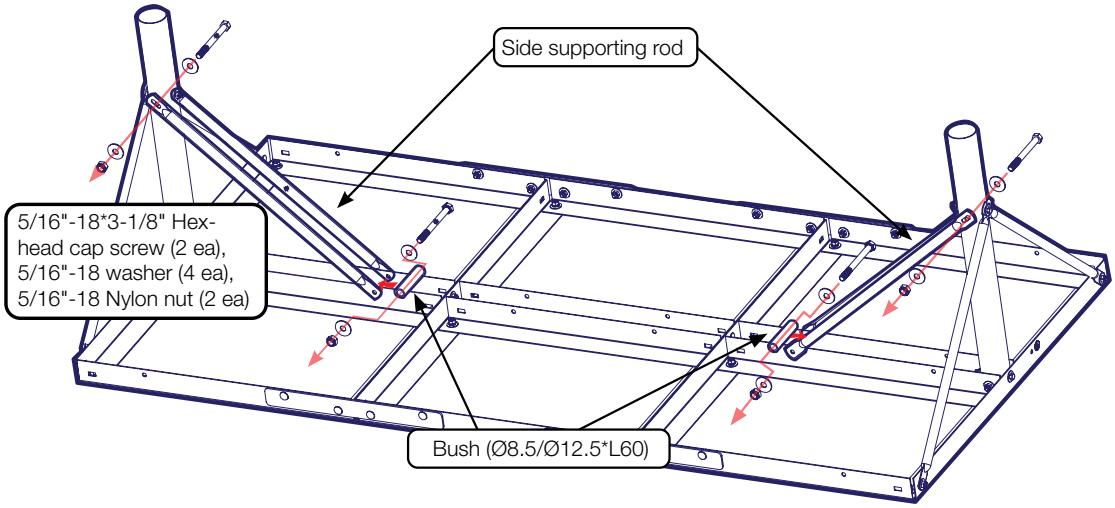


3. Assemble 2 mast poles with bolt kits.

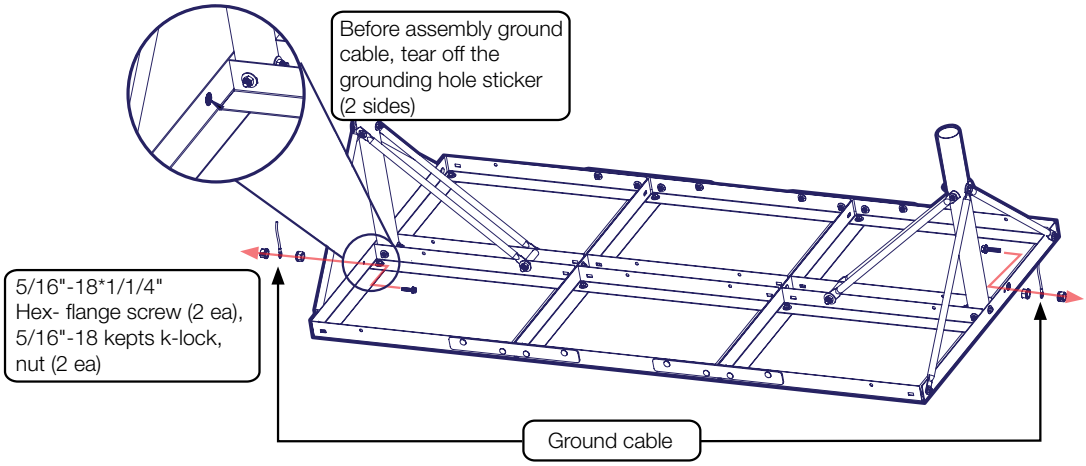


4. Assemble 4 side supporting rods with bolt kits

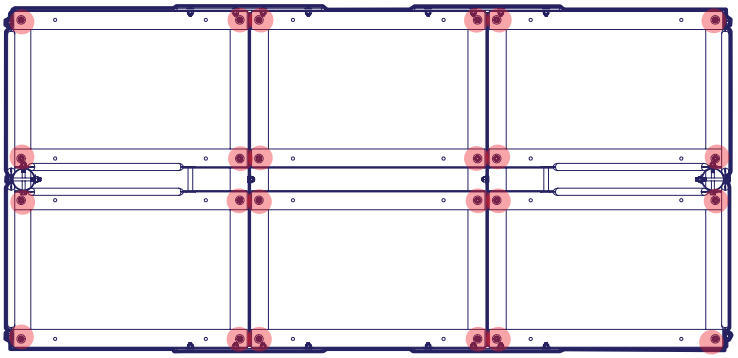


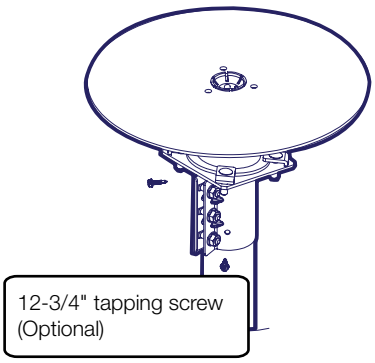


5. Assemble ground cable with bolt kits.



Penetrating fastener option:
For directly mounting using fasteners, place appropriately fasteners, at the locations circled in the below diagram

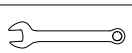




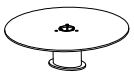
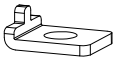
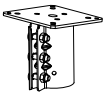
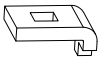
5.4.2 Placing Antenna on Fine Tune assembly

Check the requirement tools before assembling the Fine Tune assembly

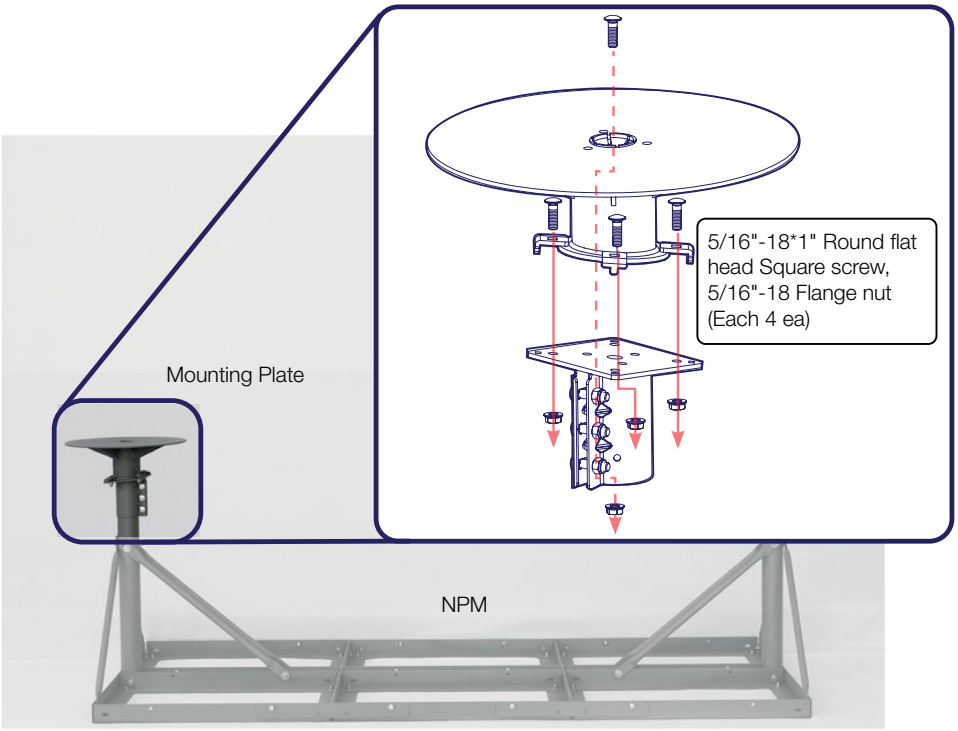
FASTENERS			
NO	ITEM	DESCRIPTION	QTY
1		5/16"-18*1"Round head Square screw	4
2		5/16"-18 Flange nut	4
3		M12*35 hex-head cap screw	4
4		M12 Spring Washer	4
5		M12 Washer	4

TOOLS

13mm hexa-wrench

19mm hexa-wrench

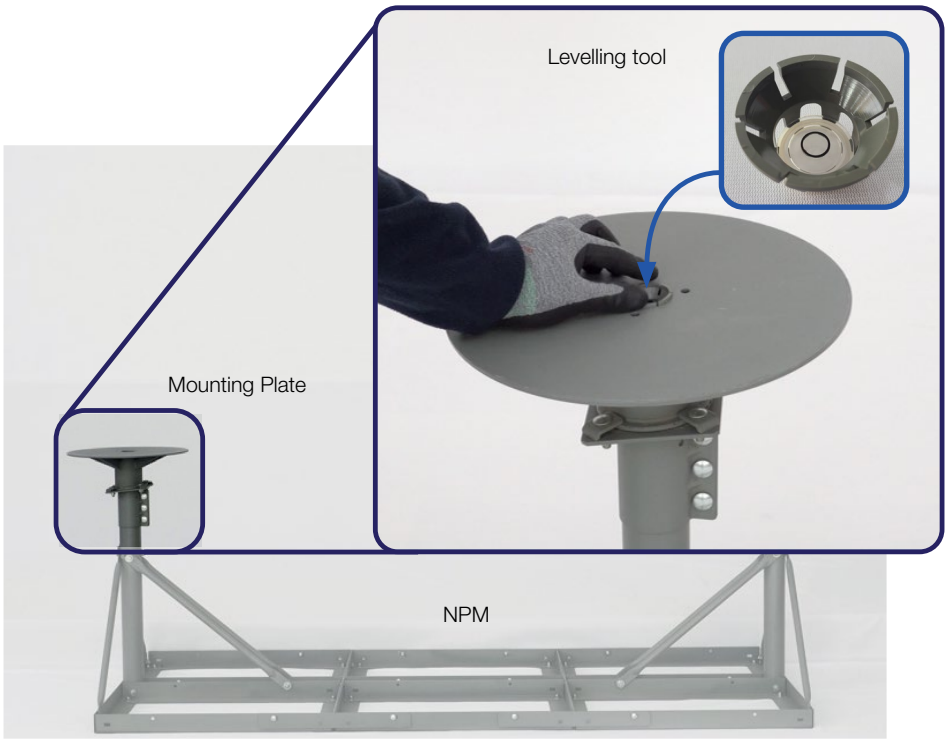
HARDWARE					
DESCRIPTION	QTY	DESCRIPTION	QTY	DESCRIPTION	QTY
TOP FINE TUNE ASSY. (#A)	1	TOP PLATE CLAMP (#D)	4		
A 		D 			
DESCRIPTION	QTY	DESCRIPTION	QTY	DESCRIPTION	QTY
CLAMP ASSY.(#B)	1	FIX CLAMP (#E)	4		
B 		E 			
DESCRIPTION	QTY	DESCRIPTION	QTY	DESCRIPTION	QTY
BOTTOM PLATE CLAMP (#C)	4				
C 					

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

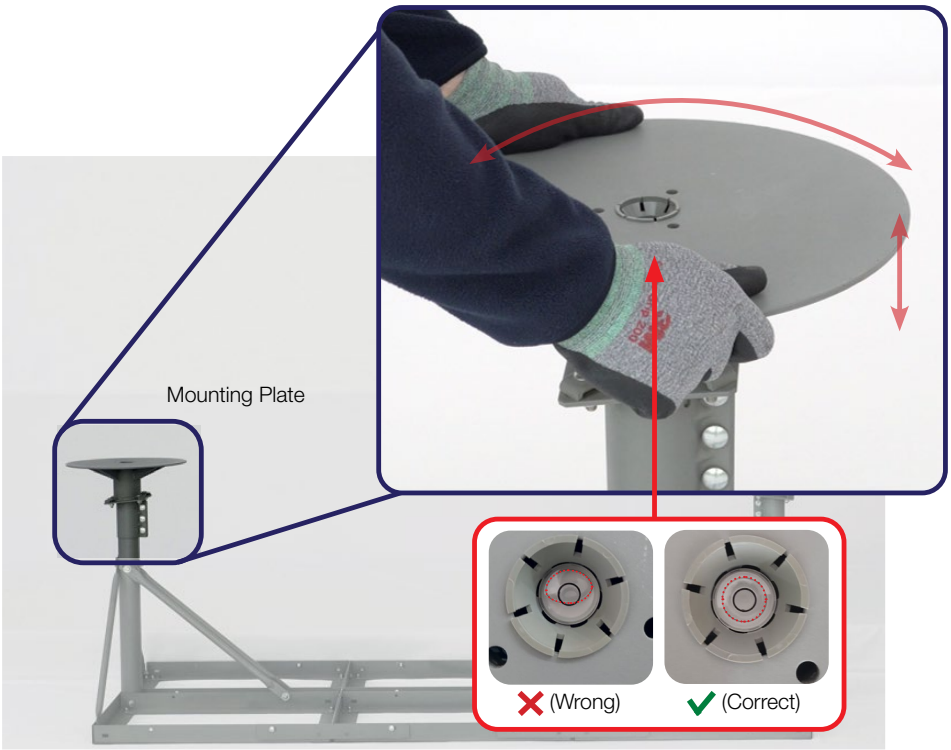


5.4.3 Levelling the Mounting Plate

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.



5.4.4 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.

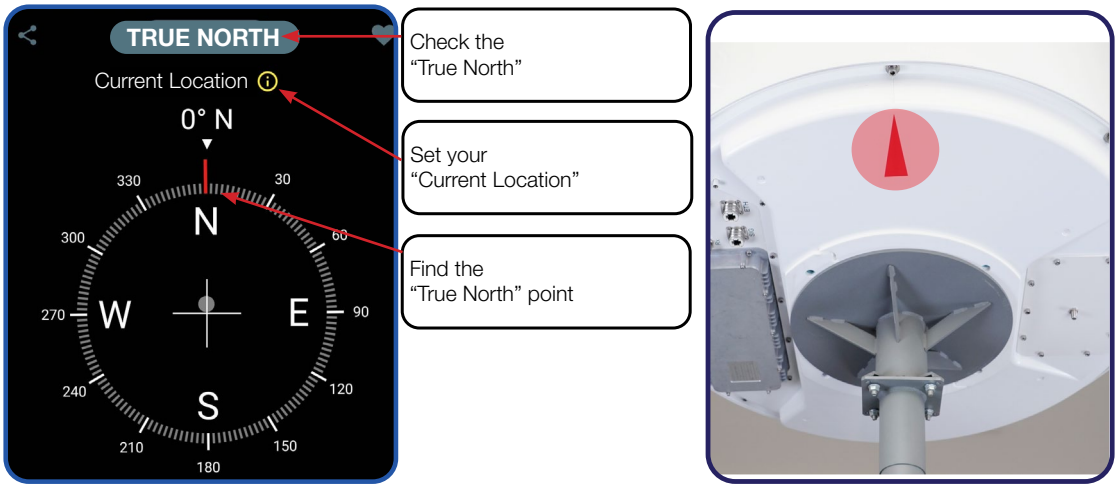
A. When using a magnetic compass

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)

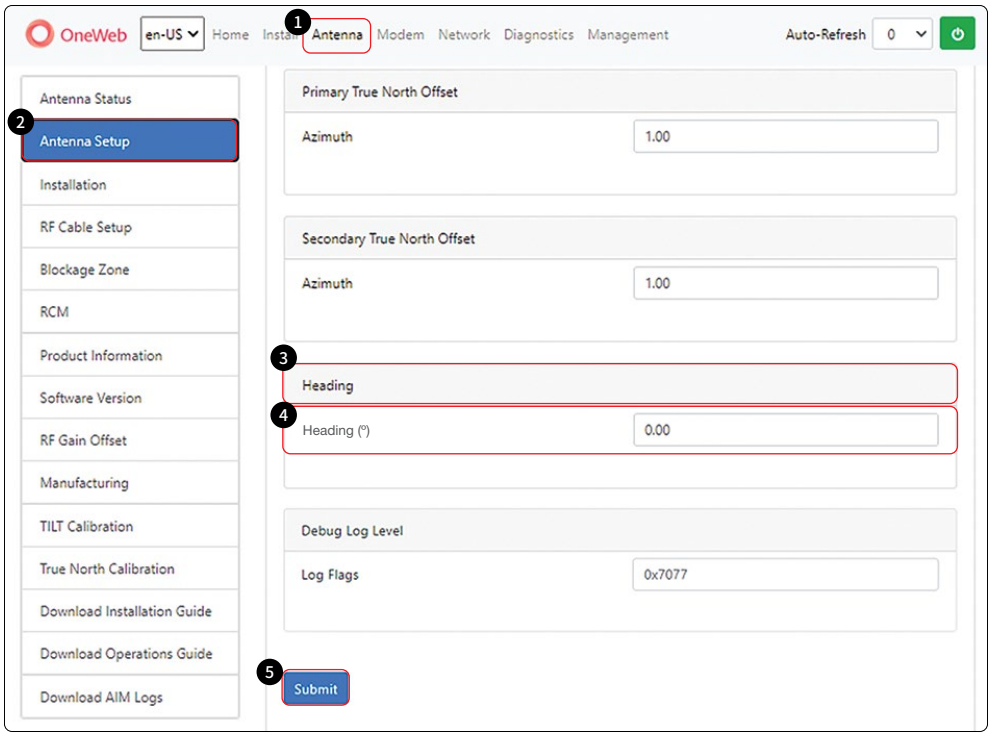
1. Check the orientation of the True North indicator.
2. Extending its virtual line from the centre of the User Terminal to the Tip of the True North indicator (Line) by using your own GPS compass (Smart phone applications or devices).
3. Compare with virtual line and “Red triangle” on the bottom of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

Refer to the below App screen as a reference.



C. When using a LUI

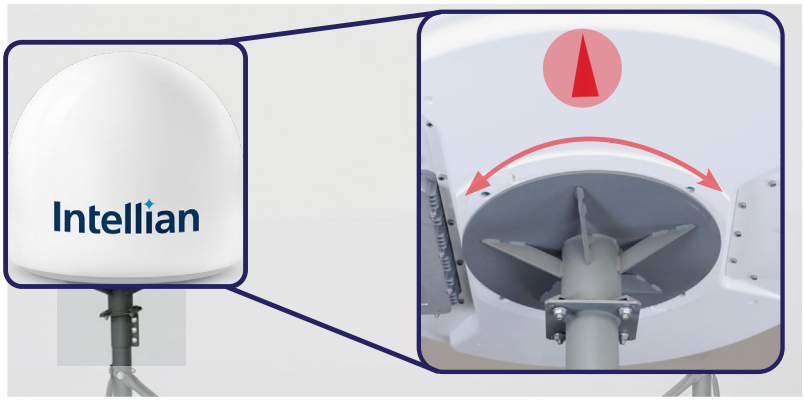
1. Connect an Ethernet cable from the LAN Port on the front panel of CNX to a LAN Port of PC. The Data LED indicator will turn Green if CNX is connected.
2. Enter the IP address into your web browser's address bar to log in to the Local User Interface (LUI).
   - **IP Address: 192.168.100.1 (Default)**
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.



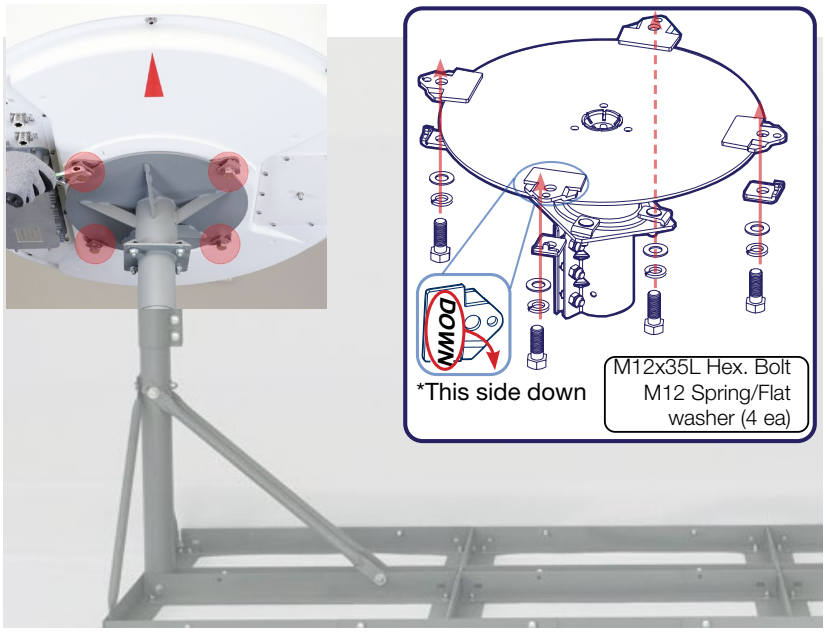
5.4.5 Mounting antenna on the Mounting Plate

1. Place the antenna on the mounting plate softly.

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



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.



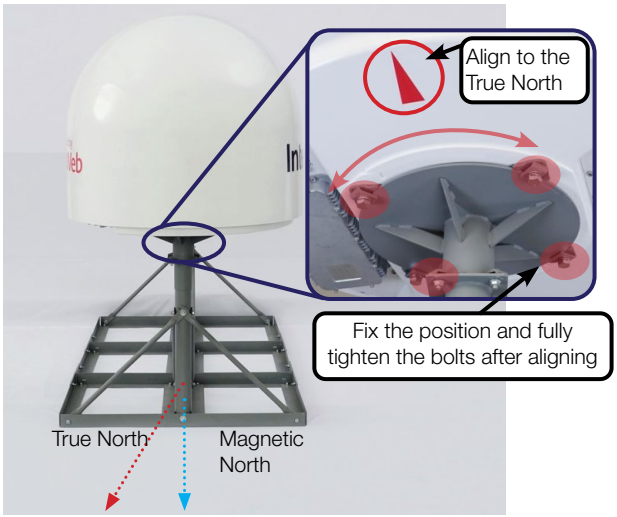
NOTE

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

5.4.6 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.

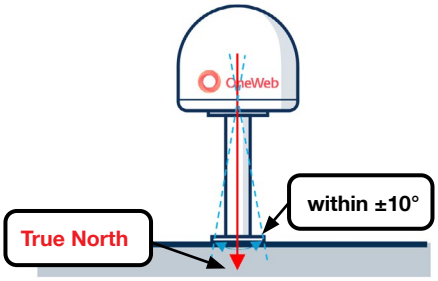
2. Mark the true north point on the mounting plate by including the declination angle using a True North indicator. (Refer to “5.4.4 Measuring the North point” on page 26)



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

WARNING

- Ensure the antenna is mounted within ±1° elevation angle.
- Ensure the antenna is aligned within ±10° degrees of True North.



5.4.7 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).

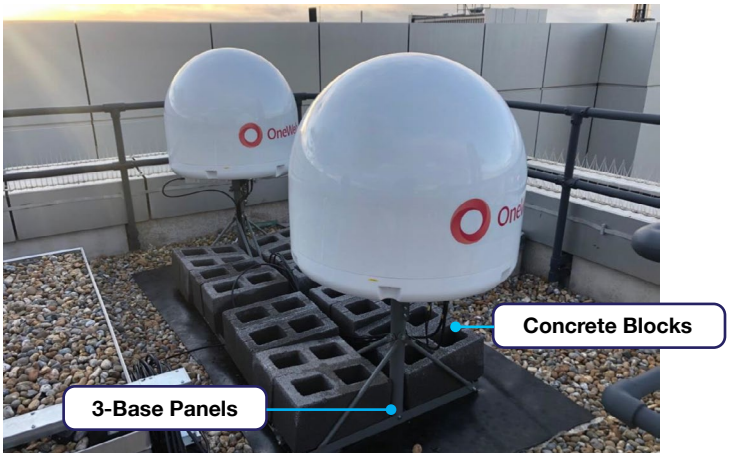


Figure 5: Placing Concrete Blocks on Base Panel of NPM

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).

5.5 Mounting Antenna on Surface

1. Bring the M12 x 40L hex bolts from (8 ea for Primary and Secondary).
2. Lower the antenna onto the mast, making sure the mounting holes of the antenna are aligned with those of the mast. Make sure the cable from the mast is aligned with the cable entry on the bottom of the antenna for stable connection.
3. Apply Loctite #263 to the bolt threads, insert the bolts and washers from under the mast into the built-in nuts on the bottom of the radome (see Figure 7), and then lightly tighten them by hand. Use a crisscross sequence as shown in Figure 6.
4. After installing all 4 bolts, fully tighten the bolts using a torque wrench in the crisscross sequence. Refer to **"11.2 Appendix B. Tightening Torque Specification" on page 57** for the bolt tightening torque.

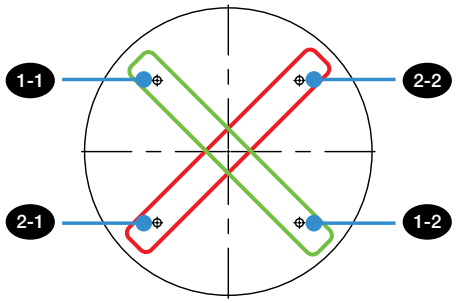


Figure 6: Installing Sequence of Bolts

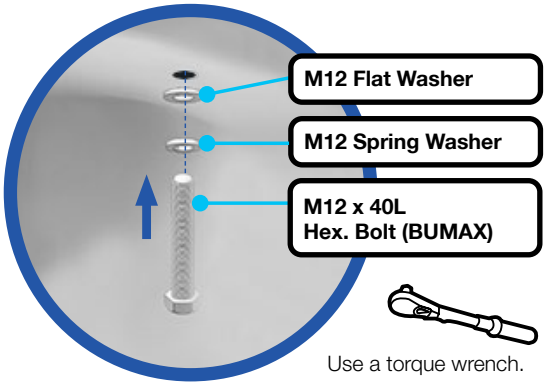


Figure 7: Installing Bolts for Mounting Antenna

NOTE

- The bolt kits for Primary and Secondary come together as the same package in the primary box.
- Make sure the cable from ODU is aligned with the cable connector on the bottom of the antenna for stable connection.
- Refer to **"11.2 Appendix B. Tightening Torque Specification" on page 57** for the bolt tightening torque.

WARNING

If a bolt does not fit into the mounting hole when installing the bolt by hand, stop installing and check the bolt size. DO NOT tighten the bolts forcefully. Forceful tightening can damage the inner threads of the antenna mounting holes. This type of damage is not covered by the warranty.

5.6 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.

5.6.1 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 the Primary Antenna and the CNX Unit.

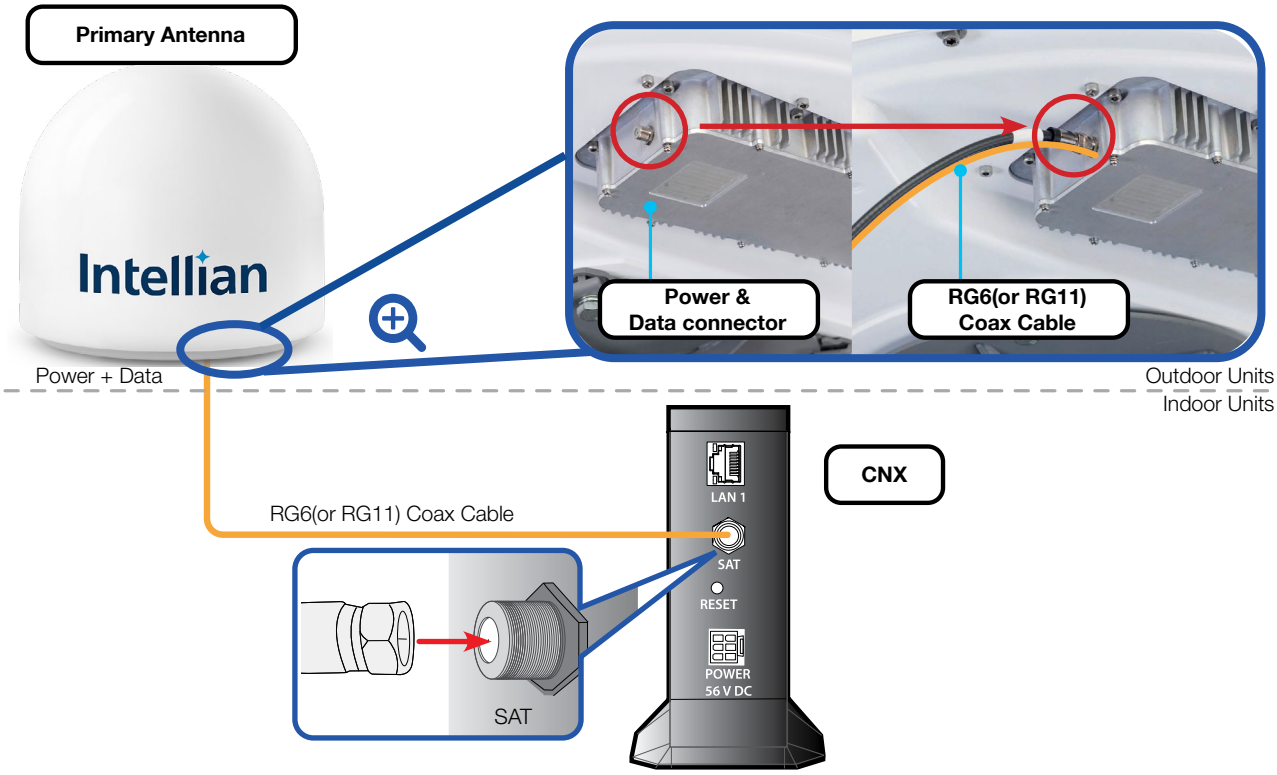


Figure 8: Cable Connection of CNX to Antenna

NOTE

- To connect the primary antenna to CNX, use the RG11 Coaxial Cable or better cable. The maximum cable length recommended 100 meters for RG11.
- A separate purchase of RG11 Coax cable is required.

5.6.2 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.

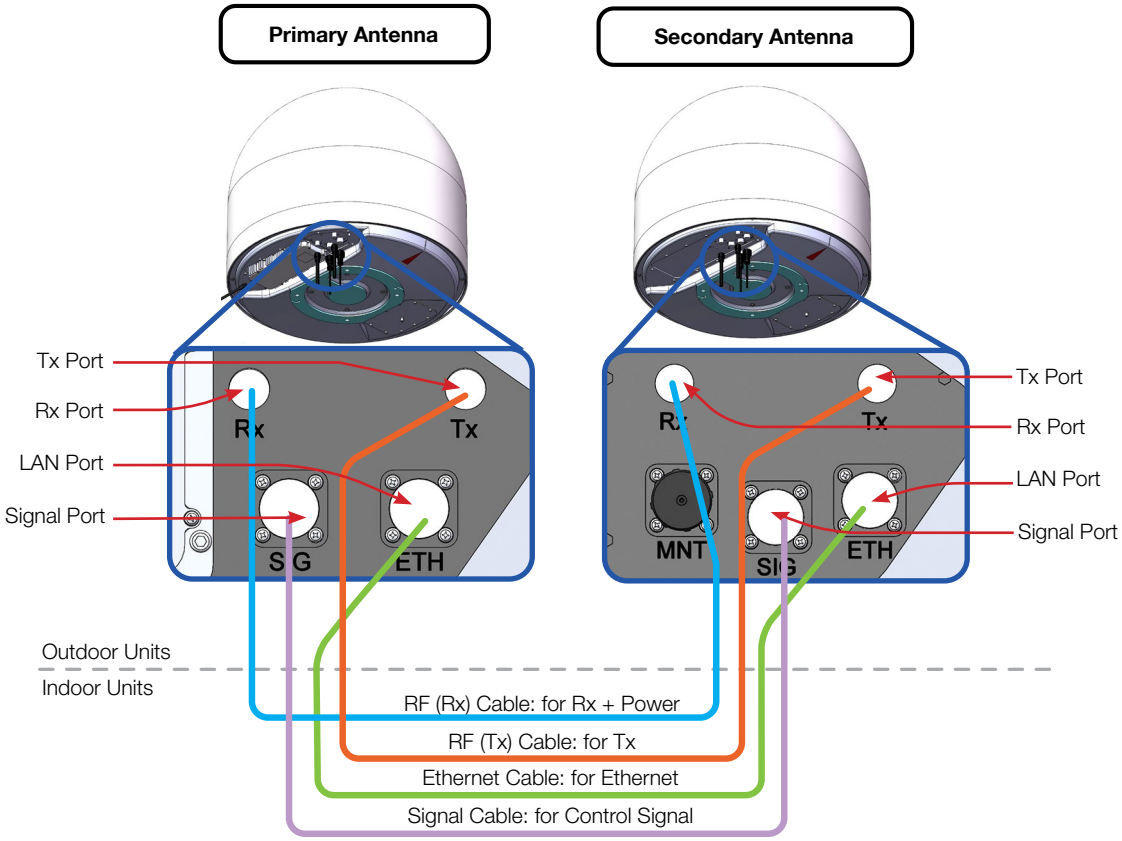


Figure 9: Cable Connection Between Two Antennas

NOTE

Intellian recommends using included two 5M RF Cables, 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 10M or 20M Inter-dome cables kit.

5.7 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.

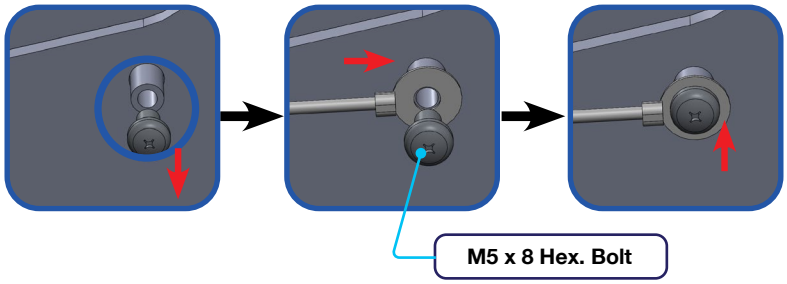


Figure 10: Grounding Antenna

Chapter 6. Installing Indoor Unit (IDU)

6.1 CNX Dimensions

Confirm the dimensions of the CNX before installing it.

Unit: mm (inches)

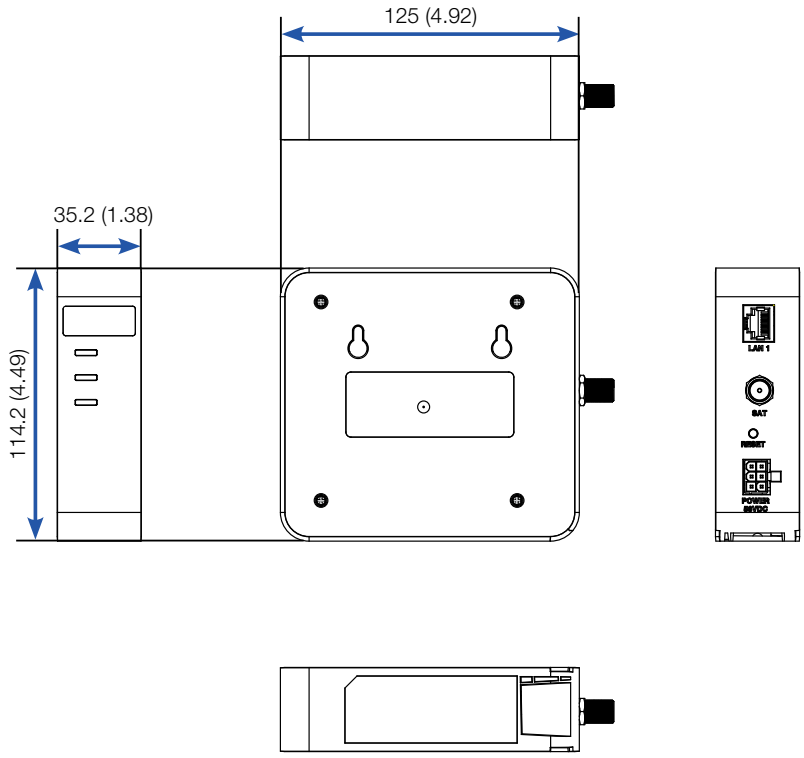


Figure 11: CNX Dimensions

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 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 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.

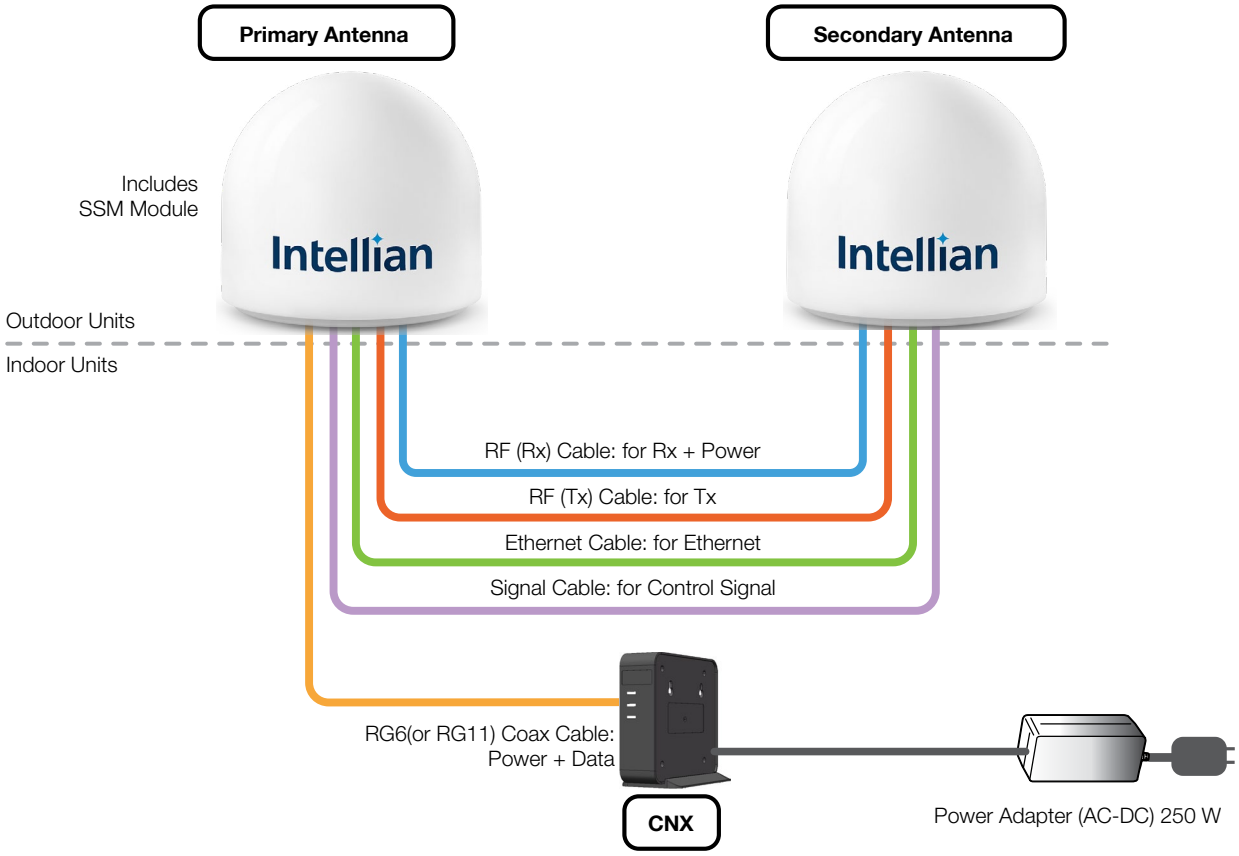


Figure 12: Dual Antenna System Configuration of OW70L-Dac (Standard)

NOTE

To connect the primary antenna to CNX, use the RG11 Coaxial Cable or better cable. The maximum cable length recommended 100 meters for RG11.

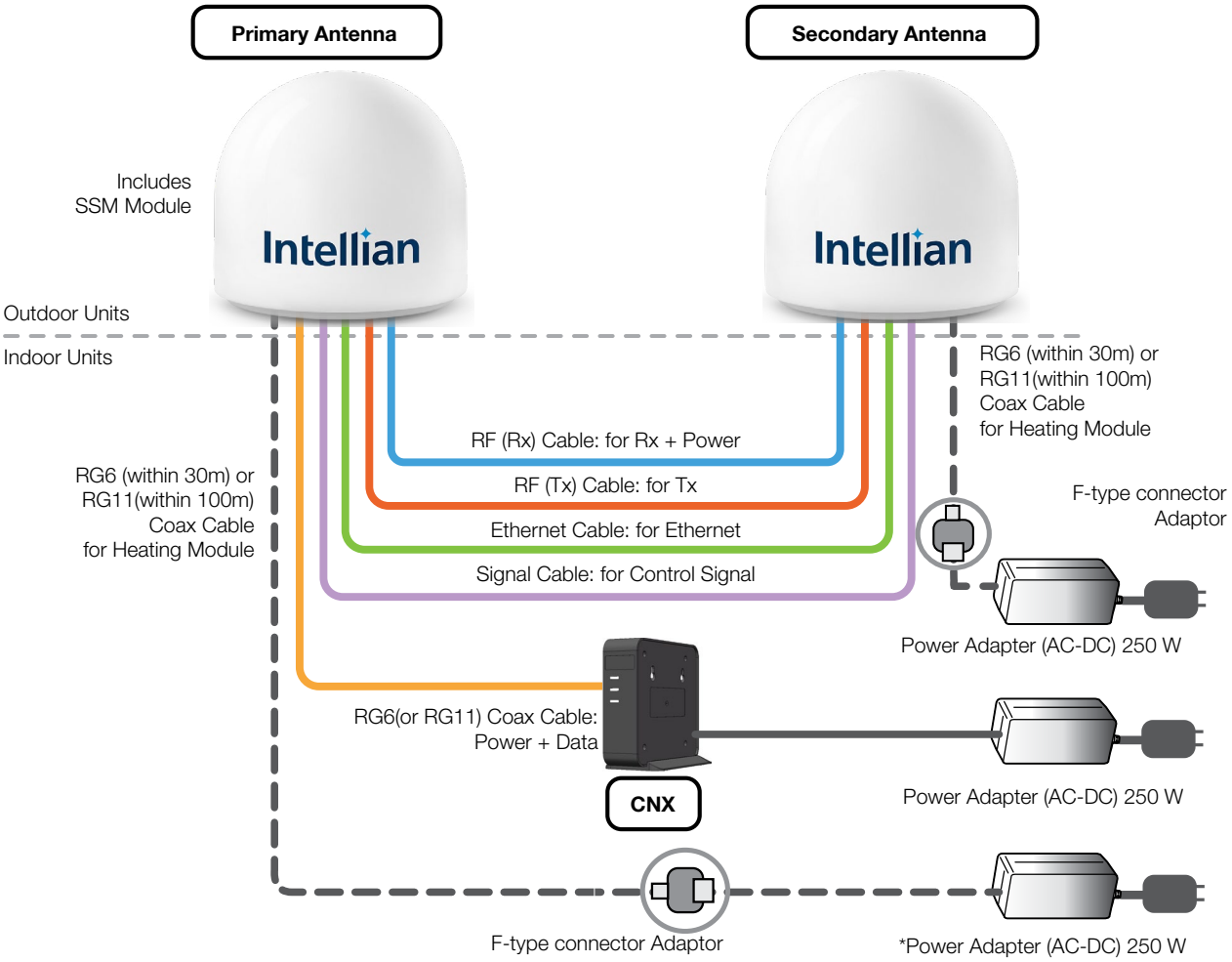


Figure 13: Dual Antenna System Configuration of OW70LH-Dac (w/ Heating Module)

NOTE

The Coax cable (to CNX and heating module) can be used RG6 or RG11 as per length.
- RG6: within 30m (98.43ft), RG 11: within 100m(328.08ft)

6.3 CNX Cable Connection

6.3.1 CNX Back Panel Connectors

The following figure shows the CNX back panel connectors.

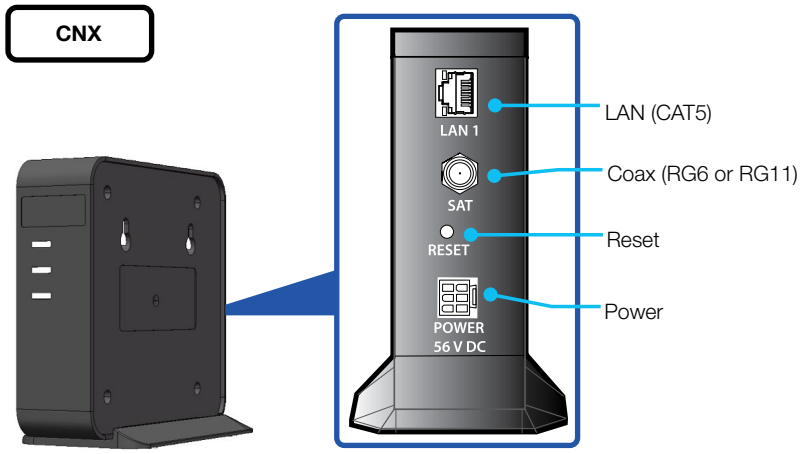
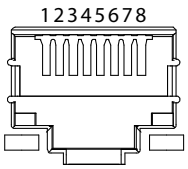


Figure 14: Back Panel Connectors

6.3.2 CNX Connector Pinout Guide

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

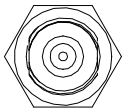
LAN Connector



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-

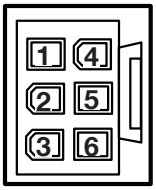
Coax Connectors



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

Chapter 7. Operating CNX

7.1 CNX Front Panel View

Check the connection status with the LED indicators on the front panel of CNX.

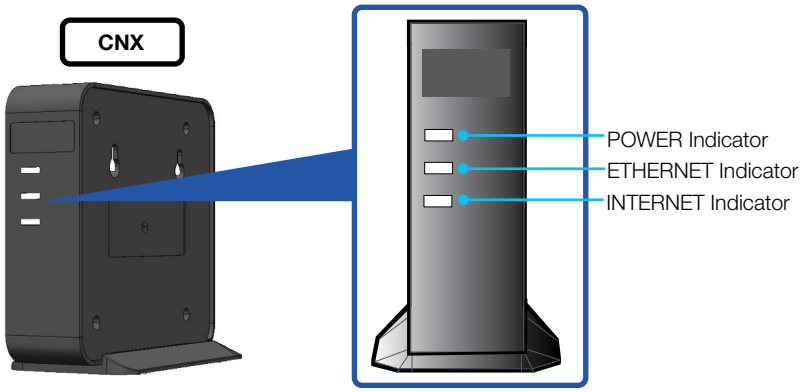


Figure 15: Front Panel View of CNX

The following table shows status indicators on the CNX.

LED Indicators	Colour	Description
POWER	Steady Green	The CNX is powered on.
	Off	The CNX is powered off.
ETHERNET	Steady Green	The user network is ready. (There is a good physical connection and also, running thorough traffic stably connected)
	Blinking Green	The user network is connected. (There is a physical connection)
	Off	The user network is not connected.
INTERNET	Blinking Green	The CNX Coaxial cable is connected. Its blinking frequency changes by the signal traffic. (MoCA communication is established)
	Off	The CNX Coaxial cable is not connected properly. (MoCA communication is not properly established)

Chapter 8. Using Local User Interface (LUI)

8.1 Introduction

With the embedded Using Local User Interface (LUI) software, the antenna can be monitored, controlled, and diagnosed remotely through a web browser. It saves your time and cost generated by various maintenance activities such as operating firmware upgrades, tracking parameter resets, and system diagnosis, etc.

8.2 Requirements to Access OneWeb Web Interface

The LUI can be accessible by Chrome web browser.

NOTE

LUI works on Chrome web browsers. (Intellian recommended using Chrome web browser when operating ***LUI***.)

8.3 Turning On System

The primary antenna has to be connected to the CNX and powered up in order to access the webpage.

The CNX should be connected to a power adapter before connecting between the antenna and CNX.

8.4 Accessing Webpage

8.4.1 TCP/IP Connection through LAN Port

The network is automatically configured by DHCP with no additional PC IP configuration.

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)**

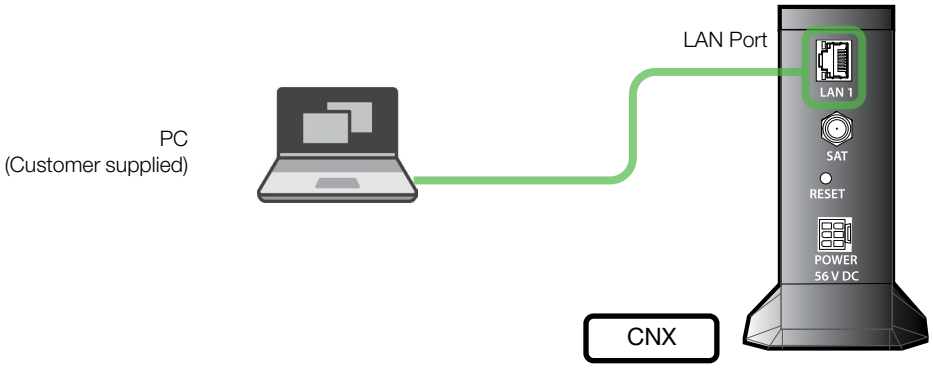


Figure 16: Back Panel LAN Port Connection

8.5 Webpage Layout

Once you log in, the following information and menus are displayed.

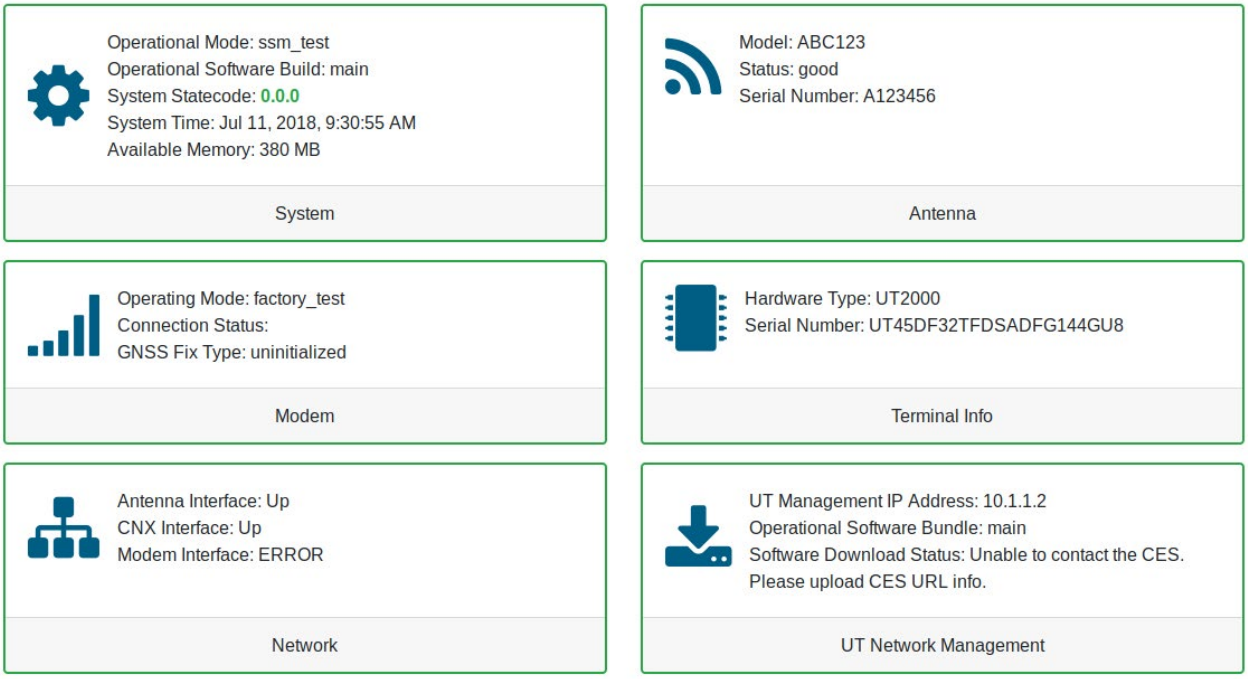
8.5.1 Navigation bar

The navigation bar as shown below is the primary way being able to navigate the LUI. The navigation bar is persistent across all LUI pages.

No.	Item	Description
①	Logo	This is the banner that displays the branding logo. Clicking on the logo on any given page will return the LUI to the homepage.
②	Language Drop Down Menu	The language drop-down menu lists all supported languages. Picking a language from the drop-down menu will change all text to the specified language immediately.
③	Navigation Items	These are the navigation items on the navigation bar. Clicking on a section will take you to a different part of the LUI. The sections are as follow: • Home: The homepage of the LUI displays a high-level overview of most components via a card layout. • Install: Guides the user through the installation process. More information on the installation process can be found in the “8.7 Starting Install Menu (Install Wizard)” on page 47. • Antenna: Displays Antenna Information such firmware version, configuration and status. • Modem: Displays Modem Information (IMSI, IMEI, Manufacturer, Software Version, etc.), Modem Status (Call Status, Operating mode, etc.), OneWeb Extension Statistics, and GNSS Statistics. • Network: Displays statistics for all the network interfaces on the SSM such as the CNX interface, MGT interface, and WAN interface. • Diagnostics: Contains most of the SSM related statistics and configuration. Displays information such as the UT Status, Sensor Information, Host Processor Logs, and Event Logs. • Management: Displays UT Network Management Information such as SDL Information and UCR Statistics.
④	Auto-Refresh	This is the auto-refresh dropdown. Choosing an interval other than 0 will, refresh the display, fetch the data again at the specified interval.
⑤	Reboot	This is the reboot button. Clicking this button will trigger an SSM reset. While the SSM is rebooting, the reboot button turns from green to red. Upon successful reboot, the LUI will automatically refresh the page and the reboot button will go back to being green.

8.5.2 Home Page

The home page consists of several cards that display a high-level overview of certain components such as the UT System, Antenna, or UT Network Management. Each card has a border that, depending on the status of the subsystem, changes colour. If the subsystem is in a bad state, the card is outlined in red. If the subsystem is behaving as normal, then the card is outlined in green. Clicking on a card will take you to the webpage where you can find more detailed information about the subsystem.

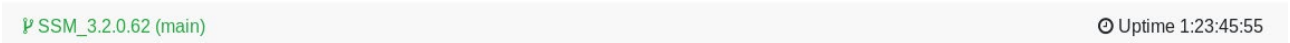


8.5.3 Footer

The footer, like the navigation bar, is persistent throughout all LUI pages. The footer contains two pieces of information: one on the left and one on the right.

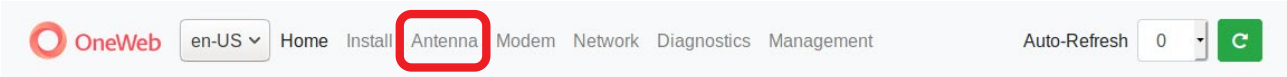
The current software version that is running on the Host Processor is displayed on the left. The operational software mode follows the software version. If the operational software mode is a factory, the text colour is red. If the operational software mode is main, the text colour is green. Clicking on this will take you to the **UT Status** section of the Diagnostics page.

The system uptime is displayed on the right. It displays how much time has passed since the last reboot. The format is days:hours:minutes:seconds.

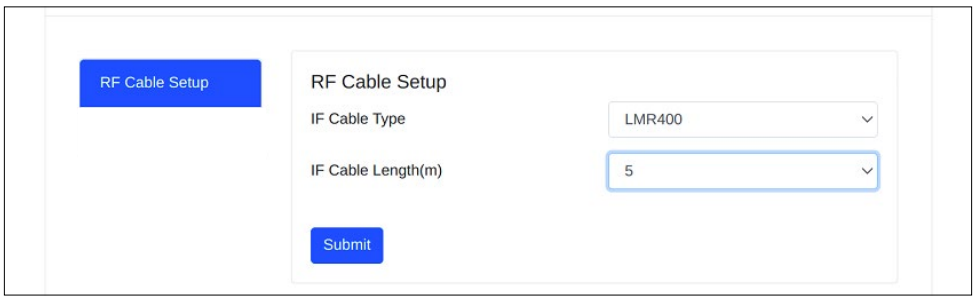


8.6 Setting Up Cable and Antenna

This section describes how to setup the antenna.
Setting up the antenna is required before “7.7 Starting Install Menu (Install Wizard)”.



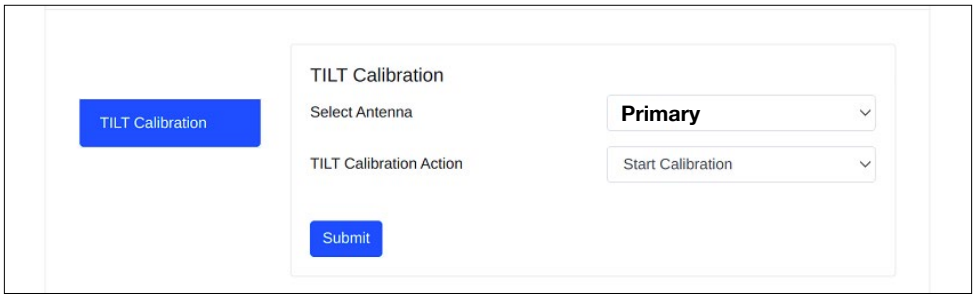
8.6.1 RF Cable Setup



Intellian provides the Antenna RF Cables (LMR400, 5 m) as default. Choose the **LMR 400** on the **IF Cable Type** and the **5** on the **IF Cable Length (m)** from the drop-down list. Click on **Submit**.

NOTE: The RF cable type and length value must be the same as the RF cable being used.

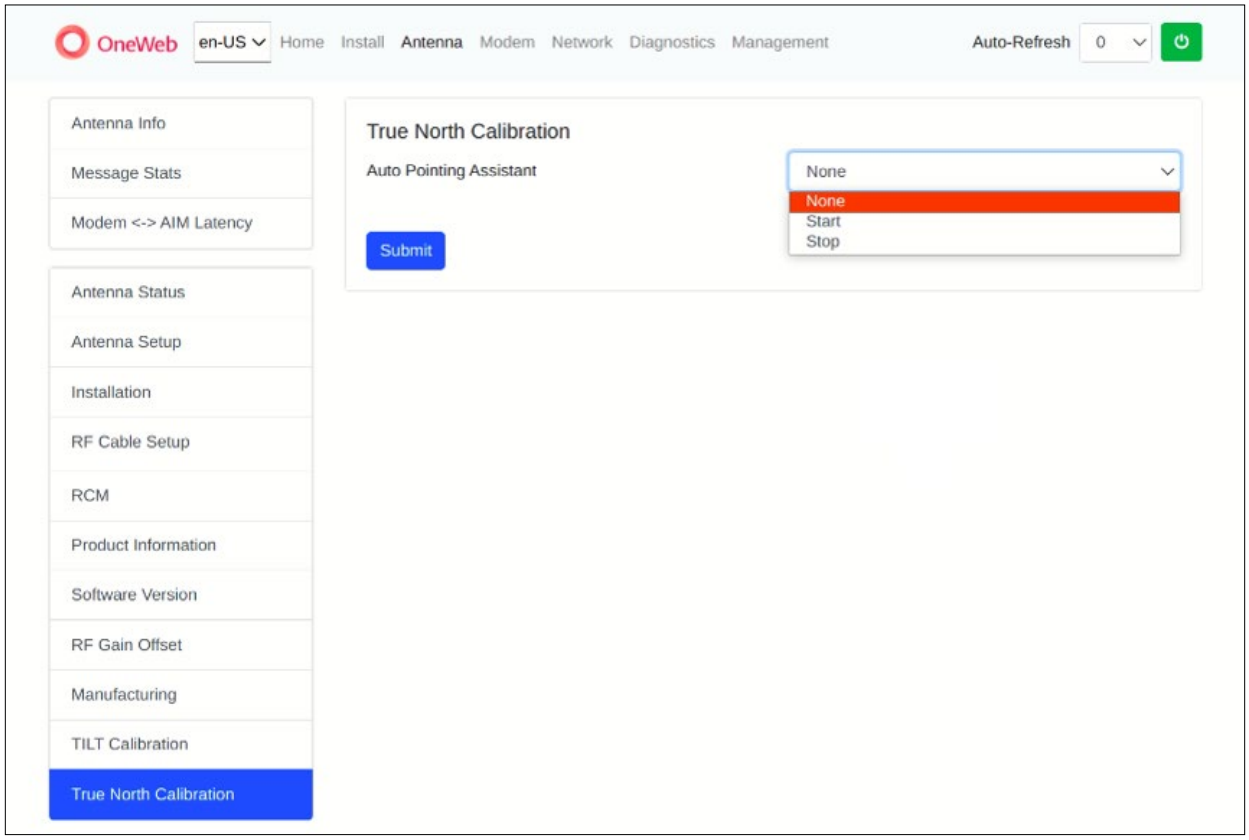
8.6.2 TILT Calibration



The Tilt Calibration must be applied to both the primary and secondary antennas. Choose the **Primary/ Secondary** on the **Select Antenna** and select the **Start Calibration** on the **TILT Calibration Action** from the drop-down list. If you select the **Stop** on the **TILT Calibration Action** and Click the **Submit**, the antenna system will stop the tilt calibration.

Click on **Submit**, then click on **Next**. The antenna system will start the tilt calibration.

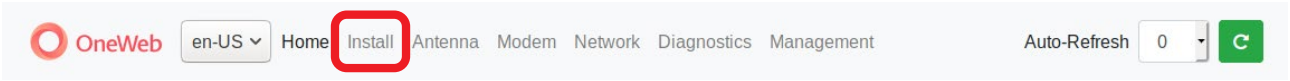
8.6.3 Antenna Setup



This section can be skipped if this is first time setting up the antenna. Only if the antenna is moved to a different location, select **Start** for Auto Pointing Assistant and click on **Submit**.

8.7 Starting Install Menu (Install Wizard)

The Install Wizard will give you a guide by going through the steps of setup for the antenna system commissioning. We highly recommend using this wizard to complete your installation and commissioning of the system. After accessing LUI main page, go to the **Install** menu on the navigation bar and perform the wizard.



The LUI Installation page serves as the front end for installation.

8.7.1 Installation Navigation

At the top of the installation, the page is the installation navigation. At the top is a progress bar that displays what percentage of the installation process is complete. An auto advance button on the left that, when enabled, advances the installation to the next step once the current step has either finished or is not required.

On the right are three buttons:

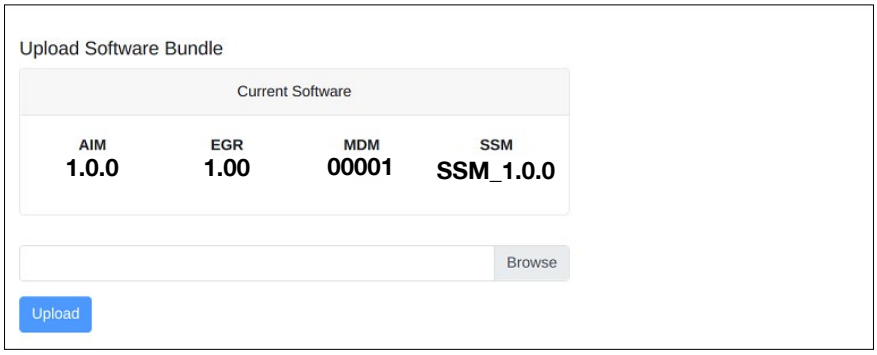
- **Start Over** button: Brings you back to the first step of the installation.
- **Back** button: Steps one step back in the installation.
- **Next** button: Advances to the next step in the installation.

If a given state is required, the Next button is disabled, and the installation cannot proceed until the current step has been completed.

8.7.2 Initial Install Page

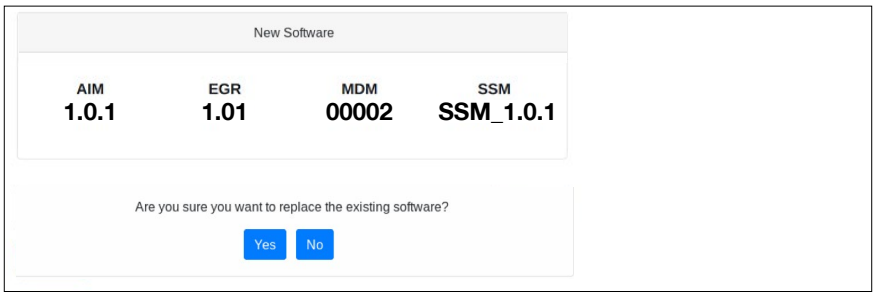
The first page of the installation process is a splash screen that states that the UT has not yet been installed. To proceed with the installation to the next step, click on **Start Installation** or **Next**.

8.7.3 Upload Software Bundle



The Upload Software Bundle page displays the current software versions running on each component. Clicking on the empty text box or the **Browse** button allows the upload of a Software Bundle. Until a bundle has been uploaded, the **Upload** button is greyed out. If the upload is not successful, a status error message will be displayed.

8.7.4 New Software Listing



Upon a successful upload, the New Software version is displayed beneath the current software along with a prompt. Clicking **No.** It deletes the bundle file that was uploaded and returns you back to the beginning of the state in which you must upload another bundle file. Clicking **Yes** then triggers the next step of this state which is performing the updates. If an update fails for any given component, an error message is displayed and the SSM stops attempting to update the rest of the components. Upon a successful update, the SSM will reset itself and the LUI will refresh the page once the SSM has finished rebooting. After the reboot, you can click to advance to the next state.

8.7.5 Upload Ephemeris Data

The Upload Ephemeris Data page is a simple file upload page. Simply click on the empty text box or the **Browse** button to upload an Ephemeris file. Until a file has been uploaded, the upload button is greyed out. Upon a successful upload, a success status message will be displayed, and the state can be advanced. Click on **Next**.

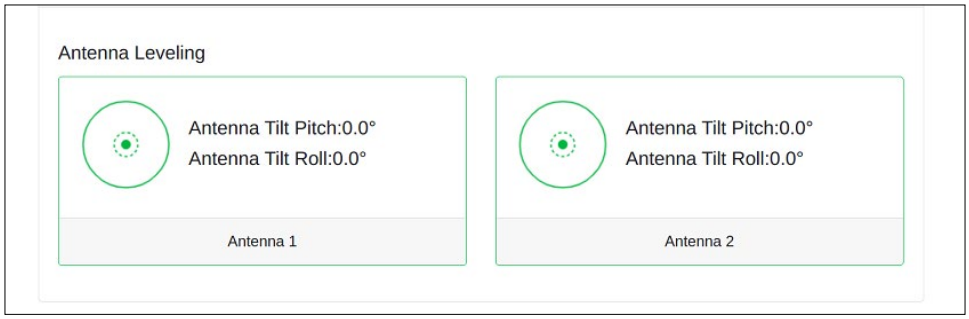
NOTE

What is Ephemeris Data?

Ephemeris Data contains current information about the orbits of the satellites in the OneWeb constellation. The User Terminal uses ephemeris data to determine the positions of the satellites in the sky at any given time.

Remark: Every 30days, this data file is updated. Once User Terminal is commissioned this will be updated automatically.

8.7.6 Antenna Levelling



The antenna Levelling page displays the current sensor data received from the antenna.
The “Tilt Pitch: degrees” and “Tilt Roll: degrees” are displayed. If the degree values meet the tolerance, the card for the corresponding antenna is outlined in Green; otherwise, it is outlined in Red.
If it is Red, antennal Levelling has to be re-done until the display becomes Green. When Levelling is re-done, “7.6.2 TILT Calibration” has to be done after the installation completes. If the installation fails, it could be due to the incorrect Levelling; therefore, installation has to be re-done.

8.7.7 Autonomous States

Autonomous states all display a progress bar of its progress. The following states require no action from the user aside from proceeding to the next state. All installation state is displayed, or some installation status is displayed underneath the progress bar.

Chapter 9. Specification

9.1 Technical Specification

9.1.1 RF Specification

Item	Specification
Rx Frequency	Rx : 10.7 – 12.7 GHz
Rx Gain (Wthout Radome)	Rx: 36.0 dBi
G/T (@ 11.8 GHz, @ >30deg. EL)	12.2 dB/K
Tx Frequency	Tx: 14.0 – 14.5 GHz
Tx Gain (Without Radome)	Tx: 38.4dBi
EIRP	33.6 dBW / 20 MHz (single carrier) 36.6 dBW / 40 MHz (dual carrier)
Cross pol Isolation	Min 20 dB (Antennas Field of view)
Polarization	Rx: RHCP, Tx: LHCP

9.1.2 System Specification

Item		Specification
Platform		Three Axis: Azimuth, Elevation, Cross-level
Positioning		3-axis Velocity Mode Servo Control: Azimuth, Elevation, Cross-Level
Pedestal Motion Range	Azimuth	-300° to +300°
	Elevation	-59° to +59° (FOV -53° to +53°)
	Cross-Level	-10° to +10°
Power Consumption		Primary: 76 W average, 80 W peak Secondary: 76 W average, 80 W peak
Power Adaptor		300W Max
CNX Power Source		AC/DC Adapter (Input 100-240 VAC, 50-60 Hz, Output 56 VDC)
DC Power to Antenna Subsystem		Current 4 A average/ 5 A peak @ 32-60 V, 56 V nominal

Item		Specification
EGR	GPS L1 Frequency	1574.397 – 1576.443 MHz
	GLONASS Frequency	1597.5515 – 1605.886 MHz
	Communication Protocol	NMEA 0183
	Reference Clock Frequency	10MHz sinusoidal reference clock output to the MIM
	Supply Voltage	Min. 5.2 V, Max. 5.8 V
	Power Consumption	Max. 8 W
	Antenna Power Interface	Min. 3 V, Max. 5 V
	Surge Protection	Max. 2 kV
	Connections	SMA
Digital Signals		Tx-ON : LVDS
		Rx-ON : LVDS
		Frequency Reference: LVDS
		Reset: LVDS
Ant. Monitor, Control Interface		Ethernet, 10/100 Base T
CNX	Antenna Subsystem Interface	Four GigE RJ-45 Ethernet
	Encryption	MoCA 2.0 E-band (400-700MHz)
	Input Voltage	Min. 52 V, Max. 59 V
	Operating Power	Max. 30 W
	Output Voltage	56 VDC
	Output Power	Max. 220 W
	Reset	MoCA chipset and Ethernet PHY
	LEDs	Power: Operational – Solid GREEN Fault Condition – Solid RED Operating with Backup S/W – Blinking RED Off – No power
		Ethernet: Ready – Solid GREEN Activity – Blinking GREEN Off – No device connected or device connected not operational
		Internet: Operational – Solid GREEN (CNX-MIM MoCA connected) Fault Condition – Solid RED
	Antenna Subsystem Interface	Four GigE RJ-45 Ethernet
Tx Cable		LMR 400: Tx IF + 25 MHz reference signal
Rx Cable		LMR 400: 2 GHz IF + Power
Ethernet Cable		CAT5

9.1.3 Mechanical Specification

Item		Specification	
Radome Height		770 mm (30.3")	
Radome Diameter		Ø845 mm (33.3")	
Reflector Size		73 cm (28.7")	
Radome Color		White	
Antenna Safety Gap		15 mm	
Antenna Weight		< 34 kg (75.0 lbs) with Radome 33.6 kg (74.1 lbs) for Primary, 32.5 kg (71.7 lbs) for Secondary	
		Primary	Secondary
Package (Single stack)	Size	900 mm x 900 mm x 1070 mm (L x W x H)	900 mm x 900 mm x 1070 mm (L x W x H)
	Package weight (Antenna+ Package+HM)	Approx. 66 kg	Approx. 63 kg
Package (Double stack)	Size	900 mm x 900 mm x 2140 mm (L x W x H)	
	Package weight (Antenna+ Package+HM)	Approx. 129 kg	
Package (Single stack)	Size	900 mm x 900 mm x 1070 mm (L x W x H)	900 mm x 900 mm x 1070 amm (L x W x H)
	Package weight (Antenna+Package)	Approx. 64 kg	Approx. 61 kg
Package (Double stack)	Size	900 mm x 900 mm x 2140 mm (L x W x H)	
	Package weight (Antenna+Package)	Approx. 125 kg	

※ Package size may change with design revisions

9.1.4 Environmental Specification

Item		Specification	
Operational Temperature		- 40°C to + 55°C (w/ optional heating device) - 25°C to + 55°C (w/o heating device)	
Survival Temperature		-40°C to +80°C	
Storage Temperature		-40°C to +85°C	
Storage Environment		ETSI EN 300 019 Class 1.1	
Operational Temperature (CNX)		0°C to +40°C	
Operational Humidity		Relative humidity range of 10% to 100% non-condensing in accordance with IEC60068-2-78 for a period of 96 hours.	
Non-operational Humidity		IEC 60068-2-78, Method Db for a period of 96 hours.	
Operational Vibration		IEC 60068-2-64, .001 - .02 PSD, slope +12, 5 to 10 Hz .02 PSD, slope 0, 10 to 50 Hz .02 - .001 PSD, slope -12, 50 to 100 Hz	
Non-operational Vibration		IEC 60721-3-4, Class 4M3 3.0 mm peak (+/- 1.5) (2-9 Hz) 5 m/s2 (9-200 Hz) IEC 60068-2-6 with test duration of 5 sweeps per each of the 3 axes.	
Operational Shock		IEC 60068-2-27	
Non-operational Shock		IEC 60068-2-27	
Weather Tightness		IP66 per IEC 60529	
Lightning Protection		IEC 61000-4-5 Class 4	
Hail Impact		ASTM E822	
Operating Wind Resistance	Wind Load*	128 km/hr (80 mph)	1226 N (125 kgf)
Functional Wind Resistance	Wind Load*	160 km/hr (100 mph)	1916 N (195 kgf)
Survival Wind Resistance	Wind Load*	216 km/hr (135 mph)	3491 N (356 kgf)
Salt Erosion		IEC 60068-2-52 Severity Lv 3	

* Wind Load: N is weight expression unit: newton and kgf is 9.80665N

Chapter 10. Warranty

Intellian systems are warranted against defects in parts and workmanship. These warranties cover ONE (1) YEAR of parts and ONE (1) YEAR of factory repair labour to return the system to its original operational specification.

Warranty periods commence from the date of shipment from Intellian facility or date of installation, whichever is sooner.

Intellian Technologies warranty does not apply to a product that has been damaged and subjected to accident, abuse, misuse, non-authorized modification, incorrect and/or non-authorized service, or to a product on which the serial number has been altered, mutilated or removed.
Intellian Technologies, will (at its sole discretion) provide factory repair service during the warranty period any product which is proven to be defective in materials or workmanship, in accordance with the relevant product warranty policy.

All products returned to Intellian Technologies during the warranty period must be accompanied by a Service Case reference number issued by the dealer/distributor from Intellian Technologies, and (where applicable) a copy of the purchase receipt as a proof of purchase date, prior to shipment.

Alternatively, you may bring the product to an authorized Intellian Technologies dealer/distributor for repair.

Chapter 11. Appendix

11.1 Appendix A. Pre-Installation Checklist

This pre-installation checklist describes important considerations before installing the UT. It must be completed by the certified installer to install in a safe location. Please fill out the general information below.

Date of Survey:

Date of Install (If different from installation date):

Installer Information

- Company Name:
- Installer's Name:
- Contact Phone Number:
- Address:
- Email:

Customer Information

- Organization Name:
- Customer Name:
- Phone Number:
- Address:
- Email:
- Site Location (Lat / Long.):
- UT Type Being Installed (w. CNX):

The following checklist is to be completed by the Installer.

Building / Site checklist

Check Item	Result
The proposed antenna mount type is checked. (Roof Mount / Ground Mount / Ground Level Pole Mount / Pole Mount Bolted to Wall / Custom Mount / Etc.)	(Fill out)
The location of the site is checked. (Urban / Semi-urban / Rural / Remote)	(Fill out)
The building external wall composition is checked. (If mounted on the building)	Yes / No / N/A
The line-of-sight of the antenna is checked for radiation safety.	Yes / No / N/A
The safety from unauthorized access is checked.	Yes / No / N/A
The roof space/floor space availability based on mount type is checked.	Yes / No / N/A
The roof/soil composition based on mount type is checked.	Yes / No / N/A
The lightning protection availability is checked.	Yes / No / N/A

Expected Obstructions / Possible Interference checklist

Check Item	Result
The field of view to satellite constellation is checked.	Yes / No / N/A
The no interference with RF transmitters is checked.	Yes / No / N/A
The no interference by high voltage lines, power cables, and telephone cables is checked.	Yes / No / N/A
The no other possible sources of interference are checked.	Yes / No / N/A
The map of no obstruction is checked. (Also updated into UT configuration as an array of AZ, EL coordinates.)	Yes / No / N/A

11.2 Appendix B. Tightening Torque Specification

This table shows the recommended values of tightening torques.

Bolt Size	Tightening Torque (N m)
M2	0.5
M2.5	1
M3	1.5
M4	3
M5	6
M6	12
M8	27
M10	50
M12	85
M14	130
M16	200

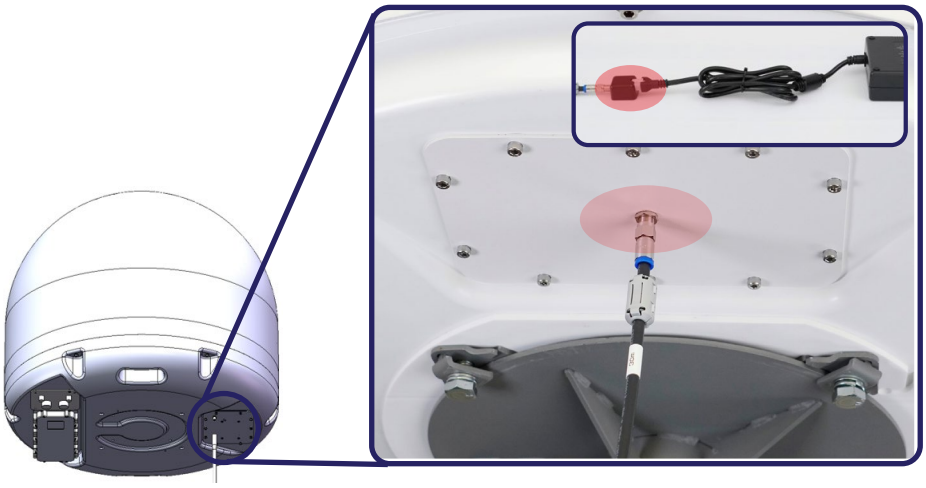
11.3 Appendix C. Connecting power adapter for Heating Module

There are two kinds of OW70L-Dac versions, one is OW70L-Dac without Heating Module. Another one is OW70LH-Dac 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 Primary and Secondary Bottom of the Radome as picture below.

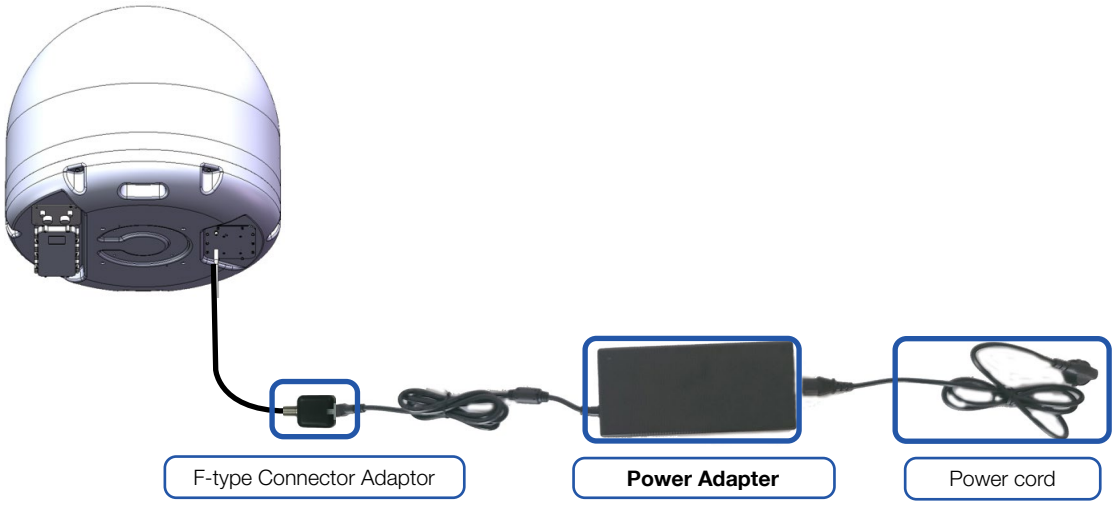
2. Connect the RG11 Coax cable to the Heating Module connector. To convert connector type, use a F-type connector adaptor between the Heating Module and a power adapter.



NOTE

RG11 Coax cable for the Heating Module power supply should be purchased separately. The cable length should be under 100 m.

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

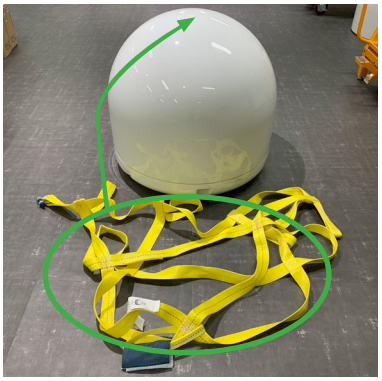


11.4 Appendix D. Using a lifting strap

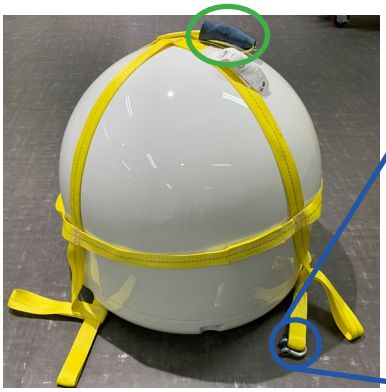
When you install the antenna unit to the mounting plate (or other surfaces), you can use the lifting strap.

To use the lifting strap, Refer to pictures below. (A separate purchase of the lifting strap is required.)

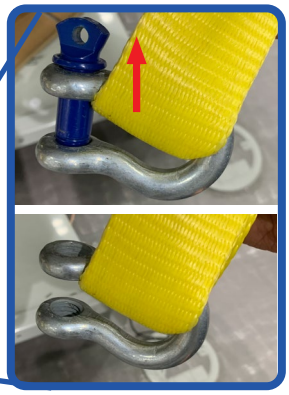
Make sure that before installing the lifting strap on the antenna, has plenty of room.



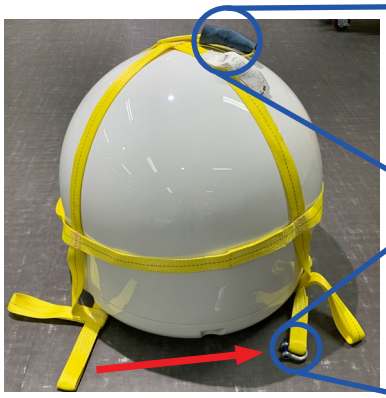
1. Prepare the lifting strap.
2. Wrap the antenna up using the lifting straps.



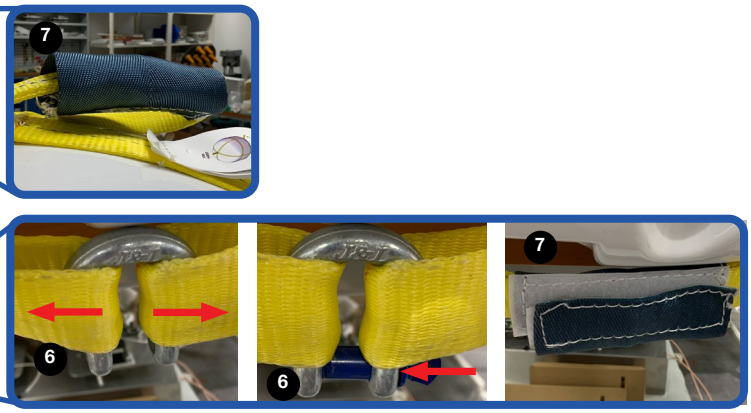
3. Arrange the straps to locate the holder is the top of the antenna.



4. Remove a pin from a shackle on the strap.



5. Clip the opposite side's strap onto the shackle.



6. Fully tighten the lifting strap and secure the shackle with the pin.

7. Re-wrap the holder and shackle with the protection.

8. Ready to lift the antenna.

11.5 Appendix E. Checking separately sold items

Refer to separately sold items list below table.

Accessory Kit

Part Number	Part Description
OW-NPM-Kit	None-Penetrating Mount Kit
OW-GB-1050-Kit	Ground Braid Kit

Accessories

Part Number	Part Description
OW-TK-1008	Toolkit, Compression Connector
OW-CIK-1010	Connector Installation Kit
OW-RG11-1009	1000’ Reel RG11 Cable, Solid Copper Conductor
OW-LS-1002-OW70	UT Lifting Strap for OW70L-D
OW-NPM-1012-RM	NP Mount
OW-NPM-1013-ATP	NP Adjustable Top Plate (2EA)
OW-NPM-1014-RM	NP Rubber Mat
OW-GB-1053	Grounding Braid (1EA)
OW-GB-1054-M58	M5 X 8 Screw for GB (25EA)
OW-GB-1055-FW	Flat Washer for GB (100EA)
OW-GB-1056-TLW	Tooth Lock Washer for GB (100EA)
OW-CNX-BB	CNX
OW-CNX-1057-PA	CNX Power Adapter (250W)

11.6 Appendix F. Important Notice of Waterproofing Connector

11.6.1 Introduction

During antenna installation, it is important to ensure that once the cable is connected to the antenna, proper waterproofing of the connector must b e done with a self-amalgamating tape.
If you need any assistance, please contact Intellian Technical Support (support@intelliantech.com).

11.6.2 Outline of Taping

Self-amalgamating tape comes with a protective, plastic peel-away layer that allows the tape to rolled and shipped. To waterproof a connector, you need to begin by peeling away a portion of this protective plastic layer and then start wrapping the tape around it.

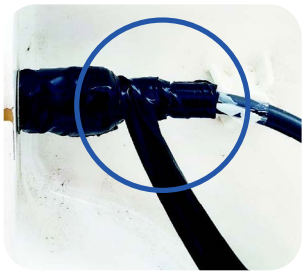
11.6.3 Procedure

1. Connect the cable to the connector to be fully secured.

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.

2. Apply tape over the connetor.
   It is important to wrap the cable onto itself and the best practice is to wrap the tape over itself by 50%, meaning that once you wrap your first layer your second layer should overlap over half of the first layer, and so on. This ensures that you get a strong bond between the different layers of tape that properly adhere to one another.



3. Ensure that the entire RF connector is taped up as shown the picture right.

WARNING

- Note that you cannot use ordinary electrical tape to waterproof the RF connector.
  Only self-amalgamating tape is able to waterproof the connector properly.
- Failure to do so will result in rust and corrosion to the cable and its connector and this might end up damaging the antenna.