

FB500
Inmarsat FleetBroadband



Installation & Operation User Guide

Serial number of the product

--

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



© 2022 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. 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 manual is subject to change without prior notice through a product life cycle. A printed version of the user manual is periodically updated and may contain inaccuracies or omissions compared to the recent product information. The most up-to-date information is 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	8
Chapter 2. Certifications	10
Chapter 3. Introduction	11
3.1 Introduction of FB500	11
3.2 Features of FB500	11
3.3 Overview of FleetBroadband	13
3.3.1 BGAN Services	13
Chapter 4. Planning Installation	14
4.1 Selecting Installation Site	14
4.1.1 Avoiding RF Interference	14
4.1.2 RF Hazard Precautions	15
4.2 System Package	16
4.2.1 Above Deck Unit (ADU) / Antenna Unit	16
4.2.2 Below Deck Unit (BDU)	16
4.2.3 Packing List	17
4.3 System Cables	19
4.3.1 Antenna RF Cable (Connecting ADU - BDU)	19
4.4 Unpacking System Package	20
Chapter 5. Installing ADU	22
5.1 Antenna Dimensions	22
5.2 ADU Mounting Hole Pattern	23
5.3 Mast Designing (Installation Example)	24
5.4 Routing RF Cable on Mast (Example Only)	29
5.5 Fixing the RF Cable on Bracket	31
5.6 Mounting Antenna	32
5.6.1 Mounting Antenna using Inner Holes (with M10 Bolts)	32
5.6.2 Mounting Antenna using Outer Holes (with M12 Bolts)	32
5.7 Connecting Antenna RF Cable	34
Chapter 6. Installing BDU	35
6.1 Selecting BDU Installation Site	35
6.2 BDU Dimensions	35
6.3 BDU Mounting Template	37
6.4 Mounting BDU	38
6.4.1 Direct Mounting Type	38
6.4.2 19-inch Rack Mounting Type (Optional)	38
6.5 Antenna System Configuration	40
6.5.1 Data sessions and voice calls	40

6.6 BDU Cable Connection	41
6.6.1 BDU Back Panel View	41
6.6.2 BDU Connector Pinout Guide	41
6.6.3 Connecting DC Power to BDU	45
6.6.4 Connecting BDU to ADU (Antenna)	48
6.6.5 Connecting BDU to Devices using LAN Port (RJ45)	48
6.6.6 Connecting BDU to Device using WAN Port	49
6.6.7 Connecting BDU to POTS Phone (RJ14)	49
6.6.8 Connecting BDU to External Devices	50
6.6.9 Connecting Wi-Fi Antenna to BDU	50
6.6.10 Grounding Stud	50
6.6.11 Inserting USIM Card	51
Chapter 7. Operating BDU	52
7.1 BDU Front Panel	52
7.2 Powering On System	53
7.3 Making POTS Phone Call	53
7.4 Enabling PoE	54
7.5 Activating Data Connection	55
7.5.1 Registering Device	55
7.5.2 Activating Data Connection	56
7.6 Using Grandstream VoIP Phone Call	57
7.7 Using Wireless Devices through Wi-Fi	60
7.8 Using Mobile Phone Call	61
7.8.1 Installing Mobile Application	61
7.8.2 Registering New Extension for Voice Service (Optional)	61
7.8.3 Setting Mobile Phone	62
Chapter 8. Using AptusLX	63
8.1 Introduction	63
8.2 Accessing Internal Webpage of BDU	63
8.3 Login	64
8.4 Top Menus	65
8.5 Account Menu	66
8.5.1 User	66
8.5.2 Logout	67
8.6 Dashboard	68
8.6.1 Satellite Data Connection Control	69
8.6.2 Satellite Connection Statistics	69
8.7 Status	70
8.7.1 Network	70
8.7.2 Wi-Fi	71
8.7.3 Phone/PABX	72
8.7.4 Data	73
8.7.5 USIM	74
8.7.6 Terminal info	75
8.7.7 External GPIO	75
8.7.8 Satellite PDP	76

8.8 Setup	77
8.8.1 Network	77
8.8.2 Wi-Fi	78
8.8.3 Firewall	79
8.8.4 Phone/PABX	82
8.8.5 Data	83
8.8.6 Satellite	84
8.8.7 SMS	85
8.8.8 Satellite Voice	87
8.8.9 Service Profile	88
8.8.10 Service User Group	90
8.8.11 Device Registration	91
8.8.12 Traffic Flow Template (TFT)	92
8.8.13 USIM	93
8.8.14 External GPIO	94
8.8.15 Restricted Dialing	95
8.8.16 NSD	96
8.8.17 MST	97
8.9 Tools	98
8.9.1 Software Upgrade	98
8.9.2 Backup and Restore	100
8.9.3 Reset	101
8.9.4 Logs	102
8.9.5 Diagnostic	103
8.9.6 Support	104
Chapter 9. Specification	105
9.1 Antenna Specification	105
9.2 RF Specification	105
9.3 Below Decks Unit Specification	106
9.4 Packing Specification	106
9.5 Environmental Specification	106
Chapter 10. Warranty Policy	108
Chapter 11. Appendix	109
11.1 Tightening Torque Specification	109
11.2 Important Notice of Waterproofing Connector	110
11.2.1 Introduction	110
11.2.2 Outline of Taping	110
11.2.3 Procedure	110

List of Figures

Chapter 4. Planning Installation	14
Figure 1: Potential RF Interference	14
Figure 2: RF Radiation Hazard Area	15
Figure 3: Above Deck Unit (ADU) / Antenna Unit	16
Figure 4: Below Deck Unit (BDU)	16
Figure 5: Unpacking System Package (with ADU & BDU Sub-package)	20
Figure 6: Unpacking BDU Package	20
Figure 7: Unpacking ADU Package	21
Chapter 5. Installing ADU	22
Figure 9: Antenna Dimensions	22
Figure 10: ADU Mounting Hole Pattern	23
Figure 11: Recommended Size of Mast (Option 1)	25
Figure 12: Recommended Size of Mast (Option 2)	26
Figure 13: Recommended Size of Mast (Option 3)	27
Figure 14: Recommended Size of Mast (Option 4)	28
Figure 15: Routing Cable Through Outside of Mast	29
Figure 16: Routing Cable Through Inside of Mast	30
Figure 17: Fixing the RF Cable on Bracket	31
Figure 18: Mounting Antenna using Inner Holes (with M10 Bolts)	32
Figure 19: Mounting Antenna using Outer Holes (with M12 Bolts)	32
Figure 20: Installing Bolts for Antenna-Mast Assembly	33
Figure 21: Connecting Antenna RF Cable When Using Outside of Mast	34
Figure 22: Connecting Antenna RF Cable When Using Inside of Mast	34
Chapter 6. Installing BDU	35
Figure 23: BDU Dimensions (Direct Mounting Type)	35
Figure 24: BDU dimensions (installed using 19-inch BDU Rack Mount Kit)	36
Figure 25: BDU Mounting Template	37
Figure 26: Direct Mounting of BDU	38
Figure 27: Attach Cable Tray to BDU	38
Figure 28: Attach Rackmount Plate to BDU	39
Figure 29: Mount BDU Assembly into 19" Rack	39
Figure 30: System with Connected Devices for FB500	40
Figure 31: BDU Back Panel View	41
Figure 32: DC Power Connector Pinout	41
Figure 33: Antenna Connector (TNC) Pinout	42
Figure 34: LAN Connector (RJ45) Pinout	42
Figure 35: POTS Phone Connector (RJ14 & 6P4C) Pinout	42
Figure 36: GPIO Connector Pinout	43
Figure 37: DC Power to BDU Connection	45
Figure 38: BDU to Antenna Cable Connection	48
Figure 39: BDU to Devices Cable Connection using LAN Port (RJ45)	48
Figure 40: BDU to Device Cable Connection using WAN Port	49
Figure 41: BDU to POTS Phone (RJ14) Cable Connection	49

Figure 42: Using Cable Splitter with POTS Phones (RJ14)	49
Figure 43: BDU to External Devices Connection	50
Figure 44: Wi-Fi Antenna to BDU Connection	50
Figure 45: Grounding Stud Connection	50
Chapter 7. Operating BDU	52
Figure 46: BDU Front Panel	52

Chapter 1. Precautions

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 which, if not avoided, could result in death or serious injury.
	CAUTION CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to equipment. It may also be used to alert against 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.
	DO NOT STACK MORE THAN FOUR UNITS Do not stack boxes/crates more than four units as there is a risk boxes/crates may fall and be damaged.
	KEEP DRY - Always make sure the antenna is stored on a dry surface in a dry, well-ventilated area. - The antenna is designed to withstand a normal rain shower; however, water resistance cannot be guaranteed if the antenna is submerged.

- * **DO NOT SHIP VIA RAIL:** Ensure not to ship any system via Rail.
- * **Shock Hazard:** To minimize shock hazard and to protect against lightning, you must connect the equipment chassis and cabinet to an electrical ground. Make sure the system is correctly grounded and power is off when installing, configuring, and connecting components.
- * **Do not operate in an explosive atmosphere:** Do not operate the equipment in explosive environments or in the presence of flammable gases. Operating this equipment in such an environment causes a definite safety hazard.
- * **Keep away from living circuits:** Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustment inside the equipment with any power supply turned on. Under certain conditions, dangerous potentials may exist in the power supplies even with the power cable removed. To avoid injuries, always remove the power and discharge a circuit before touching it.

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.

Changes or modifications made to this equipment not expressly approved by Intellian Technologies, Inc. may void the FCC authorization to operate this 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 2.3 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 of FB500

Intellian's FB500 delivers a cost-effective, global, voice and data solution via the world's most reliable commercial L-band network, Inmarsat Elera, comprised of their I-4 and AlphaSat satellites. Our FB500 introduces the most competitive, highly efficient RF performance using an innovative 18 patched array, directional antenna, easy installation, market leading AptusLX software and the quality and reliability of the Intellian brand. It's a winning solution that meets our customers' demand for low cost of ownership in terms of installation, efficient operation and reliability.

Intellian's FB500 provides simultaneous voice and IP data, with data rates of up to 432 kbps IP data and 256 kbps streaming IP.

3.2 Features of FB500

Inmarsat Fleet Broadband Service

Intellian FB500 provides simultaneous high-speed data and voice communication via satellite through the Inmarsat BGAN (Broadband Global Area Network). The terminal is future proofed as it incorporates Inmarsat's latest L-band modem that features packet switching for all services, in place of the older circuit switching technology.

Fleet Safety GMDSS Ready

Intellian FB500 is GMDSS ready. The AptusLX software includes Marine Safety Terminal (MST) functionality that Inmarsat used to trial their new Fleet Safety GMDSS system.

Enhanced Cyber Security

Intellian FB500 includes firewall functionality allowing the operator to 'white list' or 'black list' data traffic to and from specified sites, as well as functionality to control which devices can access the terminal. This along with encrypted firmware and secure logins significantly reduces the risk of a successful cyberattack.

Reliable Data Connectivity

The ethernet ports allow various IP device connections, such as SIP phones. Ports 1 & 2 have PoE (power over ethernet) to support devices that require PoE connection. RJ45 port allows the connection of up to two POTS phones (using a splitter).

A dedicated WAN port allows the operator to switch across to an LTE connection when in range of a 3G/4G/5G signal - minimizing airtime costs.

Simple and Easy

Intellian FB500 is designed for simple and easy installation. The above deck unit (ADU) is connected to the below deck unit (BDU) by a single RF cable that also powers the ADU. No adjustment for varying cable lengths is required. The BDU can take a wide range of DC voltage inputs and an AC/DC adaptor is also available. The BDU can be either stand-alone or rack mounted.

Secured Safety at Sea

Intellian FB500 ensures reliable connectivity to access critical applications wherever you are. Also, Intellian FB500 supports Maritime Safety Terminal, Inmarsat's next generation of GMDSS.

Unlimited Back-up to Fleet Xpress Service

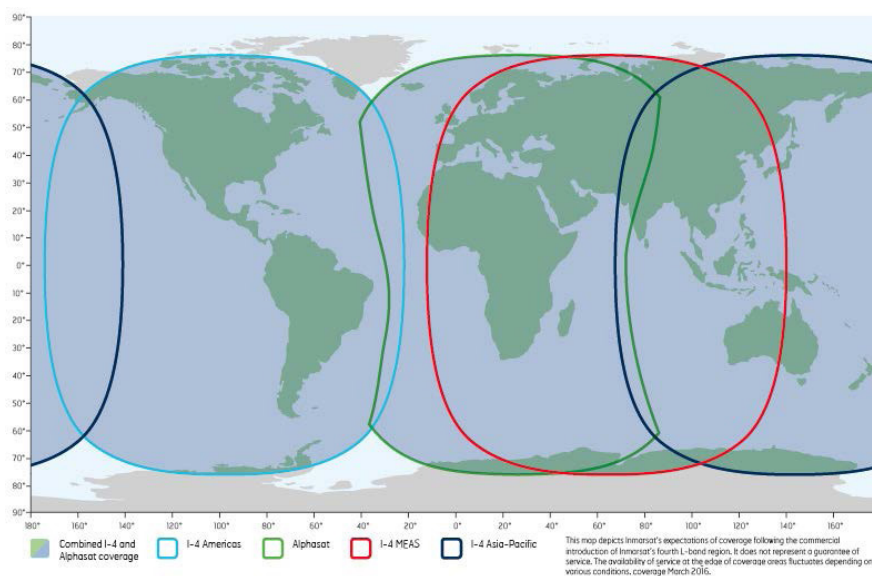
Inmarsat Fleet Xpress is a fully managed and streamlined broadband satellite communications service that is well established in the higher volume segments of the maritime market, such as commercial shipping. Inmarsat have fully approved Intellian's FB500 for Fleet EXpress and it is the ideal companion terminal to one of Intellian's Global Xpress products such as the GX100NX, and GX60NX.

3.3 Overview of FleetBroadband

3.3.1 BGAN Services

The Broadband Global Area Network (BGAN) is a global Satellite Internet Network using portable terminals. The terminals are usually connected to a laptop computer to access broadband Internet in remote locations, where a line-of-sight to the satellite exists. The user can make phone calls, access the Internet, check e-mail, download files, or perform any other Internet activity using the terminals. The network is provided by Inmarsat and uses four geostationary satellites called I-4 and Alphasat to provide almost global coverage. The map below shows the four satellite coverage regions.

FleetBroadband service coverage



NOTE

The above map depicts Inmarsat's expectations of coverage but does not represent a guarantee of service. The availability of service at the edge of coverage areas fluctuates depending on various conditions.

Chapter 4. Planning Installation

The antenna installation requires precaution and safety measures. Failure to follow the correct installation process may lead to injury of the installer and/or cause damage to the system. In order to maximize the performance of the system, a thorough review of this installation guide is strongly recommended, as well as executing the installation process as it is noted in this manual.

4.1 Selecting Installation Site

The antenna should be placed in an area on-board of the vessel with an unobstructed view extending from (at least) -30° below the horizontal surface in all azimuth direction. When the antenna is transmitting, obstacles in way of the beam path will cause decreased satellite signal strength. The antenna unit should have direct line-of-sight with the desired satellite without any obstacles in the beam path. Certain minimum distances between the antenna and other onboard devices must also be considered during installation.

Do not place the antenna near to a funnel because smoke deposits can cause corrosion of the antenna. In addition, the deposit can result in any malfunction of the antenna.

Do not place the antenna where there is a direct spray of seawater to avoid percolating any water into the vent hole.

4.1.1 Avoiding RF Interference

Do not install the antenna near the high power shortwave radar. Most radar transmitters emit RF energy within an elevation range of -15° to $+15^\circ$. For this reason, it is recommended to position the antenna at least 4.6 m (15.09 feet) away from any radars (s-band, c-band, and x-band radar up to 50kW).



WARNING

Never place the antenna in the beam path of the radar regardless of distance. The high power shortwave radar may impair its performance or damage the antenna.

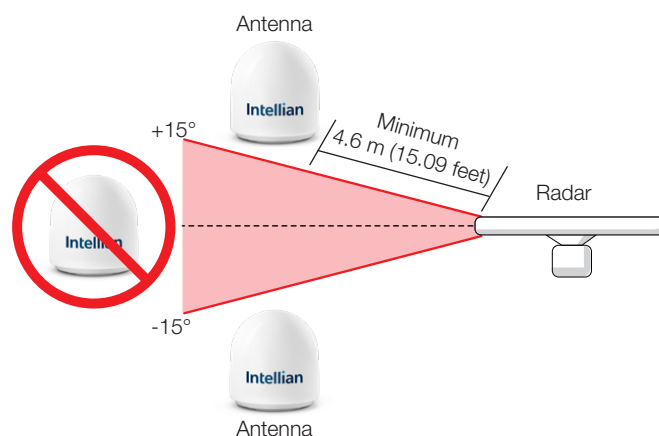


Figure 1: Potential RF Interference

4.1.2 RF Hazard Precautions

The antenna is designed to be used with radiation transmitting equipment manufactured by others. Exposure to RF radiation, including exposure associated with an improper use of the transmit equipment, may be hazardous to persons close to the above deck unit. Ensure the safety of personnel who work on the system.

During transmission, ensure to keep the minimum safety distance. The recommended minimum safety distance to the reflector on the focal line is about 1.2 m (3.9 ft), based on a radiation level of 10 mW/m² that applies under uncontrolled environment. No hazard exists >20° below the antenna's mounting plane.

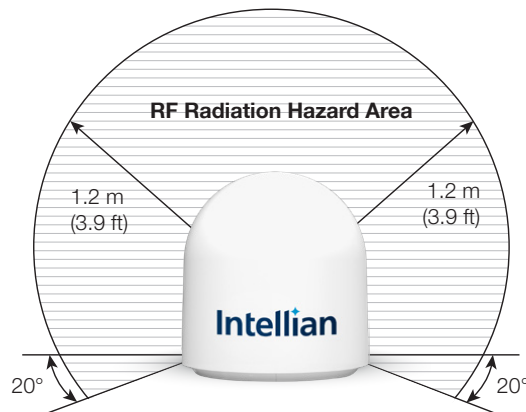


Figure 2: RF Radiation Hazard Area

4.2 System Package

4.2.1 Above Deck Unit (ADU) / Antenna Unit

The Above Deck Unit (ADU) consists of a medium-size maritime 3-axis stabilized BGAN antenna, active RF switch, BRM, and GNSS circuit.

The antenna unit is protected from a severe marine environment by a radome. The ADU and BDU are connected by a single coaxial cable which delivers RF signals and DC power.



Figure 3: Above Deck Unit (ADU) / Antenna Unit

4.2.2 Below Deck Unit (BDU)

The Below Deck Unit (BDU) supports voice and data communications in a marine environment. The BDU is the main control unit of an antenna system that monitors and controls the antenna operation through Intellian's web-based software. The BDU contains user interfaces and controls all communication between the ADU and the local communication devices such as phones, and computers, etc.



Figure 4: Below Deck Unit (BDU)

4.2.3 Packing List

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

The ADU Package & BDU Package are provided in one box.

NOTE: The USIM card is provided by the service provider and may be packaged separately.

Above Deck Unit (ADU) Package for FB500

Item	Q'ty	Size	Description
Above Deck Unit (ADU)	1		Antenna Unit
Antenna RF Cable (LMR200, N to TNC Type)	1	30 m	To Connect ADU - BDU
Antenna Mounting Template	1		Antenna Mounting Template
Hex Bolt	5	M10 x 40L	To Mount Antenna on Mounting Surface (M10 Bolt Kit)
Spring Washer	5	M10	
Flat Washer	5	M10	
Hex Bolt	5	M12 x 40L	To Mount Antenna on Mounting Surface (M12 Bolt Kit)
Spring Washer	5	M12	
Flat Washer	5	M12	

Below Deck Unit (BDU) Package

Item	Q'ty	Size	Description
Below Deck Unit (BDU)	1	315 mm x 190 mm x 42 mm	Below Deck Unit
DC Power Cable	1	1 m	BDU Power
Ethernet Cable (RJ45 / LAN)	1	1 m	To Connect BDU to PC
Wi-Fi Antenna	1		
Quick Installation Guide (QIG)	1		Quick Installation Guide
Tapping Screw	5	M5 x 16 L	To Fix BDU (Direct Mounting Type)
Terminal Block	1	85 mm x 40 mm x 36 mm	For Inter-connection of Cables

19-inch Rack Mount Kit (Optional)

The 19-inch Rack Mount Kit can be purchased separately. When this kit is supplied, it is packaged in the BDU Package. Intellian recommends using a 19" rack shelf (not supplied) to support the BDU in the rack.

Item	Q'ty	Size	Description
AC Power Cord (USA)	1	1.5 m	BDU Power Cord (110 V)
AC Power Cord (CEE7/7)	1	1.5 m	BDU Power Cord (220 V)
AD-DC Adaptor	1		BDU Power Adaptor (150 W)
Rackmount Plate	1		Kit for Rackmount Plate
Pan Head Screw (with Spring & Flat Washer)	5	M4 x 16 L	
Trus Head Screw	5	M6x 16 L	To Fix BDU (Rack Mounting Type)
Cable Tray	1		Kit for Cable Tray
Flat Head Screw	4	M3 x 6 L	

4.3 System Cables

Make sure of the following before installing system cables.

1. All cables need to be well clamped and protected from physical damage and exposure to heat and humidity.
2. Don't use any acutely bent cable.
3. Use watertight glands or swan neck tubes on exposed bulkheads or deck heads where the cable passes through.
4. For installing cables longer than the recommended length, consult with Intellian Technologies first.

4.3.1 Antenna RF Cable (Connecting ADU - BDU)

Intellian provides the Antenna RF Cable (LMR200, 30 m) for connecting ADU and BDU. Due to the signal losses across the length of the RF coax on L-Band, Intellian recommends the following 50 Ω coax cable types for standard system installations. Check the instructions from the cable supplier. The table below shows the recommended cable types and maximum cable lengths for the antenna system.

Coaxial Cable Type	Attenuation (@ 900 MHz)	*Max. Cable Length (17.5 dB loss @ 900 MHz)	Min. Bend Radius
LMR200	0.326 dB/1 m	50 m (17.5 dB loss @ 900 MHz)	Installation 12.7 mm (0.5 in.)
LMR300	0.199 dB/1 m	60 m (17.5 dB loss @ 900 MHz)	Installation 22.2 mm (0.88 in.)
LMR400	0.128 dB/1 m	100 m (17.5 dB loss @ 900 MHz)	Installation 25.4 mm (1 in.)

- Connector type: N to TNC
- Optimal tightening torque: 1.5 N-m
- Maximum DC resistance of RF cable: 1.3 Ω
- *Maximum RF loss at 900MHz: 17.5 dB including connector

4.4 Unpacking System Package

Follow the steps for easy and safe unpacking. The system package consists of two sub-packages that an ADU Package and a BDU Package.

1. Place the package in a safe area large enough. Remove the top cover and Box. Then take out the ADU and BDU packages.

Unit: mm (inch)

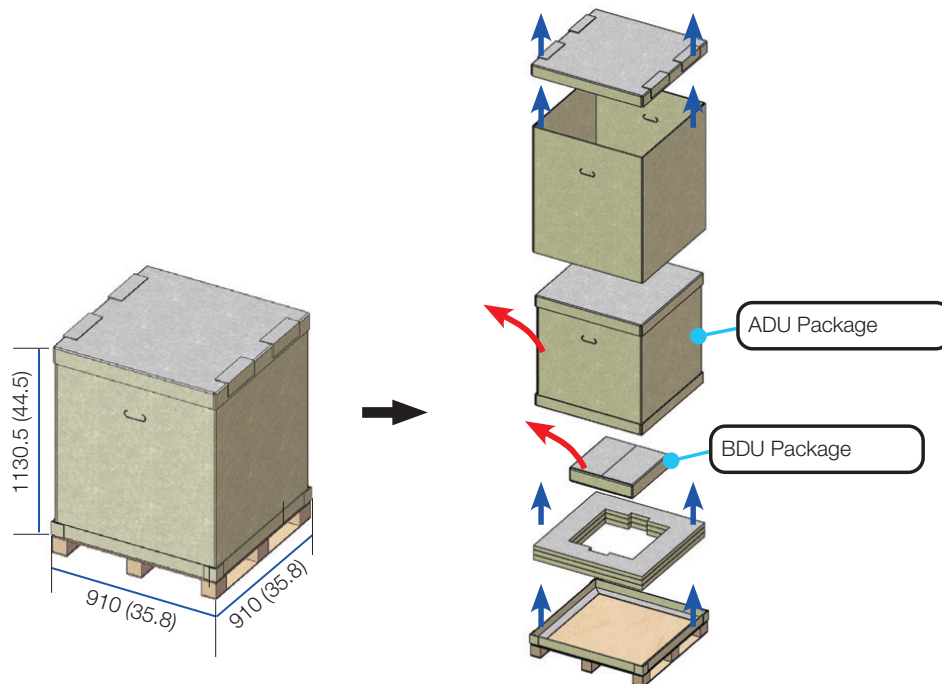


Figure 5: Unpacking System Package (with ADU & BDU Sub-package)

2. Remove the top cover and take out the BDU package including a Quick Installation Guide, a BDU Unit, a Wi-Fi Antenna, a DC Power Cable, an Ethernet Cable, a BDU Bolt Kit, and a Terminal Block. The 19-inch Rack Mount Kit (Optional) can be purchased separately.

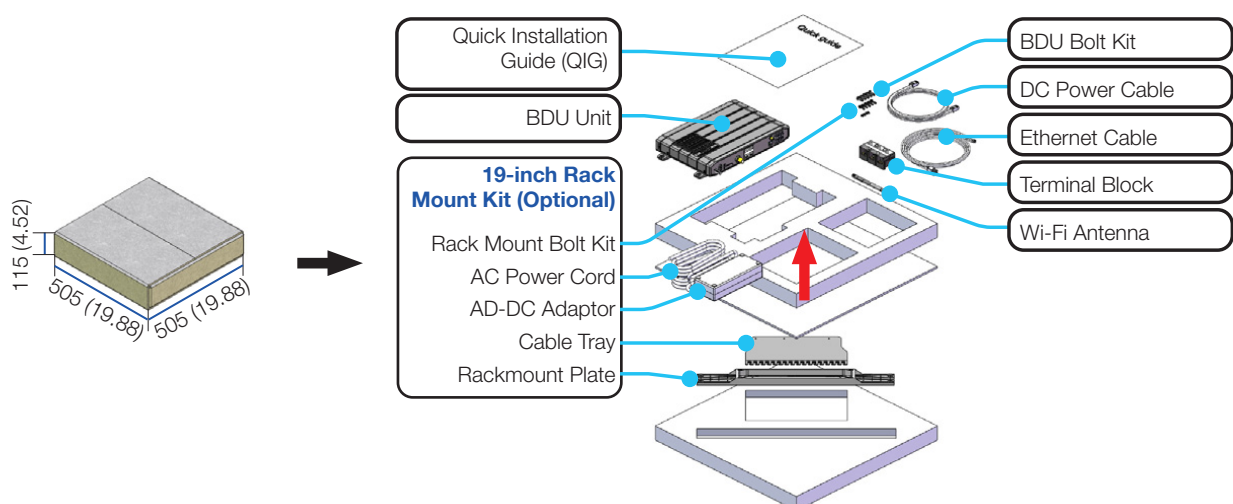


Figure 6: Unpacking BDU Package

3. Take out the ADU package including an Antenna Mounting Template, an ADU Bolt Kit, an Antenna RF Cable, and an ADU Unit.

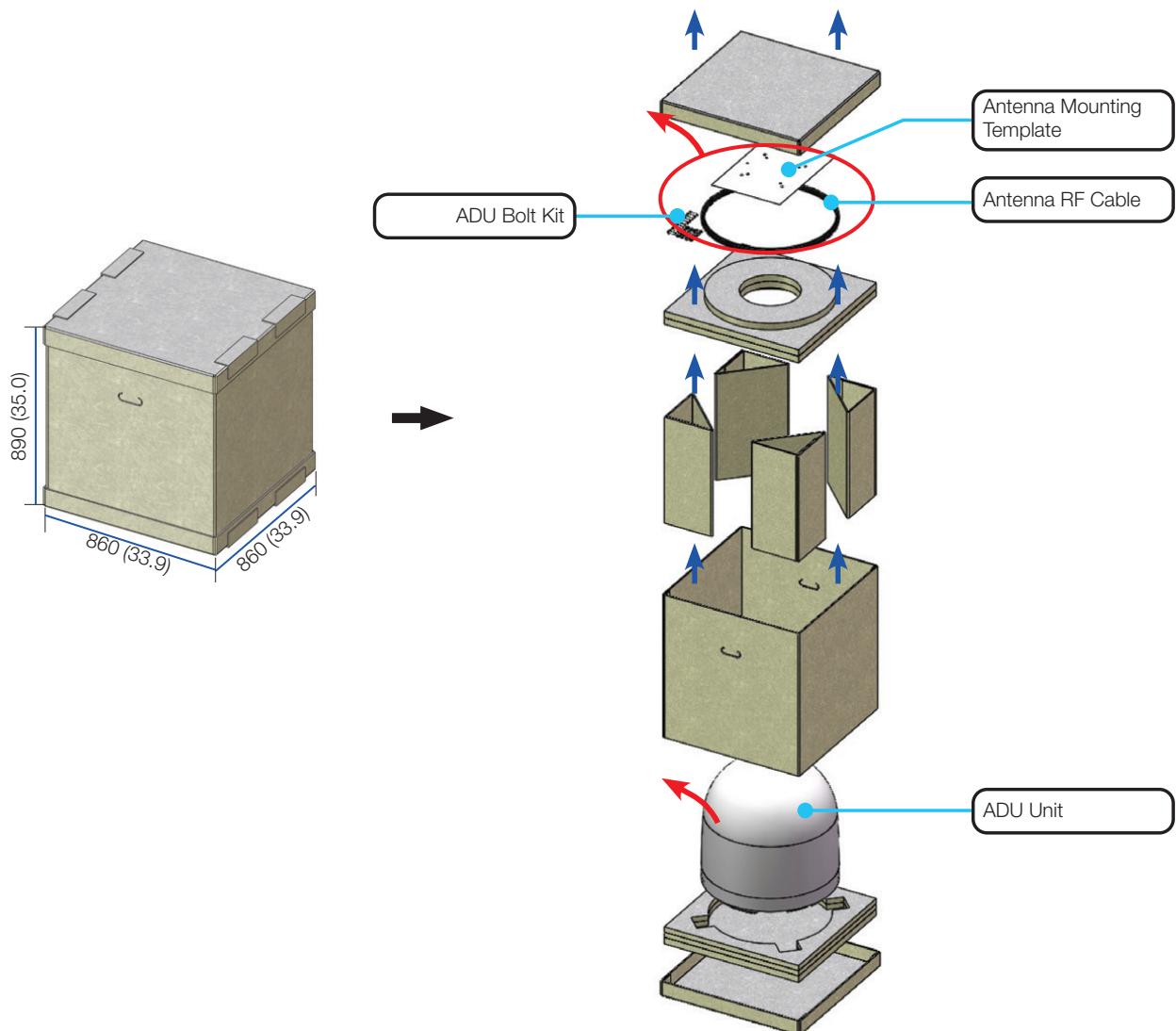


Figure 7: Unpacking ADU Package

Chapter 5. Installing ADU

5.1 Antenna Dimensions

Confirm the height and diameter of the antenna unit shown in the following figure before installing it.

Unit: mm (inch)

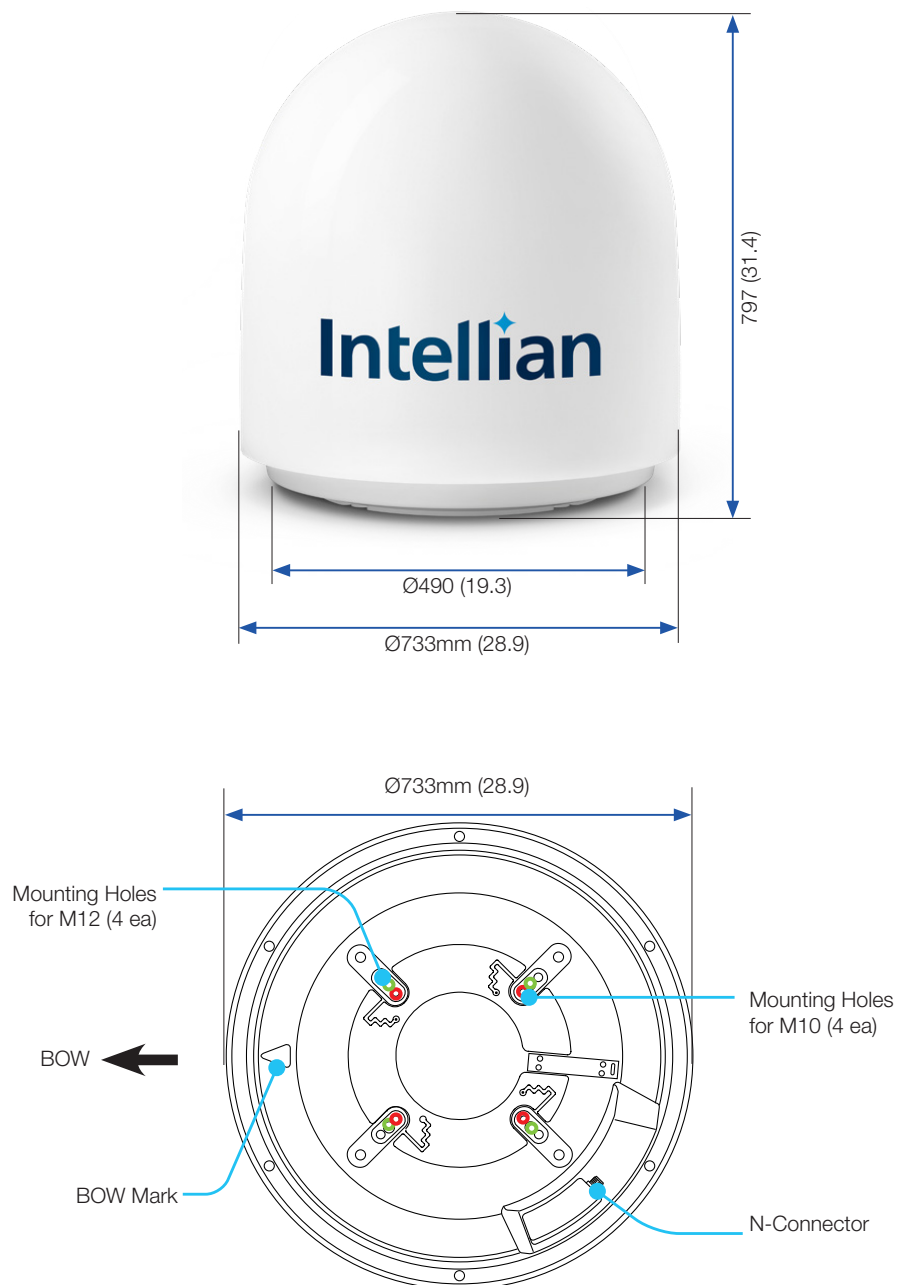


Figure 9: Antenna Dimensions

5.2 ADU Mounting Hole Pattern

Use the supplied mounting template when drilling mounting holes on the mast. The hole placement for the antenna must match the mounting hole pattern on the template.

The lower radome has an industry-standard mounting hole with four mounting points. This hole pattern is compatible with other companies' mounting holes. Use the mounting holes to secure the antenna to the desired mounting surface.



WARNING

When reusing an existing mast, check the condition of holes on the mast and make sure those are proper to use compared to the hole locations and sizes printed on the mounting template.

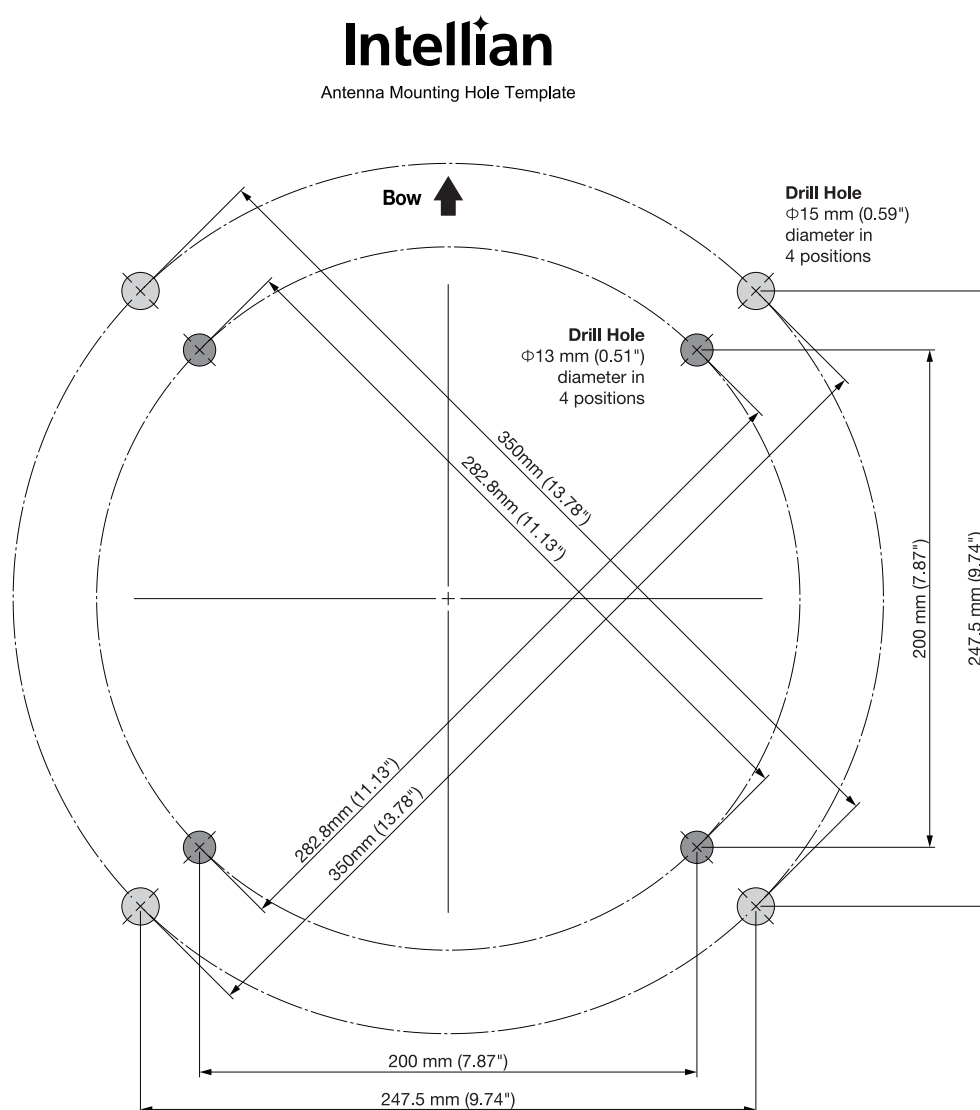


Figure 10: ADU Mounting Hole Pattern

5.3 Mast Designing (Installation Example)

The installation mast must be robust enough to prevent flex, vibration, and sway when an external force is exerted on the mast with antenna and radome. Refer to the following mast drawings for more details.



WARNING

- 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. 8.0 mm / 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	
8~10mm (Recommended)	M10x40L (Supplied)	M12x40L (Supplied)
11~15mm	M10x45L	M12x45L
16~20mm	M10x50L	M12x50L

- To use the supplied bolts (M10 x 40L/ M12x40L) for mounting antenna on a mast, the thickness of mast plate must be 8 ~ 10 mm. The minimum thickness of the mast plate is 10 mm. If the mast plate is thicker than 20 mm, the supplied antenna-mast mounting bolts can be too short to mount the antenna on the mast securely.

Option 1. When Installing Cable on Outside of Mast (with M12 Bolts)

This method is generally recommended.

Unit: mm (inch)

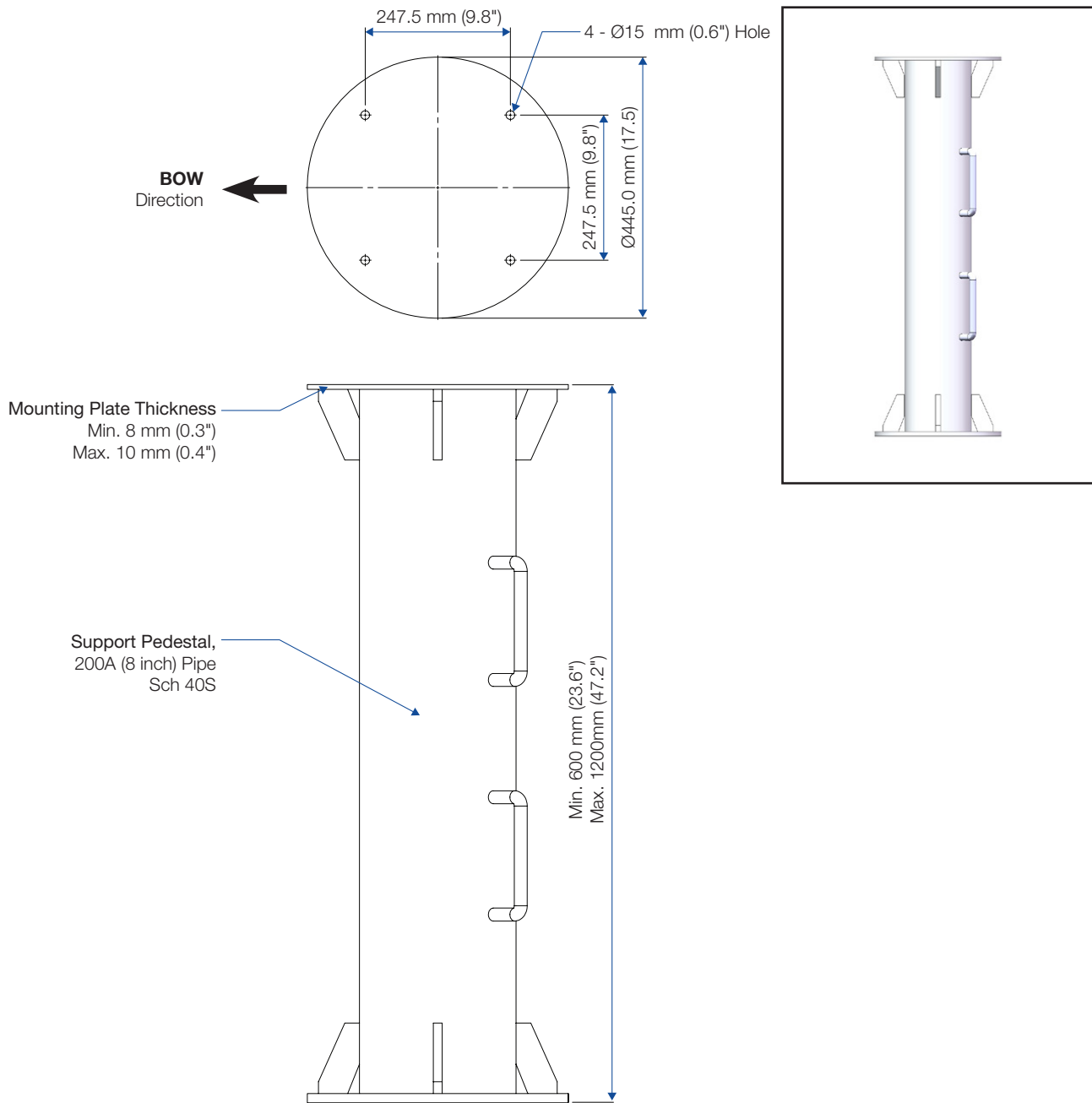


Figure 11: Recommended Size of Mast (Option 1)

Option 2. When Installing Cable on Outside of Mast (with M10 Bolts)

Unit: mm (inch)

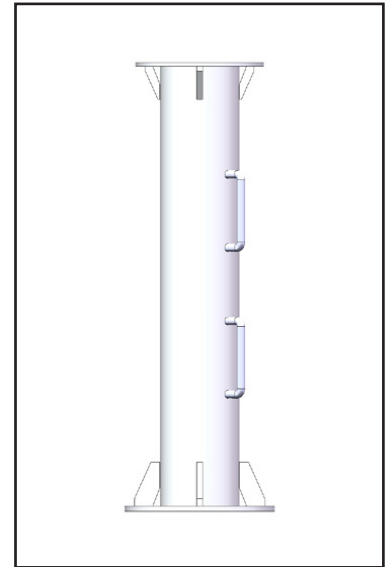
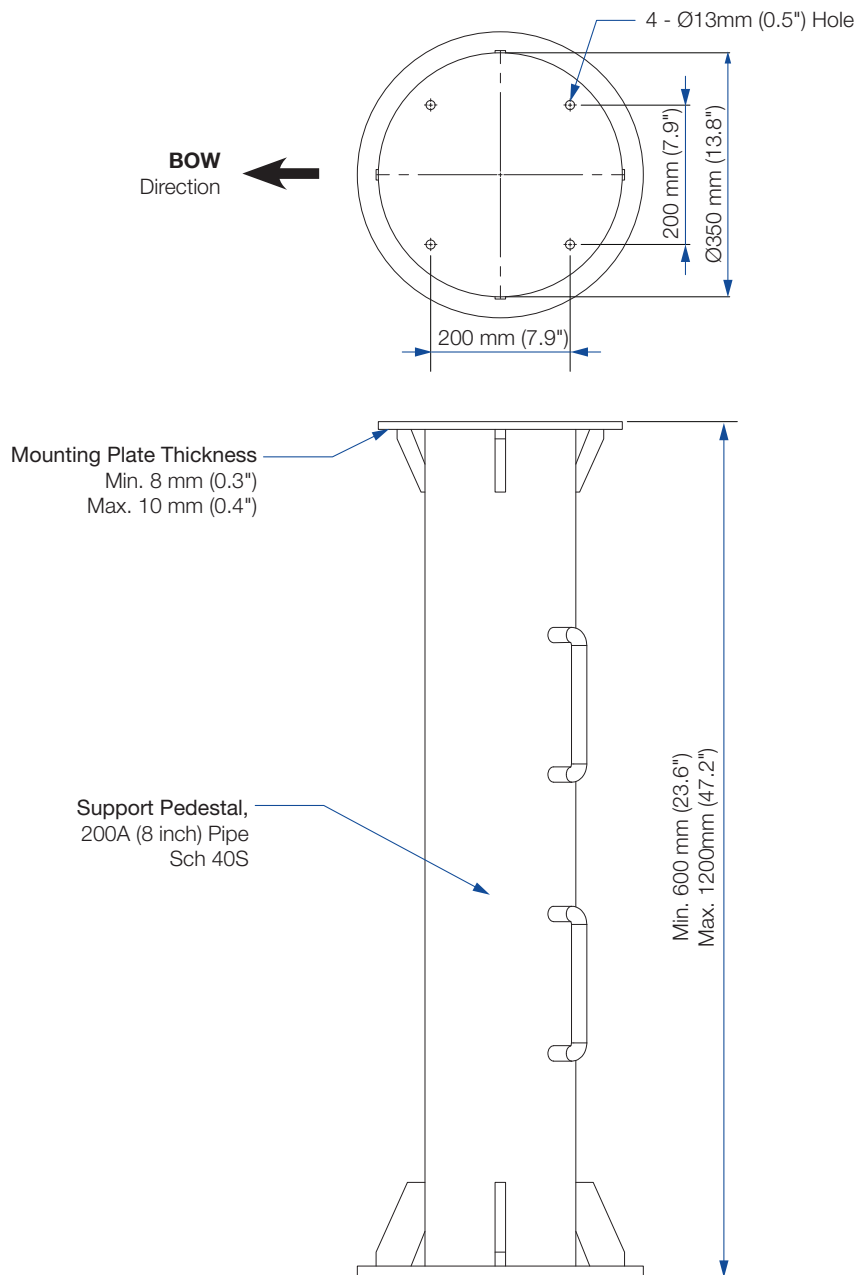


Figure 12: Recommended Size of Mast (Option 2)

Option 3. When Installing Cable Through Inside Mast (with M12 Bolts)

Unit: mm (inch)

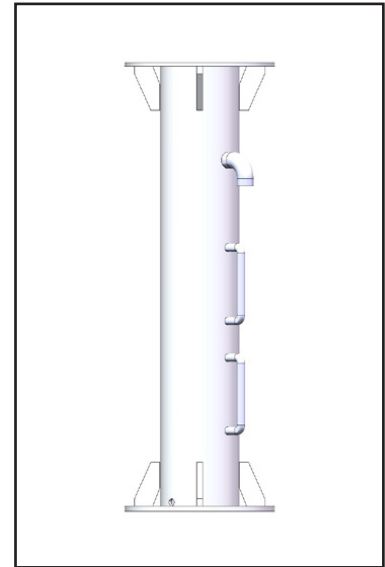
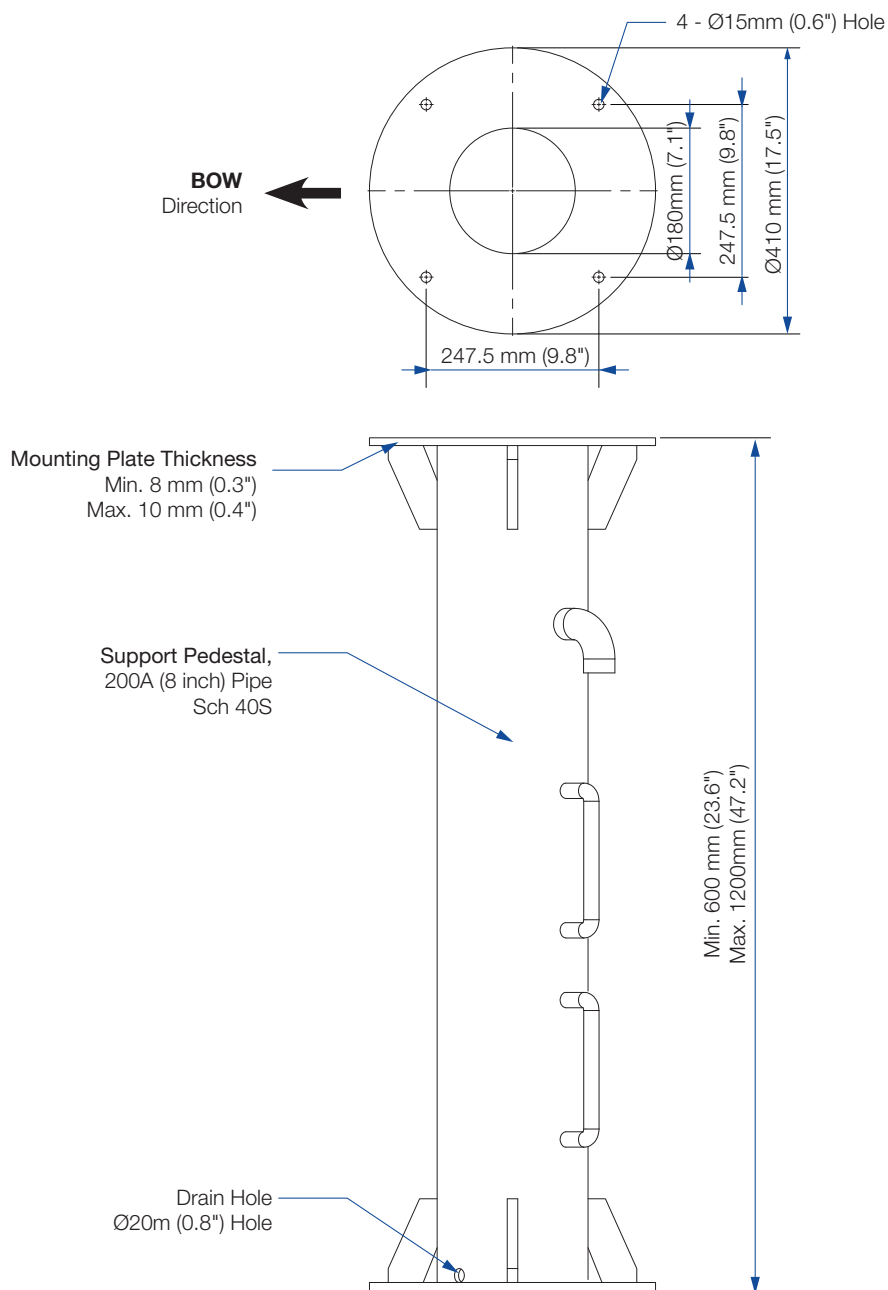


Figure 13: Recommended Size of Mast (Option 3)

Option 4. When Installing Cable Through Inside Mast (with M10 Bolts)

Unit: mm (inch)

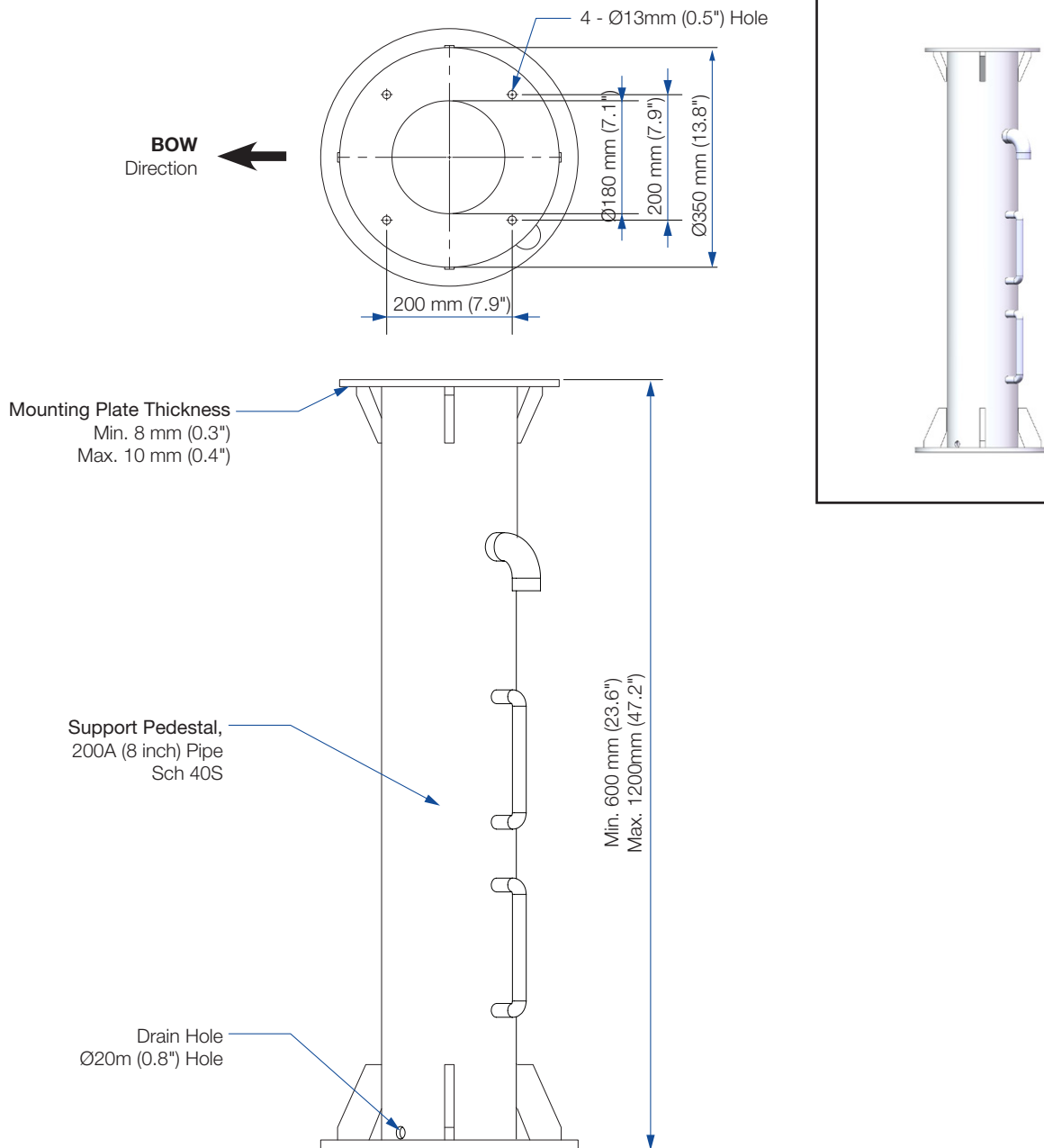


Figure 14: Recommended Size of Mast (Option 4)

5.4 Routing RF Cable on Mast (Example Only)

The cable must be routed from the antenna and through various areas of the ship to end up at the antenna control unit. When pulling the cables in place, avoid sharp bends, kinking, and excessive force. After placement, seal the deck penetration gland and tie the cable securely in place. The cable bracket must be installed on the mast to fix the relevant cable. The gooseneck must be installed on the side of the mast to protect the relevant cable against water.



WARNING

Ensure that cable has been run through watertight fittings to prevent water entry into the vessel when installation is completed.



NOTE

This is a general example of routing cables on the mast. The routing method may differ depending on the ship's environment.

Option 1. Routing Cable on Outside of Mast

This method is generally recommended.

1. Route the cable from the gooseneck placed on the deck to the antenna as shown in the picture.
2. Maintain a sufficient cable length (at least 2 m) when routing the cable on the surface of the mast. After connecting the cable to the connector on the radome, adjust the length and fix the cable on the cable brackets using cable ties.

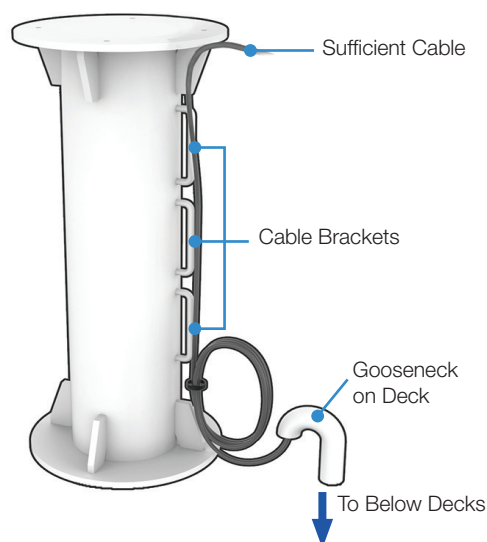


Figure 15: Routing Cable Through Outside of Mast

Option 2. Routing Cable Through Inside Mast

1. Before placing the radome on the mast, route the cable through the gooseneck on the deck and the built-in gooseneck on the mast for easier placing of the RF Cable through the inside of the mast as shown in the picture.
2. Maintain a sufficient cable length (at least 2 m) when routing the cable on the surface and inside of the mast. After connecting the cable to the connector on the radome, adjust the length and fix the cable on the cable brackets using cable ties.

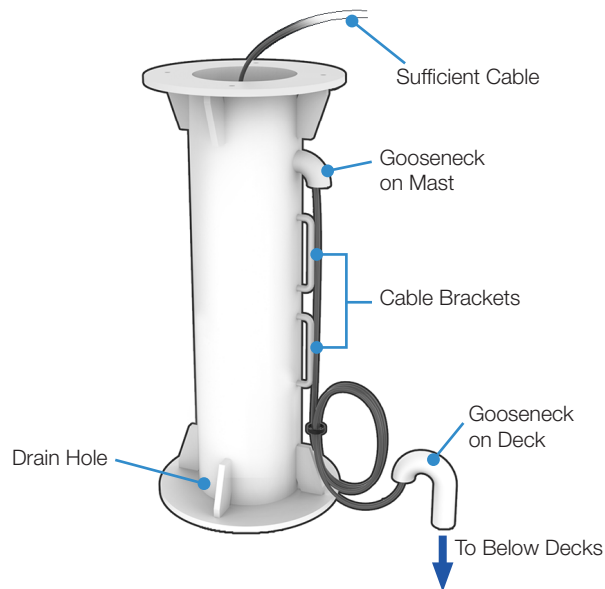


Figure 16: Routing Cable Through Inside of Mast



CAUTION

Do not leave the cables on the top surface of the mast. When putting down the antenna on the mast, there is a risk of damage to the cable connector if the cable is located on the top surface of the mast.

5.5 Fixing the RF Cable on Bracket

The cable must be fix to bracket before mounting the radome on the mast. Make sure the positions of bracket in the below picture

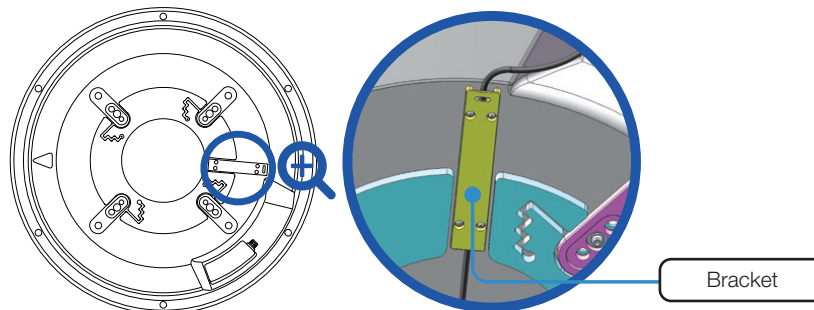
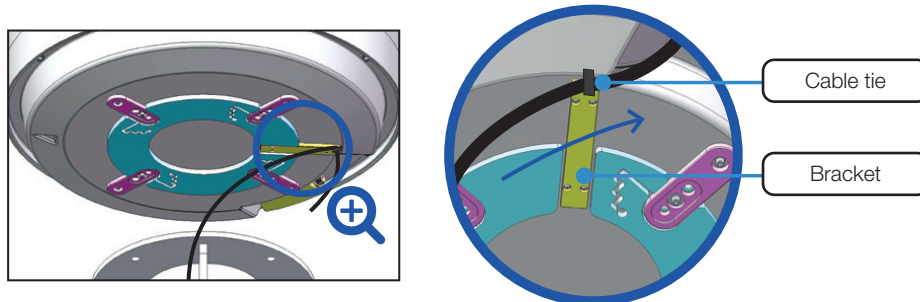


Figure 17: Fixing the RF Cable on Bracket

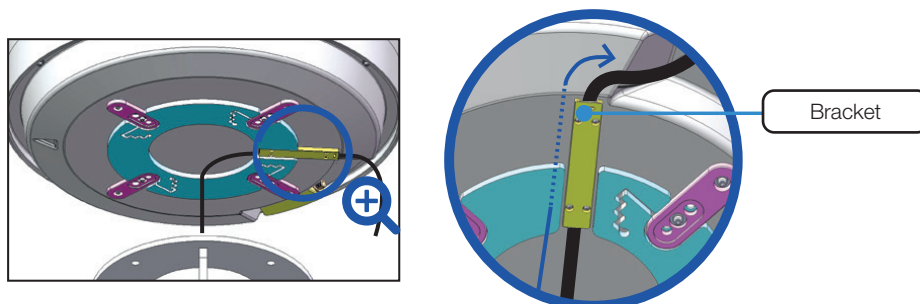
Option 1. When Installing Cable on Outside of Mast

1. Route the RF cable from the gooseneck placed on the deck to the the N-Connector of antenna.
2. Fix the cable on the end of the bracket using cable ties.



Option 2. When Installing Cable Through Inside Mast

1. Unscrew the bracket using a phillips screwdriver and detach the bracket from antenna.
2. Extend the RF cable up to the N-Connector of antenna from the mast.
3. Then put the bracket in the right place and tighten the screw back by using a phillips screwdriver. When moving the antenna, be careful with the bracket and cable not to be detached.



5.6 Mounting Antenna

The lower radome has two types of industry-standard mounting holes, each with four mounting points. Select one of the two mounting types to secure the antenna to the desired mounting surface. Bring the provided Antenna Mounting Template and the ADU Bolt Kit from the ADU package. Create the appropriate hole pattern in the desired mounting surface for the chosen mounting bolts type.

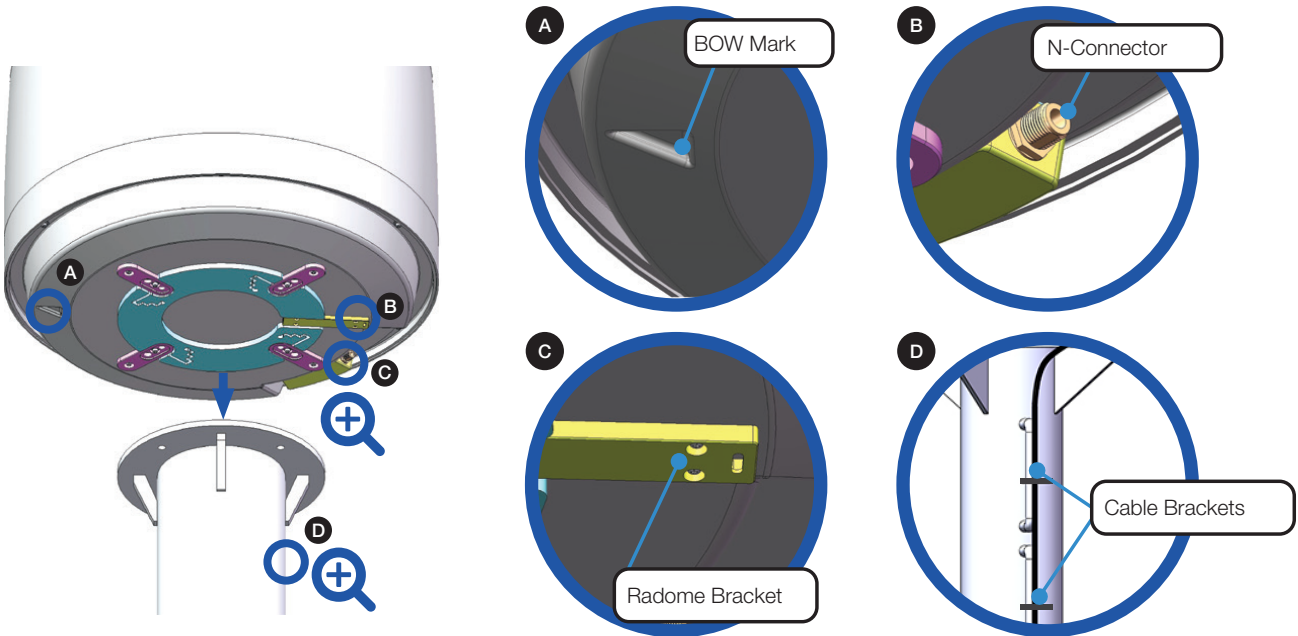


Figure 18: Installing Bolts for Antenna-Mast Assembly



NOTE

- Check the positions of **A** BOW mark, **B** Radome Bracket, **C** N-Connector and **D** Cable Brackets when mounting antenna on the mast.
- Make sure the cable from the mast is aligned with the cable entry on the bottom of antenna for stable connection.
- Refer to “11.1 Tightening Torque Specification” on page 109 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. It may cause damage to the inner threads of the mounting holes of antenna. In this case, the damage is not covered by the warranty.

5.6.1 Mounting Antenna using Inner Holes (with M10 Bolts)

First, remove the protective stickers on the Inner Holes. Check the position of **A** the antenna's N-Connector and BOW direction. Lift the antenna above the mounting surface using hands and carefully put the antenna down in place. Before assembling bolts, apply Loctite #263 to the bolt's threads to ensure the bolts are fastened firmly. Insert **B** the bolts and washers from under the mast into the radome then fasten them to the nuts assembled inside the radome using the torque wrench.

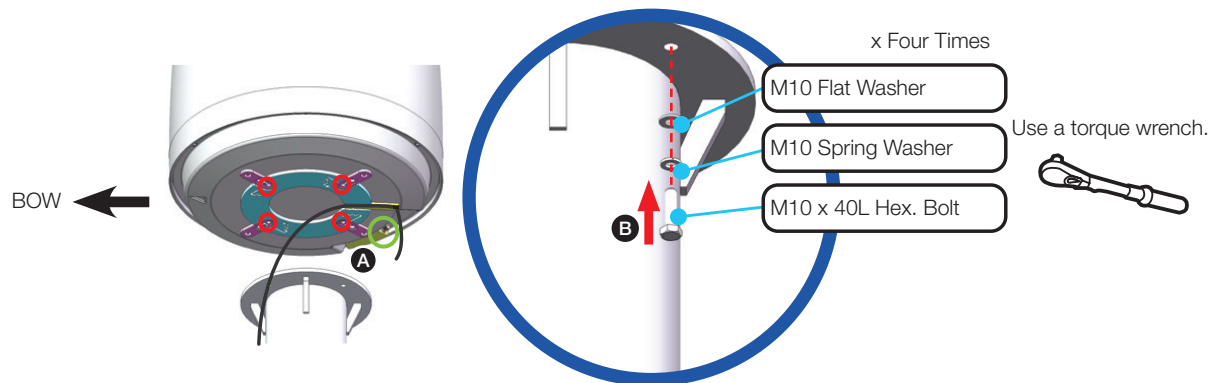


Figure 19: Mounting Antenna using Inner Holes (with M10 Bolts)

5.6.2 Mounting Antenna using Outer Holes (with M12 Bolts)

First, remove the protective covers on the Outer Holes. Check the position of **A** the antenna's N-Connector and BOW direction. When placing the antenna on the mounting surface, be careful of the direction of the cutting holes. Lift the antenna above the mounting surface using hands and carefully put the antenna down in place. Before assembling bolts, apply Loctite #263 to the bolt's threads to ensure the bolts are fastened firmly. Insert **B** the bolts and washers from under the mast into the radome then fasten them to the nuts assembled inside the radome using the torque wrench.

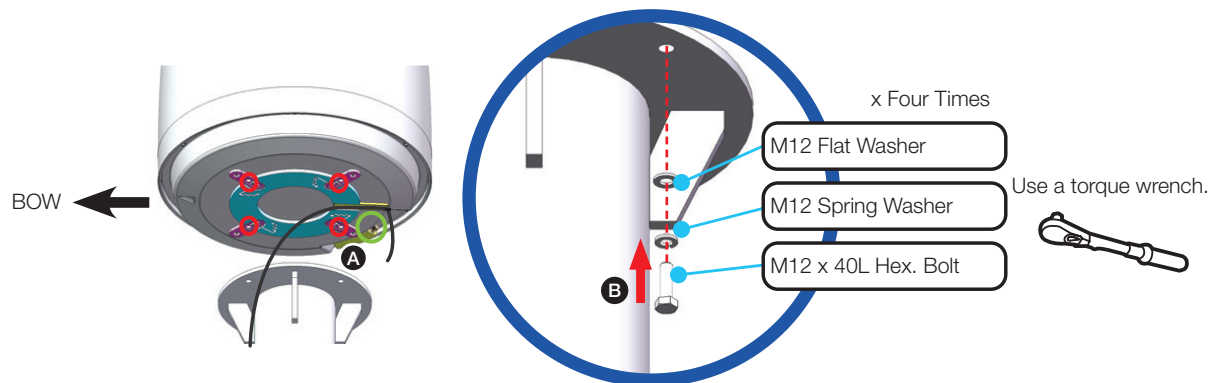


Figure 20: Mounting Antenna using Outer Holes (with M12 Bolts)

5.7 Connecting Antenna RF Cable

The cable must be routed from the antenna and through various areas of the ship to end up at the Below Deck Unit. When pulling the cables in place, avoid sharp bends, kinking, and excessive force. After placement, seal the deck penetration gland and tie the cable securely in place. The cable bracket must be installed on the mast to fix the relevant cable. The gooseneck must be installed on the side of the mast to protect the relevant cable against water. The supplied RF cable connector has the rubber grommet to protect inside the ADU from any water.

1. The RF cable is connected to the **Antenna** port of the BDU. Route the RF cable from the gooseneck placed on the deck to the antenna.
2. Maintain a cable length at least 2 m considering service loops when routing the cable on the mast. Connect the RF cable to the N-Connector on the bottom of radome, adjust the length, and fix the cable position along the routing path using cable ties on the cable brackets. Since the cable connector at the bottom of radome is waterproofed at the factory, there is no need to work waterproofing.

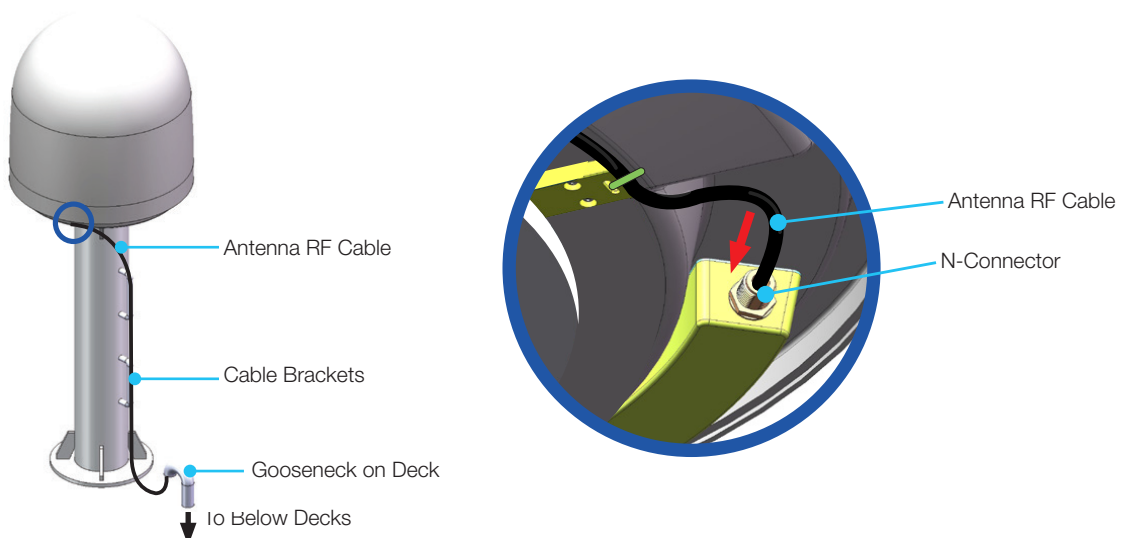


Figure 21: Connecting Antenna RF Cable When Using Outside of Mast

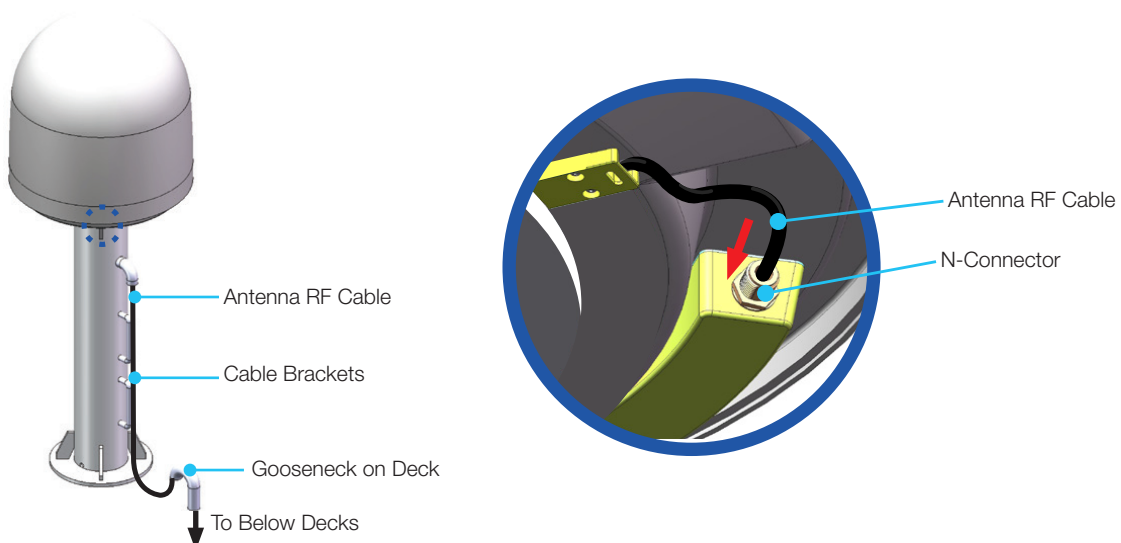


Figure 22: Connecting Antenna RF Cable When Using Inside of Mast



NOTE

To prevent cable damage, wrap the cable and connector by using a waterproof tape. (Refer to “11.2 Important Notice of Waterproofing Connector” on page 110)

Chapter 6. Installing BDU

The Intellian offers two versions of BDU installation, one can be installed to the surface of the wall or desktop, and one can be installed into a 19-inch rack frame using the BDU Rack Mount Kit (sold separately) and a 19-inch rack shelf (recommended but not supplied).

6.1 Selecting BDU Installation Site

The BDU should be installed below the deck in a location that is dry, cool, and ventilated. The front panel of BDU should be easily accessible to users.

6.2 BDU Dimensions

Confirm the dimension of the BDU before installing it.

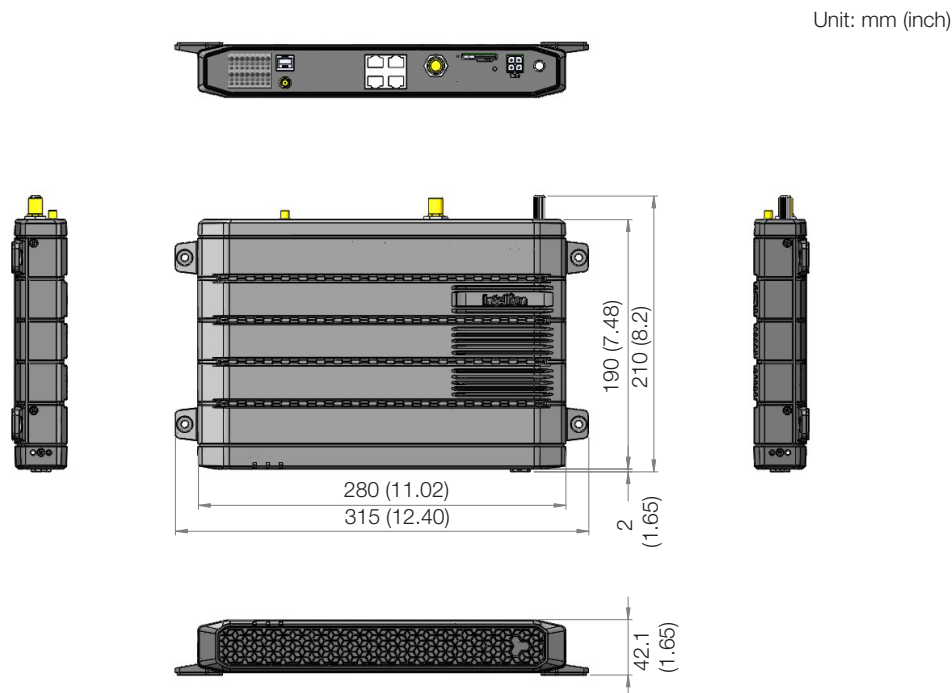


Figure 23: BDU Dimensions (Direct Mounting Type)

Unit: mm (inch)

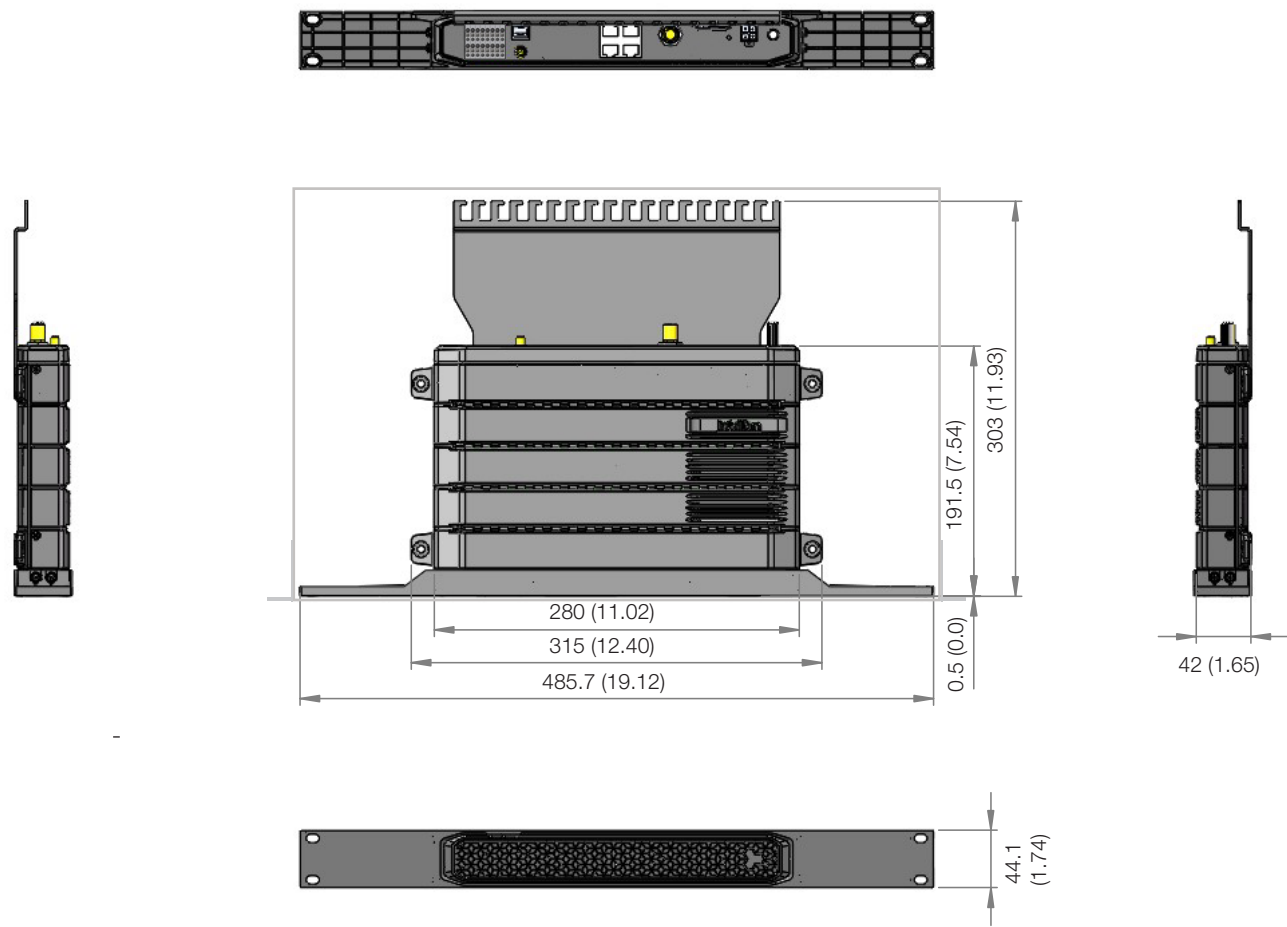


Figure 24: BDU dimensions (installed using 19-inch BDU Rack Mount Kit)

6.3 BDU Mounting Template

The BDU mounting holes must be in the exact same place as shown in the provided mounting template below.

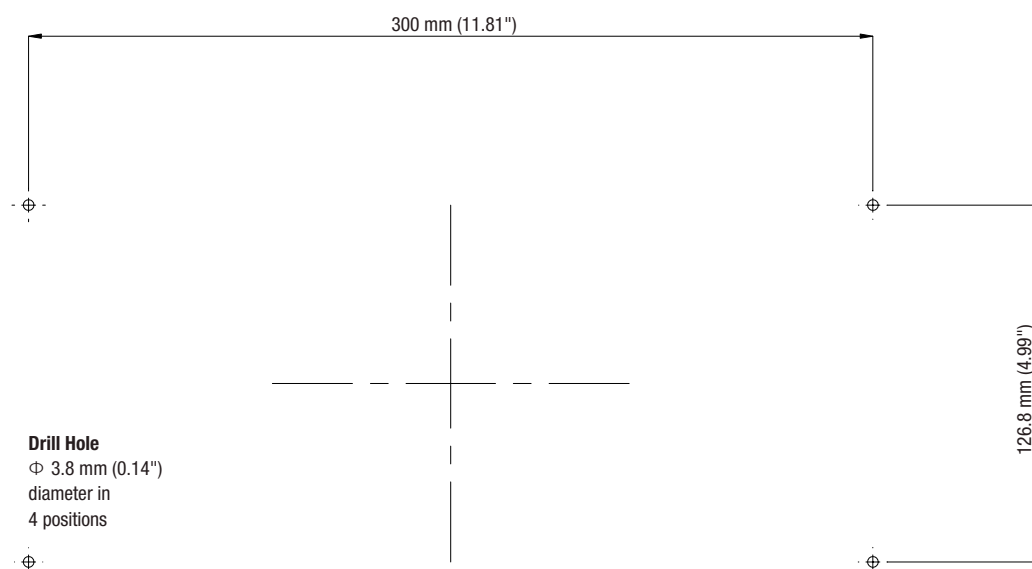


Figure 25: BDU Mounting Template

6.4 Mounting BDU

The BDU can be mounted in any orientation but for best performance, Intellian recommends that it is mounted horizontally.



WARNING

Ensure that the cables connected to the BDU are long enough to prevent damage when the BDU is pulled out from the rack.

6.4.1 Direct Mounting Type

The BDU is designed with four corner mounting holes to make direct mounting on the wall or desktop easily.

1. Mount the BDU on the mounting surface by inserting four screws through the mounting holes.

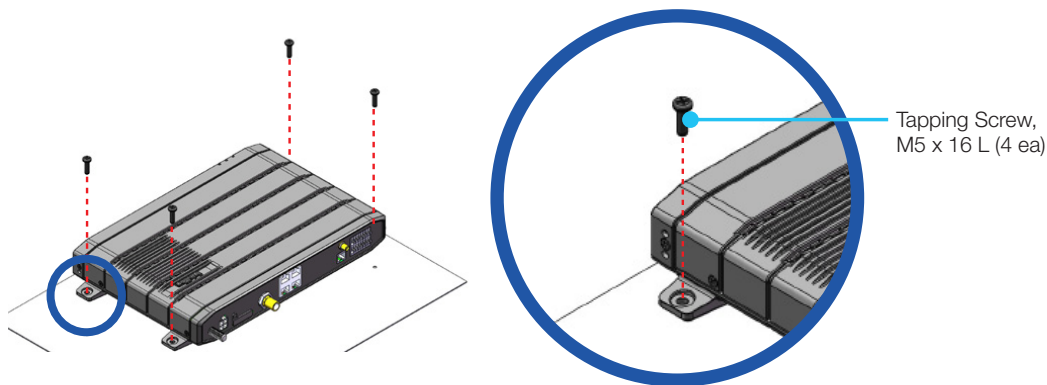


Figure 26: Direct Mounting of BDU

6.4.2 19-inch Rack Mounting Type (Optional)

Intellian offers the BDU Rack Mount Kit (separate purchase) including the rackmount plate and cable tray to mount the BDU in a 19" rack. Intellian recommends using a 19-inch rack shelf (not supplied) to support the BDU in the rack.

1. Using the Screws supplied, attach the cable tray to the BDU.

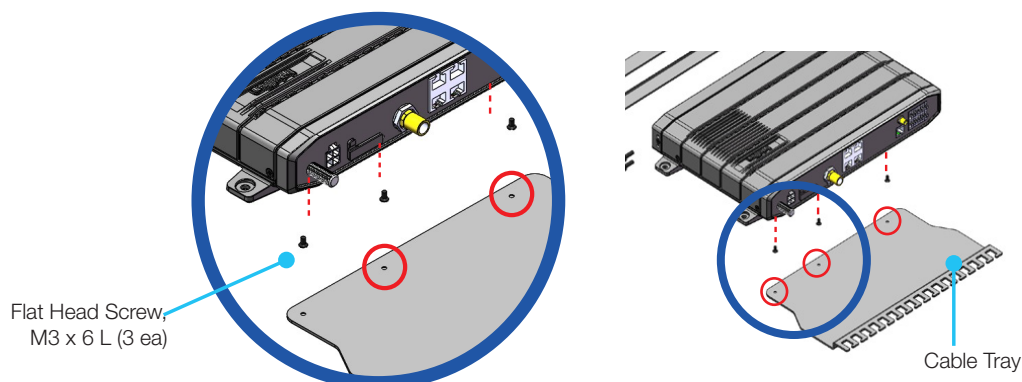


Figure 27: Attach Cable Tray to BDU

2. Using the Screws supplied, attach the rackmount plate to the BDU.

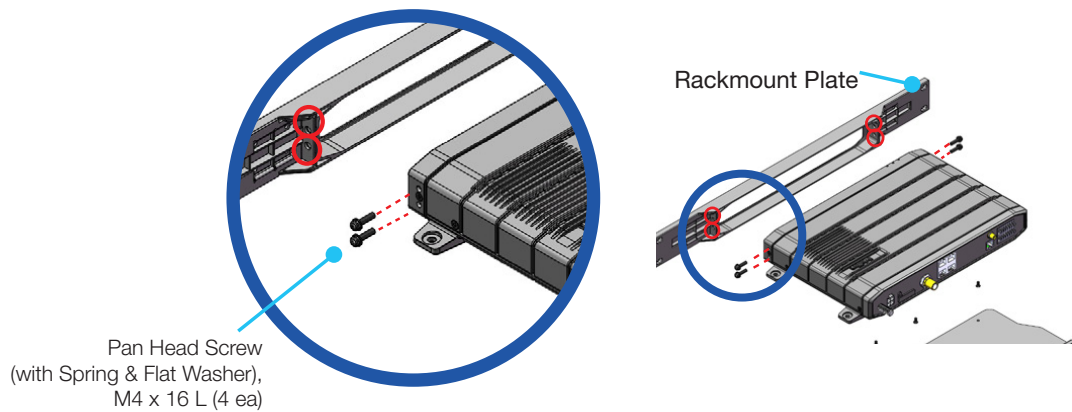


Figure 28: Attach Rackmount Plate to BDU

3. and fasten the screws to the rack. Make sure that the BDU assembly is mounted securely according to the requirements for your 19" rack. In case of using a provided AC-DC adapter for AC power connection, mount it securely in a safe place. After connecting all cables, fix the cables on the end of the cable tray using cable ties.



Figure 29: Mount BDU Assembly into 19" Rack

6.5 Antenna System Configuration

The basic system consists of one antenna and one BDU. Separate purchase of standard items including POTS phones, SIP phones, computers, etc. may be needed. For your satellite communication system to work properly, connect the cables according to the configuration below.

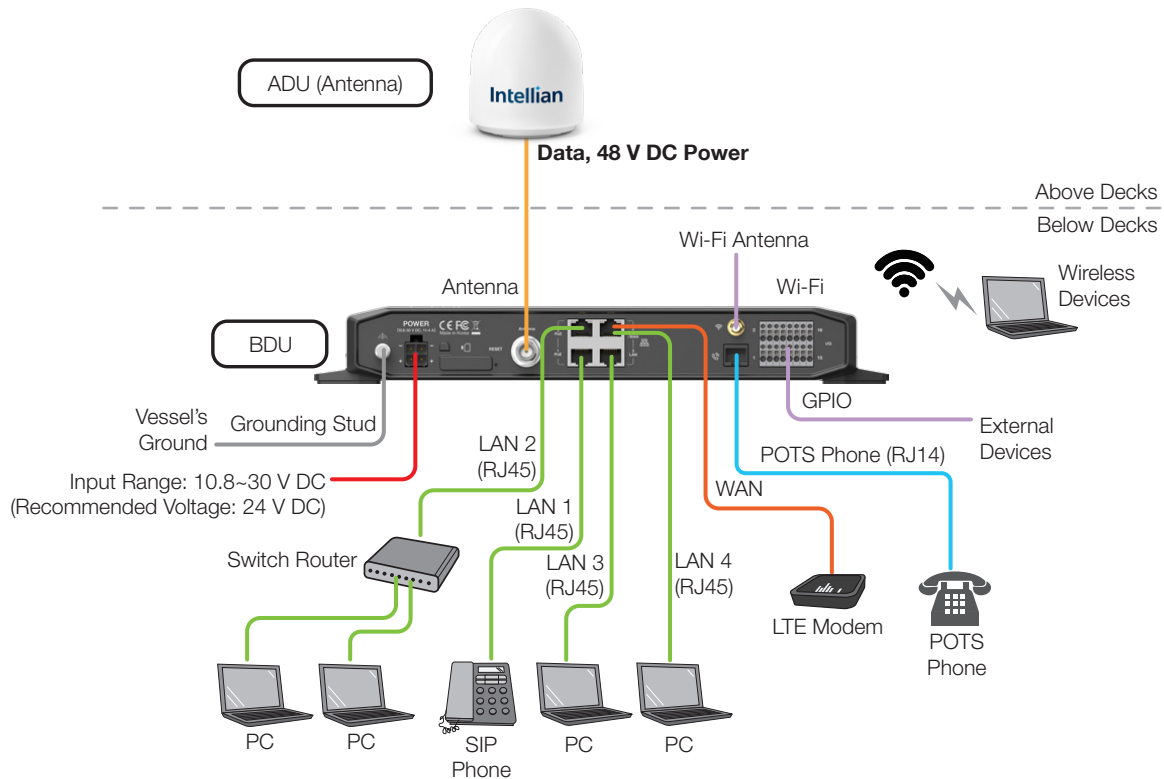


Figure 30: System with Connected Devices for FB500

6.5.1 Data sessions and voice calls

The system provides 1 voice call, multiple data sessions, Wi-Fi, and supports up to 18 extensions (including 2 analog phones and 16 sip phones).

The BDU communicates directly with SIP phones on any of the LAN user ports (**FB500**: LAN 1, 2, 3, or 4). The SIP phones register directly to the SIP server in the BDU.

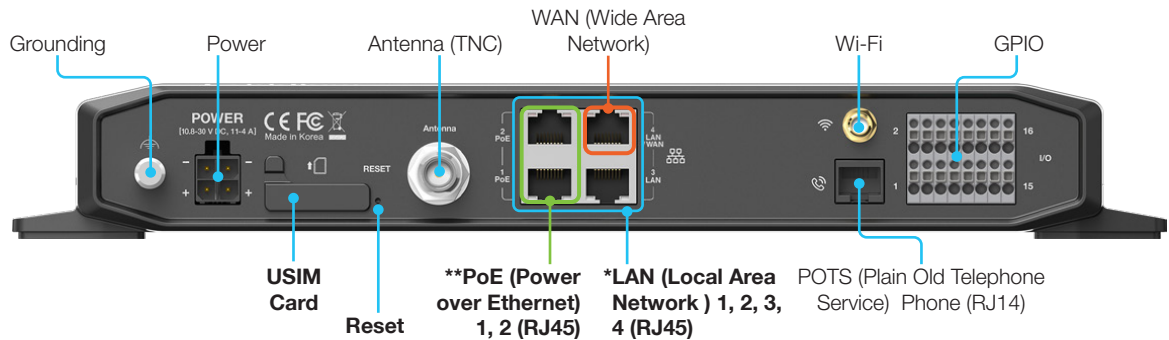
Recommended VoIP Phones

- Grandstream GXP16 Series: 1610, 1615, 1620, 1625, 1628, 1630
- Grandstream GXP17 Series: 1760, 1780
- Grandstream GXP21 Series: 2120, 2130, 2135, 2140, 2160, 2170
- Grandstream GXV32 Series: 3240, 3275

6.6 BDU Cable Connection

6.6.1 BDU Back Panel View

The following figure shows the BDU back panel.



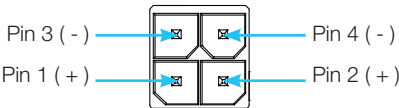
- * All LAN ports are IEEE 802.3 compliant.
- ** Each PoE Port is designed to use 7.5 W power. When using over 12.5 W in one port, the PoE function will be stopped in port 1 or port 2.

Figure 31: BDU Back Panel View

6.6.2 BDU Connector Pinout Guide

The BDU connector pins and their corresponding descriptions are shown in the following figures and tables.

Power Connector (DC Power)

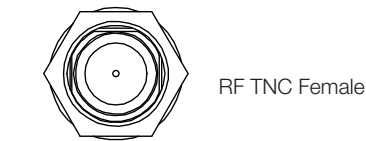


4 Contact Power Plug Male

Pin	Signal
1	+
2	+
3	-
4	-

Figure 32: DC Power Connector Pinout

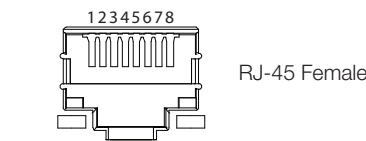
Antenna Connector (TNC)



Conductor	Function
Inner	Data, 48 V DC Power
Outer	Ground

Figure 33: Antenna Connector (TNC) Pinout

LAN Connectors (1~4) (RJ45)



Pin	Signal
1	Tx+
2	Tx-
3	Rx+
4	N/C
5	N/C
6	Rx-
7	N/C
8	N/C

Figure 34: LAN Connector (RJ45) Pinout

POTS Phone Connector (RJ14)

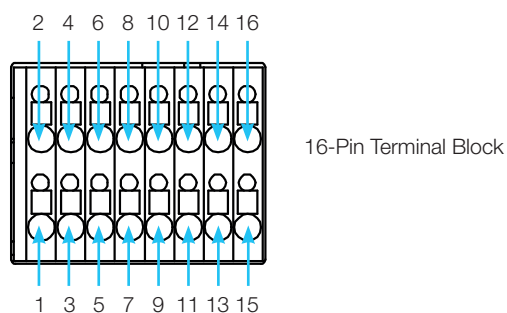


Pin	Signal
1	N/C
2	T2+ (POTS Phone 2, no. 102)
3	R1- (POTS Phone 1, no. 101)
4	T1+ (POTS Phone 1, no. 101)
5	R2- (POTS Phone 2, no. 102)
6	N/C

Figure 35: POTS Phone Connector (RJ14 & 6P4C) Pinout

General Purpose Inputs/Outputs (GPIO) Connector

The BDU has a dedicated 16-pin connector to provide a GPIO (General Purpose Input/Output) interface to the external devices. All wires for the GPIO connector must use AWG 24 unscreened wire type.

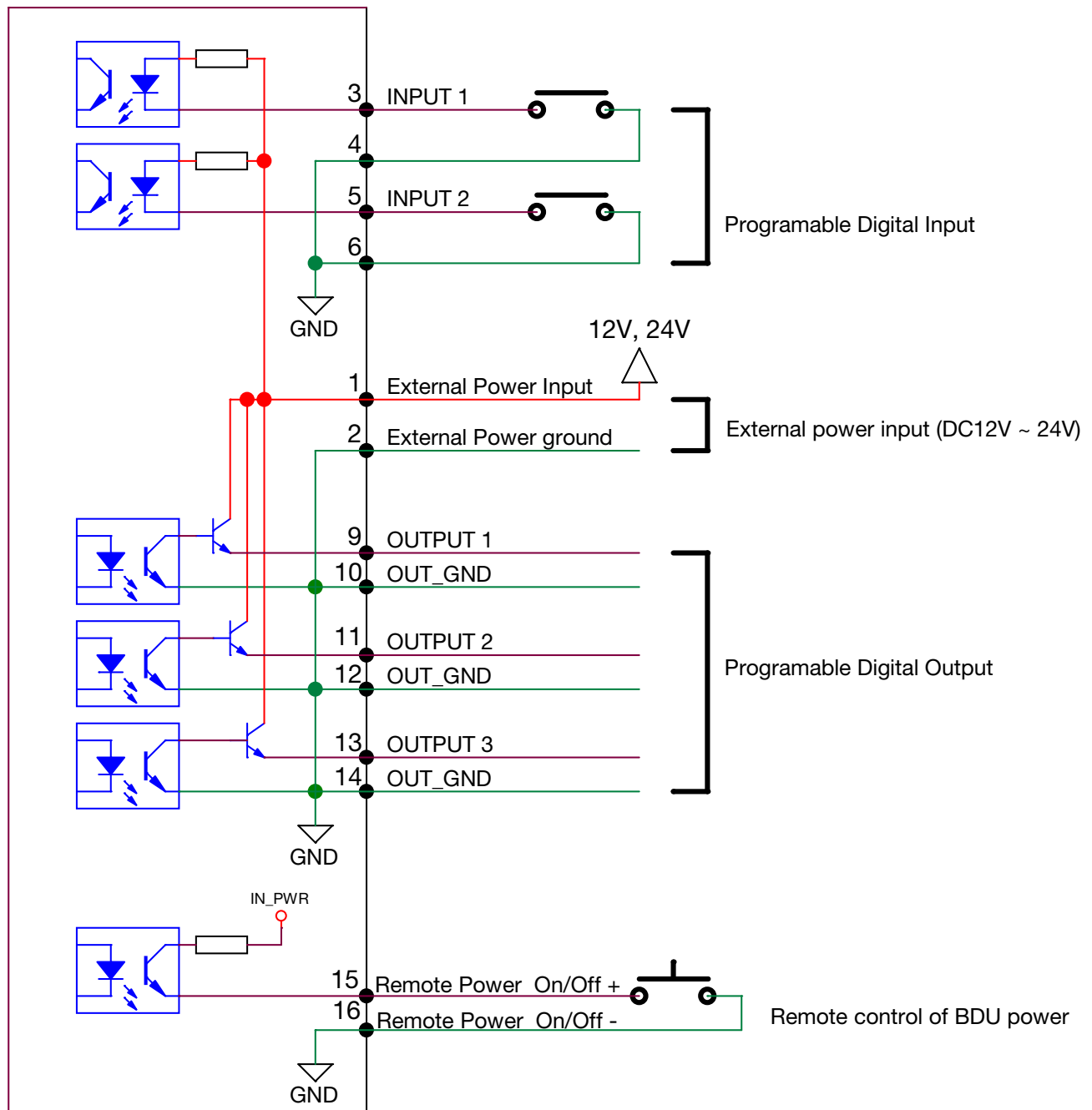


Pin	Signal	Explanation	Pin	Signal	Explanation
1	External Power Input	Power Input (DC 12 V ~ DC 24 V)	2	External Power Ground	Input/Output Ground
3	Input 1	• Satellite Data Prevention	4		
5	Input 2	• Force Prevent RF Activity	6		
7	N/A		8		
9	Output 1	• Incoming Call Alarm	10		
11	Output 2	• Data Connection Indication	12		
13	Output 3	• System Event Indication	14		
15	Remote Power On/Off +	Remote Control of BDU Power +	16	Remote Power On/Off -	Remote Control of BDU Power -

Figure 36: GPIO Connector Pinout

To use External GPIO, connect the external power (DC 12 V ~ 24 V). Refer to the External GPIO Block Diagram below.

External GPIO Block Diagram



6.6.3 Connecting DC Power to BDU

You can supply DC power to the BDU in the following methods depending on the power supply available in the vessel. Intellian provides a DC Power Cable, an AC-DC Adapter (optional), and a Terminal Block for the power connections.

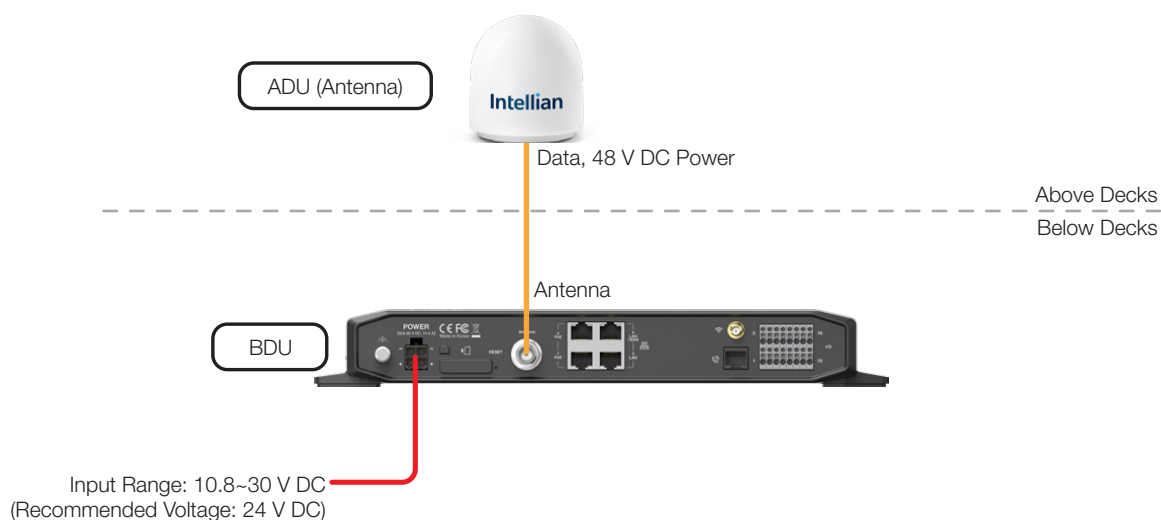


Figure 37: DC Power to BDU Connection

1. Connecting to Battery (default): Using the DC power cable (1 m), supply the DC power to the BDU from the battery. The power cable is installed with the Molex connector (P/No. 1716920204, Max. AWG 12). Use 1~2 m (3.28~6.56 ft) length wire for the power supply to prevent voltage drop. If you need an extended length of power cable, refer to the following table to choose a correct size cable. Check with your cable supplier for more information.

Cable Length	Maximum Wire Size	
	AWG	mm ²
5 m (16.40 ft)	13	2.62
10 m (32.80 ft)	11	4.17
20 m (65.61 ft)	9	6.63

BDU Power Input Range: 10.8~30 V DC

2. Connecting to AC Power Source (optional): Using the AC-DC adapter (110~220 V Input, 24 V DC output) and power cord, supply the DC power to the BDU from the AC power source. (You can find the AC-DC adapter in the 19-inch Rack Mount Kit).



NOTE

To connect multiple power cables from the power source, use a Terminal Block (supplied). Refer to the following page "How to Use Terminal Block" for more details.

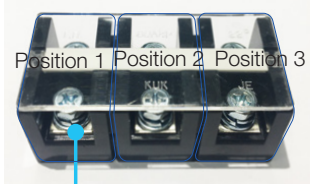
How to Use Terminal Block



WARNING
Turn off the power before installing the wire nut connector.

Intellian provides a 3-position double-row barrier terminal block as below.

Terminal Block: KH-6060-3P

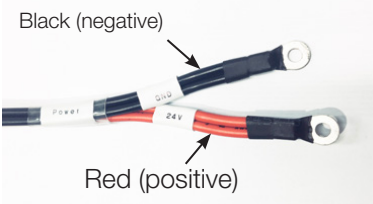
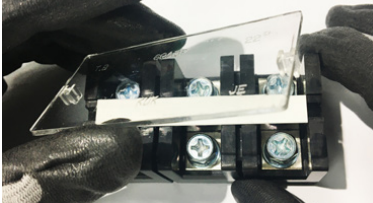
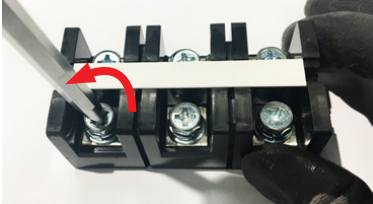
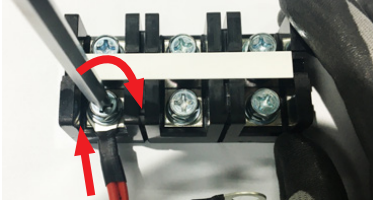
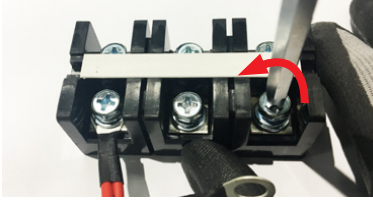
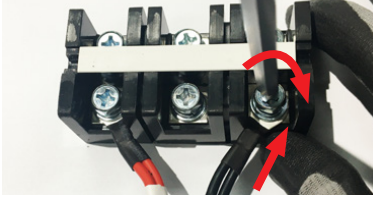
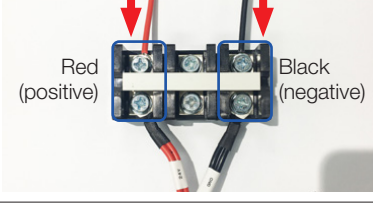
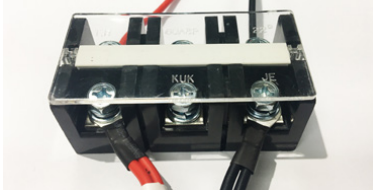


Barrier type terminal strip:
3 positions, 6 contacts

KH-6060-3P Specification	
Rated Voltage	600 V
Rated Current	60A (250 V)
Insulation Resistance	100M Ω min.
Dielectric Strength	2,500 VAC for 1min.
Wire	22 mm ²
Terminal Screw	M6

Terminal Blocks Dimension							
Rating/Pole	F(mm)	G(mm)	Hole(Ø)	L(mm)	W(mm)	H(mm)	Weight
60A 3P	28	16	5.2	85	40	36	142 g

Wiring Lug Dimension			
	E	14.5 mm	
	F	Min. Ø 6.1	
	W	Max. 16.8 mm	
	L	35.5 mm	

 Black (negative) Red (positive)	For the DC power wires, Red (positive) and Black (negative), you can connect each wire with other wires using the terminal block.
	1. Open the top cover of the terminal block.
	2. Unscrew the 1st position terminal using a Phillips screwdriver. Insert the ring connector of the Red (positive) wire to the terminal and tighten the screw back into the terminal.
	3. Unscrew the 3rd position terminal using a Phillips screwdriver. Insert the ring connector of the Black (negative) wire to the terminal and tighten the screw back into the terminal.
	3. Unscrew the 3rd position terminal using a Phillips screwdriver. Insert the ring connector of the Black (negative) wire to the terminal and tighten the screw back into the terminal.
	3. Unscrew the 3rd position terminal using a Phillips screwdriver. Insert the ring connector of the Black (negative) wire to the terminal and tighten the screw back into the terminal.
 Red (positive) Black (negative)	4. Connect wires for distribution to the terminals on the opposite side of each connected wires. CAUTION: DO NOT switch positions of the Red (positive) and Black (negative) wires. Switching the polarity of power may damage the product.
	5. Close the top cover of the terminal block.

6.6.4 Connecting BDU to ADU (Antenna)

Intellian provides the Antenna RF Cable (LMR200, 30 m) for connecting ADU and BDU. Connect the **Antenna RF Cable** from the **Antenna** port on the back of the BDU to the N-Connector on the bottom of radome (Antenna).

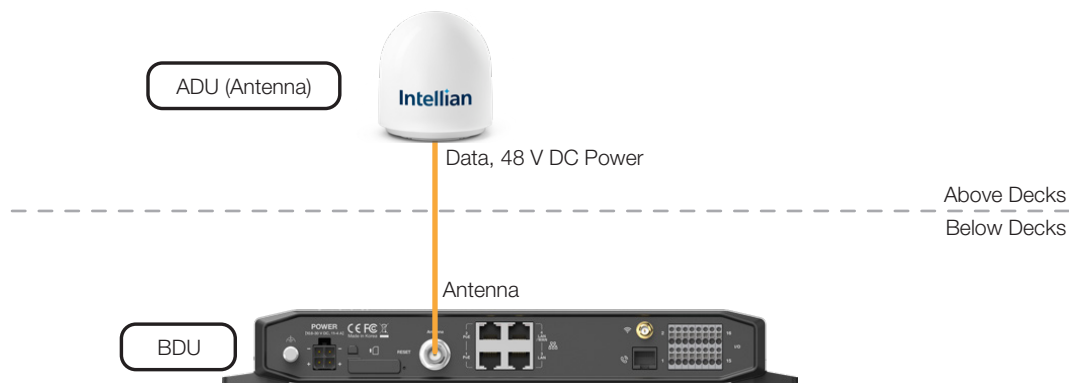


Figure 38: BDU to Antenna Cable Connection

6.6.5 Connecting BDU to Devices using LAN Port (RJ45)

Intellian provides the Ethernet Cable. Connect the **Ethernet Cable** from the **Port 1, Port 2, Port 3, or Port 4** on the back of the BDU to the **LAN** port on the devices such as SIP Phone or Computer.

Only the **Port 1** and **Port 2** include Power over Ethernet (PoE).

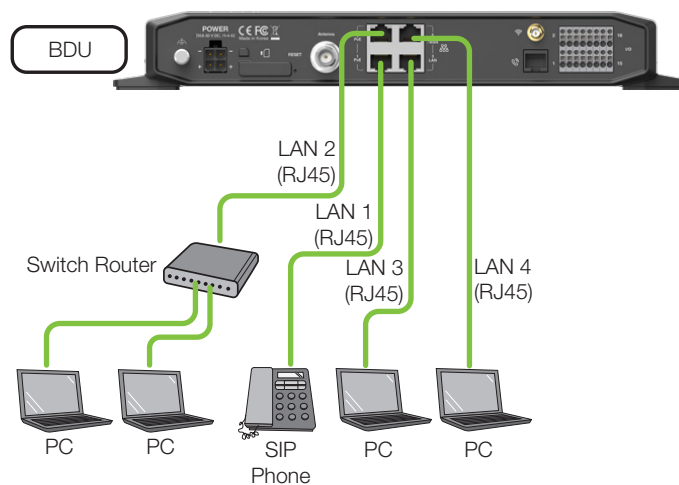


Figure 39: BDU to Devices Cable Connection using LAN Port (RJ45)

6.6.6 Connecting BDU to Device using WAN Port

Intellian provides the Ethernet Cable. Connect the **Ethernet Cable** from the **WAN port** on the back of the BDU to the **RJ-45 port** on the devices such as LTE modem.



Figure 40: BDU to Device Cable Connection using WAN Port

6.6.7 Connecting BDU to POTS Phone (RJ14)

Connect the standard phone cord (customer supplied) from the **POTS Phone port** on the back of the BDU to the **RJ-14 port** on the POTS phone as default.



Figure 41: BDU to POTS Phone (RJ14) Cable Connection

Up to 2 POTS Phones can be connected to the BDU using a RJ14 Cable Splitter (customer supplied). Using a RJ14 Cable Splitter, the two POTS phones can each have a separate phone line (not two phones using the same phone line). The POTS phone 1 (no. 101) is connected to a pair of Pin 3 (R1-) and Pin 4 (T1+) wires. The POTS phone 2 (no. 102) is connected to a pair of Pin 5 (R2-) and Pin 2 (T2+) wires.

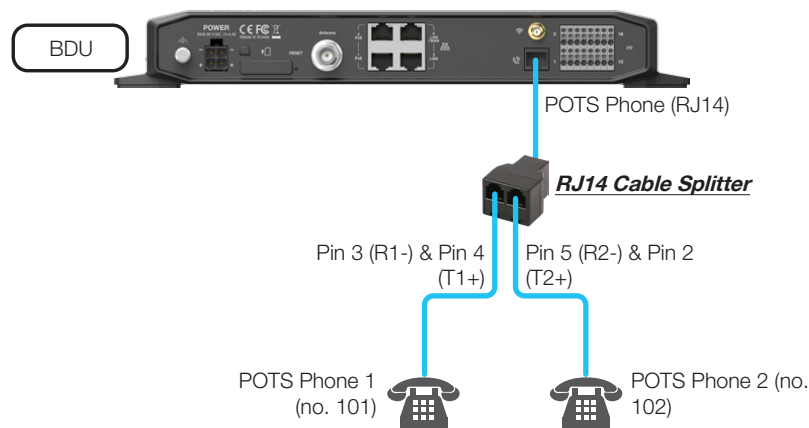


Figure 42: Using Cable Splitter with POTS Phones (RJ14)

6.6.8 Connecting BDU to External Devices

The BDU has a dedicated 16-pin connector to provide a GPIO (General Purpose Input/Output) interface to the external devices. All wires for the GPIO port must use AWG 24 unscreened wire type. Connect the end of these AWG 24 wires to the GPIO port's Pin A (point 1) and Pin B (point 2) respectively.



Figure 43: BDU to External Devices Connection

6.6.9 Connecting Wi-Fi Antenna to BDU

Intellian provides the Wi-Fi Antenna for Wi-Fi connection. Plug the **Wi-Fi Antenna** into the **Wi-Fi** port on the back of the BDU.

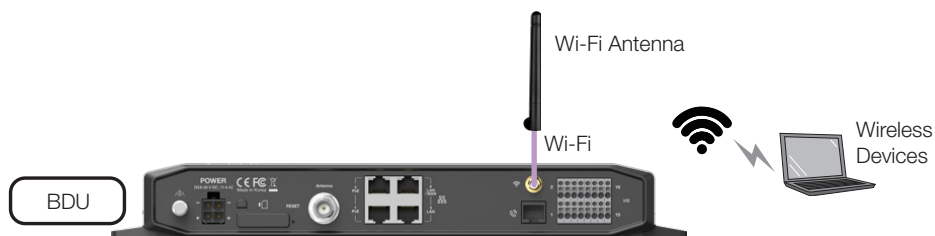


Figure 44: Wi-Fi Antenna to BDU Connection

6.6.10 Grounding Stud

The BDU should be grounded. Use a heavy ground cable (customer supplied) to connect the BDU to the vessel's ground during normal use. A safety grounding system is necessary to protect your radio hardware from lightning strikes and the build-up of static electricity. The grounding system must comply with the safety standards that apply in your country.

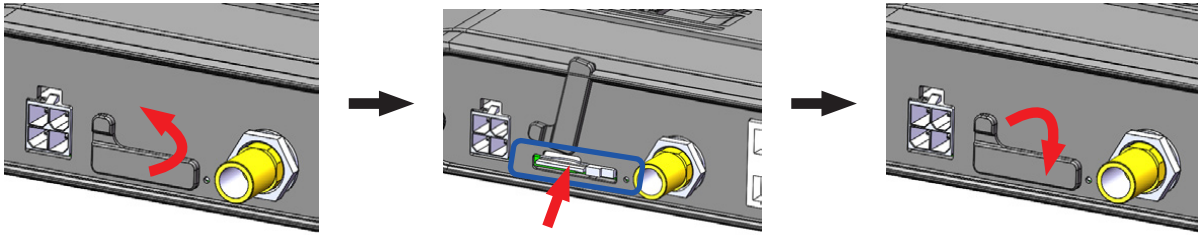
Ground the BDU using a heavy ground cable (not included) from the **Grounding Stud** of the BDU back panel to the vessel's ground to protect the system from unwanted surges and voltage differentials.



Figure 45: Grounding Stud Connection

6.6.11 Inserting USIM Card

The system requires a USIM card from the service provider to use the terminal and configure the settings of the BDU.



1. Find the USIM card slot on the BDU and open the cover.
2. Insert the USIM card into the slot until it clicks. Face the contact surface down when inserting it.
3. After the USIM Card is placed in the slot, close the cover.



NOTE

If the USIM card is not detected properly ("NO USIM" message is displayed on the dashboard), remove and re-insert the USIM card or turn the BDU power off and on again with the USIM card inserted.

Chapter 7. Operating BDU

The BDU and ADU are connected by a single coaxial cable through which power and Ethernet data are delivered between the BDU and ADU. The BDU is responsible for all the terminal management, system monitoring, control, error detection, and maintenance operations.

7.1 BDU Front Panel

The following figure shows the BDU's front panel.



Figure 46: BDU Front Panel

The following table shows status indicators on the face of BDU.

LED Indicator	Color	Description
Power	Off	The terminal is powered off.
	Blinking	The terminal is booting a system. The terminal is calibrating a system. The terminal is in error. There is no USIM card inside BDU.
	Steady Green	The terminal is powered on.
Satellite	Off	The system is not connected to a satellite.
	Blinking	The system is acquiring a satellite. The system is searching for a satellite.
	Steady Green	The system is connected to a satellite.
Event	Off	The system has no event (call or data).
	Blinking	The system has an alert, an unread message, an incoming call.
	Steady Green	The system has a voice or data.

NOTE: When 3 LEDs blink simultaneously, the BDU is in a low power state. Check the current input voltage status.

7.2 Powering On System

Use the power ON/OFF button on the BDU's front panel. Wait for all LED indicators to turn green to indicate the system is completely powered up.

7.3 Making POTS Phone Call

To make POTS phone calls, do as follows:

1. Connect an phone cable from the Phone Port (RJ14) on the back of the BDU to the **POTS phone**.



NOTE

When connecting a cable to the Phone port (RJ14), a pair of wires are connected to Pin 3 (R1-) and Pin 4 (T1+) of the analog POTS phone 1 (no. 101), and another pair of wires are connected to Pin 5 (R2-) and Pin 2 (T2+) of the analog POTS phone 2 (no. 102).

2. Lift the POTS handset and listen for dial tone.
3. Make a test call to check the voice clarity. Enter '9 + 00 + Country code + Area code + Phone #' using the keypad. (e.g. 9 00 1 209 1234 5678).

7.4 Enabling PoE

To use PoE, you need to enable in the terminal. Only the LAN Port 1 and LAN Port 2 of BDU are Power over Ethernet (PoE) capable.

The network is automatically configured by DHCP without the need for additional PC or device IP configuration.

1. Connect an Ethernet cable from the **LAN Port 1** or **LAN Port 2** on the back of the BDU to devices. The network connection is established automatically.
2. Use the following IP address to access the Intellian AptusLX Web page.
 - **IP Address: 192.168.0.1 (Default)**
3. Log in to the AptusLX Web by typing in a user name and password information. If this system has not been changed from the factory default:
 - **User Name: intellian**
 - **Password: 12345678**
4. Select the **SETUP** on the main menu then go to the **Network → Port** menu.
5. Toggle PoE button to the ON position on the port 1 or port 2. If you don't want to use PoE connection, choose the OFF position.
6. Click the **Apply** button to apply the settings to the system.

The screenshot shows the AptusLX Web interface. At the top, there are tabs: DASHBOARD, STATUS, **SETUP** (1), and TOOLS. On the left sidebar, under the 'Network' section, the 'Network' item is highlighted (2). The main content area shows network configuration fields: Subnet Mask (255.255.255.0), Gateway (192.168.200.1), and Lease Time (604800 sec). Below these is a table for Port configuration:

Name	PoE Status	Port Type	Link Status
1	☒ (3)	LAN	PD Connected
2	☐	LAN	Non-PD Connected
3		LAN	Non-PD Connected
4		LAN/WAN	Not Connected

At the bottom of the table is an 'Apply' button (4). A 'NOTE' box is located to the right of the table.



NOTE

Users can check the Link Status (PoE) following messages;

Not Connected: No device is connected to the BDU.

PD connected: A device that uses PoE is connected to the BDU.

Non-PD connected: A device that does not use PoE is connected to the BDU.

7.5 Activating Data Connection

The terminal does not automatically connect to the satellite data when you connect your computer or other equipment to the LAN interface. You must activate the data connection on the Dashboard of the web interface.

7.5.1 Registering Device



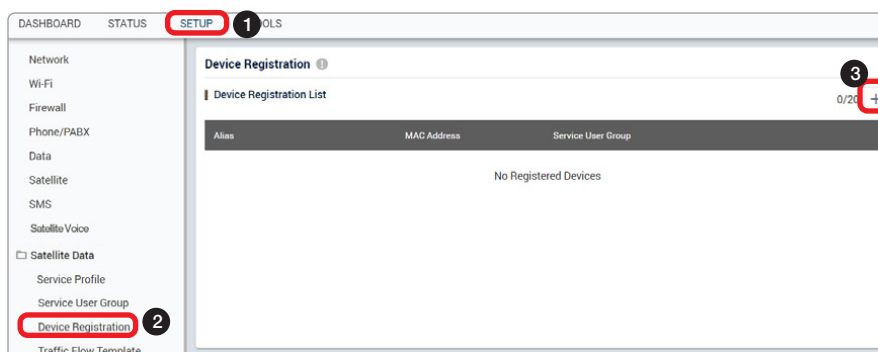
NOTE

Disable the Private Wi-Fi or random MAC address option on your mobile device to avoid a disconnect. This happens when the AptusLX registered MAC address no longer matches the random generated MAC address.

- iPhone: Settings > Wi-Fi > select the AptusLX's Access Point Name > disable the Private Wi-Fi option.
- Android (Samsung Galaxy, for example): Settings App > Wi-Fi > tap the gear icon next to the AptusLX's Access Point Name > MAC address type > Use phone MAC.

The device registration option is available only when you log in with the admin account (**intellian**).

1. Connect an Ethernet cable from the **LAN Port 1** or **LAN Port 2** on the back of the BDU to devices. The network connection is established automatically.
2. Use the following IP address to access the Intellian AptusLX Web page.
 - **IP Address: 192.168.0.1 (Default)**
3. Log in to the AptusLX Web by typing in a user name and password information. If this system has not been changed from the factory default:
 - **User Name: intellian**
 - **Password: 12345678**
4. Select the **SETUP** on the main menu then go to the **Network → Device Registration** menu.
5. To add a new device, click the **Add(+)** button.



6. To create an **Alias** for the device, input the **MAC Address** (if the device is connected to the BDU, a drop-down menu will be shown), and select a **Service User Group**.

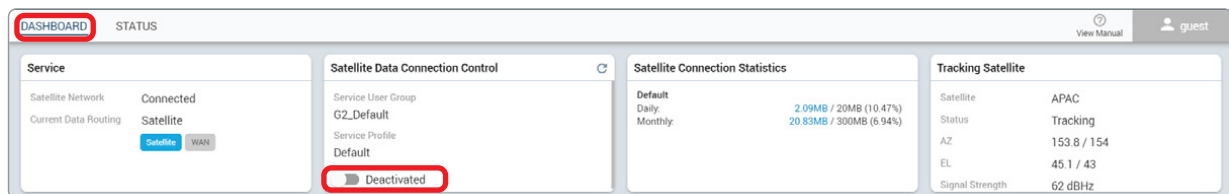
- Service User Group
 - **G2_Default:** Background profile for normal use. Multiple users can share the data simultaneously. The users need to pay per the amount of data usage in byte.
 - **G6_DataStream:** Streaming profile. You get an exclusive and high-priority connection that ensures seamless transfer of data. The users need to pay per the time of data usage in second.
 - **G5_DataCustom:** Specified profiles by user.
 - **G7_DataSecondary:** Secondary profile of the G2_Default or the G5_DataStream.

7.5.2 Activating Data Connection

When logging in with the admin account (**intellian**), all the service groups are displayed for devices including non-registered devices. Device registration is not required when you are logged in with admin account (**intellian**). Activate the data connections on the dashboard with the activation buttons.

When logging in with a guest account (**guest**), available service groups are displayed on the dashboard for the devices which are already registered. You can activate the data connections with the activation buttons, then you can use the satellite data of the service groups.

1. Log in to the AptusLX Web by typing in a user name and password information. If this system has not been changed from the factory default:
 - **User Name:** guest
 - **Password:** guest
2. Toggle the Deactivated switch to the **Activated** position on the **Satellite Data Connection Control** in the Dashboard. If the device is not registered in the **Device Registration** menu, 'Unregistered device' is displayed on the screen and the data cannot be used.



7.6 Using Grandstream VoIP Phone Call

Use the Grandstream VoIP phone to make VoIP phone calls.

Recommended VoIP Phones

- Grandstream GXP16 Series: 1610, 1615, 1620, 1625, 1628, 1630
- Grandstream GXP17 Series: 1760, 1780
- Grandstream GXP21 Series: 2120, 2130, 2135, 2140, 2160, 2170
- Grandstream GXV32 Series: 3240, 3275

1. Connect an Ethernet Cable from a LAN port (**Port 1~ Port 4**) on the back of the BDU to a LAN port of devices. Only the **LAN Port 1** and **LAN Port 2** of BDU are Power over Ethernet (PoE) capable.

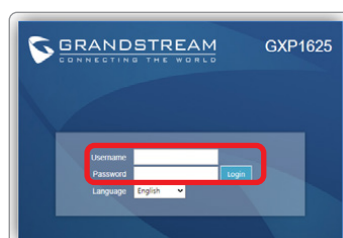


2. On the front LCD panel of the phone, go to Menu > Status > Network Status. Note the IP address for IPv4 accessing the web interface of the VoIP phone.
For example, IP address 192.168.0.132 is displayed on the LCD panel.

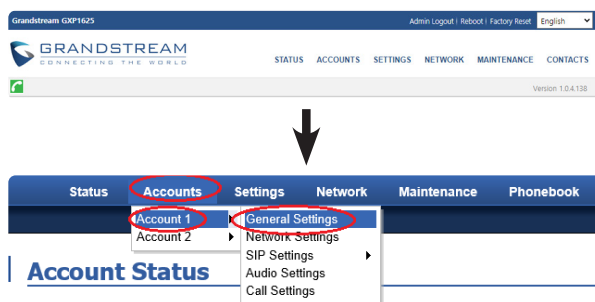


3. On your laptop, open a web browser and type in the IP address for IPv4 (<http://192.168.0.132>). Log into the web interface of the VoIP phone using the user name and password.

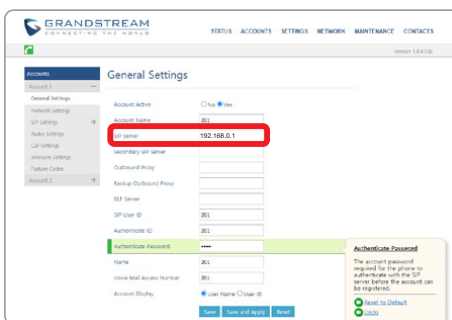
- **Login Username:** admin
- **Password:** admin



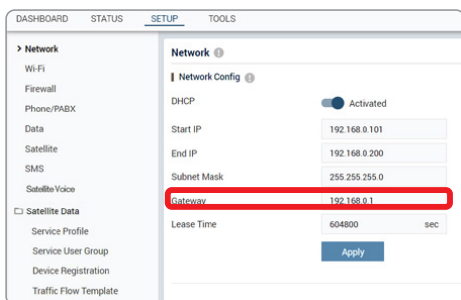
4. Go to **Account > Account 1 > General Settings**.



5. According to the AptusLX setting, enter the values for General Settings.

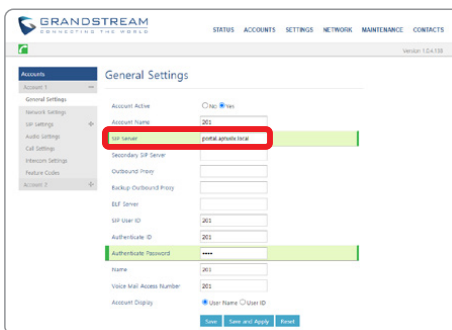


or



AptusLX

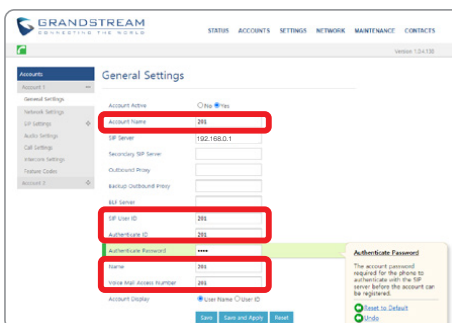
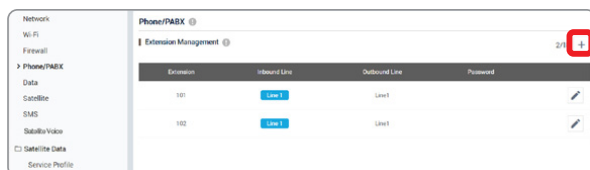
Enter the values according to the AptusLX setting (**SETUP > Network**).



VoIP Phone

The engineer needs to remember the default IP for BDU **192.168.0.1** or can simply input '**portal.aptuslx.local**'.

Need to input IP into SIP Server on GRANDSTREAM SIP Server IP.



AptusLX

Go to **SETUP > Phone/PABX**. Extension 10X (ex.101,102) is used for analog phones. For VoIP phones, used Extension **20X** to assign desired number. To create new extension numbers, click the Add(+) button. Then the pop-up window is opened.

Extension	Inbound Line	Outbound Line	Password
101	Line 1	Line 1	
102	Line 1	Line 1	
201	Line 1	None	0000

AptusLX

Assign the **Password** for Inbound Line/Outbound Line according to the vessel's purpose to assigned phone location.

The created extension numbers are displayed on the list.

- Change 'Resister Expiration' value from 60 to 1 under **Account 1 > SIP Settings > Basic Settings** menu.

VoIP Phone

Input values for **Account Name / SIP User ID / Authenticate ID / Name / Voice Mail Access Number** according to the AptusLX setting.

VoIP Phone

The **Password** should be the same for AptusLX and VoIP Phone.

Basic Settings

TEL URI: ☒ Disabled ☐ User=phone ☐ Enable

SIP Registration: ☐ No ☒ Yes

Unregister on Reboot: ☒ No ☐ All ☐ Instance

Register Expiration

Subscribe Expiration:

Reregister before Expiration:

Enable OPTIONS Keep Alive: ☒ No ☐ Yes

OPTIONS Keep Alive Interval:

OPTIONS Keep Alive Max Lost:

Local SIP Port:

SIP Registration Failure Retry Wait Time:

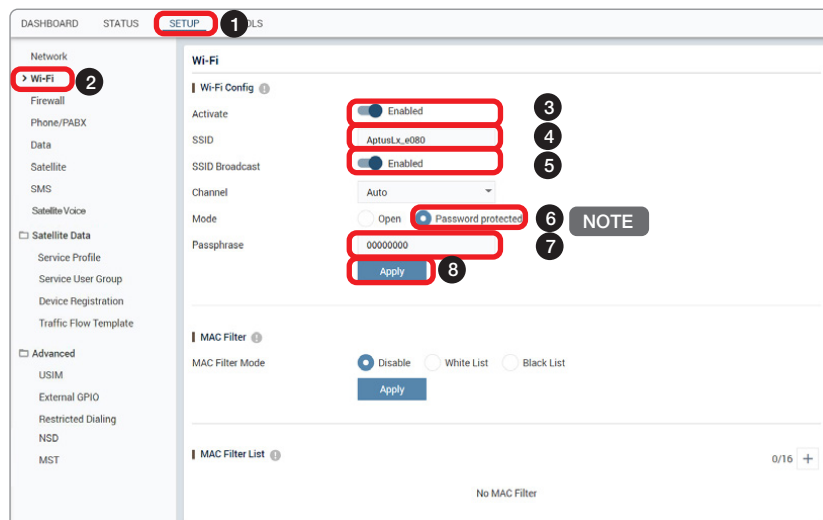
Register Expiration
Specifies the frequency (in minutes) in which the phone refreshes its registration with the specified registrar. The maximum value is 64800 (about 45 days).
[Reset to Default](#)
[Undo](#)

7.7 Using Wireless Devices through Wi-Fi

You can connect to the BDU via Wi-Fi for easy management and control whenever you are on the vessel.

1. Bring the Wi-Fi Antenna located in the BDU package. Plug the Wi-Fi Antenna into the Wi-Fi port on the back of the BDU.
2. Connect an Ethernet cable from any LAN ports (**Port 1~ Port 4**) on the back of the BDU to the LAN port of PC. The network connection is established automatically.
3. Use the following IP address to access the Intellian AptusLX Web page.
 - **IP Address: 192.168.0.1 (Default)**
4. Log into the AptusLX Web by typing in a user name and password information. If this system has not been changed from the factory default:
 - **User Name: intellian**
 - **Password: 12345678**
5. Select the **SETUP** on the main menu then go to the **Wi-Fi → Wi-Fi Config** menu.
6. Toggle Activation button to the **Enabled** position on the **Activate**. If you don't want to use Wi-Fi Connection, choose the **Disabled** position.
7. Check the **SSID (Wi-Fi AP Name)** information.
8. Choose the SSID Broadcast **Enabled** button to show the SSID (Wi-Fi AP Name) on the Wi-Fi list.
9. Click the **Password protected** button on the **Mode** menu.

NOTE: Password protection uses WPA2 protocol.
10. Set a Wi-Fi password on the **Passphrase** menu.
11. Click the **Apply** button to apply the settings to the system.
12. Connect to the Wi-Fi.



7.8 Using Mobile Phone Call

7.8.1 Installing Mobile Application

To be able to use a mobile phone call you must install a compatible mobile application. Intellian recommends using the following mobile application:

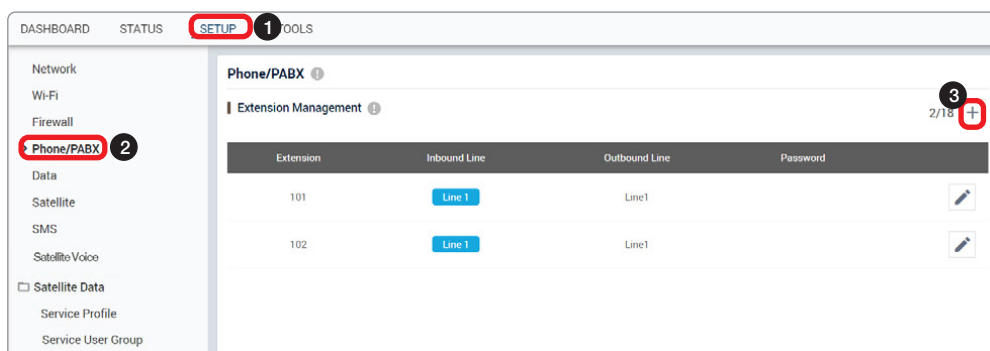
Grandstream Wave App

- **App Store:** <https://apps.apple.com/us/app/grandstream-wave/id1029274043?ls=1>
- **Google Play:** <https://play.google.com/store/apps/details?id=com.grandstream.wave>

7.8.2 Registering New Extension for Voice Service (Optional)

If voice services are required, register the new extension of the terminal.

1. Select the **SETUP** on the main menu then go to the **Phone/PABX** menu.
2. To add a new extension, click the **Add(+)** button.



3. The registration window will appear in the pop-up window. Enter the new extension information. When you want to use the external call, select the **Inbound Line** and **Outbound Line**. Click the **Update** button.

AptusLX

Extension: 201

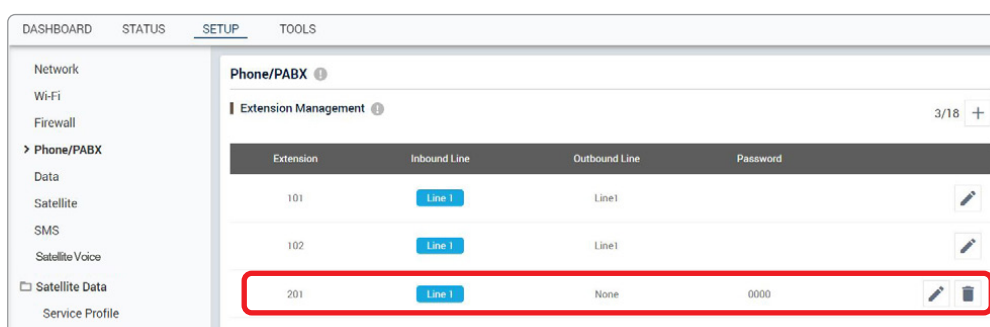
Inbound Line: Line 1

Outbound Line: None

Password:

Cancel Update

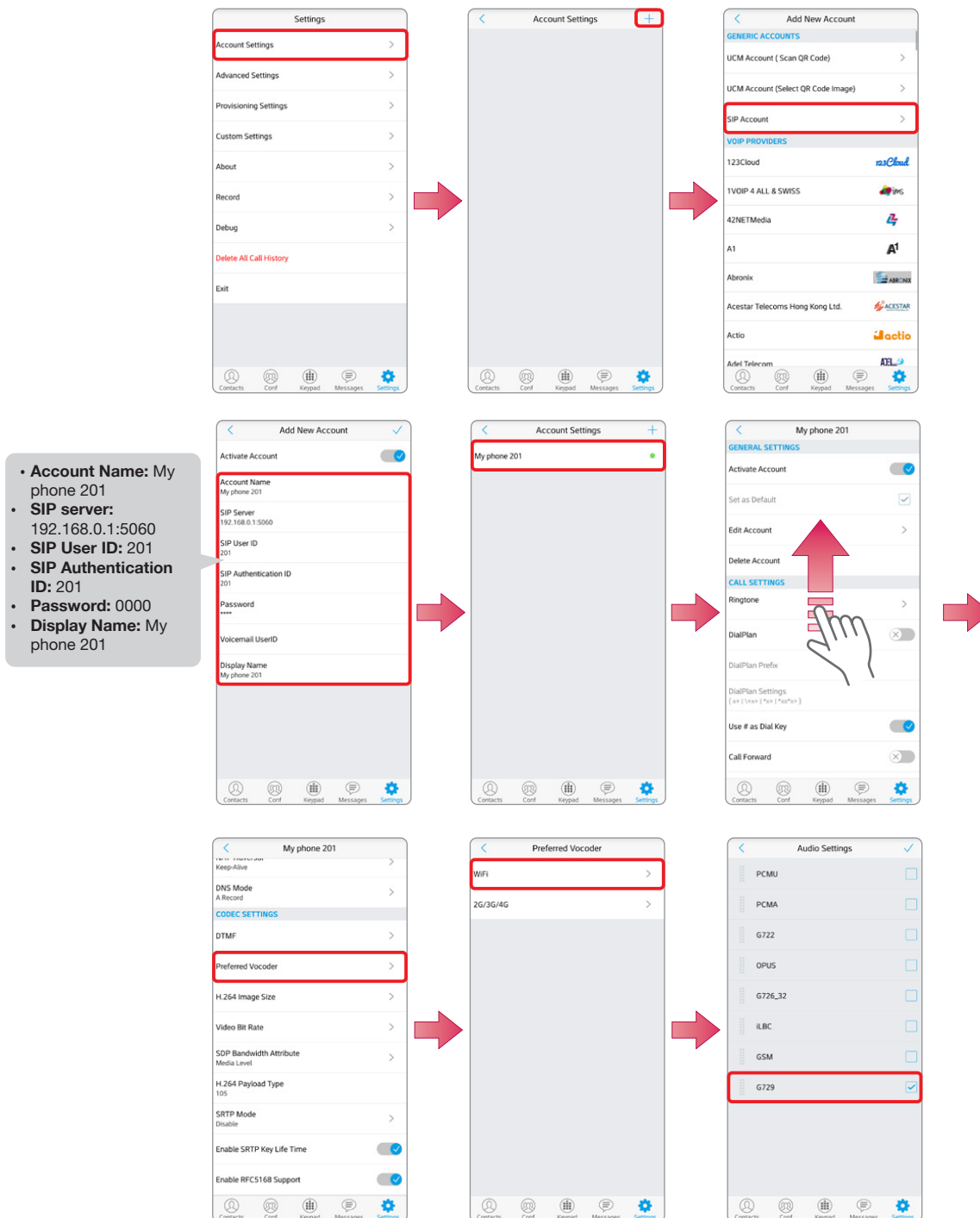
4. Check the new extension added.



7.8.3 Setting Mobile Phone

Using Grandstream Wave App (Recommended) through Mobile Phone

To make a call on your mobile phone, Intellian recommends using the Grandstream Wave app. Follow the steps below to set up your mobile phone.



Chapter 8. Using AptusLX

8.1 Introduction

With the embedded **AptusLX** software, the antenna can be monitored, controlled, and diagnosed remotely, anytime through the TCP/IP protocol. 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 Accessing Internal Webpage of BDU

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

1. Connect an Ethernet cable from any LAN ports (**Port 1~ Port 4**) on the back of the BDU to the LAN port of PC. The network connection is established automatically.
2. Enter the BDU IP address (**Default: 192.168.0.1**) or (<https://portal.aptuslx.local>) into the address bar of the web browser to login to the internal HTML page of BDU.

NOTE



AptusLX works on Internet Explorer 11 or higher (Windows 7 or higher editions), Firefox, Microsoft Edge and Chrome web browsers.

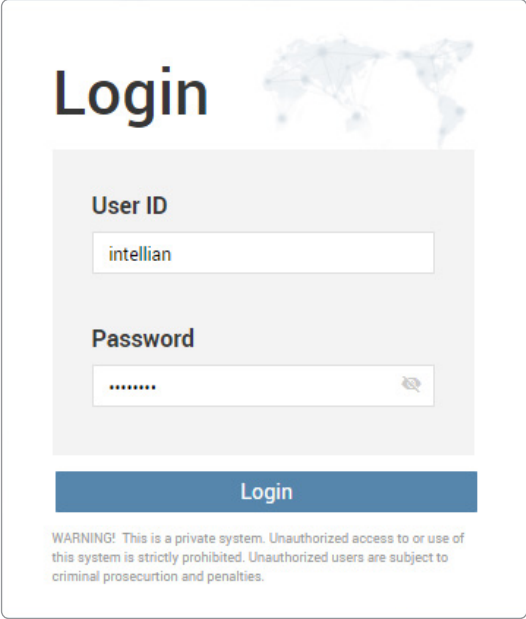
If you cannot open AptusLX on Chrome, clear all browsing data (history, cookies, cache, and more) in Chrome's setting and try again.

8.3 Login

The Intellian software Aptus provides different user access levels to protect the system for safe operation. Depending on the user access level, the accessible range of functions in the software can be limited.

Log into the BDU by typing in User Name and Password information. If this system has not been changed from the factory default:

User ID	Password	Access Authority
intellian	12345678	Supports all menus for monitoring and setting.
guest	guest	Only some menus for monitoring are supported.



NOTE

After entering the default password, the user must change the default password to a new password for security. If you have forgotten your ID and/or password, you can reset it on the Reset ID/Password menu. Refer to the “8.5 Account Menu” on page 66.

8.4 Top Menus

Once you log in, the following information and menus are displayed. The overall state of the system is always displayed in the top menu.



No.	Item	Description
①	Satellite Status	Displays the status of the satellite network connection. - Off: The system has not detected the Satellite network. - Steady Green: The Satellite Network available, ready to connect. - Blinking Green (Acquiring): The system is connecting to the satellite network. - Steady Blue: The system is registered and connected to the satellite network. - Steady Red: Registration on the network was denied. If the USIM card is inserted incorrectly, insert the USIM card in place. Refer to the “6.6.11 Inserting USIM Card” on page 51. If there is no error with the USIM card status, contact the service provider.
②	WAN Status	Displays the status of the wide-area network (WAN) connection. The system connects to the WAN according to the setting of the routing policy. You can also check the status of the WAN connection on the 'Current Route Selection' panel of the “8.6 Dashboard” on page 68. - Steady Blue: The WAN is connected. - Red/Off: The WAN is not connected.
③	Wi-Fi Status	Displays the status of the Wi-Fi connection. - Off: The Wi-Fi connection is disabled. - Steady Green: The Wi-Fi connection is enabled. Ready to connect. - Steady Blue: The Wi-Fi is connected.
④	Signal Strength	Displays the current signal level. - Off: The network is disabled. - Steady Green: The network is enabled. Displays the current signal level.
⑤	System Power	Displays the current system power. - Steady Blue: The system is in normal operation. - Steady Red: A error is detected.
⑥	Call	Displays the status of the call connection. - Steady Green: The extension call is available. - Steady Blue: The extension and external call is available. - Blinking Blue: The external call is active.

No.	Item	Description
⑦	SMS	Displays the status of SMS messages. - Off: The system cannot send and receive SMS messages. - Steady Green: The system can send and receive SMS messages normally. Displays the number of unread messages next to the SMS icon. Click the icon to see new messages. For more information, see “8.8.7 SMS” on page 85. - Blinking Red: There is no space to store new a SMS message in the SMS inbox. After deleting existing SMS messages, you can receive the new SMS message.
⑧	Main Menu	Select the Main Menu. Each main menu offers side menus on the left of the screen.
⑨	View Manual Button	Select the View Manual button to open the user guide pop-up window.
⑩	Disconnect Button	Select the Disconnect button to terminate all Packet Data Protocol (PDP) or Data connections.
⑪	Account Button	Select the Intellian button to manage your account details and select the Logout menu to log out of the AptusLX web page.

8.5 Account Menu

Click the **Intellian** button to manage the user account.

The **User** menus are for user management. Click the **Logout** button to log- out of the AptusLX web page.



8.5.1 User

No.	Item	Description
①	User	Updates your password and ID.
②	User ID Change	You can change your ID • ID: Displays the user current ID. • New ID: Enter the new ID you want to change. Click the Apply button to set the ID to the new ID.
③	User Password Change	You can change your password. • ID: Displays the user current ID. • Old Password: Enter the current password. • New Password: Enter the new password. Click the Apply button to set the password to the new password. For the next login, the new password is required.
④	Reset ID/ Password	If you have forgotten your ID and/or password, you can reset depending on your account level. The admin account (intellian) allows you to reset the guest account (guest). Click the account button to reset to the default id and password. For the next login, the default id and password are required.
⑤	Session Timeout Change	Enter the session timeout (min.). Click the Apply button to apply the settings to the system.
⑥	Language Setting	You can change the language. • Supported Languages: Chinese-Simplified, Chinese-Traditional, Dutch, English, French, German, Japanese, Korean, Russian, Spanish (alphabetical order) Select the language you want to change and click the Apply button to apply the settings to the system. Log in again after changing the language.

8.5.2 Logout

Click the **Logout** button to log out from the AptusLX.

8.6 Dashboard

The Dashboard menu is displayed as below to provide quick monitoring of the antenna status. The Dashboard helps you arrange panels on a single screen while providing you with a broad view of a variety of information at once.

The screenshot displays the FB500 Dashboard interface with the following panels:

- Service:** Shows Satellite Network as 'Connected' and Current Data Routing as 'Satellite' (with a 'WAN' button).
- Tracking Satellite:** Displays satellite details for APAC:

Status	Tracking
AZ	153.9 / 154
EL	44.8 / 43
Signal Strength	66 dBHz
Quality	14
- Terminal:** Shows status for Terminal, Operation Mode, USIM Inserted, USIM Connected, ADU Status, and Modem Status, all in 'OK' or 'Normal' states.
- Location:** Displays Valid status as 'Normal' and coordinates: Latitude 37.401956 (N), Longitude 127.112777 (E), Altitude 96.90, Date 2022-06-22, and Time(UTC) 05:14:30.
- Product Info:** Lists Package Software Version (0.2.0), BDU Serial, BDU MAC (14:42:FC:A2:A5:48), ADU Software Version (0.2.0), ADU Serial, and Model (FB500).
- Modem Info:** Lists Software Version (5.9.5), Hardware Version (07-01), IMEI (004433060000261), and Serial (JBO1A01215).
- Environment:** Shows BDU Voltage (23.9 V), ADU Temperature (51.8 °C), and ADU Voltage (46.4 V).
- System Event:** Shows '- No Event'.
- Satellite Data Connection Control (1):** A list of service user groups (G2_Default, G6_DataStream, G8_DataUser1, G10_DataUser3, G11_DataUser4) and their profiles (User_1, User_2), each with a 'Deactivated' toggle.
- Satellite Connection Statistics (2):** Displays Incoming and Outgoing call statistics for various service user groups, including daily and monthly usage and data limits.



NOTE 1.

Tracking Satellite - Status:

The following 6 status information is displayed.

- Initialize: The antenna system is Initializing.
- Setup: The antenna system is waiting for BDU commands.
- Searching: The antenna system is searching for a satellite connection.
- Tracking: The antenna system is connected to the satellite, and is tracking.
- Diagnostic: The antenna system is performing antenna diagnosis.
- Upgrading: The antenna system is upgrading firmware.

NOTE 2.

Tracking Satellite - Quality:

This value is provided by Modem and displays the quality score of the received signal (Range: 0 ~ 20).

NOTE 3.

To send a new SMS click the letter icon. Type the message and recipient's phone number. For more information see "8.8.7 SMS" on page 85.

8.6.1 Satellite Data Connection Control

No.	Description	
	Displays the satellite data connection status. The screen is different depending on the user access level.	
①	When logging in with the admin account (intellian); - Monitors the connection status of all service user groups. - All the service groups are displayed for devices including non-registered devices. Device registration is not required when you are logged in with admin account (intellian). Activate the data connections on the dashboard with the activation buttons to use the device which is logged in with admin account (intellian). - If you deactivated a service user group, the data sessions of all devices included in the service user group are terminated.	When logging in with a guest account (guest); - Available service groups are displayed on the dashboard for the devices which are already registered. You can activate the data connection of your own service group with the activation button, then you can use the satellite data of your service group. - If you deactivate the service user group, the data session of your device is terminated. - If the device is not registered in the Device Registration menu, 'Unregistered device' is displayed and the data cannot be used. For device registration, refer to the "7.5 Activating Data Connection" on page 55.

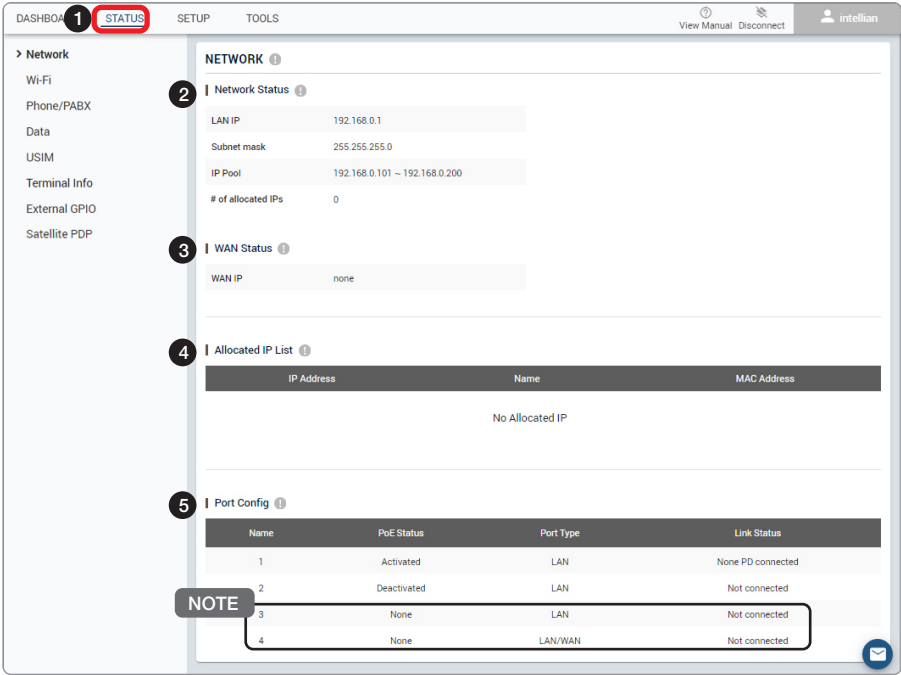
8.6.2 Satellite Connection Statistics

No.	Description	
	Displays Satellite Connection Statistic. You can check Incoming/Outgoing usage for satellite call and each profiles usage for satellite data.	
②	When logging in with the admin account (intellian); - In voice case, you can check a Daily/Monthly for Incoming/Outgoing call usage. - In data case, you can check current Daily/Monthly usage and Daily/Monthly limit for all user profiles. - For Default, User_1, User_2, User_3, the usage of background data is displayed in MB. For Strm8/16/32/64/128/256, the usage of streaming data is displayed in time.	When logging in with a guest account (guest); In guest account case, you can check current Daily/Monthly usage and Daily/Monthly limit for guest account only.

8.7 Status

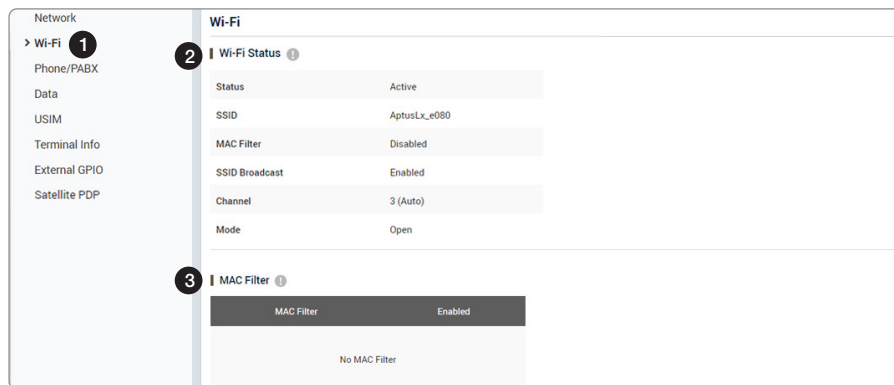
This menu displays the Network, Wi-Fi, Phone/PABX, Data, USIM, Terminal Info, and External GPIO function.

8.7.1 Network



No.	Item	Description
①	Network	Displays the information about a network and ports.
②	Network Status	Displays the network information in use. • LAN IP: Displays the network IP address (Factory default: 192.168.0.1). • Subnet Mask: Displays the subnet mask (Factory default: 255.255.255.0). • IP Pool: Displays the range of available IP. • # of allocated IPs: Displays the number of IP devices assigned.
③	WAN Status	Displays the WAN information in use. • WAN IP: Displays the WAN IP address.
④	Allocated IP List	Displays the allocated IP list and information.
⑤	Port Config	Displays the switch port list and information.

8.7.2 Wi-Fi



No.	Item	Description
①	Wi-Fi	Displays Wi-Fi access information.
②	Wi-Fi Status	Displays the Wi-Fi access point configuration. • Status: Displays the Wi-Fi status (Active / Inactive). • SSID: Displays the SSID network name. • MAC Filter: Displays the MAC address filtering status (Enabled/Disable). • SSID Broadcast: Displays the SSID broadcast status (Enabled/Disable). • Channel: Displays the WLAN (wireless local area network) channel in use. • Mode: Displays the security mode (Open/Password protected).
③	MAC Filter List	Displays devices to either your whitelist or blacklist simply.

8.7.3 Phone/PABX

Phone/PABX

2 | Extension Management

Extension	Inbound Line	Outbound Line
101	Line 1	Line1
102	Line 1	Line1
201	Line 1	Line1

3 | Call History

All Search Clear Call History

10 1~5/5

Source	Destination	Start Time	Duration (sec)	Disposition
203	008225112244	2021-07-28 00:57:02	4	Answer
008225112244	90112114169861(ext-203)	2021-07-28 00:56:42	0	No Answer
008225112244	90112114169861(ext-201)	2021-07-28 00:56:42	5	Answer
008225112244	90112114169861(ext-102)	2021-07-28 00:56:42	0	No Answer
008225112244	90112114169861(ext-101)	2021-07-28 00:56:42	0	No Answer

10 1~5/5

No.	Item	Description
①	Phone/PABX	Displays the phone and Private Automatic Branch Exchange (PABX) status.
②	Extension Management	Displays the extension number and details. - Extension: Displays the registered extension. - Inbound Line: Displays the inbound line in use through the blue indicator. - Outbound Line: Displays the outbound line.
③	Call History	Displays the made and received call history log. You can set view details from the drop-down list. Remove the history by clicking the Clear Call History button.

8.7.4 Data

Network
Wi-Fi
Phone/PABX
> **Data**
USIM
Terminal Info
External GPIO
Satellite PDP

Data

Routing

Routing Policy	Satellite Only
Satellite Link	Active
WAN Link	Inactive

Port Forwarding

Link	Type	Internal IP	Protocol	Internal Port	External Port	Enable
No Data						

Data Call History

All
Search
Clear Call History

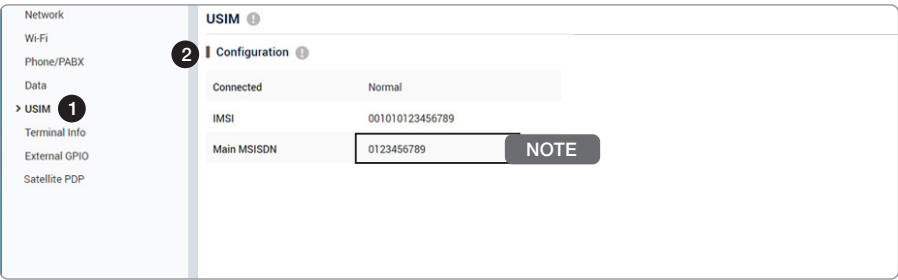
10
1-10/27

Alias	Service Profile	Start Time	End Time	Duration (sec)	Session Transmission Volume (bytes)	Session Receive Volume (bytes)
1st_Laptop_u	Default	2021-07-28 00:13:18	2021-07-28 00:23:10	592	280,219	1,915,699
1st_Laptop_u	Default	2021-07-28 00:13:16	-	0	0	0
1st_Laptop_u	Default	2021-07-27 23:23:05	2021-07-27 23:24:39	94	420	420
1st_Laptop_u	Default	2021-07-27 23:23:02	-	0	0	0
1st_Laptop_u	Default	2021-07-27 05:55:35	-	0	0	0
1st_Laptop_u	Default	2021-07-26 05:05:20	-	0	0	0
2nd_Laptop	Default	2021-07-26 04:59:33	2021-07-26 05:05:16	343	405,587	306,606
2nd_Laptop	Default	2021-07-26 04:59:30	-	0	0	0
2nd_Laptop	Default	2021-07-26 04:49:02	2021-07-26 04:55:58	416	714,807	1,033,323

10
1-10/27

No.	Item	Description
①	Data	Displays the data setting status.
②	Routing	Displays the data route status (Routing Policy, Satellite Link, WAN Link).
③	Port Forwarding	Displays the port forwarding data information.
④	Data Call History	Displays the connected/disconnected data call history log. You can set view details from the drop-down list. Remove the history by clicking the Clear Call History button.

8.7.5 USIM



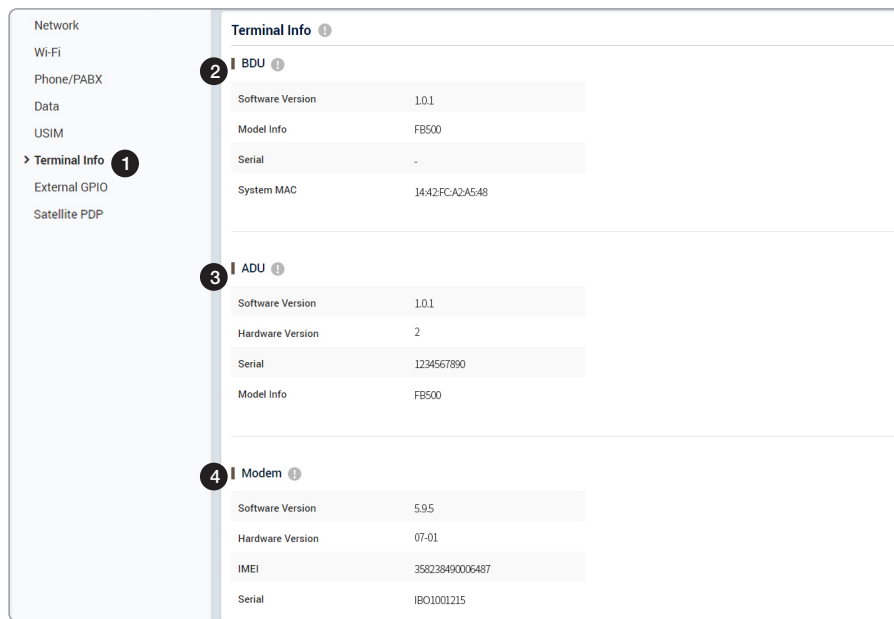
No.	Item	Description
①	USIM	Displays information about the USIM card.
②	Configuration	Displays the USIM card information in use. • Connected: Displays the connection status of the USIM card. The USIM must be inserted. • IMSI: Displays a unique identifier to the USIM card. • Main MSISDN: Displays main MSISDN



NOTE

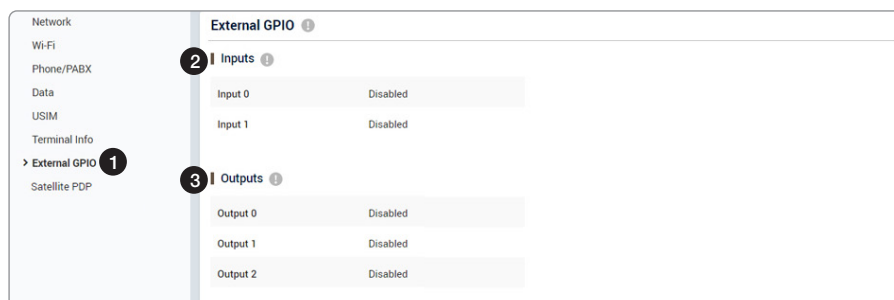
The Number is for your information.

8.7.6 Terminal info



No.	Item	Description
①	Terminal info	Displays the system terminal information.
②	BDU	Displays BDU information in use.
③	ADU	Displays ADU information in use.
④	Modem	Displays the modem information in use.

8.7.7 External GPIO



No.	Item	Description
①	External GPIO	Displays external GPIO.
②	Inputs	Displays input information in use.
③	Outputs	Displays output information in use.

No.	Item	Description
①	Satellite PDP	Displays the Satellite PDP.
②	Connected PDP information	- Displays the status of the connected PDP sessions including CID number, traffic class, requested/negotiated uplink and downlink rate. - Displays nothing if UT doesn't have the connected PDP session. - The reload button in the right upper side on the table can be used for the manual update.

8.8 Setup

This menu sets and displays the Network, Wi-Fi, Firewall, Phone/PABX, Data, Satellite, SMS, Service Profile, Service User Group, Device Registration, Traffic Flow Template, USIM, External GPIO, Restricted Dialing, NSD, and MST function.

8.8.1 Network

The screenshot shows the 'Setup' menu in the AptusLX interface. The 'Network' option is selected in the left sidebar. The main area displays the 'Network Config' and 'Port' settings. The 'Network Config' section includes fields for DHCP (Activated), Start IP (192.168.0.101), End IP (192.168.0.200), Subnet Mask (255.255.255.0), Gateway (192.168.0.1), and Lease Time (604800 sec). The 'Port' section shows a table of ports with columns for Name, PoE Status, Port Type, and Link Status. Port 1 is LAN, PoE is Activated, and Link Status is PD Connected. Port 2 is LAN, PoE is Deactivated, and Link Status is Non-PD Connected. Port 3 is LAN, PoE is Deactivated, and Link Status is Non-PD Connected. Port 4 is LAN/WAN, PoE is Deactivated, and Link Status is Not Connected. An 'Apply' button is at the bottom of each section.

No.	Item	Description
①	Network	Sets the information about a network and ports.
②	Network Config	Sets the network configuration. • DHCP: Sets the DHCP function by toggling the activation button (Activated/Deactivated). • Start IP: Sets the start range of lease IP address. • End IP: Sets the end range of lease IP address. • Subnet Mask: Sets the subnet mask (Factory default: 255.255.255.0). • Gateway: Sets the gateway IP address. • Lease Time: Sets the lease time (sec). Click the Apply button to apply the settings to the system.
③	Port	Sets each switch port. • Name: Displays the port mane. • PoE Status: Sets the PoE function by toggling the activation button on port 1 and 2. • Port Type: Displays the port type. • Link Status: Displays the link status (Up/Down). Click the Apply button to apply the settings to the system.

8.8.2 Wi-Fi

No.	Item	Description
①	Wi-Fi	Sets the Wi-Fi access information.
②	Wi-Fi Config	Sets the Wi-Fi access point configuration. • Activate: Sets the Wi-Fi function by toggling the activation button (Enabled/Disabled). • SSID: The SSID is the network name shared among all devices in a wireless network. The SSID must be identical for all devices in the wireless network. It is case-sensitive and must not exceed 32 alphanumeric characters, which may be any keyboard character. Make sure this setting is the same for all devices in your wireless network. • SSID Broadcast: Sets the SSID broadcast function by toggling the activation button (Enabled/Disabled). • Channel: Selects an appropriate channel from the list provided to correspond with your network settings. All devices in your wireless network must use the same channel in order to function correctly. Try to avoid conflicts with other wireless networks by choosing a channel where the upper and lower three channels are not in use. • Mode: Sets the security mode type (Open/Password protected). • Passphrase: Enter the user name connected to Wi-Fi. Click the Apply button to apply the settings to the system.
③	MAC Filter	• MAC Filter Mode: Select the MAC filter mode (Disable/White List/Black List). - Disable: The MAC filter is disabled. - White List: In Whitelist mode, the router will restrict LAN access to all computers except those contained in the MAC Filter List. - Black List: In Blacklist mode, the listed devices are completely blocked from local network access. Click the Apply button to apply the settings to the system. NOTE: Use caution when using the MAC Filter to avoid accidentally blocking yourself from accessing the router.
④	MAC Filter List	Displays the MAC address. To create new MAC addresses, click the Add(+) button. Then the pop-up window is opened. You can assign the new MAC address. Click the Create button. The created MAC addresses display on the list.

8.8.3 Firewall

The screenshot displays the AptusLX Firewall configuration interface. On the left, a sidebar lists various network settings, with 'Firewall' selected and highlighted by a red circle (1). The main area is divided into two tabs: 'Firewall Config' (2) and 'Firewall Rules' (3). The 'Firewall Config' tab shows the firewall is 'Enabled' with 'Accept' as the default action for both inbound and outbound traffic. The 'Firewall Rules' tab shows two rules: an 'Outbound Rule' and an 'Inbound Rule'. The 'Inbound Rule' is highlighted, and a red circle (4) is around the '+' button to add a new rule. On the right, a detailed configuration window for the 'Inbound Rule' is shown, with fields for Enable (checked), Link (All), Source (192.168.0.1), Source Mask (255.255.255.0), Source Port Start (8.8.8.8), Source Port End (255.255.255.255), Protocol (TCP), Specifier (Subnet Mask), Destination (10.186.123.0), Destination Mask (255.255.255.0), Destination Port Start (255.255.255.0), Destination Port End (192.168.0.1), Action (Drop), and Direction (Inbound). The 'Direction' dropdown is highlighted with a red circle (5).

No.	Item	Description
①	Firewall	Sets the firewall, network security system, which monitors and controls incoming and outgoing network traffic based on predetermined security rules.
②	Firewall Config	Sets the firewall configuration. • Activate: Sets the firewall function by toggling the activation button (Enabled/Disable). • Inbound Default Action: Select the default settings for the incoming network from the drop-down list (Accept/Drop). • Outbound Default Action: Select the default settings for the outgoing network from the drop-down list (Accept/Drop). Click the Apply button to apply the settings to the system.
③	Firewall Rules	Displays firewall rule lists. • Add(+) button: To create new firewall rules, click the Add(+) button. Then the pop-up window is opened. Click the Update button. The created firewall rules are displayed on the list. - Enable: Select the checkbox to use the firewall rule. - Link: Select the link from the drop-down list. - Source: Enter the origin IP address. - Source Mask: Enter the source mask. - Source Port Start: Enter the source mask start. - Source Port End: Enter the source mask end. - Protocol: Select the protocol from the drop-down list. - Specifier: Select the Specifier from the drop-down list. - Destination: Enter the destination IP address. - Destination Mask: Enter the destination mask. - Destination Port Start: Enter the destination mask start. - Destination Port End: Enter the destination mask end. - Action: Select the action from the drop-down list. - Direction: You can assign the new rule entered above to the Inbound or the Outbound in the Direction menu.

Creating Firewall Rules (Example):

To block www.youtube.com,

1. Click the **Add(+)** button. On the pop-up window, enter the settings. Click the **Update** button to save. Enter each value accurately as the following.

- Link: **All**
- Source: **IP address** or **0.0.0.0** (0.0.0.0 means all the IP addresses)
- Source Mask: **Subnet Mask** (ex: 255.255.0.0) or **0.0.0.0** (0.0.0.0 means any masks)
- Source Port Start: **1 ~ 65535** (Source Port Start 1~ Source Port End 65535 means all the ports)
- Source Port End: **1 ~ 65535** (Source Port Start 1~ Source Port End 65535 means all the ports)
- Protocol: **All**
- Specifier: **Domain**
- Destination: **www.youtube.com**
- Destination Port Start: **1 ~ 65535** (Source Port Start 1~ Source Port End 65535 means all the ports)
- Destination Port End: **1 ~ 65535** (Source Port Start 1~ Source Port End 65535 means all the ports)
- Action: **Drop**
- Direction: **Outbound**

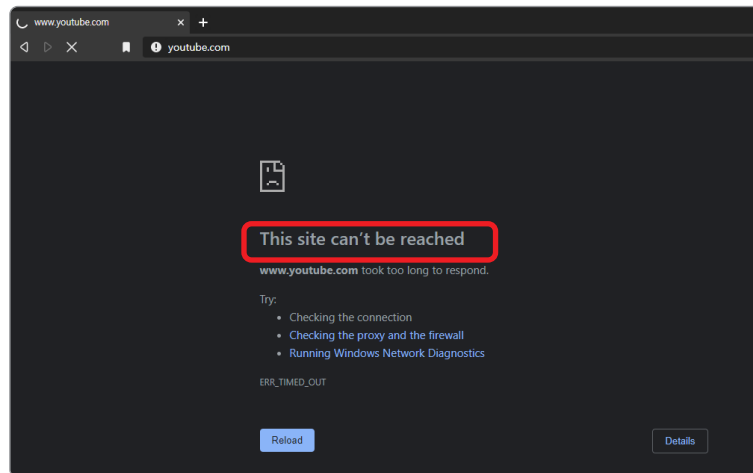
The left screenshot shows the 'Firewall' configuration page. The 'Firewall Rules' button is highlighted with a red box. The right screenshot shows the 'AptusLX' pop-up window with the 'Update' button highlighted with a red box.

2. The Firewall rules are displayed on the Firewall page. Check the Firewall configuration setup and confirm the created Firewall Rules.

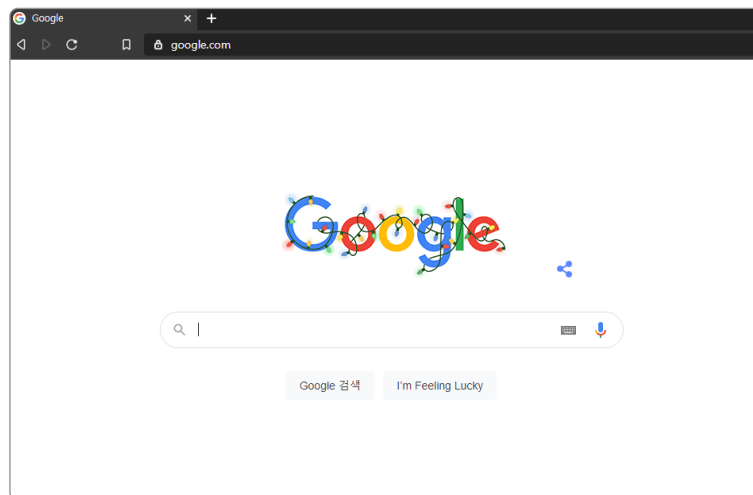
The screenshot shows the 'Firewall' configuration page. The 'Firewall Config' section is highlighted with a red box, showing the 'Activate' toggle set to 'Enabled'. The 'Firewall Rules' section is also highlighted with a red box, showing a list of rules. The first rule is an 'Outbound Rule' with the following settings:

Enable	Link
True	All
Source	Source Mask
0.0.0.0	0.0.0.0
Specifier	Destination
Domain	www.youtube.com
Destination Mask	Protocol
	All
Source Port	Destination Port
1~65535	1~65535
Action	Direction
Drop	Outbound

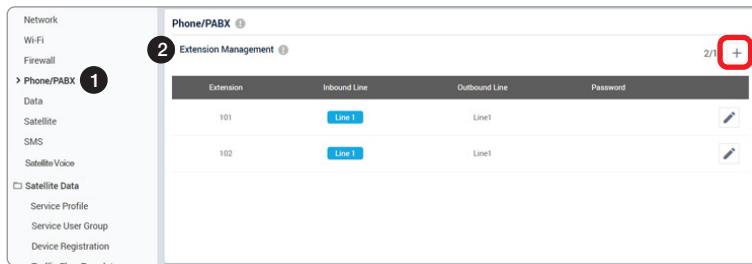
3. Try to open www.youtube.com on your web browser. Once applied, the user will not be able to access the website.



4. Make sure you can open websites other than www.youtube.com.



8.8.4 Phone/PABX



AptusLX

Extension: 201

Inbound Line: ☒ Line 1

Outbound Line: None

Password: ...

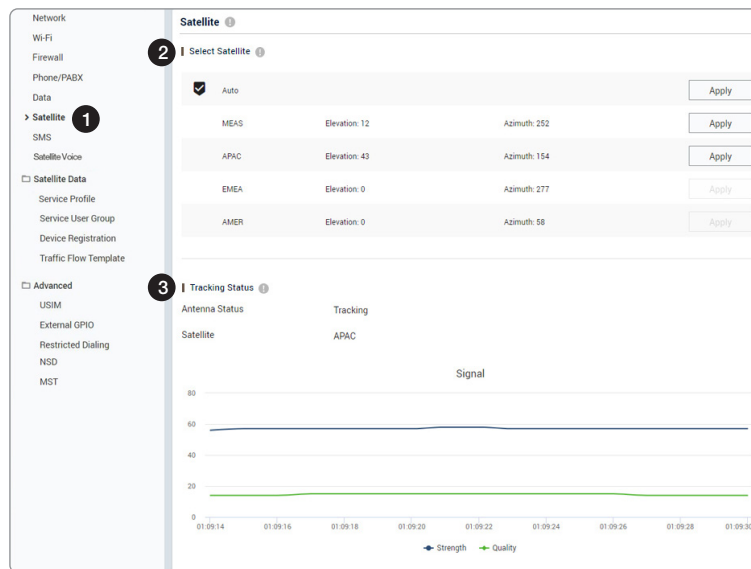
Cancel Update

No.	Item	Description
①	Phone/PABX	Sets the phone and Private Automatic Branch Exchange (PABX).
②	Extensions Management	Sets the extension number and details. • Edit() button: To edit the registered extension, click the Edit() button. Then the pop-up window is opened. You can edit details. • Delete() button: To delete the registered extension, click the Delete() button. (Extension 101 and 102 have no Delete() button.) • Add() button: To create new extension numbers, click the Add() button. Then the pop-up window is opened. You can assign the new extension number. Click the Update button. The created extension numbers are displayed on the list. - Extension: Displays the registered extension. - Inbound Line: The inbound line can be controlled and managed by individual selection through the blue indicator. - Outbound Line: Displays the outbound line. - Password: Displays the password.

8.8.5 Data

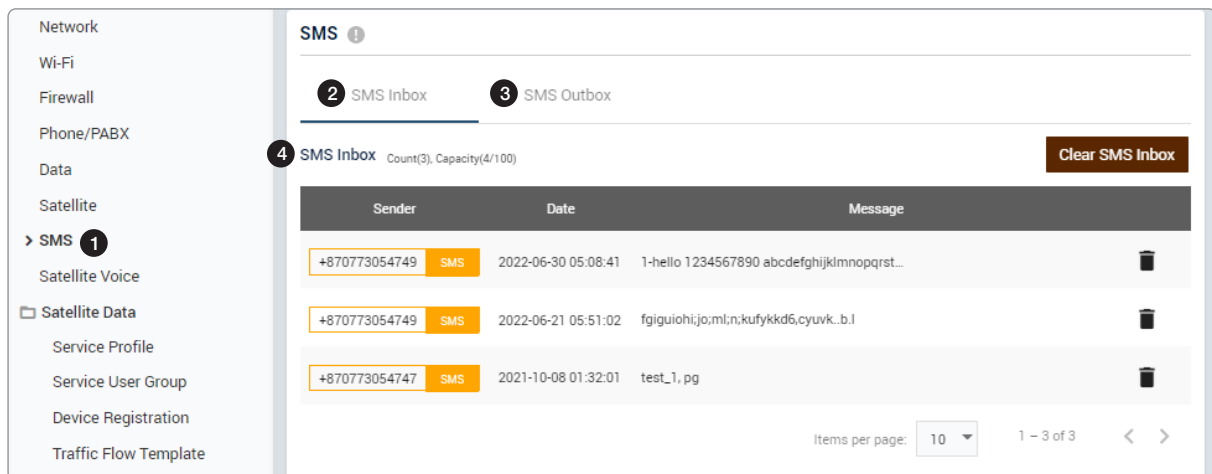
No.	Item	Description
①	Data	Sets the data settings.
②	Routing Config	Selects the Routing Config (None, Satellite Only, WAN Only, WAN Preferred). Click the Apply button to apply the settings to the system.
③	WAN Link	<i>This function is available in the WAN Only/WAN Preferred mode of the Routing Config.</i> Sets the WAN Link configuration. • Address Mode: Select the Address Mode (Dynamic/Static). • Static Config: Set the IP manually. - IP: Enter the IP address. - Subnet Mask: Enter the subnet mask. - Gateway: Enter the gateway IP address. - DNS: Enter the DNS. Click the Apply button to apply the settings to the system.
④	Port Forwarding	Displays the port forwarding list. To connect to the internal PC from the outside, create a rule of port forwarding. • Add(+) button: To create new port forwarding rule, click the Add(+) button. Then the pop-up window is opened. Enter the details, then click the Update button. The created ports are displayed on the list. - Enable: Select the checkbox to use the new port forwarding rule. - Internal IP: Enter the internal IP address. - Link: Select the link from the drop-down list. - Specifier: Select the specifier from the drop-down list. - Protocol: Select the protocol from the drop-down list. - Internal Port: Enter the port number of internal IP for forwarding the target port. - External Port: Enter the external port number for accessing the internal PC from the outside.

8.8.6 Satellite



No.	Item	Description
①	Satellite	By the satellite setup, the terminal automatically finds and connects to the most appropriate satellite in the default mode. In an area available with multi BGAN satellites, select a satellite to use for the registration on the BGAN network.
②	Select Satellite	Select a satellite to use. Check Auto and click the Apply button for setting the Auto Satellite mode (default). In the Auto Satellite mode, the terminal automatically finds and connects to the most appropriate satellite. To select a preferred satellite, check the satellite to use and click the Apply button. The terminal connects to the selected satellite only. If the antenna locates outside the coverage area of that satellite, the terminal is disconnected from the BGAN network. Note: When you click the Apply button, all of ongoing connections (calls, data transfer, etc.) with currently registered satellite will be terminated before registering the new satellite.
③	Tracking Status	When a satellite is selected, the antenna status is changed from Searching to Tracking Status. - Searching Status: The antenna is searching for the BGAN signal. - Tracking Status: The antenna is locked to and tracking the BGAN signal. In the graphic chart, the blue line shows Signal Strength (dBHz) and the green line shows Signal Quality Scores.

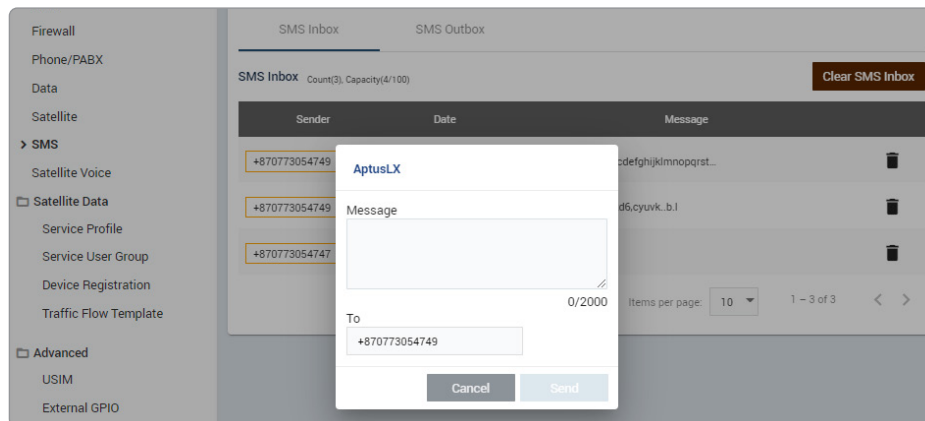
8.8.7 SMS



No.	Item	Description
①	SMS	The BGAN system provides a Short Messaging Service (SMS) and Concatenated Short Messaging Service (C-SMS) for sending and receiving SMS messages (Standard 3G, up to 2000 characters (or 1000 characters in case of UCS-2 encoding) per SMS) to and from the terminal.
②	SMS Inbox	All received SMS messages are stored in the inbox. Unread messages are marked with a New icon. If you have received a message with more than USIM capacity, you have to delete some of them in order to free space for new messages. Also, you can check a new SMS message at the top menu. Click Clear SMS Inbox to delete all messages in the Inbox.
③	SMS Outbox	All sent messages are stored in the outbox. If sending is successful, it is displayed as Success, and if it is unsuccessful, it is displayed as Error. Click the Receiver number field to re-send the message. Click Clear SMS Outbox to delete all messages in the Inbox.
④	SMS Inbox/ Outbox List	Click the number field in the list, a pop-up window will appear for sending SMS. Also, you can send SMS by clicking the letter icon at the bottom right of the screen. Refer to the following page for more details. Click the text field in the list, a pop-up window will appear to see the entire message.

Sending SMS message

1. Click the **Sender** number field in the list of SMS Inbox. Then the pop-up window is opened.
2. Type in the message in the Message field (Standard 3G, up to 2000 characters (or 1000 characters in case of UCS-2 encoding) per SMS). Check the number of written characters counted under the message field.
3. Type in the phone number in the To field (Recipient). Remember 00 and country code (e.g., 00 1 for the USA). '+' and country code is also available.
4. Click the Send button. The message is now sent and moved to the SMS Outbox.



8.8.8 Satellite Voice

No.	Item	Description
①	Satellite Voice	This menu provides the configuration for the satellite voice call service. The voice APN and SIP domain should not be changed if it is not necessary. <u>The satellite voice service might not be available if those are changed inadvertently.</u>
②	Satellite Voice	Sets the Satellite Voice for the satellite voice call service. - Voice Service: Enable or disable the satellite voice service. If disabled, the outgoing and incoming voice calls using the satellite are not available and the available voice service is limited to the local PBX calls. - Voice APN: Change voice APN(Access Point Name) for satellite voice service. (Default value for Voice APN: ipvoice.bgan.inmarsat.com) - SIP domain: Change SIP(Session Initiation Protocol) domain name for satellite voice service. (Default value for SIP Domain: sip.fbbip.inmarsat.com) Click the Apply button to apply the settings to the system.



NOTE

- If voice service is disabled, the safety voice call using MST device will not be available as well.
- The system event in the dashboard shows this information if Voice Service is disabled in this menu.

8.8.9 Service Profile

Network	Service Profile ¹						
Wi-Fi	2 Profile List						
Firewall							
Phone/PABX							
Data							
Satellite							
SMS							
Satellite Voice							
▣ Satellite Data							
> Service Profile ¹							
Service User Group							
Device Registration							
Traffic Flow Template							
▣ Advanced							
USIM							
External GPIO							
Restricted Dialing							
NSD							
MST							

Name	Traffic Class	Max Bitrate Downlink	Max Bitrate Uplink	Guaranteed Bitrate Downlink	Guaranteed Bitrate Uplink	Data Limit	
Default	Background	256	256	0	0	Unlimited /Unlimited (MB)	
Strm8	Streaming	8	8	8	8	Unlimited /Unlimited (min)	
Strm16	Streaming	16	16	16	16	Unlimited /Unlimited (min)	
Strm32	Streaming	32	32	32	32	Unlimited /Unlimited (min)	
Strm64	Streaming	64	64	64	64	Unlimited /Unlimited (min)	
Strm128	Streaming	128	128	128	128	Unlimited /Unlimited (min)	
Strm256	Streaming	256	256	256	256	Unlimited /Unlimited (min)	
User_1	Background	0	0	0	0	Unlimited /Unlimited (MB)	
User_2	Background	0	0	0	0	Unlimited /Unlimited (MB)	
User_3	Background	0	0	0	0	Unlimited /Unlimited (MB)	

AptusLX

Name

Default

Traffic Class

Background

Max Bitrate Downlink

256

Max Bitrate Uplink

256

Guaranteed Bitrate Downlink

0

Guaranteed Bitrate Uplink

0

Data Limit(Daily)

0

MB

Data Limit(Monthly)

0

MB

Use USIM Default APN

☒ Enable ☐ Disable

User Defined APN

Username

Password

Cancel

Update

No.	Item	Description
①	Service Profile	A profile includes Quality of Service (QoS) settings and other which define the data transmission mode on an interface. For example, a profile defines whether the traffic class should be a Background or Streaming. • Background: is the background profile for normal use. Several users can share the data connection simultaneously. The user pays for the amount of data sent and received (per byte). • Streaming: is the streaming profile. You get an exclusive, high-priority connection, that ensures seamless transfer of data. The user pays for the duration of the connection (per second). Select a profile among predefined profiles or define your own profiles for the data transmission.

No.	Item	Description
②	Profile List	Displays information of predefined service profiles. When you set up a service user group, you select the profiles to use. Select one primary profile and one secondary (optional) profile for the service user group. • Edit() button: To edit the profile, click the Edit() button. Then the pop-up window is opened. Enter the details, then click the Update button. - Name: Displays the name of profile. - Traffic Class: Select a traffic class from the drop-down list. NOTE: Choose the right traffic class for your network service for the best performance. Recommended to choose Background for TCP/IP service and Streaming IP for UDP traffic such as live video or audio. - Subscribed: This function is not available. - Conversational: This function is not available. - Streaming: Real-time 2 way communication. It is primarily used for video and audio. - Interactive: This function is not available. - Background: Used for data which is not delay-sensitive, such as Email SMS, download of databases, and reception of measurement records. - Max Bitrate Downlink: Select the maximum download bit rate allowed for this profile from the drop-down list. - Max Bitrate Uplink: Select the maximum upload bit rate allowed for this profile from the drop-down list. - Guranteed Bitrate Downlink: Select the guaranteed download bit rate needed for this profile from the drop-down list. - Guranteed Bitrate Uplink: Select the guaranteed upload bit rate needed for this profile from the drop-down list. - Data Limit: Set the Daily and Monthly limit. • In background: Enter a value between 1~102400 MBytes (MB: Enter a number, 0: unlimited). • In streaming: Enter a value between 1~1440 minutes for daily limit or 1~44640 minutes for monthly limit (Minute: Enter a number, 0: unlimited). For further information on the principles and parameters of the traffic flow filters, refer to the 3GPP standards TS 23.060. - Use USIM Default APN: Recommended. Choose whether to use the default APN (Access Point Name) value of USIM or not (Enabled/Disable). The APN is defined on the USIM card. - Use Defined APN: When you want to use a user-defined APN value, enter the APN value. APNs are provided by service providers. - Username & Password: Enter the username and password if the service provider or the operator will request these fields for the APN access

8.8.10 Service User Group

Service User Group List

Name	Status	Primary Profile	Secondary Profile	Edit
G2_Default (AUTO)	Enabled	Default	-	
G5_DataCustom	Enabled	User_1	-	
G6_DataStream	Enabled	Strm128	-	
G7_DataSecondary	Enabled	Default	Strm32	
G8_DataUser1	Disabled	User_1	-	
G9_DataUser2	Disabled	User_1	-	
G10_DataUser3	Disabled	User_2	-	
G11_DataUser4	Disabled	User_2	-	

AptusLX

Name: G2_Default

Auto Activation: ☒ Enable ☐ Disable

Primary Profile: Default

Secondary Profile: None

Cancel Update

NOTE

No.	Item	Description
①	Service User Group	The system can be organized in service user groups with a different setup and different access rights. Each service user group has a service profile that determines how users connect to the Inmarsat BGAN network. NOTE: For FB500, the maximum Streaming bit rate is 256 kbps.
②	Service User Group List	Displays the service user group list and information. - Edit() button: To edit the profile, click the Edit() button. Then the pop-up window is opened. Enter the details, then click the Update button. - Name: Enter the name of service user group. - Status: Set whether to use this group automatically or not(Enabled/Disabled). - Primary Profile: Select the target primary profile from the drop-down list. This profile is used by this service user group as a first choice, when possible. - Secondary Profile: Select the target secondary profile from the drop-down list. - For G2_Default only, “Auto Activation” feature can be enabled or disabled. And the auto activation feature is disabled by default. - If this feature is enabled and UT is rebooted, all users in user group G2_Default may use data services after the satellite connection completes without pressing the activation button in the dashboard as per “8.6.1 Satellite Data Connection Control” on page 69. - This feature has an effect on the devices whose service user group is G2_Default and which have been already registered in the SETUP, Device Registration menu. (Refer to the clause, “8.8.11 Device Registration” on page 91) - If the device is not registered as a G2_Default service user group in the menu, the data service will not be automatically available even after auto activation configuration change to ‘enabled’ and UT reboot.



NOTE

- Unintended background data from personal devices connected to the user terminal may result in excessive charges after a reboot if the auto activation is enabled. Therefore you should be careful to enable the auto activation feature.
- You may configure the data limit for the charge control for the Default background profile session (Refer to the clause, “8.8.9 Service Profile” on page 88 for the data limit configuration)

8.8.11 Device Registration

The screenshot displays the AptusLX web interface for device registration. On the left, a sidebar contains a navigation menu where 'Device Registration' is selected and marked with a circled '1'. The main content area, titled 'Device Registration List' (marked with a circled '2'), shows a table with three columns: 'Alias', 'MAC Address', and 'Service User Group'. The table lists three devices: '1st_laptop_u', '2nd_laptop', and '1st_laptop_w'. Each row has an 'Edit' icon (pencil) on the right. A red box highlights a '+3/2' button in the top right corner of the table. To the right of the table, a pop-up window titled 'AptusLX' allows editing a device profile. It contains input fields for 'Alias' (1st_laptop_u), 'MAC Address' (08:00:27:50:73:AD), and 'Service User Group' (G2_Default). At the bottom of the pop-up are 'Delete', 'Cancel', and 'Update' buttons.

Alias	MAC Address	Service User Group
1st_laptop_u	08:00:27:50:73:AD	G2_Default(2)
2nd_laptop	00:E0:4B:69:2A:4E	G2_Default(2)
1st_laptop_w	98:83:89:9C:F7:9E	G2_Default(2)

No.	Item	Description
①	Device Registration	Register the MAC address of the device for using the data service, and assign a service user group to the device.
②	Device Registration List	Displays device registration list and information. • Edit() button: To edit the profile, click the Edit() button. Then the pop-up window is opened. Enter the details, then click the Update button. Click the Delete() button to delete it on the list. - Alias: Enter the device name for the data service. - MAC Address: Enter the MAC address. - Service User Group: Select the service user group from the drop-down list.

8.8.12 Traffic Flow Template (TFT)

Network

Wi-Fi

Firewall

Phone/PABX

Data

Satellite

SMS

Satellite Voice

☐ Satellite Data

Service Profile

Service User Group

Device Registration

> Traffic Flow Template

☐ Advanced

USIM

External GPIO

Restricted Dialing

NSD

MST

2 Uplink TFT List

Packet Filter Identifier	Target Route Service Profile	Remote Address	Subnet Mask	Protocol Number	Source Port Range	Destination Port Range	Type of Service	Type of Service Mask
1	None			255	0~0	0~0		
2	None			255	0~0	0~0		
3	None			255	0~0	0~0		
4	None			255	0~0	0~0		

1 Downlink TFT List

Packet Filter Identifier	Target Route Service Profile	Remote Address	Subnet Mask	Protocol Number	Source Port Range	Destination Port Range	Type of Service	Type of Service Mask
1	None			255	0~0	0~0		
2	None			255	0~0	0~0		
3	None			255	0~0	0~0		
4	None			255	0~0	0~0		
5	None			255	0~0	0~0		
6	None			255	0~0	0~0		
7	None			255	0~0	0~0		
8	None			255	0~0	0~0		

AptusLX

Packet Filter Identifier: 1

Target Route Service Profile: Strm8

Remote Address:

Subnet Mask:

Protocol Number: 255

Source Port Range: 0

Destination Port Range: 0

Type of Service:

Type of Service Mask:

Cancel Update

No.	Item	Description
①	Traffic Flow Template	By the Traffic Flow Template (TFT), set up each type of traffic differently for the best performance. When you need more than one type of traffic, use both primary and secondary profiles. Use the traffic template to classify information received from an external network as the service profile for the BGAN network and your terminal. When using a secondary profile, assign specific addresses, protocols, and ports for the system transmission and reception by traffic filtering.
②	Uplink/Downlink TFT List	Displays Uplink/Downlink TFT list and information. - Edit() button: To edit the profile, click the Edit() button. Then the pop-up window is opened. Enter the details, then click the Update button. - Packet Filter Identifier: Displays the filter ID. - Target Route Service Profile: Select the target route service profile from the drop-down list. - Remote Address: Enter the remote address (IPv4 IP). Enter a source address for Downlink TFT and a target address for Uplink TFT. - Subnet Mask: Enter the subnet mask. - Protocol Number: Enter an unique number to assign to the protocol used. TCP is set to 6, and UDP is set to 17. The protocol number determines which protocol is used by TFT. - Source Port Range: Enter from and to ports of the range. - Destination Port Range: Enter from and to ports of the range. - Type of Service /Type of Service Mask: Set the value between 0 and 255. Type of Service (TOS) is used to define Quality of Service with an associated mask.

8.8.13 USIM

No.	Item	Description
①	USIM	Sets the use of a PIN to access the terminal.
②	PIN Configuration	Select Enabled or Disable to use a PIN. • Enable: You must enter a PIN before you can change settings or make calls or data sessions. • Disable: You can access and use the terminal without entering a PIN. Click the Apply button to apply the settings to the system. The new PIN settings will take effect at the next power on.
③	Change PIN	Changes the PIN used to access the terminal. • Old PIN: Type in the old PIN. • New PIN: Type in the new PIN. • Confirm new PIN: Retype in the new PIN. Click the Apply button to apply the settings to the system. The new PIN settings will take effect at the next power on.
④	Mobile Number	Enters the mobile number. The mobile number is not available at delivery. The user has to enter the number received from the Airtime provider. Click the Apply button to apply the settings to the system.



NOTE

The Number is for your information.

8.8.14 External GPIO

The screenshot shows the 'External GPIO' configuration page. The sidebar menu on the left includes categories like Network, Wi-Fi, Firewall, Phone/PABX, Data, Satellite, SMS, Satellite Voice, Satellite Data, and Advanced. The 'External GPIO' option is selected under the 'Advanced' category. The main content area is titled 'External GPIO' and contains two sections: 'Inputs' and 'Outputs'. Each section has a '1' icon and a '2' icon. The 'Inputs' section has two input fields, both set to 'Disable'. The 'Outputs' section has three output fields, all set to 'Disable'. An 'Apply' button is located at the bottom right of the 'Outputs' section.

No.	Item	Description
①	External GPIO	Select the external General Purpose Inputs/Outputs (GPIO) settings from the drop-down list.
②	Inputs	Select the input settings from the drop-down list.
③	Outputs	Select the outputs settings from the drop-down list.

8.8.15 Restricted Dialing

Restricted Dialing

Activation: ☒ Enable ☐ Disable
 Apply

Allowed Dialing List 4/21 **+**

Allowed Numbers or Masks	
888777555666	
+00006666	
76767666+	
+2335557799+	

Extension Status

Extension	Restrictions
101	☒ Enabled
102	☒ Enabled
201	☐ Disabled
203	☐ Disabled

AptusLX

Restricted Dialing

Cancel **Create**

No.	Item	Description								
①	Restricted Dialing	Set up the terminal for restricted dialing.								
②	Restricted Dialing	Set whether to use restricted dialing or not (Enable/Disable). Click the Apply button to apply the settings to the system.								
③	Allowed Dialing List	Displays the allowed dialing list. • Add(+) button: To create a new restricted dialing rule, click the Add(+) button. Then the pop-up window is opened. Enter the allowed numbers or masks in the entry box. The numbers or masks must be max. 32 digits. The masks may start or end with + that positions the first or last part of a phone number, and it covers all numbers. No other special characters are allowed. See the example below. <table><thead><tr><th>Mask (+)</th><th>Numbers Accepted</th></tr></thead><tbody><tr><td>+123456789</td><td>Any number ending with 123456789 ex) 00123456789</td></tr><tr><td>123456789+</td><td>Any number starting with 123456789 ex) 12345678900</td></tr><tr><td>+123456789+</td><td>Any number including 123456789 in the middle ex) 0012345678900</td></tr></tbody></table> Click the Update button. The created dialing rule is displayed on the list.	Mask (+)	Numbers Accepted	+123456789	Any number ending with 123456789 ex) 00123456789	123456789+	Any number starting with 123456789 ex) 12345678900	+123456789+	Any number including 123456789 in the middle ex) 0012345678900
Mask (+)	Numbers Accepted									
+123456789	Any number ending with 123456789 ex) 00123456789									
123456789+	Any number starting with 123456789 ex) 12345678900									
+123456789+	Any number including 123456789 in the middle ex) 0012345678900									
④	Extension Status	Set whether outgoing calls of each extension should be limited to the numbers or not (Enabled/Disabled).								

8.8.16 NSD

This function is available in the Satellite Only mode of the Routing Config.

No.	Item	Description
①	NSD	<i>This function is available in the Satellite Only mode of the Routing Config.</i> Set the Routing Config in the “8.8.5 Data” on page 83. Network Service Device (NSD) is used to manage and control the data traffic over both GX and BGAN terminals when an L-band BGAN terminal is used as a backup to a Global Xpress (GX) service.
②	Network Service Device	Select the terminal type of NSD to connect to the antenna from the drop-down list. Click the Apply button to apply the settings to the system.
③	Fleet Edge Support	• Fleet Edge: Activates the function to support Fleet Edge. The IP assigned from the satellite is assigned to the device connected to the Ethernet port below. • Ethernet Port: In case Fleet Edge is enabled, specify the Ethernet port to which the device to receive the IP assigned from the satellite is connected. • APN: Enter the APN name of the Fleet Edge. • Username: Enter the username of the APN. • Password: Enter the password corresponding to the user name.



NOTE 1.

If Fleet Edge support is activated, the satellite data connection is not available in dashboard. In that case, the satellite data connection for Fleet Edge support is only available. Voice service using the satellite network is always available regardless of Fleet Edge support activation.

NOTE 2.

If Fleet Edge support is activated, the existing firewall rules at **SETUP > Firewall** menu are disabled and not used.

NOTE 3.

If Fleet Edge support is activated, the existing port forwarding rules at **SETUP > Data** menu are disabled and not used.

NOTE4.

If Fleet Edge support is activated, you can see the status in the dashboard.

8.8.17 MST

MST

2 Maritime Safety Terminal

MST Connection ☒ Enabled

Listening port in FB terminal's JSON-RPC

Server

3 MST Handset Configuration

Incoming Distress Call Alert ☒ Enabled

Incoming Normal Call Alert ☐ Disabled

4 Service Profile List

Name	Traffic Class	Max Bitrate Downlink	Max Bitrate Uplink	Guaranteed Bitrate Downlink	Guaranteed Bitrate Uplink	APN
SafetyVoice	Background	0	0	0	0	ipvoice.bgan.inmarsat.com
SafetyP5	Background	0	0	0	0	prio5-msds.bgan.inmarsat.com
SafetyP6	Background	0	0	0	0	prio6-msds.bgan.inmarsat.com
SafetyP9	Background	0	0	0	0	prio9-msds.bgan.inmarsat.com
SafetyP11	Background	0	0	0	0	msds.bgan.inmarsat.com

AptusLX

Name

Traffic Class

Max Bitrate Downlink

Max Bitrate Uplink

Guaranteed Bitrate Downlink

Guaranteed Bitrate Uplink

User Defined APN

No.	Item	Description
①	MST	The Maritime Safety Terminal (MST) performs all mariner interactions with the Maritime Safety Data Service (MSDS), including the processing of vessel generated Distress Alerts that are initiated by the dedicated distress button.
②	Maritime Safety Terminal	Sets the maritime service function. - MST Connection: Set the maritime service by toggling the activation button (Enabled/Disabled). - Server: Enter the listening port number in the JSON-RPC server.
③	MST Handset Configuration	- Incoming Distress Call Alert: This function is not available for setting activation button because it is fixed as Enabled. - Incoming Normal Call Alert: Set the normal call alert by toggling the activation button (Enabled/Disabled). Click the Apply button to apply the settings to the system.
④	Profile List	Displays the profile list for safety service using MST. Refer to the “8.8.9 Service Profile” on page 88 to edit details.



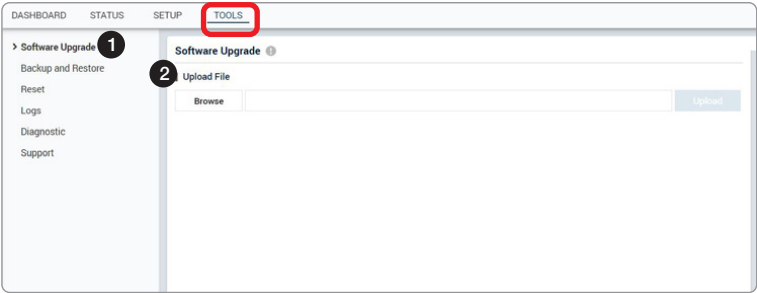
NOTE

If the APN of SafetyVoice in Service Profile List table has been changed, Voice APN in 8.8.8 Satellite Voice will be changed to the same value. (Default value for APN of SafetyVoice: ipvoice.bgan.inmarsat.com)

8.9 Tools

This menu sets and displays the Software Upgrade, Backup & Restore, Reset, Logs, Diagnostic, and Support function.

8.9.1 Software Upgrade



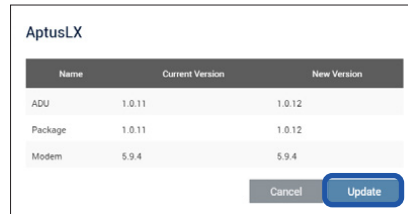
No.	Item	Description
①	Software Upgrade	Upgrades antenna software firmware.
②	Upload File	Browse and select the package firmware file to upload and click the Upload button. The update may take a few minutes to complete. The upload time may vary due to a variety of factors such as the speeds of your network. Uploading an incorrect firmware file may cause serious damage to your antenna and BDU. Refer to the following "Package Update Procedures" page for more details.

Package Firmware Update Procedures:

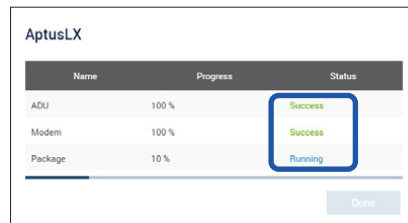
1. Browse and select the upgrade package file to upload. Click on the **Upload** button to transfer the Firmware package file (*.bin) to the BDU module.



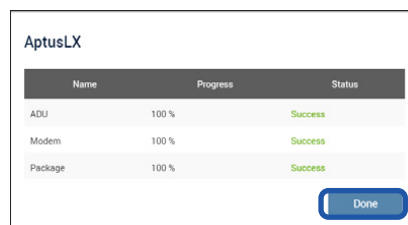
2. The antenna firmware state will appear in the pop-up window. Check the current version and the new version. Click the **Update** button.



3. During the upgrade process, the window will display process status.



4. If the firmware is successfully upgraded, it will display as **Success**. Click the **Done** button to close the pop-up window.



8.9.2 Backup and Restore

Software Upgrade

➤ Backup and Restore ①

Reset

Logs

Diagnostic

Support

② Backup

Backup

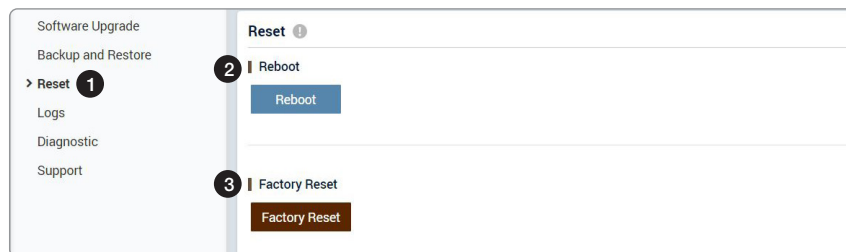
③ Restore

Browse

Upload

No.	Item	Description
①	Backup and Restore	Backs up user configuration files to PC and Restores the antenna settings.
②	Backup	Saves user configuration files to PC. Click the Backup button to apply the settings to the system.
③	Restore	Restores the antenna setting by using the setting files saved from the PC. Click the Restore button to apply the settings to the system.

8.9.3 Reset



No.	Item	Description
①	Reset	Resets the antenna system and factory reset.
②	Reboot	Click the Reboot button to reset the antenna system. The user configuration is not reinitialized.
③	Factory Reset	Click the Factory Reset button to initialize the antenna system. The user configuration is initialized.

8.9.4 Logs

No.	Item	Description
①	Logs	Downloads the antenna log data.
②	Log Download	Displays the antenna log list. Any log data (.tgz) within a month can be downloaded. • Date: Set the duration by selecting start and end dates in the calendar. • Category: Choose the logs category to download. - All : All logs including below 3 categories - Minimal : Minimal logs for ADU/BDU/System Event only - SIP/PPPoE : SIP/PPPoE packet dump only - Modem/Kernel/MDM/Asterisk : Other logs only Click the Download Log File button to download the logs data.

8.9.5 Diagnostic

The screenshot shows the 'Diagnostic' menu with the following steps:

- Diagnostic** (selected): Includes links for Software Upgrade, Backup and Restore, Reset, Logs, Diagnostic, and Support.
- Hardware Test Mode Status**: Shows 'Operation Mode' as 'Active' with a toggle switch.
- Self Test**: Contains a 'Start' button.
- Self Test Results**: Displays 'No Test Results'.
- ADU Diagnostic**: A table with columns for Test, Result, and Reason. All tests are currently 'Idle'.

Test	Result	Reason
Comms	Idle	-
IMU Sensor	Idle	-
AZ Motor	Idle	-
EL Motor	Idle	-
CL Motor	Idle	-
MPU Temperature	Idle	-
ADU RF Temperature	Idle	-
MoCA PHY	Idle	-
MPU PHY	Idle	-
Modem PHY	Idle	-
FEM Current	Idle	-

No.	Item	Description
①	Diagnostic	Executes antenna diagnosis test to check the antenna status.
②	Hardware Test Mode Status	Sets the hardware test function by toggling the activation button (Active/Inactive).
③	Self Test	The activation button must be selected to the "Active" in the previous step. Click the Start button to run the self-test.
④	Self Test Results	Displays the self-test result.
⑤	ADU Diagnostic	Executes the ADU diagnosis test to check each part of ADU status. Select the ADU part to test by toggling the activation button (Enabled/Disable). Click the Start button to run the test.



WARNING

While selecting the **Active** button in the Hardware Test Mode Activate menu, the system is in the hardware test mode. Select the **Inactive** button for normal operation.

8.9.6 Support



No.	Item	Description
①	Support	Downloads the User Guide.
②	Manual	The user guide file (.pdf) can be downloaded. Click the Download button.

Chapter 9. Specification

9.1 Antenna Specification

Item		Specification
Ship's Motion	Roll	$\pm 28^\circ / 4 \text{ s}$
	Pitch	$\pm 15^\circ / 3 \text{ s}$
	Yaw	$\pm 10^\circ / 5 \text{ s}$
	Turning rate	$36^\circ/\text{sec}$ and $12^\circ/\text{s}^2$
	Headway	30 knots
MoCA	Frequency Band	750 MHz
	Throughput	500 Mbps in 100 feet on LMR200
	Return Loss	8 dB
Tx Module	Frequency Range	1626.5 ~ 1675.0MHz
	Output Power level	+34 dBm (2.5Watt)
	Normal signal Gain	31 dB typ
ADU to BDU Cable (Antenna Cable)		Single Coaxial Cable
Antenna Power		48 V DC supplied from BDU over Coax Cable
Antenna Power Consumption		Antenna Power 48 Vdc Max 80 W, BDU Power Max 40 W
Radome Height		797 mm (31.4")
Radome Diameter		$\varnothing 733 \text{ mm}$ (28.9")
Antenna Weight		29.5 kg (65.0 lbs)

9.2 RF Specification

Item	Specification
Rx Frequency	1518.0 ~ 1559.0 MHz L-Band
Rx Gain	18 dBi
G/T	- 7.0 dB/K
Tx Frequency	1626.5 ~ 1675.0 MHz L-Band
Tx Gain (Without Radome)	18 dBi
EIRP	22 dBW
Polarization	RHCP
Axial Ratio	<2 dB
Antenna Motion	-25 ~ 115°

9.3 Below Decks Unit Specification

Item	Specification	
Size (W x D x H)	315 x 190 x 42 mm (12.4" x 7.5" x 1.7")	
Weight	1.5 kg (3.3 lbs) (Stand-alone Type)	
LED Indicator	3 LEDs for Power, Tracking, Event	
GNSS	GPS, GLONASS	
SIM	1 ea, 2FF Push-Push type with locking structure	User Authentication
Ethernet	4x RJ45 female (FB500)	TCP/ IP connection 2 port PoE
RF Interface	1 ea, TNC Female	Sub-System Connection to ADU
Analog	1 ea, RJ14 Female	Analog Phone
GPIO	1 ea, (16 pins)	General Purpose I/O
Wi-Fi	1 ea, SMA Female (802.11 b/g)	External Wi-Fi Antenna
On/Off switch	1 ea., power switch or toggle type	System Power Switch
Reset	1 ea	System Reset
1 ea Grounding	1 ea	Grounding
BDU Power Input	10.8 ~ 30 V DC, 120 W max	
Web Interface	Embedded in BDU, available by Ethernet or Wi-Fi	

9.4 Packing Specification

Item		Specification
Package	Size	1130.5 mm x 910 mm x 910 mm (L x W x H, 44.5" x 35.8" x 35.8")
	Weight	85kg (187.4lbs)

9.5 Environmental Specification

Test	Intellian Standard	
Temperature (ADU)	Operational	IEC-60945 (-25 °C to + 55 °C / Power On)
	Survival	IEC-60945 (-40 °C to + 80 °C / Powered On and a non-functional state)
	Storage	IEC-60945 (-40 °C to + 85 °C / Power off)
Temperature (BDU)	Operational	IEC-60945 (-25 °C to + 55 °C)
	Survival	IEC-60945 (-40 °C to + 80 °C)
	Storage	IEC-60945 (-40 °C to + 85 °C)
Humidity	IEC-60068-2-30 Upper test Temp.: + 40 °C (-3), Humidity 98 % Lower test Temp.: +15 °C (+3), Humidity 71 % ~ 78 %	
Vibration	Operational	IEC-60945 Random 1.05 g RMS
	Survival	IEC-60721-3-6 Class 6M3 Random 1.7 g RMS
Shock (ADU)	Operational	Half sine, 20g / 11 ms

Test	Intellian Standard	
Shock (BDU)	Operational	IEC-60068-2-27 10 g/11 ms, 20 g/7 ms
	Survival (Transient)	IEC-60721-3-6 Class 6M3 (10 g/11 ms, 30 g/6 ms, 50 g/3 ms)
	Survival (Bump)	IEC-60721-3-6 Class 6M3 (25 g/6 ms)
Salt Mist	Saline solution: 5 % NaCl, PH 6.5 to 7.2 at 20 °C ± 2 °C Storage period: 7 Days (IEC-60945)	
Wind Load	200 km/hr	
Ingress Rating (ADU)	IP56 (Water Proofing: IEC-60529)	
Ingress Rating (BDU)	IP31	

Chapter 10. Warranty Policy

Intellian systems are warranted against defects in parts and workmanship, these warranties cover THREE (3) YEAR of parts and TWO (2) YEAR of factory repair labor to return the system to its original operational specification.

Warranty periods commence from the date of shipment from Intellian facility, or date of installation which is come sooner. Providing maximum 6 months Warranty additionally if submission of authorized form which is described installation occurs within 6 months from the shipment date.

Intellian Technologies warranty does not apply to 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) repair or replace 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 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

11.2 Important Notice of Waterproofing Connector

11.2.1 Introduction

During antenna installation, it is important to ensure that once the cable is connected to the antenna, proper waterproofing of the connector must be done with a self-amalgamating tape.

If you need any assistance, please contact Intellian Technical Support (support@intelliantech.com).

11.2.2 Outline of Taping

Self-amalgamating tape comes with a protective, plastic peel-away layer that allows the tape to be 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.



11.2.3 Procedure

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

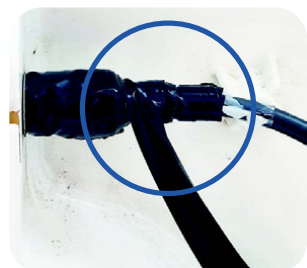


CAUTION

- DO NOT over-tighten the connector, nuts, or screws when mounting the antenna to prevent any damage.
- DO NOT leave any cables loose and non-fixed, especially for those installed outside of the antenna.

2. Apply tape over the connector.

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.