

COBHAM

SAILOR 4300 L-Band System

Installation and Maintenance Manual



SAILOR 4300 L-Band System

Installation Manual

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NOTICE:

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.

Le présent appareil est conforme aux CNR d'Industrie 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, et
- (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

NOTICE:

Changes or modifications made to this equipment not expressly approved by Thrane & Thrane A/S may void the FCC authorization to operate this equipment.

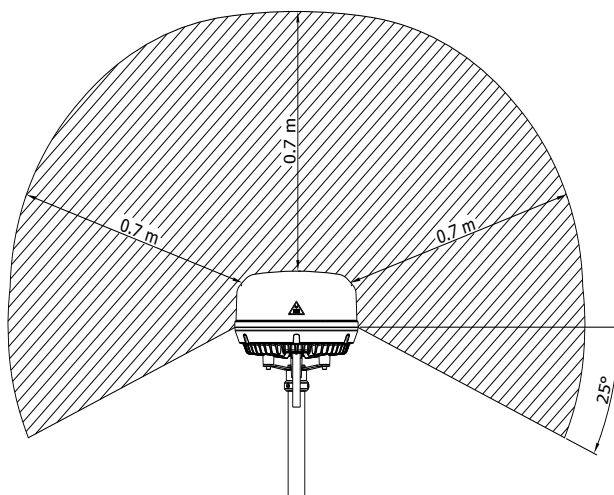
Safety summary

The following general safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Thrane & Thrane A/S assumes no liability for the customer's failure to comply with these requirements.

Microwave radiation hazards

During transmission the antenna in this system radiates Microwave Power. This radiation may be hazardous to humans close to the antenna. During transmission, make sure that nobody gets closer than the recommended minimum safety distance.

The minimum safety distance to the antenna is 0.7 m, based on max Eirp = 46.4 dBm + 1 dB. No hazard exists > 25° below the antenna's mounting plane. Refer to the drawing below.



Distance to other equipment

Do not install the antenna closer to radars than the minimum safe distance specified in section *Interference from radar, GNSS, L-band and other transmitters* on page 3-3. It may cause damage to the antenna.

Compass safe distance:

SAILOR 4352A Above Deck Unit (ADU): min. 0.3 m (IEC/EN 60945).

SAILOR 4338A Below Deck Unit (BDU): min. 0.3 m (IEC/EN 60945).

Service

User access to the interior of the terminal is not allowed. Only a technician authorized by Cobham SATCOM may perform service - failure to comply with this rule will void the warranty. Access to the interior of the antenna is not allowed. Replacement of certain modules and general service may only be performed by a technician authorized by Cobham SATCOM.

Grounding, cables and connections

To minimize shock hazard and to protect against lightning, you must connect the equipment chassis and cabinet to an electrical ground. Ground the BDU to the ship. For further details see Appendix D, *Grounding and RF protection*. Do not extend the cables beyond the lengths specified for the equipment. The cable between the BDU and antenna can be extended if it complies with the specified data concerning cable losses etc.

Coax cable for the SAILOR 4300 L-Band System are shielded and should not be affected by magnetic fields. However, try to avoid running cables parallel to high power and AC/RF wiring as this might cause malfunction of the equipment.

Power supply

SAILOR 4300 L-Band System: voltage range 12 - 24 VDC.
The antenna is powered by the terminal.

Do not operate in an explosive atmosphere

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Keep away from live circuits

Operating personnel must not remove equipment covers. Component replacement and internal adjustment must be made by qualified maintenance personnel trained and authorized by Cobham. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

Failure to comply with the rules above will void the warranty!

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About this manual

1.1 Intended readers

This is an installation and service manual for the SAILOR 4300 L-Band System, intended for installers of the system and service personnel. Personnel servicing the system must be properly trained and authorized by Cobham SATCOM. It is important that you observe all safety requirements listed in the beginning of this manual, and install the system according to the guidelines in this manual.

1.2 Manual overview

This manual has the following chapters:

- *Introduction*
- *Installation*
- *Configuration*
- *Final installation check*
- *Service & maintenance*

This manual has the following appendices:

- *Technical specifications*
- *System messages*
- *Approvals*
- *Grounding and RF protection*

1.3 Related documentation

The following related documentation is referred to in this manual:

Part Number	Description
98-159746	SAILOR 4300 L-Band System, Installation Guide
98-159912	SAILOR 4300 L-Band System, User manual
98-126059	Thrane IP Handset, User Manual
99-159739	SAILOR 4300 Service Provider Interface Control Description

Table 1-1: List of Related Documentation

1.4 Precautions

Warnings, Cautions and Notes

Text marked with “Warning”, “Caution”, “Note” or “Important” have the following meanings:

- **Warning:** A Warning is an operation or maintenance procedure that, if not obeyed, can cause injury or death, or jeopardize the safety on board.
- **Caution:** A Caution is an operation or maintenance procedure that, if not obeyed, can cause damage to the equipment.
- **Note:** A Note gives information to help the reader.
- **Important:** A text marked Important gives information that is important to the user, e.g. to make the system work properly. This text does **not** concern damage on equipment, safety nor personal safety.

General precautions

All personnel who operate equipment or do maintenance as specified in this manual must know and follow the safety precautions. The warnings and cautions that follow apply to all parts of this manual.



WARNING! Before using any material, refer to the manufacturers' material safety data sheets for safety information. Some materials can be dangerous.



CAUTION! Do not use materials that are not equivalent to materials specified by Cobham SATCOM. Materials that are not equivalent can cause damage to the equipment.



CAUTION! The system contains items that are electrostatic discharge sensitive. Use approved industry precautions to keep the risk of damage to a minimum when you touch, remove or insert parts or assemblies.

Introduction

This chapter contains the following sections:

- *General description*
- *Part numbers*
- *Part numbers*

2.1 General description

2.1.1 Overview

The SAILOR 4300 L-Band System consists of an ADU (Above Deck Unit) and a BDU (Below Deck Unit). The two units are connected with a single coax cable with TNC connectors. The system is DC powered. The SAILOR 4300 L-Band System is used for voice calls and data sessions. Iridium OpenPort Services offer up to 134/134 kbps, while Iridium Certus 350 Services offer up to 176/352 kbps uplink/downlink clarification. The Iridium Certus 700 Service offers on the SAILOR 4300 speeds up to 176/704 kbps. Iridium has 100% global coverage. Some countries have national restrictions.



Figure 2-1: SAILOR 4300 L-Band System

2.1.2 SAILOR 4338A Below Deck Unit (BDU)

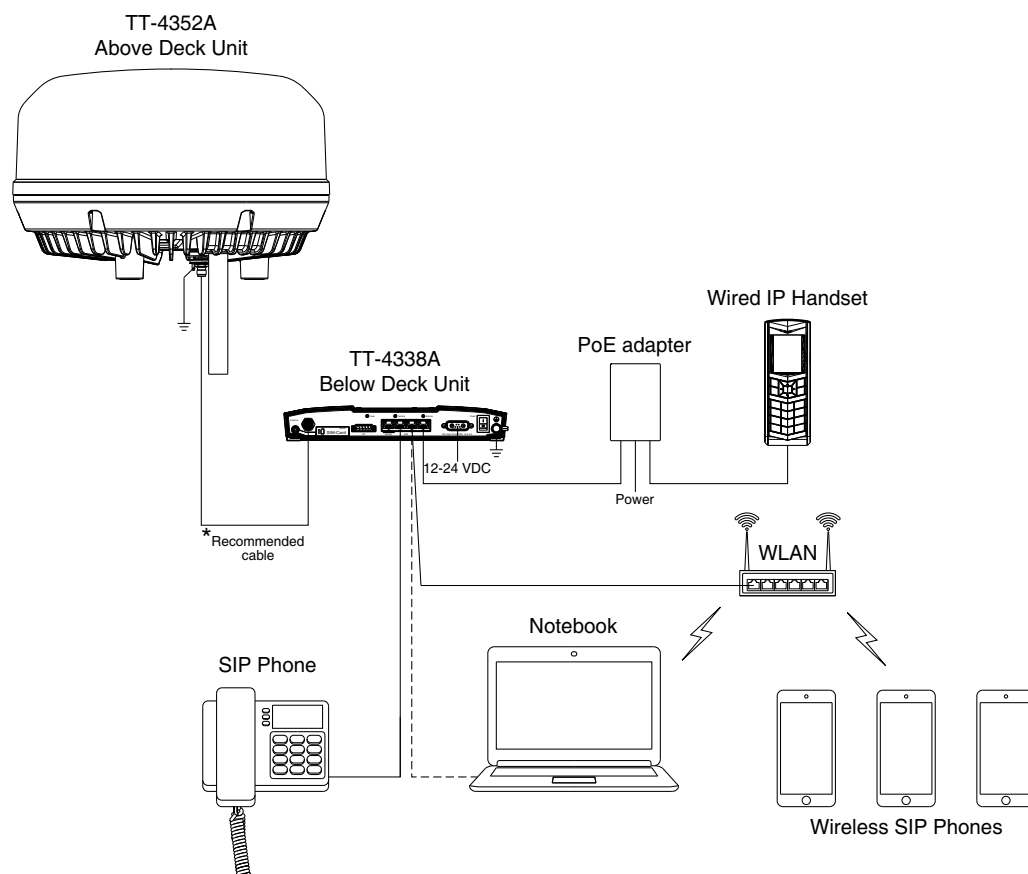
The BDU is the central unit in the system. It contains all user interfaces and handles all communication between the ADU and the local communication units (phones, computers etc.). The BDU has Built-In Test Equipment (BITE) for Power On Self-Test (POST) and Continuous Monitoring (CM). It comes in two versions, one designed for wall or desktop installation, and one designed for installation in a 19" rack. The BDU supplies 42VDC to the antenna through a single coaxial cable. The DC input for the BDU is designed for both 12VDC/24VDC power supply.

2.1.3 SAILOR 4352 Above Deck Unit (ADU)

The ADU consists of an antenna with an RF-unit, unit for antenna control and GPS antenna. The ADU is dedicated to the Iridium system. All communication between the ADU and BDU passes through a single coaxial cable. The ADU is protected by a thermoplastic radome.

2.1.4 Data sessions and voice calls

The SAILOR 4300 L-Band System provides data connection and up to three simultaneous IP voice calls. Both data and voice services is accessed through the service and the three user LAN ports depending on configuration.



* Connector type: TNC
Cable requirements:
- Installation on bigger vessels: RG214/U up to 100 m length
- Installation in a mechanically protected environment and shorter distances: RG223/U up to 25 m length

Figure 2-2: Data sessions with the SAILOR 4300 L-Band System

Data services are available on any of the LAN ports. The Certus data service define multiple data flows as shown in the table below:

Name	Services
Post-paid	Data, voice and DHCP server
Secondary 1	Data

Table 2-1: Data services

Name	Services
Secondary 2	Data
Secondary 3	Data
Secondary 4	Data

Table 2-1: Data services (Continued)

All user ports are default attached to Post-paid data flow. A user port can be attached to any other flow depending on configuration.

All flows are available through the Service port via VLANs. Each flow's VLAN ID is shown in table Table 4-10 on page 4-21.

Each flow has three modes: off, manual (default) and automatic. If a flow is in manual mode, the data session is stopped on terminal startup and can easily be started and stopped from the Service or Mobile web interface. If a flow is in automatic mode, the data session will automatically start when traffic is detected. Automatic mode is persistent across reboots.

The BDU communicates directly with SIP phones on any of the LAN ports. The terminal SIP server is available on the Post-paid data flow only. Be aware that if connected to the service port the SIP phone has to setup VLAN tagging.

For configuration and setup of voice and data services see *Configuration* on page 4-1.

2.1.5 IMEI and IMSI number

The terminal has an IMEI number which is stored by Iridium. The IMEI is printed on the ADU type label and on the dashboard page.

The IMSI number is printed on the SIM card which you have received from your airtime provider.

2.1.6 Emergency calls

Iridium Certus Terminals support several emergency services internationally. Ship personnel should in general use GMDSS equipment in the event of an emergency.

2.2 Part numbers

This installation manual is for the SAILOR 4300 L-Band System and is applicable to the following part numbers:

Part number	Description
404338A-00500	SAILOR 4338A Below Deck Unit (Bulk)
404338A-00510	SAILOR 4338A Below Deck Unit (19" rack)
404352A-00500	SAILOR 4352A Above Deck Unit

Table 2-2: Part numbers for the SAILOR 4300 L-Band System

Installation

This chapter has the following sections:

- *What's in the box*
- *Site preparation*
- *Installation of the ADU*
- *Installation of the BDU*
- *Interfaces of the BDU*
- *Commissioning (Iridium Service Provider)*

3.1 What's in the box

3.1.1 To unpack

Unpack the ADU and the BDU. Check that the following items are present:

- SAILOR 4338A Below Deck Unit (bulk or 19" rack variant)
- SAILOR 4352A Above Deck Unit
- Accessory kit for SAILOR 4352A Above Deck Unit
- Power cable
- Antenna cable
- Ethernet cable
- User manual
- Installation guide

3.1.2 Initial inspection

Inspect the shipping carton immediately upon receipt for evidence of damage during transport. If the shipping carton is severely damaged or water stained, request that the carrier's agent be present when opening the carton. Save the carton packing material for future use.



WARNING! To avoid electric shock, do not apply power to the system if there is any sign of shipping damage to any part of the front or rear panel or the outer cover. Read the safety summary at the front of this manual before installing or operating the system.

After unpacking the system, inspect it thoroughly for hidden damage and loose components or fittings. If the contents are incomplete, if there is mechanical damage or defect, or if the system does not work properly, notify your dealer.

3.1.3 Tools needed

No special tools are needed.

3.2 Site preparation

3.2.1 General site considerations

For optimum system performance, some guidelines on where to install the components of the SAILOR 4300 L-Band System must be followed. It is recommended to mount the ADU in a location with as much 360° free line of sight to the satellites as possible. The ADU must be mounted on stiffened structures with a minimum of exposure to vibrations. A small platform or short mast must provide rigid support for the antenna fastening bolts and a rigid interface to the ship.

The antenna is designed for harsh environmental conditions at sea, both in regard to vibration amplitude and speed. The antenna system performs optimally when mounted on a properly designed foundation. When mounting the antenna the overall goal is to establish a foundation which is as rigid as possible.

Painting the radome

Customers may wish to paint the radome in order to match the vessel's colour. Any paint used must be non-metallic based. Painting the radome may impact RF performance and may lead to over-heating, causing the antenna to go in safe mode (switch off).

Cobham SATCOM recommends that the radome should NOT be painted, Painting the radome may void the general warranty regarding material and workmanship etc. It is only the performance that cannot be guaranteed.

Modifying the radome or using another radome

The SAILOR 4300 L-Band System comes with a type-approved radome fitted from the factory. This radome is specifically designed for a minimal loss of RF performance for this specific antenna. Insertion loss reduces the available signal and decreases the effective radiated power and G/T (the ability to receive a weak signal). Modifying the radome or using another radome may increase the antenna side lobes, resulting in interference with other communication systems and thereby void satellite operator approvals. Other electrical effects on antenna performance of another radome, or of modifying the radome, include a change in the antenna beam width and shifting of the antenna bore sight.

Cobham SATCOM recommends that the radome should NOT be modified or changed to another type. Exchanging or modifying the radome will always void the general warranty.

3.2.2 Safe access to the ADU: Radiation hazard

The SAILOR 4300 L-Band System ADU has a minimum safety distance of 0.7 m from the ADU while it is transmitting.

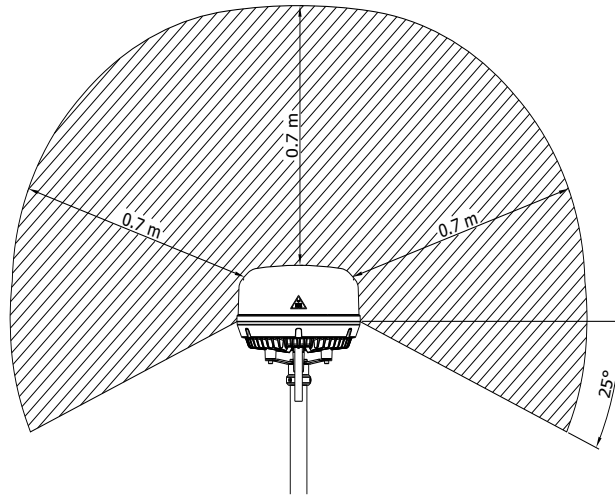


Figure 3-1: Radiation hazard, safety distance

3.2.3 Mounting considerations

For optimum system performance, some guidelines on where to install or mount the SAILOR 4300 L-Band System must be followed. Mounting and placement details are included in this section.

1. Make sure there is clearance to potentially blocking objects.
2. Place the antenna preferably on a mast with a free and unobstructed view extending from (at least) -30° below horizontal throughout the entire hemisphere and in all azimuth directions. If you place the antenna directly atop the ship superstructure, or on the ship bridge roof, this will compromise the roll-performance of the system due to the blockage caused by the ship structure.
3. Place the antenna on a rigid structural connection to the hull or structure of the ship. Parts of the ship with heavy resonant vibrations are not suitable places for the antenna.

3.2.4 Interference from radar, GNSS, L-band and other transmitters

Note

Do not place the ADU close to interfering signal sources or receivers. For allowed distances to other transmitters see Figure 3-5: *Recommended distance to transmitters (m) for frequencies below 1000 MHz* on page 3-7. We recommend testing the total system by operating all equipment simultaneously and verifying that there is no interference.

The ADU must be mounted as far away as possible from the ship's radar and high power radio transmitters, because they may compromise the ADU performance. RF emission from radars might actually damage the ADU. The SAILOR 4300 L-Band System ADU itself may also interfere with other radio systems.

Radar

Since a radar radiates a fan beam with a horizontal beam width of a few degrees and a vertical beam width of up to $\pm 15^\circ$, the worst interference can be avoided by mounting the ADU at a different level – meaning that the ADU is installed minimum 15° above or below the radar antenna. Due to near field effects the benefit of this vertical separation could be reduced at short distances between radar antenna and the SAILOR 4300 L-Band System ADU. Therefore it is recommended to ensure as much vertical separation as possible when the SAILOR 4300 L-Band System ADU has to be placed close to a radar antenna.

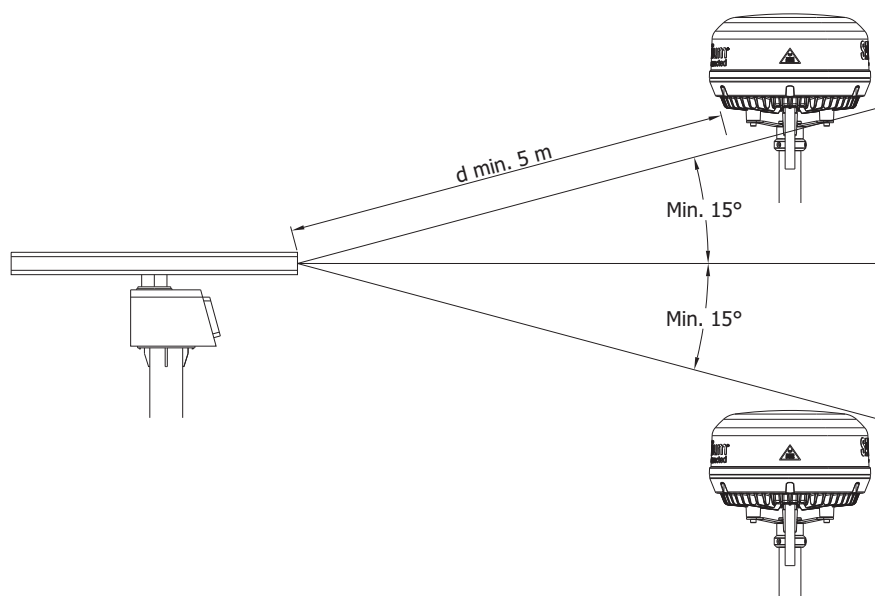


Figure 3-2: Interference with the vessel's radar

Radar distance

The minimum acceptable distance ($d_{min.}$) between a radar and the ADU is determined by the radar wavelength/frequency and the power emitted by the radar. The tables below show some “rule of thumb” minimum separation distances as a function of radar power at X and S band. If the $d_{min.}$ separation listed below is applied, antenna damage is normally avoided. “ $d_{min.}$ ” is defined as the shortest distance between the radar antenna (in any position) and the surface of the SAILOR 4300 L-Band System ADU. $d_{min.}$ indicates safe separation distance. Larger separation is recommended for operational performance.

X-band ($\sim 3\text{ cm} / 10\text{ GHz}$) damage distance		
Radar power	SAILOR 4352A ADU	
	$d_{min.}$ at 15° vertical separation	$d_{min.}$ at 60° vertical separation
0 – 10 kW	1.0 m	1.0 m
30 kW	2.0 m	1.0 m
50 kW	3.3 m	1.7 m

Table 3-1: Minimum radar separation, X-band

S-band (~ 10 cm / 3 GHz) damage distance		
Radar power	SAILOR 4352A ADU	
	d min. at 15° vertical separation	d min. at 60° vertical separation
0 – 10 kW	2.0 m	1.0 m
30 kW	3.0 m	1.5 m
50 kW	5.0 m	2.5 m

Table 3-2: Minimum radar separation, S-band

The separation distance for C-band (4-8 GHz) radars should generally be the same as for S-band radars.

Radar interference

Even at distances greater than “d min.” in the previous section the radar might still be able to degrade the performance of the SAILOR 4352 Above Deck Unit.

The presence of one or more S or X-band radars within a radius up to 100 m may cause a minor degradation of the L-band connection. The degradation will be most significant at high radar pulse repetition rates.

As long as receiving conditions are favourable, this limited degradation is without importance. However, if receiving conditions are poor – e.g. due to objects blocking the signal path, heavy rainfall or icing, low satellite elevation and violent ship movements – the small extra degradation due to the radar(s) could cause poor connection quality.

It is strongly recommended that interference free operation is verified experimentally before the installation is finalized.

GNSS receivers

Good quality GNSS receivers will work properly very close to the ADU - typically down to 1 meter outside the main beam. It is always recommended to test the GPS performance before the installation is finalized.

L-band, VSAT & GX system

For optimal performance the SAILOR 4352A must be mounted free of any objects that can block free view to the Iridium satellites as shown in figure 3-3. The SAILOR 4352A is designed for continuous tracking of the Iridium satellites even in heavy sea conditions. Notice that the level of degradation depends on the size and distance to an object in the field of view. The nature of the Iridium satellite system is dynamic, i.e. the SAILOR 4352A does not track a fixed satellite location/direction.

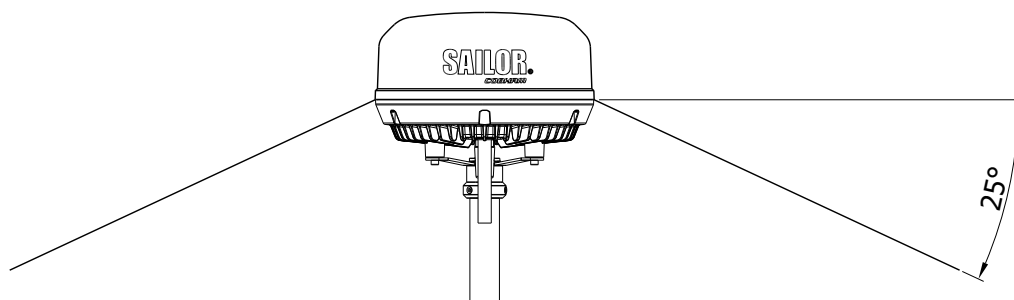


Figure 3-3: Field of view for SAILOR 4352A

When the installation include other transmitting L-Band terminals (for example Fleet Broad Band FB-500) it is important to install these terminals correctly to prevent potential interference, see figure 3-4.

- Do not install SAILOR 4352A less than 3m from SAILOR 500 FB main beam (forbidden area).
- For best operational performance mount SAILOR 500 FB vertically above the SAILOR 4352A.
- ensuring that the SAILOR 4352A is not in the main beam of the other L-band terminal.
- Within the cone shaped volume below SAILOR 500 FB preferable choose a location for SAILOR 4352A with the best possible free view to the Iridium satellites.
- In general the cone shaped volume below the upper L-band terminal will depend on how low an angle this terminal supports (angle below horizontal).
- Figure 2 includes a table showing the angle X° for SAILOR 150 FB, 250 FB, 500 FB, and mini-C.

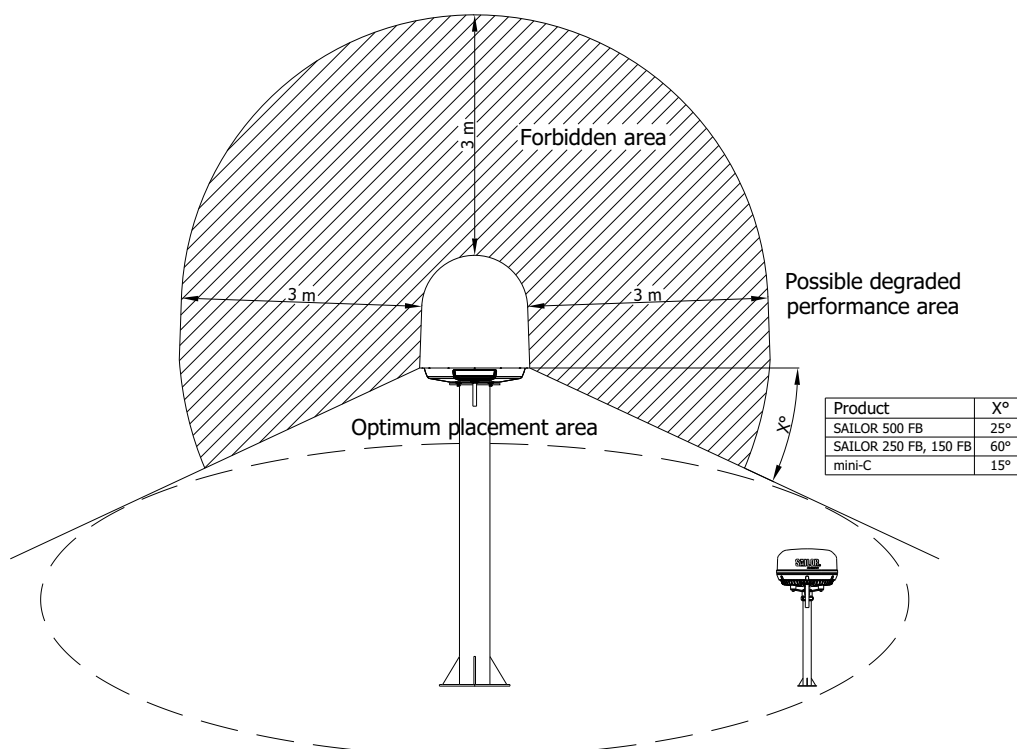


Figure 3-4: Installation of SAILOR 4352A and SAILOR 500 FleetBroadband

If the installation include VSAT and GX systems the following recommendations should be followed.

- Do not install the SAILOR 4352A less than 3m from the main beam of a VSAT or GX system.
- For best operational performance mount SAILOR 4352A below the main beam of the VSAT and/or GX system.

When the installation includes Inmarsat, VSAT and/or GX systems the following recommendations should be followed.

- Prioritize the recommendations above for installations that include other transmitting L-Band terminals.
- Secondly follow recommendations for installations that includes VSAT and/or GX systems as close as possible.

Other transmitter

The following figure shows the minimum recommended distance to transmitters in the frequency range below 1000 MHz.

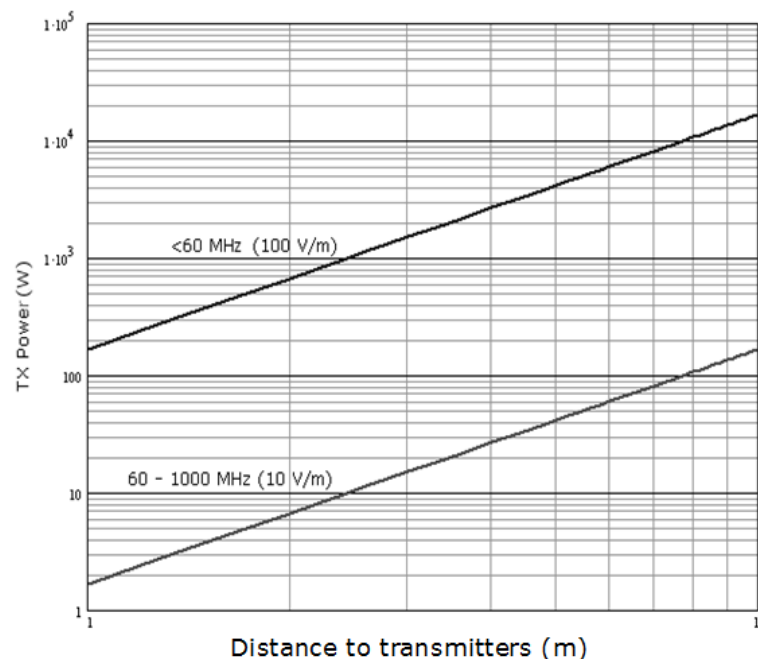


Figure 3-5: Recommended distance to transmitters (m) for frequencies below 1000 MHz

Other precautions

Do not place the antenna close to a funnel, as smoke deposits are corrosive. Furthermore, deposits on the radome can degrade performance.

Do not use pneumatic tools for cleaning the radome, especially at a short distance and directly at the split between top and bottom.

3.2.5 Antenna mast design

Overview

Parts of the ship with heavy resonant vibrations are not suitable places for the ADU. A small platform of short mast must provide rigid support for the ADU fastening bolts and a rigid interface to the ship.

The antenna mast must be designed to carry the weight of the antenna (8 kg) plus the weight of the mast flange. The mast must also be able to withstand onboard vibrations and wind forces up to 108 knots on the radome, even in icing conditions.

ADU mast flange

1. Fit the top of the ADU mast with a flange with holes matching the bushings in the radome. The flange thickness must be at least 10 mm.

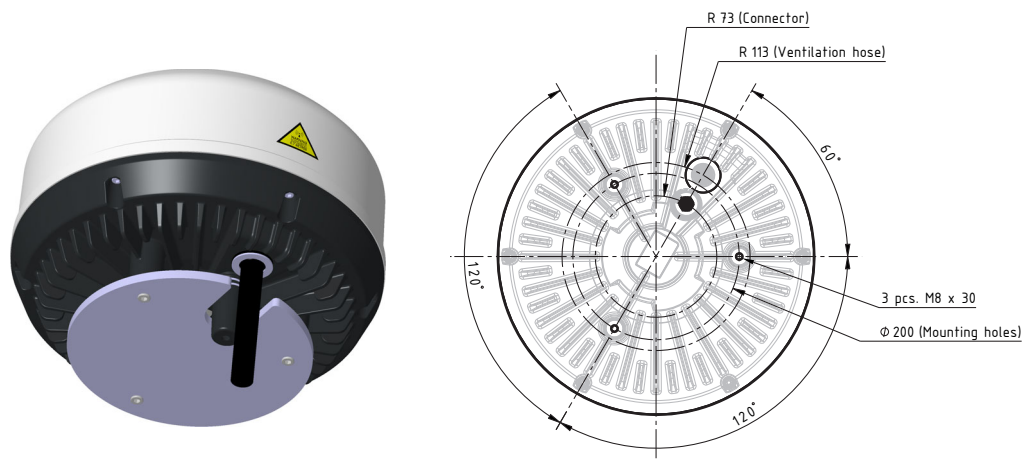


Figure 3-6: Antenna, bottom view

2. Mount the antenna on the flange with 3 pcs M8 bolts A4. The length of the bolts must be such that they engage into the bushings of the ADU with minimum 10 mm and maximum 25 mm.
3. Protect the cable connection against water ingress by wrapping it with self-amalgamating rubber, grommet and dual wire clips.
4. Make a cut-out in the flange to avoid bending the cable and blocking the drain.

Important

Avoid sharp edges where the flange is in direct contact with the ADU. Round all edges as much as possible to avoid damaging the surface of the radome.

ADU Mast mount kit

A dedicated mast mount kit for the SAILOR 4352A Antenna can be used for mounting on a 1½" pole. The mast mount kit can be procured by contacting your distributor. The SAILOR 4300 Mast Mount Kit part number is 404330A-920.

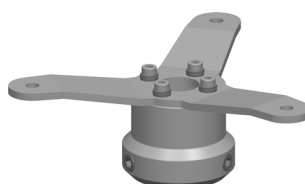


Figure 3-7: Mast Mount Kit

3.3 Installation of the ADU

To install the ADU, do as follows:

1. Select a suitable area for installation of the terminal and antenna.
2. Mount the ADU on the ship with 3 stainless steel bolts and washers fastened to the hull, to a mast flange or a mast mount kit.
3. An optional ground wire is provided. See appendix D.
4. Where the cables are exposed to mechanical wear - on deck, through bulkheads, etc. - protect the cables with steel pipes. Otherwise, follow standard procedures for cabling in ship installations.

The only electrical connector is a single TNC connector. For further grounding information read Appendix D, *Grounding and RF protection*.

Antenna cables

The coax cable must have a maximum DC resistance of 1.8 Ohm total (Shield + center wire). RF loss at 80MHz must be below 10dB.

Ensure that the specified minimum bending radius is respected. If this is not the case, the loss in the cable will increase. Check the instructions from the cable supplier.

Installation types	Cable type and maximum length
Installation in a mechanically protected environment and shorter distances	RG223/U up to 25 m length
Installation on bigger vessels	RG214/U up to 100 m length

Table 3-3: Cable recommendation

Water intrusion and condensation

In some weather conditions there may occur condensation inside the ADU. The drain opening is designed to lead any water away from inside the ADU. Observe the following guidelines for condensation and water intrusion:

1. After having connected the antenna cable to the antenna, ensure that the connector assembly is properly protected against seawater and corrosion. Make sure the default delivered coax connector rubber grommet is properly mounted.
2. If possible, install the ADU so there is no direct spray of sea water.

3. Make sure the ADU's drain opening is not blocked or bent and that there is free space between the drain opening and the mounting surface so water can escape and there is ventilation for the ADU.

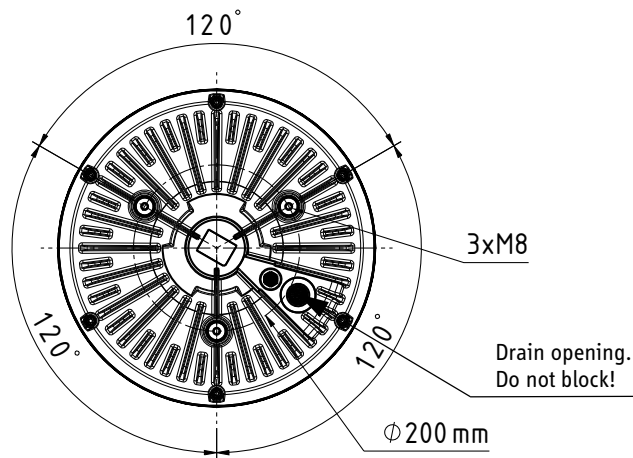


Figure 3-8: Antenna, drain opening

4. Do not place the ADU close to a funnel, as smoke deposits are corrosive. Furthermore, deposits on the ADU can degrade performance.

3.4 Installation of the BDU

Important

The terminal must be placed in an area where access to the hull or equivalent grounding can be reached within 0.5 m.

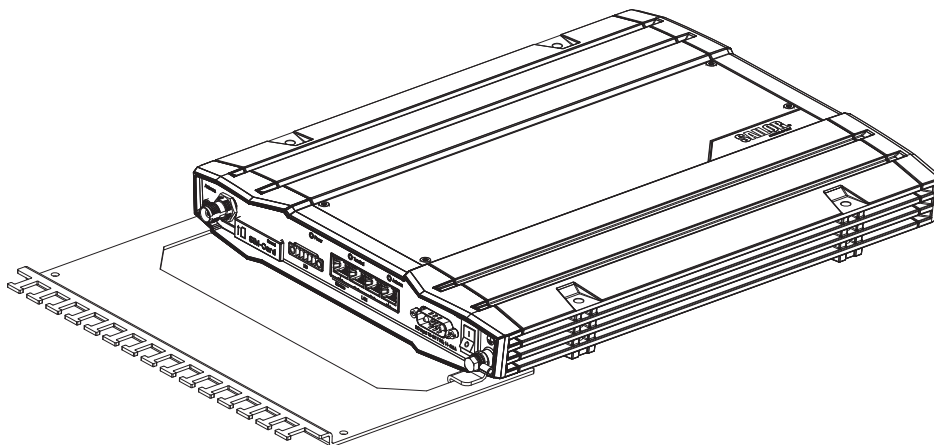


Figure 3-9: BDU

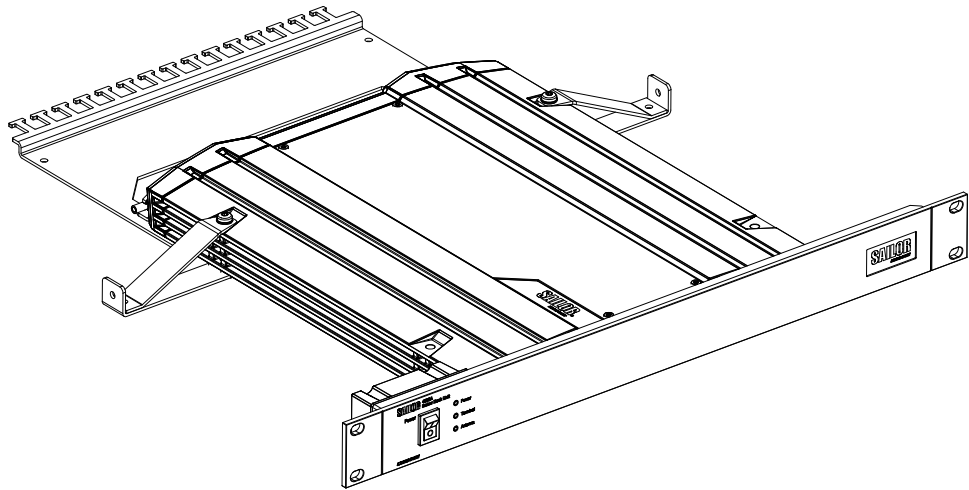


Figure 3-10: BDU (19" rack version)

To install the BDU, do as follows:

1. Place the terminal in a ventilated area with free space around all sides of the unit, except the bottom side. The temperature range is -25°C to $+55^{\circ}\text{C}$.
2. To mount the basic cable support for securing cables, remove the two rubber washers from the bottom of the terminal at the connector panel end. The threaded bushings underneath the rubber washers are used to mount the cable support.
3. Fasten the basic cable support to the terminal using two M4 x 6 mm countersunk screws.
4. Mount the terminal with the basic cable support on the bulkhead by inserting four screws through the holes in the mounting bracket and into the mounting surface.
or
Slide the 19" rack version of the terminal into a 1U space in a 19" rack and mount the screws in each side through the holes in the front and fasten the screws to the rack. Make sure that the unit is mounted securely according to the requirements for your 19" rack.
or
Place the terminal on a desktop, ground it and connect all cables. The four rubber feet make the terminal well suited for desktop installation.
5. Connect all cables. For the ADU the coax cable is connected with a TNC connector at both ends.
6. Secure the cables to the cable support using cable strips.
7. Ground the terminal, see *Grounding and RF protection* in Appendix D.
At the terminal end, it is strongly recommended to ground the antenna cable. Connect the antenna cable to common ground at the terminal end. Use a short coax cable from the terminal to the grounding point, where the short cable is connected to the antenna cable.
Ensure that the terminal is grounded – also if the cable is disconnected from the terminal. Connect an extra ground wire to the ground stud on the terminal. This ground wire must be a heavy wire or braid cable with a larger diameter than the coax cable. The ground stud is located next to the power switch.

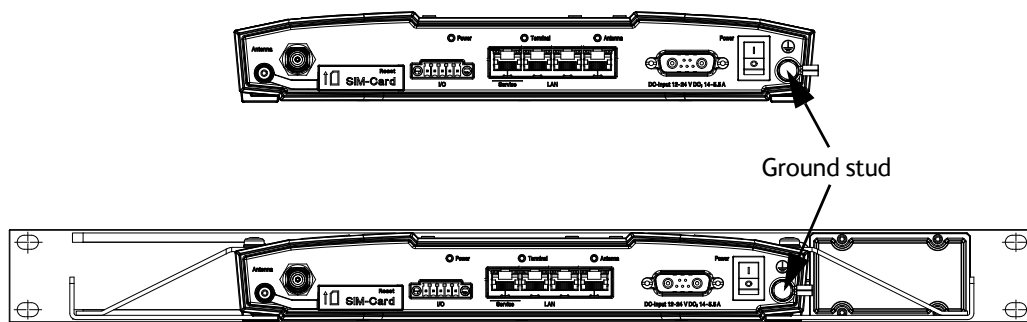


Figure 3-11: BDU ground stud

For the 19" rack version it is recommended to ground the terminal through the rack. Refer to the outline drawing *BDU, 19" rack version* on page A-6.

In some cases it may not be possible to access the hull and at the same time place the terminal in a suitable place. A way to ensure good grounding and at the same time make it possible to ground the coax cable is to extend the ship ground plane by means of copper foil. Refer to *Grounding and RF protection* in Appendix D.

3.5 Interfaces of the BDU

The BDU has the following interfaces:

- *Antenna connector*
- *USIM card slot*
- *Button for software recovery/reset (behind the SIM-Card cover)*
- *Input/Output pins*
- *LAN interface (Service and 3 x User LAN)*
- *Power (DC) and ground*

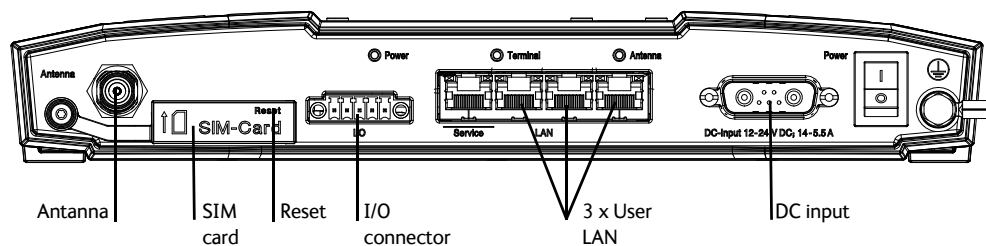


Figure 3-12: BDU connector panel

Antenna connector

Then antenna connector is a TNC connector. The BDU is connected to the antenna with a single coax cable for supply voltage for the antenna and all control data. For cable requirements refer to *Antenna cables* on page 3-9.

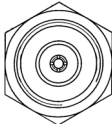
Outline (on the terminal)	Conductor	Pin function
	Inner	DC to ADU and internal communication Rx/Tx
	Outer	GND (Shield)

Table 3-4: TNC connector, outline and pin assignment

USIM card slot

The BDU has a socket for inserting a USIM card including a card lock.

LAN interface (Service and 3 x User LAN)

The BDU has 4 RJ-45 female connectors with two integrated LEDs. All LAN ports are IEEE 802.3 compliant, 10/100 Mbps.

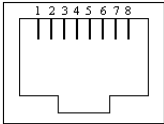
Outline	Pin	Pin function	Wire color
	1	Tx+	White/orange
	2	Tx-	Orange
	3	Rx+	White/green
	4	Not connected	Blue
	5	Not connected	White/blue
	6	Rx-	Green
	7	Not connected	White/brown
	8	Not connected	Brown

Table 3-5: Ethernet connector, outline and pin assignment

Input/Output pins

Future use.

Button for software recovery/reset (behind the SIM-Card cover)

The button is used to reboot the terminal or to enter recovery mode and reset the SAILOR 4300 L-Band System. For more details refer to *Software recovery procedure (Recovery MODE)* on page 6-6.

Power (DC) and ground

Depending on which of the three possible power switch configurations is installed on the ship, the product is powered up as follows:

- Using the rocker switch in the front panel of the SAILOR 4338A Below Deck Unit (bulk). See table 3-8.
- Using the rocker switch mounted on the SAILOR 4338A Below Deck Unit (19" rack). See table 3-9.
- Using a remote on/off control, which is a 2 pin connection (pin 2 and 5) in the Sub-D input connector. See tables 3-8 and 3-9.

Power on/off	Front Switch	Remote switch
OFF	OFF	Not Used
OFF	ON	Make
ON	ON	Not Used
ON	ON	Break

Table 3-6: SAILOR 4338A BDU turn on/off in normal BDU configuration

Power on/off	Front Switch	Rack Switch	Remote switch
OFF	OFF	x	x
OFF	ON	OFF	Make
OFF	ON	ON	Make
OFF	ON	OFF	Not Used
OFF	ON	OFF	Break
ON	ON	ON	Not Used
ON	ON	ON	Break

Table 3-7: SAILOR 4338A BDU turn on/off in rack configuration

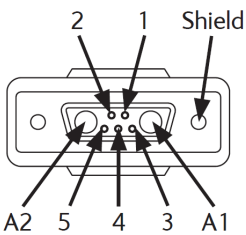
Outline	Description	Pin	Wire color
	NC	1	Black
	Remote ON/OFF	2	Green
	NC	3	Brown
	NC	4	Red
	PRI_GND	5	Orange
	Ground	Shield	
	V in +	A1	Red
	V in -	A2	Black

Table 3-8: Pin assignment for DC connector

LEDs

The BDU has three LEDs on the connector panel: Power, Terminal and Antenna. The SAILOR 4300 L-Band System uses event messages and light indicators to display the status of the system. See *Troubleshooting* on page 6-9 for details in interpretation of status information.

3.6 Commissioning (Iridium Service Provider)

After obtaining a SAILOR 4300 L-Band System, the owner must settle a contract with an Iridium Service & Solution Provider who will supply the SIM card, handle terminal activation, billing and technical support on the network side.

Configuration

This chapter has the following sections:

- *Introduction to the built-in web interfaces*
- *Service web interface* including
 - *Connecting to the service web interface*
 - *Topics in the service web interface*
 - *To configure the settings*
 - *Administration*
- *Mobile web interface*
 - *Connecting to the mobile web interface*
- *Connection of user equipment*

4.1 Introduction to the built-in web interfaces

4.1.1 Overview

With the built-in web interfaces of the SAILOR 4300 L-Band System BDU you make a full configuration of the SAILOR 4300 L-Band System. You can use a standard Internet browser. Installation of software is not necessary.

Important

The SAILOR 4300 L-Band System is not designed to be connected directly to the Internet. It must be located behind a dedicated network security device such as a firewall.

If any ports of the SAILOR 4300 L-Band System are exposed to the Internet you must change the default passwords as anyone with access and malicious intent can otherwise render the SAILOR 4300 L-Band System inoperable.

The service interface port must never be exposed directly to the Internet.

There are two types of web interface:

- Service web interface with full functionality, mainly for configuration
- Mobile web interface with functionality for daily use

The web interface shows in the top bar of the current system status and receive signal strength.

4.1.2 Service web interface

The purpose of the service web interface is to set up the SAILOR 4300 L-Band System properly and for troubleshooting purposes. The service web interface is available on the

service port (LAN 1) and can be enabled on any other port. For further information see *Service web interface* on page 4-3.

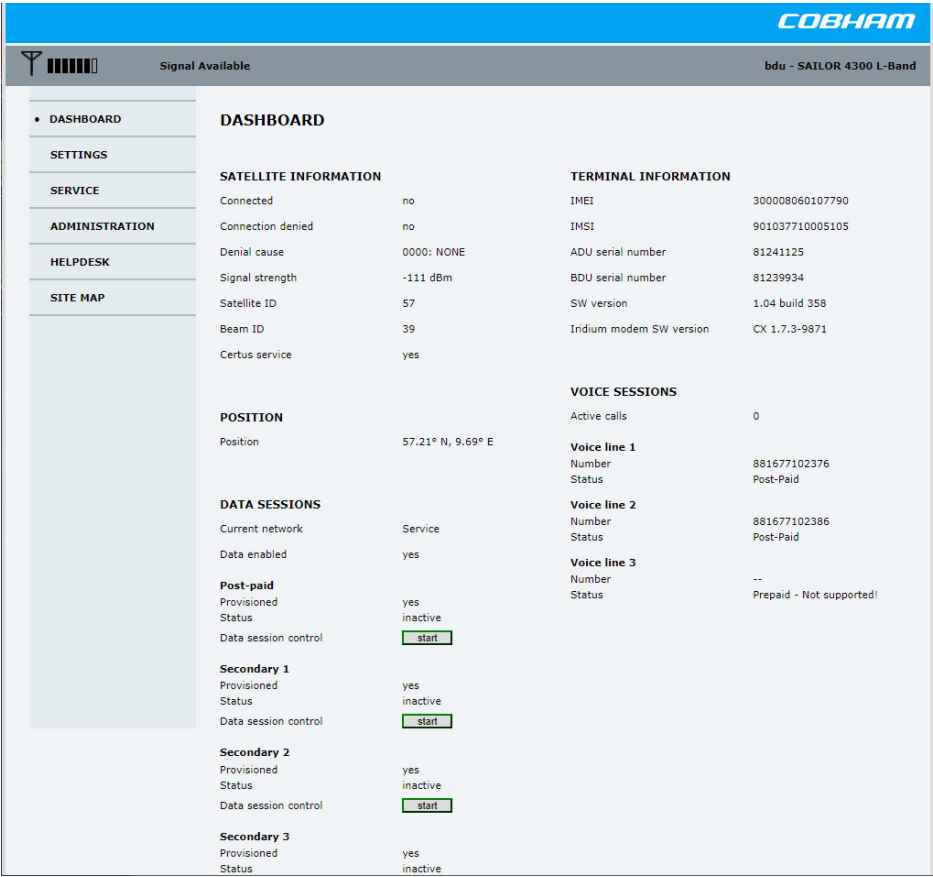


Figure 4-1: Service web interface, Dashboard

4.1.3 Mobile web interface

The purpose of the mobile web interface is to use the SAILOR 4300 L-Band System for starting and stopping data sessions and view system events. To access the mobile web interface use a smartphone or tablet that is connected to the terminal. The mobile web interface is intended for users of mobile devices. It consists of a subset of the functions in the service web interface. The mobile web interface is available on all LAN ports.

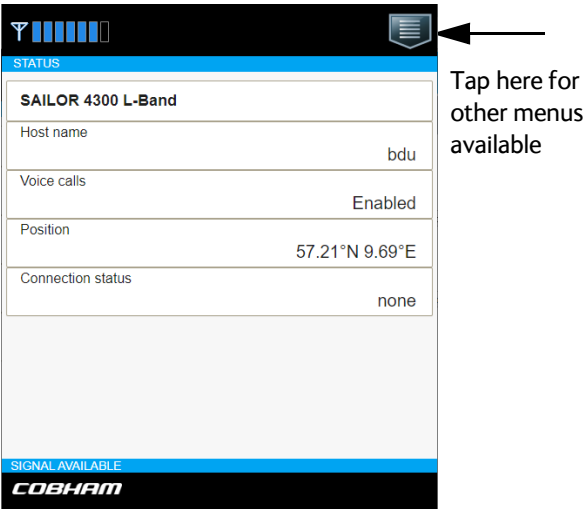


Figure 4-2: Mobile web interface, Status

4.2 Service web interface

4.2.1 Connecting to the service web interface

To connect to the service web interface, do as follows:

1. Switch on the BDU.
2. Wait until the LEDs on the connector panel of the BDU show that the system is ready to be configured.
 - Power LED: Green.
 - Terminal LED: Flashing green during power-on self test, after that steady green.
3. Connect a PC to Service LAN (standard Ethernet).

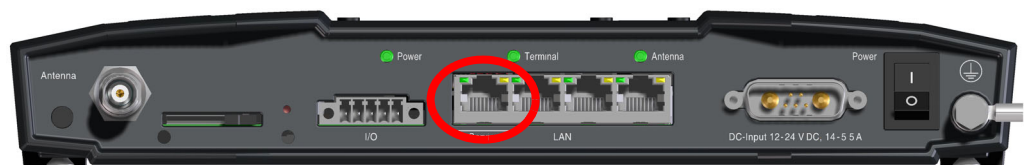


Figure 4-3: Service LAN connector used for configuration

4. Open your Internet browser and enter the default IP address of the BDU Service LAN `http://192.168.0.1`.
If you want to use another IP address to access the service web interface you must configure it as described in *To configure the settings* on page 4-7.
Depending on the configuration either the login screen or the Dashboard is displayed.
The connection to the SAILOR 4300 L-Band System is now verified and the web interface is ready for use.
5. Log on as an administrator (user name: admin, password - see the label on the BDU).
The web interface shows the **DASHBOARD** page.

The service web interface has the following top-level menus:

- **Dashboard**
- **Settings**
- **Service**
- **Administration**
- **Helpdesk**
- **Site map**

4.2.2 Topics in the service web interface

Site map

The site map gives an overview over the existing menus and submenus. You can click on each menu in the site map to go directly to the page or display the respective submenu.

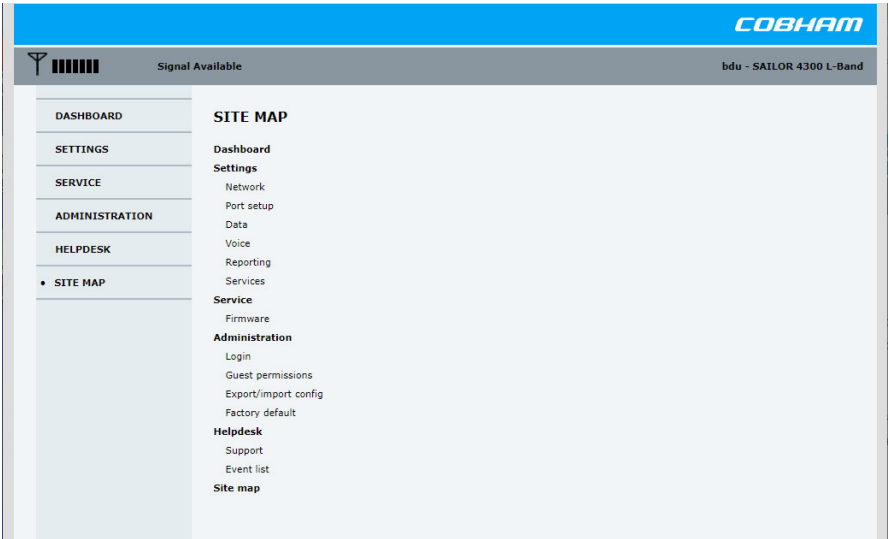


Figure 4-4: Web interface, SITE MAP

Dashboard and navigation

The **Dashboard** is the first screen that is displayed when the user, administrator or guest enters the IP address of the web interface of the BDU and the username and password. The Dashboard is used for viewing properties and status of the system. All dynamic values in the Dashboard are updated automatically.

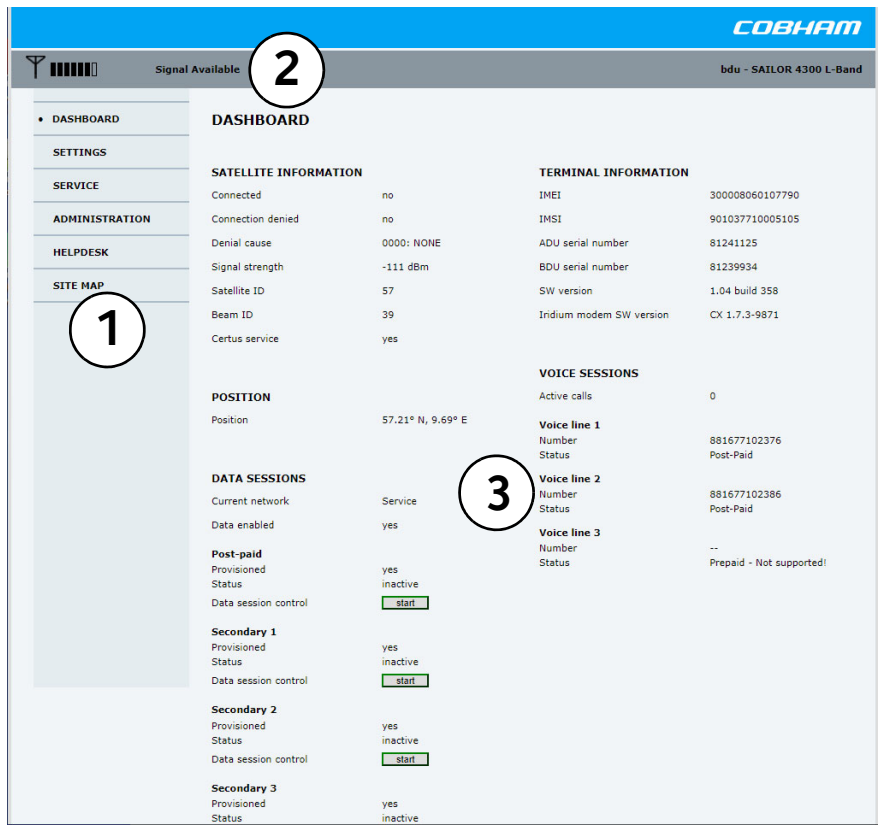


Figure 4-5: Web interface, DASHBOARD

The Dashboard has the following sections:

1. The navigation pane contains the menus. You can click an item in the menu to open the list of submenus or a new page in the contents section. The currently displayed menu is marked by a bullet.
2. The top bar shows the following:
 - Signal strength bars: This shows the tracking signal strength of the antenna. The signal strength can vary during operation, depending on the current position relative to the satellite.
 - Current system status, see *System status field* on page 4-5.
 - An icon for active events is displayed, if there are any.

Icon	Explanation
	An event is active. Click the icon to see a list of active events. The event time is UTC time. For explanations of the event messages, see Appendix B, <i>System messages</i> . Note that this icon will remain in the icon bar as long as the event is active.

Table 4-1: Web interface, Event icon

- Hostname: The hostname is shown on every page. It is useful to identify the system at remote login and in reports from the system. The hostname is recommended to contain the name of the vessel. To change the hostname see *To configure the settings* on page 4-7.
3. The contents section shows the page selected in the navigation pane. This section is used for viewing or changing settings, or for performing actions.
For a description of the individual items in the contents section see *Sections on the Dashboard* on page 4-6.

To navigate the web interface, do as follows:

- **To expand a menu**, click the menu in the navigation pane.
- **To access status and settings**, click the relevant subject in the navigation pane or click the relevant icon in the icon bar. The status or settings are displayed in the contents section.
- **To get an overview over the submenus available**, click **SITE MAP** in the navigation pane. Click on items in the site map to go directly to the relevant location.

Note You can give access to some configuration settings for users that are not administrators. For information see *To set up guest permissions* on page 4-14.

System status field

The overall state of the system is always displayed in the system status field. The following states are shown:

- Initializing. The system is initializing itself.
- Self Testing. Self test is performed after start up.
- Ready. The system is ready for operation.
- Searching. The system is searching for available satellites.
- Signal Available. Satellite signal is available from at least one candidate satellite. Ready to connect.

- Connected. The system is registered and connected to the satellite network. Ready to use.
- Denied. Registration on the network was denied. The denial cause will appear on the status page. Check also SIM card status matches the requested service.
- Overheating. System is overheated. System is halted in 30 seconds.
- Error. A critical error is detected. See event list.
- Updating Firmware. Firmware update is in progress.
- Rebooting. The system is rebooting.
- Not Responding. Rebooting? The system is currently not responding. Can be caused by a manual power cycle or loss of connection.

Sections on the Dashboard

Section	Description
SATELLITE INFORMATION	Connected: yes or no, indicates whether there is a satellite link layer connection. Connection denied: yes or no. Denial cause. Signal strength. Satellite ID. Beam ID. Certus service: Indicates whether the currently used satellite is of type B1 or NEXT.
POSITION	Position: Current GNSS position of the ADU.
DATA SESSIONS	Current network: Indicates which network/data flow the web interface is accessed from. Data enabled: yes or no. Provisioned: yes or no. Status: active or inactive. Indicates whether a data flow is currently active or inactive. Data session control: off, automatic, manual data started, manual data stopped or manual data control button.
TERMINAL INFORMATION	IMEI: The IMEI number stored by Iridium. IMSI: SIM card number. ADU serial number. BDU serial number. SW version: Version of the SAILOR 4300 L-Band System software. Iridium modem SW version: Version of the (Iridium) Modem software.
VOICE SESSIONS	Active calls: number of currently active calls. Voice line 1, 2 and 3: Number: Telephone number. Status: Inactive, Pre/Post-paid and Safety Voice.

Table 4-2: Web interface, Sections on the Dashboard

4.2.3 To configure the settings

Network

The BDU has four 10/100 Mbit/s Ethernet ports.

Important

The SAILOR 4300 L-Band System is not designed to be connected directly to the Internet. It must be located behind a dedicated network security device such as a gateway.

If any ports of the SAILOR 4300 L-Band System are exposed to the Internet you must change the default passwords as anyone with access and malicious intent can otherwise render the SAILOR 4300 L-Band System inoperable.

To configure the LAN network go to **SETTINGS > Network**.

The screenshot shows the 'NETWORK' configuration page in the COBHAM SAILOR 4300 L-Band System web interface. The interface includes a sidebar with navigation options: DASHBOARD, SETTINGS, Network (selected), Port setup, Data, Voice, Reporting, Services, SERVICE, ADMINISTRATION, HELPDESK, and SITE MAP. The main content area displays various network configuration fields:

- Hostname:** bdu
- LAN PORTS:** A diagram showing four ports: Service Port, User Port 1, User Port 2, and User Port 3.
- SERVICE PORT:**
 - Mode: Static
 - IP address: 192.168.0.1
 - Netmask: 255.255.255.0
 - DHCP server enabled: ☒
 - DHCP range start: 192.168.0.2
 - DHCP range end: 192.168.0.254
- USER PORTS:**
 - User Port 1: Port Name, Data Flow (Post-paid Data Flow), Enabled ☒
 - User Port 2: Port Name, Data Flow (Post-paid Data Flow), Enabled ☒
 - User Port 3: Port Name, Data Flow (Post-paid Data Flow), Enabled ☒
- POST-PAID DATA FLOW:**
 - VLAN ID on Service Port: 3
 - DHCP server/gateway address: 172.16.0.1
 - Netmask: 255.255.255.0
 - DHCP range start: 172.16.0.3
 - DHCP range end: 172.16.0.254
 - Web server address: 172.16.0.2
 - Web interface enabled: ☐
- SECONDARY DATA FLOW 1:**
 - VLAN ID on Service Port: 5
 - Gateway address: 192.168.0.1
 - Netmask: 255.255.255.0
 - Web server address: 192.168.0.2
 - Web interface enabled: ☐
- SECONDARY DATA FLOW 2:**
 - VLAN ID on Service Port: 6
 - Gateway address: 192.168.0.1
 - Netmask: 255.255.255.0
 - Web server address: 192.168.0.2
 - Web interface enabled: ☐

Figure 4-6: Web interface: SETTINGS, Network (default settings)

Important

Make sure that the networks do not use IP address ranges that overlap.

Make the necessary changes on this page and click **Apply**.

Sections	Description
NETWORK Hostname	The hostname is used for identifying the BDU in local networks and in reports. The hostname helps identifying the SAILOR 4300 L-Band System. The default hostname is bdu. You can change the name. Letters (a-z, A-Z), digits (0-9) and hyphen (-) are allowed. Note: The hostname must start with a letter.
LAN PORTS	Shows an informative picture of LAN ports naming.

Table 4-3: Setup of the **Network** page

Sections	Description
SERVICE PORT	Service Port network settings. Mode: Static (default) or DHCP client. Decides how the IP is assigned. IP Address: Static IP assignment. Default is 192.168.0.1. Netmask: Default is 255.255.255.0. DHCP server enabled: Enable (default) or disable the DHCP server. DHCP range start: Default is 192.168.0.2. DHCP range end: Default is 192.168.0.254. Be aware that the Service web interface is located on the same IP address as is shown in the IP Address field.
USER PORTS	Controls user port flow assignment and whether a port is enabled or disabled. Data Flow: Chooses which data flow is assigned to the specific port. Enabled: Enabled (default) or disabled. If a port is disabled no data can be transferred through it.
POST-PAID DATA FLOW	Post-paid data flow network settings. VLAN ID on Service Port: Shows this flows VLAN ID if accessed through the Service Port. DHCP server/gateway address: Default is 172.16.0.1. Netmask: Default is 255.255.255.0. DHCP range start: Default is 172.16.0.3. DHCP range end: Default is 172.16.0.254. Web server address: The IP address where the Mobile/Service web interface is hosted. Should not be in the DHCP range. Default is 172.16.0.2. Web interface enabled: Enable or disable (default). Enables access to the Service web interface on this flow. Only Mobile web is accessible if disabled.
SECONDARY DATA FLOW 1-4	Secondary data flow 1-4 network settings. VLAN ID on Service Port: Shows this flows VLAN ID if accessed through the Service Port. Gateway address: Default is 192.168.[5-8].1. Netmask: Default is 255.255.255.0. Web server address: The IP address where the Mobile/Service web interface is hosted. Default is 192.168.[5-8].2. Web interface enabled: Enable or disable (default). Enables access to the Service web interface on this flow. Only Mobile web is accessible if disabled.

Table 4-3: Setup of the **Network** page

WARNING! Applying the network settings will lead to a reboot of the system.



WARNING! Changing the IP range of any port may leave the system hanging until lease is renewed.

To configure port and protocol forwarding:

To configure port and protocol forwarding go to **SETTINGS > Port setup**.

Figure 4-7: Web interface: SETTINGS, **Port setup** (default settings)

Sections	Description
Waste bucket button	Deletes an existing rule.
Description	Optional text describing the rule.
Data Flow	Chooses on which data flow the rule is active.
Protocol	Chooses the forwarded protocol.
Ext. Port	External port to forward from.
Int. Port	Internal port to forward to.
To IP Address	Internal IP address to forward to.
Enabled	Enable or disable a rule.
Plus button	Adds the composed rule.

Table 4-4: Setup of **Port setup** page

Adding, deleting and enabling/disabling a rule takes effect immediately.



WARNING! When a rule is added, deleted or disabled/enabled the affected data flow immediately restart, resulting in a temporary loss of connection on the specific flow.

To configure the data session

To configure the data session go to **SETTINGS > Data**.

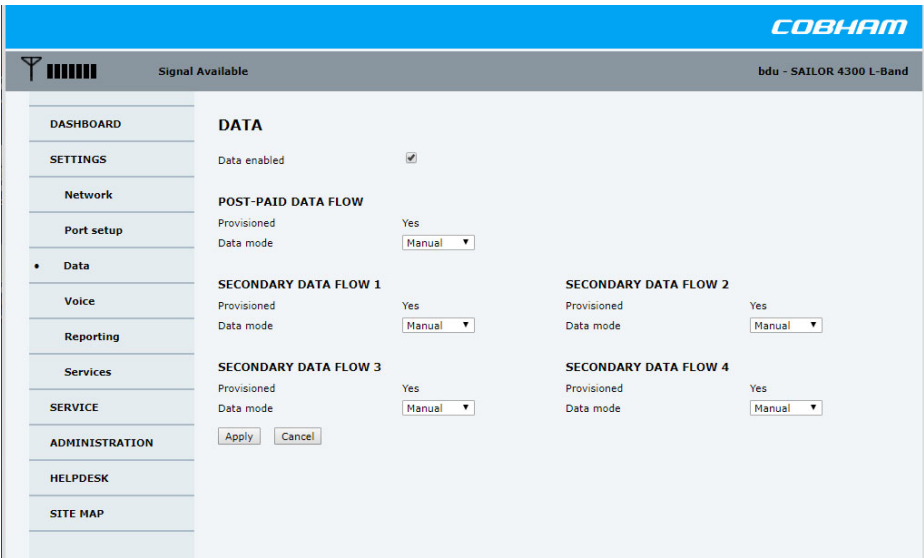


Figure 4-8: Web interface: SETTINGS, Data (default settings)

Make the necessary changes on this page and click **Apply**.

Sections	Description
Data enabled	Enable or disable. If enabled the data mode for each data flow is in effect. If disabled all data flows are disabled regardless of individual mode.
POST-PAID DATA FLOW and SECONDARY DATA FLOW 1-4	Shows provisioning and data mode control for each data flow. Provisioned: Yes or No. Shows whether a data flow is provisioned or not. Provisioning is handled by the Service Provider. Data mode: Off, Manual or Automatic.

Table 4-5: Setup of the **Data** page

To configure the voice session

To configure the voice session go to **SETTINGS > Voice**.

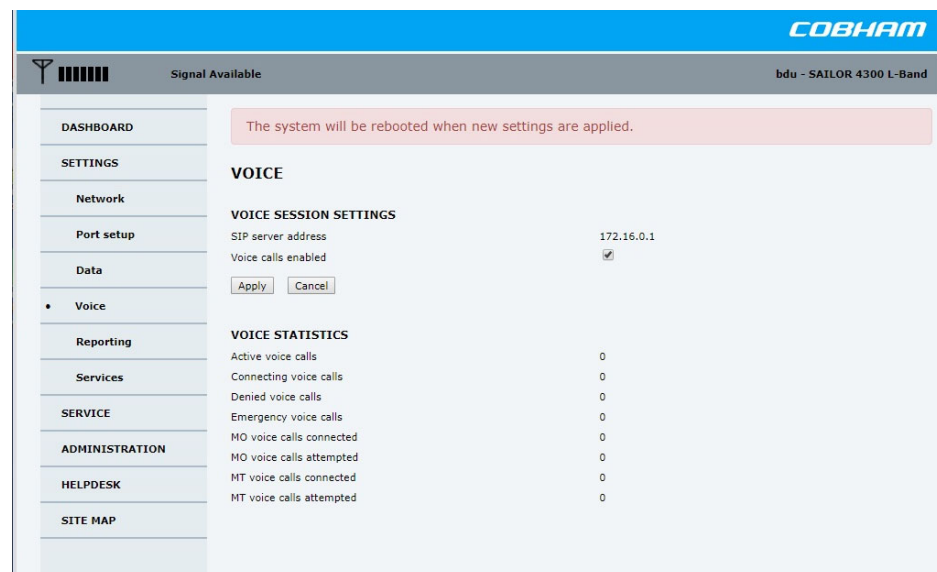


Figure 4-9: Web interface, SETTINGS, Voice (default settings)

Make the necessary changes on this page and click **Apply**.

Sections	Description
VOICE Session SETTINGS Voice calls enabled	Select or deselect to enable or disable the use of voice connections. Note that enabling and disabling of voice is entangled with enabling and disabling of Virtual Circuit Service (T-VCS) to support real time media streaming, since it's the general availability of the SIP server control that is configured.
VOICE STATISTICS	This section contains detailed statistics about voice sessions.

Table 4-6: Setup of the Voice page

To configure remote syslog

You can set up the system to send each syslog message to a syslog server to advise the system administrator of the current status of the system. Syslog uses the UDP protocol on port 514.

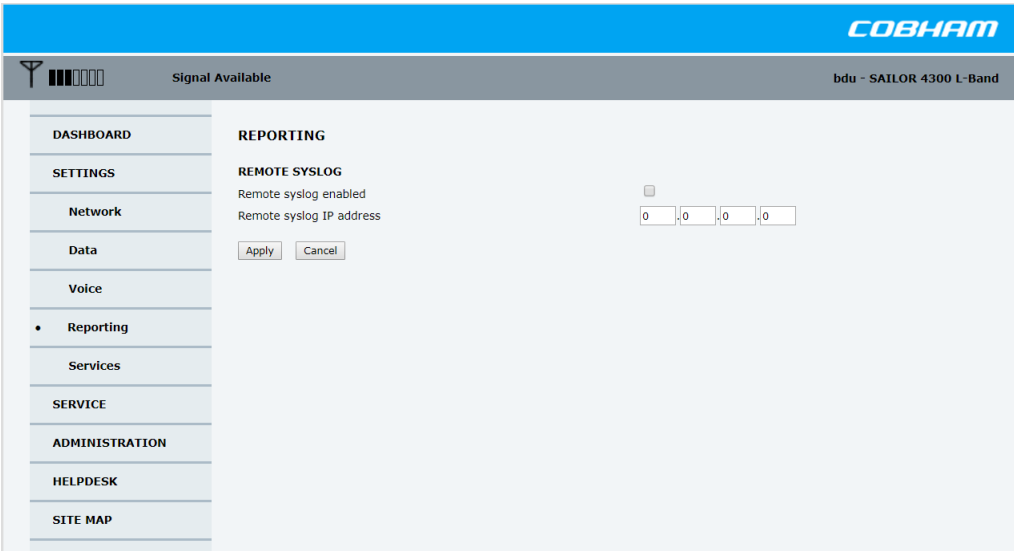


Figure 4-10: Web interface, SETTINGS, Reporting (default settings)

To set up sending syslog messages to a syslog server, do as follows:

1. Select **SETTINGS > Reporting**.
2. In the section **Remote syslog** enable remote syslog (default: **Off**).
3. Enter the IP address of the syslog server to which the syslog messages will be sent.
4. Click **Apply**.

To disable potentially unsecure services

Go to **SETTINGS > Services**.

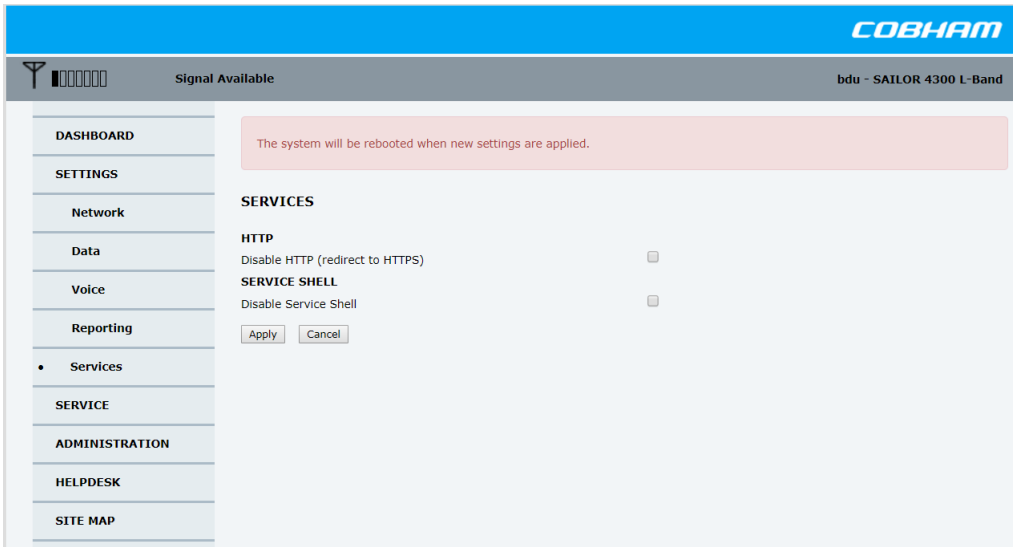


Figure 4-11: Web interface, SETTINGS, Services (default settings)

Here you can:

- Disable HTTP and redirect all requests to HTTPS.
- Disable the Service shell (see chapter 6.5.1)

4.2.4 Administration

This section describe how to perform administrative tasks:

- *Administration settings*
- *To set up guest permissions*
- *To import and export a system configuration*
- *To reset to factory default*

Administration settings

The **ADMINISTRATION** settings require an administration username and password. To log in as administrator, do as follows:

1. Select **ADMINISTRATION** from the left navigation pane.
2. Enter the Administration username and password.
The username is **admin** and the default password - see the label on the BDU.

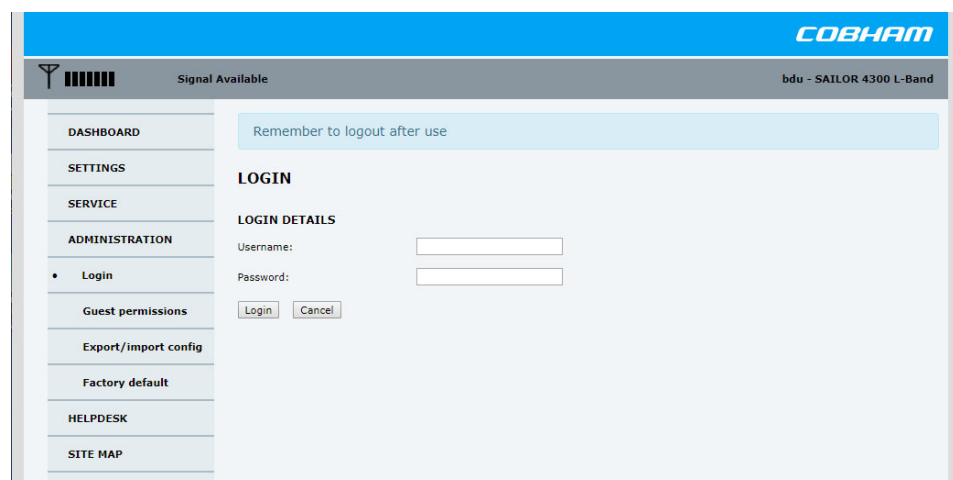


Figure 4-12: Web interface, Administration

If needed, you can reset the administrator password. For further information, see *Software recovery procedure (Recovery MODE)* on page 6-6.

3. Click **Change**.
At the next login the new password is required.
4. Click **Login**.
Now you can change the password or log out Administration.

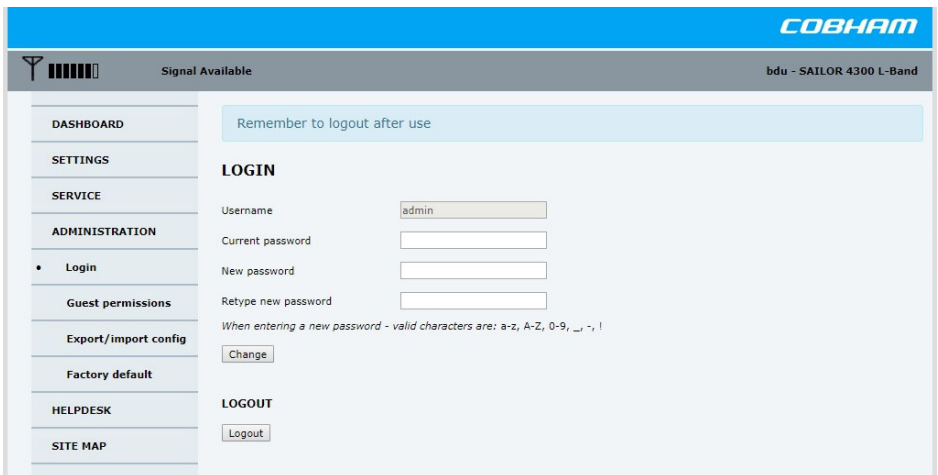


Figure 4-13: Web interface, Administration, change password

5. Type in the new password and retype it on the next line.
6. Click **Change**. At the next login the new password is required.

When logged in as a guest the guest password can be changed using the same course of action.

To log out administration

If you have not entered anything for 30 minutes, you are logged out automatically. To log out manually, click **Logout** in the **ADMINISTRATION** page.

To set up guest permissions

You can manage user access to certain functions of the SAILOR 4300 L-Band System. You can allow or deny users that are not administrators access to certain functions and make these pages read-only. This is useful if you want to protect the system against unintended changes or tampering.

Important Study this screen thoroughly and decide which areas of the SAILOR 4300 L-Band System you want to give non-administrator users access to.

To set up the guest permissions, do as follows:

1. From the left navigation pane, select **ADMINISTRATION > Guest permissions**.

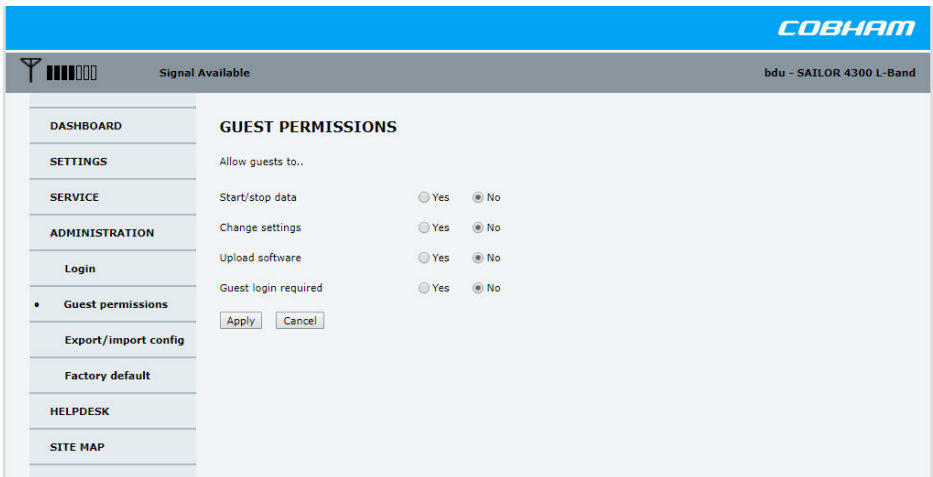


Figure 4-14: Web interface, ADMINISTRATION, Guest permissions (default settings)

2. For each item under **ALLOW guests to** select
 - **Yes** to allow access.
 - **No** to block access to this setting.

Guest login required: You must enter user name **guest** and the password **guest** (default) or the user name **admin** and the password on the label (default).

Start/stop data: Allow users to start and stop manual data sessions from Dashboard and the Mobile web interface.

Change settings: Allow users to change the settings of the system.

Upload software: Allow users to firmware upgrade the system.

3. Click **Apply**.

The settings to which access is denied cannot be changed by non-administrator users.

To import and export a system configuration

If you need to reuse a configuration in another SAILOR 4300 L-Band System, you can save the current configuration to a file, which can then be loaded into another SAILOR 4300 L-Band System. You can also use this feature for backup purposes. The configuration file contains all the settings you have entered during system setup.

To save a configuration to a file, do as follows:

1. Select **ADMINISTRATION > Export/import config**.
2. Click the button **Export**. Follow the download instructions on the screen. You can use this configuration file for upload into another SAILOR 4300 L-Band System,

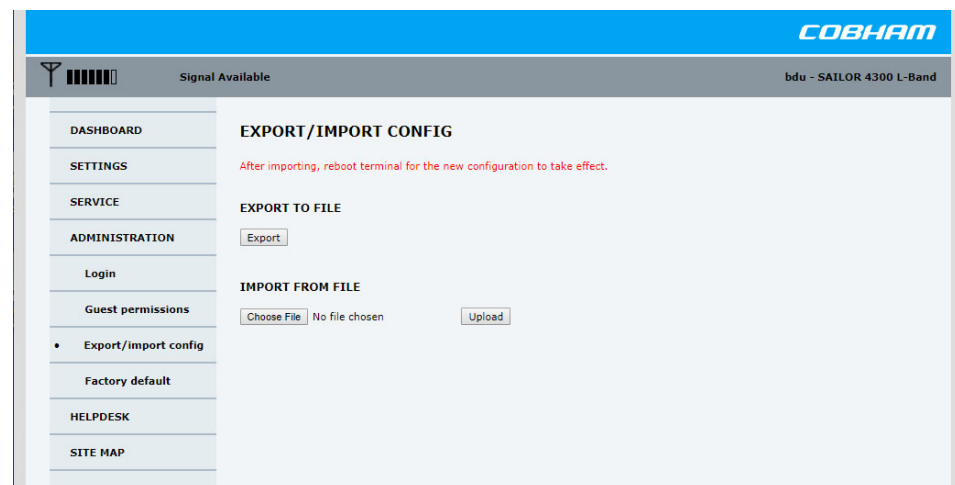


Figure 4-15: Web interface, ADMINISTRATION, Export/import config.

To import a configuration from a file, do as follows:

1. Select **ADMINISTRATION > Export/import config**.
2. Click the button **Browse...** and locate the configuration file (.cfg file) you want to upload. Then click the button **Open**.
3. In the web interface click the button **Upload**.

To clone a system configuration, do as follows:

1. Reset to factory default, see the following section for details.
2. Import a configuration from file, see section above.

To reset to factory default

To reset to factory default settings and the administrator password, do as follows:

1. From the left navigation pane, select **ADMINISTRATION > Factory default**.

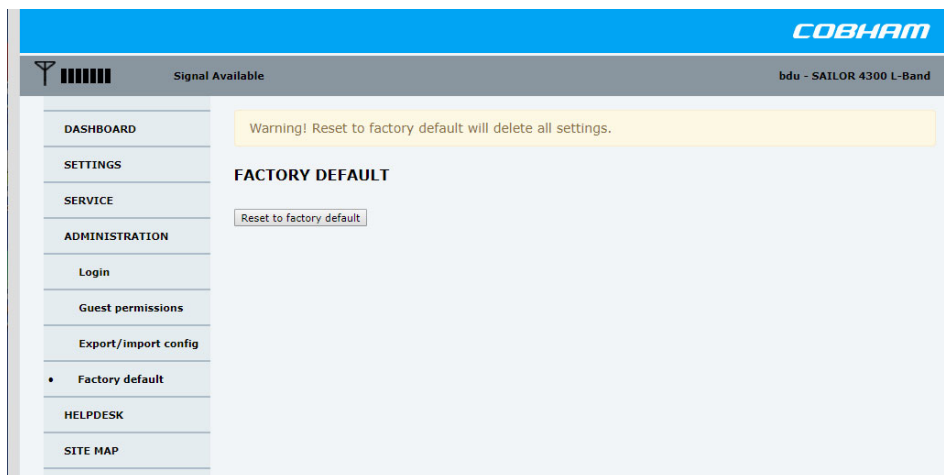


Figure 4-16: Web interface, ADMINISTRATION, Factory default

2. Click **Reset to factory default**.



WARNING! After a factory reset the IP address of the service port is 192.168.0.1. Make sure the service PC connection allows for addressing within this range. The admin password is set to default (see label on BDU).

Note

After factory reset a new SSH host key is automatically generated. SSH clients must update their list of known host keys.

Note

After factory reset a new certificate for secure HTTP access is automatically generated. Web browsers must update their certificate manager.

Note

For Service Provider Interface Control use all tokens will be cleared and must be generated in service shell as described in "99-159739" (see Table 1-1).

4.3 Mobile web interface

4.3.1 Connecting to the mobile web interface

To connect to the mobile web interface, do as follows:

1. Power up the system, i.e. switch on the terminal.
2. Wait until the LEDs at the rear of the terminal show that the system is ready to be accessed.
 - Power LED: Green.
 - Terminal: Steady green.
 - Antenna: Steady green.
3. Connect your smartphone or tablet to the WLAN access point.

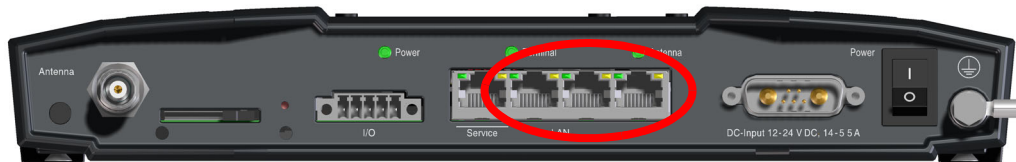


Figure 4-17: LAN 2, 3 or 4 connector used for the mobile web interface of the SAILOR 4300 L-Band System

4. Open your Internet browser and enter the default IP address of the BDU User LAN <http://172.16.0.2>. Depending on the configuration either the login screen or the Dashboard is displayed. The connection to the SAILOR 4300 L-Band System is now verified and the web interface is ready for use. The mobile web interface is ready for use.

Login details
Username
Password
Login

Figure 4-18: Mobile web interface, Login screen

5. Log in as an administrator (username: admin, password - see the label on the BDU) or as guest (username: guest, password: guest).

The web interface shows the **Status** page.

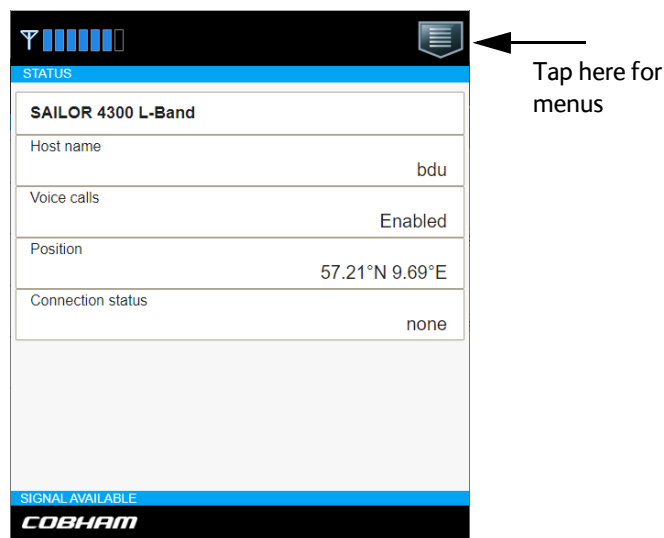


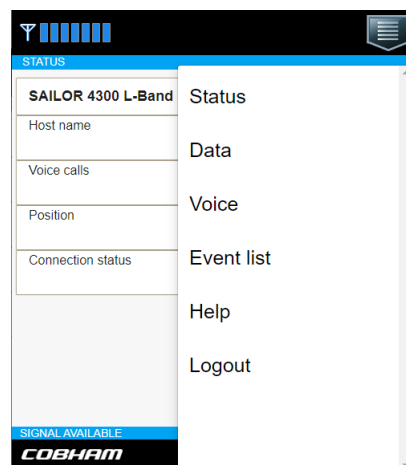
Figure 4-19: Mobile web interface, Status

4.3.2 Menus in the mobile web interface

Menus in the mobile web interface

The mobile web interface has the following top-level menus:

- **Status** shows information such as system status, host name, position, statistics etc.
- **Data** for start or stop of a data session (if data mode is set to Manual during installation).
- **Voice** displays the status of voice calls.
- **Event list** shows a list of currently active events (if any).
- **Help** opens this manual in a PDF version.
- **Logout**

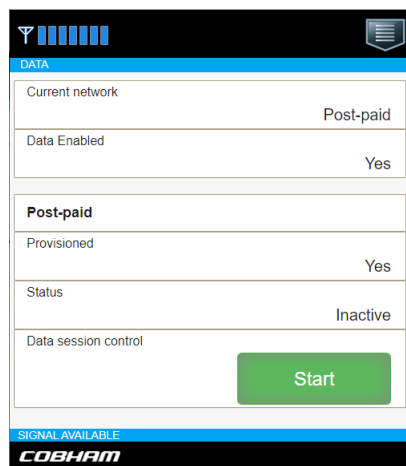


4.3.3 Start a data session

To be able to access the Internet you must have an active data session.

To start a data session manually, do as follows:

1. Open your Internet browser and enter the web server address of the connected data flow, default is `http://172.16.0.2`.
2. Tap the menu icon and select **Data** to start or stop a data session.



4.4 Connection of user equipment

4.4.1 Connection of a user PC

To connect a user PC, do as follows:

1. Connect the user PC with a straight LAN cable to one of the 3 user LAN ports.
2. Check that the user PC is set to get automatically an IP address (DHCP client enabled).

4.4.2 To setup a phone for making calls (SIP telephony and SIP profiles)

SIP telephony service

The SAILOR 4300 L-Band System has a build-in SIP server which provides up to three voice lines to users connected to the BDU. To use this service one or more VoIP-phone or soft-phone (mobile apps, PC software) are required. The effective number of available voice lines depends on the subscription. Each voice line has a dedicated mobile number and is available through one of the internal SIP user names line1, line2 and line3. The mapping from subscribed mobile number to the SIP user name is fixed and an example given in the table below.

User name	Mobile nr.	Line Type	Voice Quality
line1	8816xxxxxxx1	PostPaid	HQ
line2	8816xxxxxxx2	PostPaid	HQ
line3	8816xxxxxxx3	PostPaid	HQ

Table 4-7: Connection of user equipment, SIP telephony service

Please see your subscription information for the exact details on which mobile number is assigned to which user name.

In order to use the telephony service it is required to connect a SIP or VoIP enabled telephone to a user-port of the BDU and register it with the build-in SIP server. If a router or wireless access point is used to connect the telephone, it must support the required protocols for VoIP telephony. You can find a list of these protocols at the end of this chapter.

For the registration on the BDU a number of network-specific parameters are necessary, which are stored in a "SIP profile" in the telephone. At least the following items must be configured:

Item	Value	Description
Profile name	[arbitrary]	Choose a fitting name
User name	line1, line2 or line3	Choose the user name assigned to the mobile phone number that shall be used
Password	[leave empty]	No password required
SIP server	172.16.0.1	This is the default address. If the address does not work contact the administrator for the correct one.

Table 4-8: Connection of user equipment, SIP profile

Note For details of how to configure your device please consult the telephone's user manual.

It is not possible to register more than one telephone on the same mobile number respective user name on the SIP-server. If more telephones register with the same SIP-profile, only the last telephone registered will be subscribed to the mobile number and be able to use this number for receiving and making calls.

In contrast to this it is possible to use all available mobile numbers and user names from within one telephone or application. That means that you conveniently can handle all your subscribed numbers from one device. Please note that not all devices might support subscribing to more than one line. Please consult the device's user manual for details.

Suitable telephones for this service are dedicated stand-alone VoIP-, IP- or SIP-telephones, or soft-phone applications running on a PC or mobile phone. A VoIP-app on a mobile phone can only be used if the phone is connected to the device via a separate wireless router. Any modern SIP-telephone or software should be usable with the SAILOR 4300 L-Band System, though this cannot be guaranteed for a specific type of device or software. At least the following protocols and codecs must be supported:

Item Name	Description
SIP protocol	SIP protocol version 2.0; internet standard RFC 3261
SDP protocol	Internet standards RFC 2327 and RFC 3264
RTP - voice streams	Internet standard RFC 1889 or RFC 3550
Voice stream format	G.711 A-law; 8000 Hz sampling rate; packet interval 20 ms
DTMF format	Internet standard RFC 4733

Table 4-9: Connection of user equipment, SIP protocols and codecs

4.5 Data flows

The SAILOR 4300 L-Band System support multiple data flows defined by Iridium. A data flow is a separate network that can offer services like DHCP server, SIP server, service web interface and internet services. The data flows and their properties are shown in the table below.

Iridium Service Providers controls how the different data flows are billed and which types of data is transported.

Name	Services	Gateway (default)	VLAN ID on Service port
Post-paid	Data, voice and DHCP server	172.16.0.1	3
Secondary 1	Data	192.168.5.1	5
Secondary 2	Data	192.168.6.1	6
Secondary 3	Data	192.168.7.1	7
Secondary 4	Data	192.168.8.1	8

Table 4-10: Data flow properties

Each data flow is its own network, e.g. it has its own network configuration such as IP range. All flows are available through the Service Port through VLANs with IDs. Each of the User Ports can have a single data flow attached which becomes the ports native VLAN. All User Ports are attached to Post-paid data flow per default.

4.6 Remote management

The SAILOR 4300 L-Band System supports remote management. Remote management enables the Iridium Service Provider to access the service web interface through an Iridium data flow. Remote service web interface access is configured using port forward rules in **NETWORK > Port setup**. The table below shows the required rule for each data flow.

Data flow	Internal IP (default)	Internal port
Post-paid	172.16.0.2	80
Secondary 1	192.168.5.2	80
Secondary 2	192.168.6.2	80
Secondary 3	192.168.7.2	80
Secondary 4	192.168.8.2	80

Table 4-11: Per data flow port forward rule for external web interface access

Note

Access to the service web interface has to be enabled for each individual data flow. See chapter 4.2.3 *To configure the settings*

Final installation check

5.1 Functional test

The following list provides some of the most important checks to perform after power-up. A PC and a VOIP telephone shall be available for this test. Test the 3 ports and all telephone numbers available on the SIM card.

Item	Description of check	Reference	√	Value/ comment
1	Check that the SIM card is inserted.			
2	Make a telephone call from the terminal.			
3	Make a telephone call to the terminal.			
4	Connect service PC to the service port and access the service web interface.			
5	Connect a user PC tablet or smartphone to a user port and access the Internet.			
6	Check all 3 user ports can be used for either data or voice calls.			
7	Make a telephone call from the terminal while engaged in an Internet session on the connected user PC.			
8	Receive a telephone call while engaged in an internet session on the connected user PC.			

Table 5-1: Check sheet: Functional test

Service & maintenance

This chapter has the following sections:

- *Maintenance*
- *Helpdesk*
- *Firmware update*
- *Troubleshooting*
- *Warranty and returning units for repair*

6.1 Maintenance

Maintenance of the SAILOR 4300 L-Band System can be reduced to a maintenance check at each visit of the service staff. Inspect the unit for mechanical damages, salt deposits, corrosion and any foreign material. Due to its robust construction and ruggedness the unit has a long lifetime. Anyway it must carefully be checked at intervals not longer than 12 months – dependent on the current working conditions.

Contact for support

Contact an authorized dealer for technical service and support of the SAILOR 4300 L-Band System. Before contacting the authorized dealer you can go through the troubleshooting guide to solve some of the most common operational problems.

6.2 Helpdesk

If this manual does not provide the remedies to solve your problem, contact your service provider. If you need help with BDU or ADU related issues call your service provider.

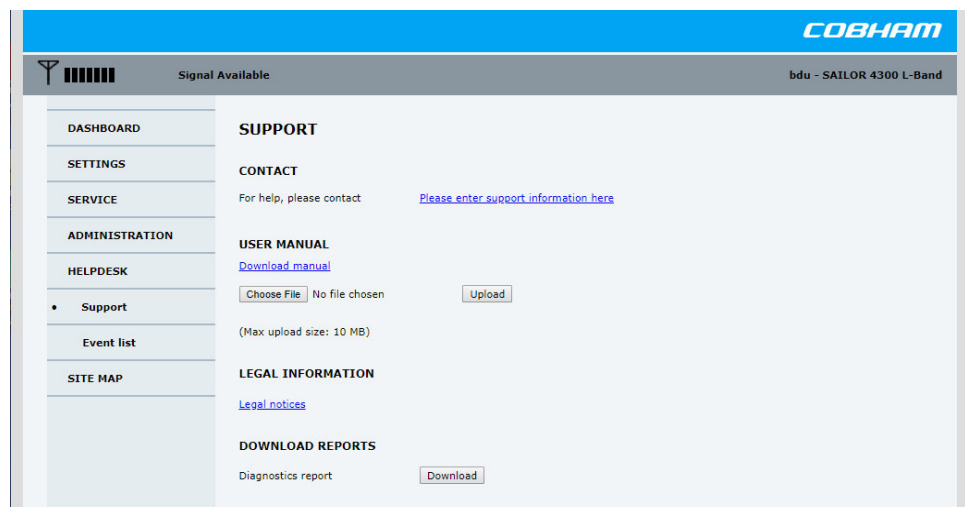


Figure 6-1: HELPDESK, Support

6.2.1 Helpdesk and diagnostic report

During the installation you can enter the support contact for this installation.

At **Legal notice** the licence text for the source code of the parts of the SAILOR 4300 L-Band System software that falls under free and open source software can be displayed.

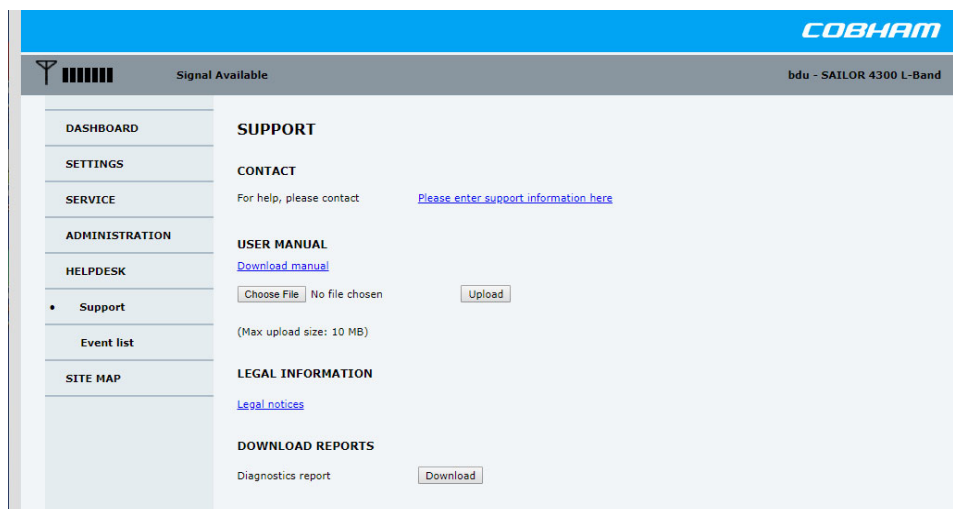


Figure 6-2: HELPDESK, Support

To set up the support contact of the Helpdesk, do as follows:

1. Select **HELPDESK** from the left navigation pane.
2. Click the link, enter support contact information and click **Apply**.

User manual

During installation a user manual can be provided that can be accessed online. The service provider specific manual may be uploaded:

1. Press **Browse...** and select the file to upload.
2. Press **Upload**.

The Diagnostics report contains information relevant for the service personnel during troubleshooting.

- Software versions in all components.
- System identification.
- POST - Result of the power-on-self-test for all components.
- Active continuously monitored events.
- Historic events logged.
- System configuration.
- System log.

To generate and download diagnostics reports

To generate a diagnostics report do as follows:

- 1. Click **HELPDESK > Download**.
- 2. Save the file to your computer.

Event list

When an event is registered, the web interface shows an event icon  in the icon bar as long as the event is active.
To view the event list with active events, click the event icon from the icon bar at the top of the web interface, or select **HELPDESK > Event list** from the left navigation pane.

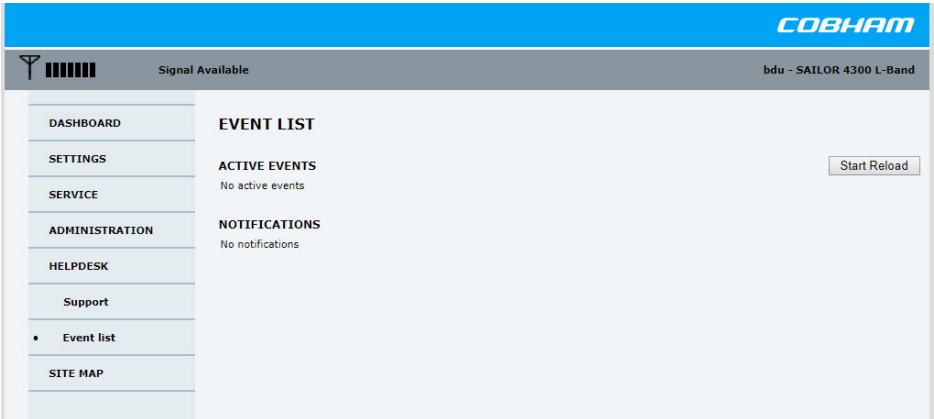


Figure 6-3: Event list (normal view)

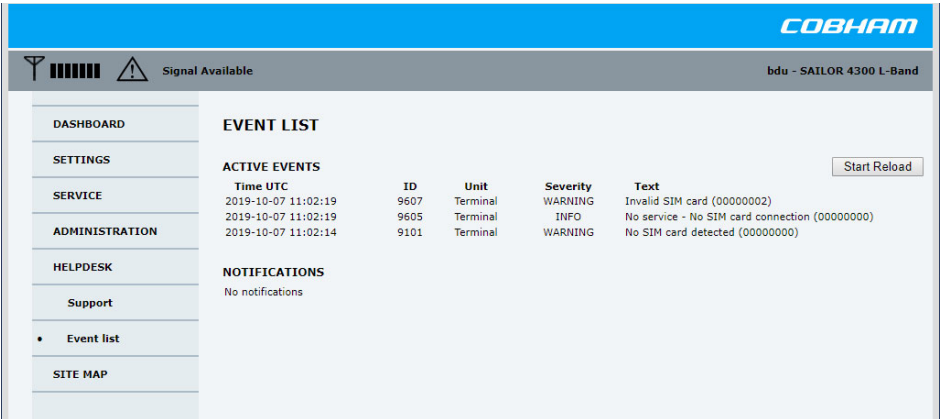


Figure 6-4: Event list, Active example

The **Event list** page shows a detailed list of active events and notifications including the time of the first occurrence, ID and severity of the event message, and a short text describing the error. Active events are cleared from the event list when the error is cleared. They are moved to the section **Notifications** and are displayed for 24 hours. All entries in the section **Notifications** are cleared automatically after 24 hours and after restart of the system. For a list of all events with description, error code (ID), explanation and remedy see *System messages* on page B-1.

Events are also shown in the mobile web interface.

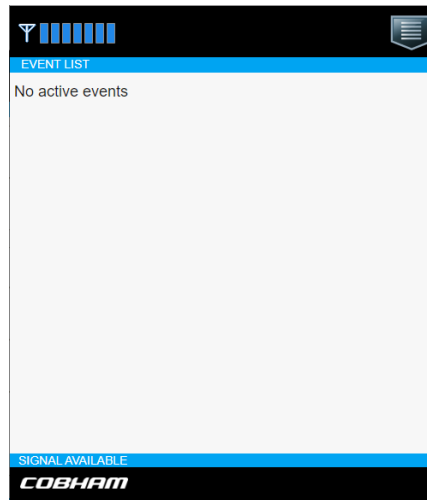


Figure 6-5: List of events, mobile web interface (normal view)

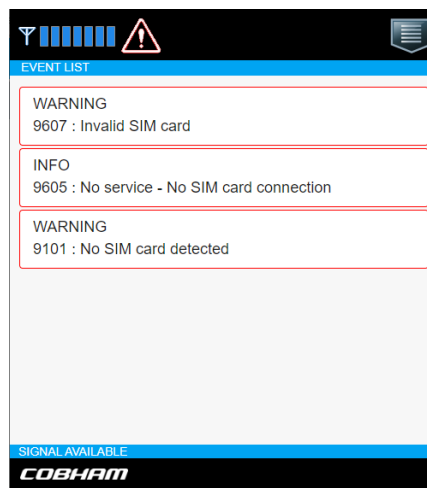


Figure 6-6: List of active events, mobile web interface

The event list may contain valuable troubleshooting information if passed to system experts.

6.3 Firmware update

You can update the SAILOR 4300 L-Band System firmware in the following ways:

- *Firmware update with the service web interface*
- *Software update with the TMA (ThraneLINK Management Application)*

Note Only qualified service personnel should make a firmware update.

6.3.1 Hardware and software requirements

The following items are required before the firmware can be updated:

- One computer with a standard Ethernet port available.
- A standard Internet browser.
- One straight LAN cable.
- The new SAILOR 4300 L-Band System firmware file (.tif).

6.3.2 Firmware update with the service web interface

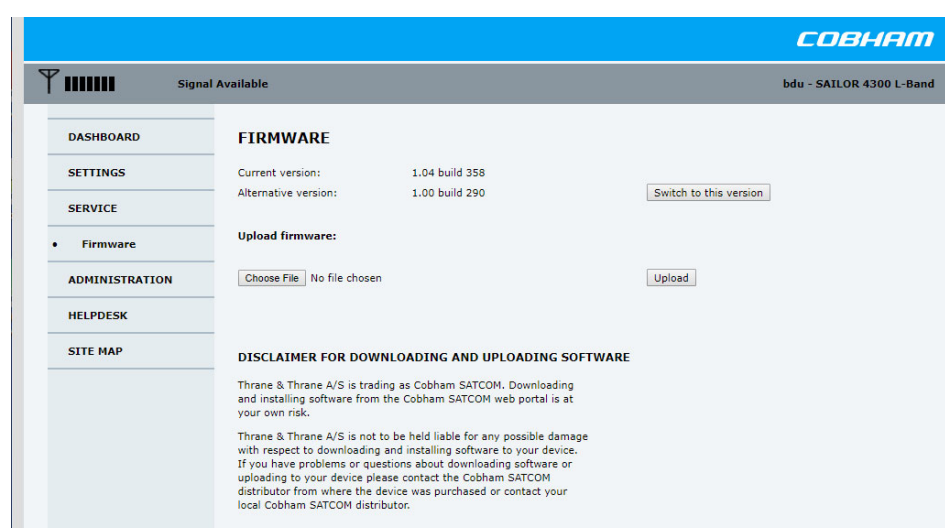


Figure 6-7: SERVICE, Firmware

1. Power up the SAILOR 4300 L-Band System, i.e. switch on the unit. Wait until the text Initialising has disappeared from the unit display.
2. Connect a PC to LAN interface 1 (Service port, standard Ethernet).
3. Open your Internet browser and enter the IP address of the unit. The IP address is **http://192.168.0.1** (default).
4. If needed, type in the user name **admin** and the password.
5. The web interface opens directly with the **DASHBOARD** page.
6. Click **SERVICE** from the left navigation pane. The **FIRMWARE** page is displayed.
7. In the section **Upload firmware**, click **Browse...** and locate the new software file.
8. Click **Upload**.

Important

Do not browse away from the upload page. This will terminate the upload process. Wait for the browser to reload automatically.

The start-up procedure after a software upload takes longer than the usual start-up time, as the software in the ADU must also be updated.
Verify that the software update has been completed successfully. You find the software version number in the **DASHBOARD** window of the web interface.

Software recovery procedure (Recovery MODE)

The terminal can be forced into recovery mode. In this mode you can reset the terminal to factory default configuration, reset the administrator password and upload software from a recovery mode web interface. This recovery mode web interface is only available at the service port (LAN 1). The service port has DHCP server disabled by default, and the default IP address is 192.168.0.1. This configuration is always used when in recovery mode, that is if there is a corrupt software image in the terminal. The use case is that the terminal's IP address is unknown or there is a need to reset the terminal to factory default.

To reset the terminal and get access to recovery mode, do as follows:

- 1. Use a pen to activate the reset button to enter recovery mode and reset the SAILOR 4300 L-Band System. The reset button is next to the SIM slot behind the SIM cover.



Figure 6-8: BDU connector panel

Indicator LED pattern (Terminal, Antenna)	Reset button activation	State	Description
Any state from section 6.4.2	Released	Any operational state	Normal operation.
Flashing (BLUE/RED, BLUE/RED)	Pressed while system is powered	Reset window	If the reset button is released in this state, the system is restarted in normal mode.
Steady (WHITE, WHITE)	Pressed (after approximately 4 seconds) while system is powered	Neutral	If the reset button is released early in this state, the system will continue to operate in the state previous to pressing the reset button.
Steady (GREEN, BLUE)	Pressed (after 30 seconds) while turned on, or pressed while powering the system on	Recovery mode	Recovery mode. It is now possible from recovery web page to: Factory Reset Firmware upload Succeeding any of these options will re-boot in normal mode.

Table 6-1: Function of the reset button

- 2. Connect a PC to service port.

To exit recovery mode without performing any of the recovery options above, the system must be power-cycled (see **Power (DC) and ground**).

3. Set the IP address of the PC to static: IP:192.168.0.2, Subnet: 255.255.255.0
4. Open an Internet browser and type http://192.168.0.1 (Default IP address of the unit).

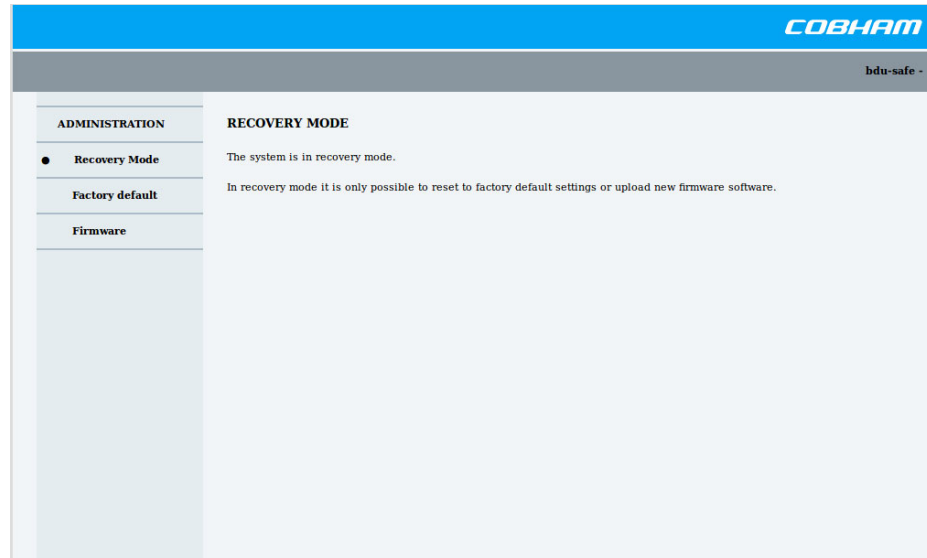


Figure 6-9: Recovery mode

Now factory reset and firmware upload can be performed.

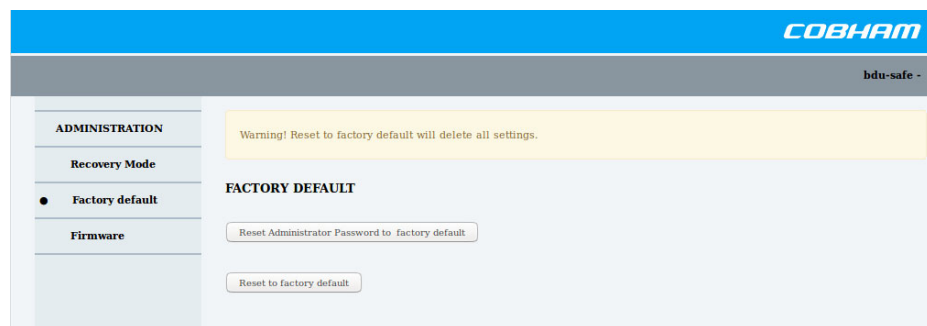


Figure 6-10: Recovery mode

Factory reset of configuration and password or setting administrator password only.

6.3.3 Software update with the TMA (ThraneLINK Management Application)

To update software in a ThraneLINK product, do as follows:

1. Connect the PC to the LAN with the ThraneLINK products for which you want to update software.
2. Click the TMA icon on the PC's desktop. The program starts and displays the ThraneLINK products found on the network.
If a Windows Security Alert pops up click **Allow access** (Windows 7).

3. Insert a USB memory stick with the new software version (placed in the root) into a USB connector in the PC.¹

The TMA automatically discovers the new software version(s) and a software update icon flashes next to the unit(s) for which the software can be installed.



4. From the main page of the TMA, select the product you want to update.
5. Select **Software update** at the bottom of the product page.
Check that the new software version is correct.
6. Select **Update**.



The progress of the software update is shown in percent under the product icon. When installation is completed, a check mark appears instead.

-
1. If the new software is not automatically found, you can point to the location of the software. Select the tool icon in the **Software update** page, select **Search for software** and enter the location of the software.



6.4 Troubleshooting

6.4.1 Introduction

In this section you find possible root causes to the experienced errors and suggestions for a remedy. Listed are only errors that may be caused by wrong installation, wrong configuration or misuse of the product. Errors where no remedy is listed could indicate damaged equipment.

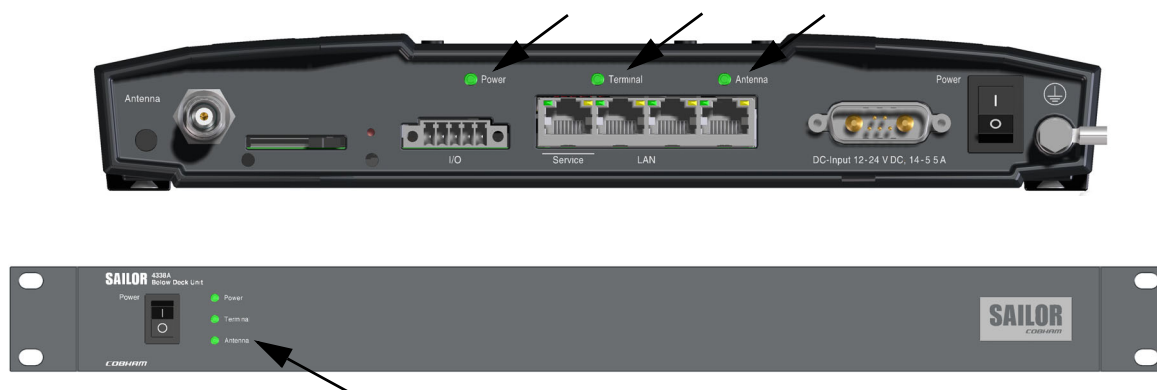
If failing to restore normal system status contact your service partner.

The following sources for system validation are available:

- *Light indicators*
- *BITE events (warning sign)*
- BITE CM events
- Functional validation tests

6.4.2 Light indicators

The BDU has several indicator LEDs. They indicate the overall system status during normal use.



Power LED

Indicator pattern	State	Remedy
Off	Power off	Check if power is present. See section <i>Power (DC) and ground</i> on page 3-14.
On (Green)	Power on	Normal operation.

Table 6-2: Power LED

Terminal LED

The terminal LED shows the status of the BDU, ADU and Iridium modem. In case of an error (red), this could be an error in the BDU, ADU or Iridium modem.

Indicator pattern	State	Remedy
Off	Power off	Check if power is present.
Blue	System initialization	The BDU initializes and powers the ADU. The system waits until a successful connection between BDU and ADU has been established.
Green flashing	Self-test (BDU and ADU POST)	The terminal and antenna is not yet ready (while performing Power On Self Test). This state may remain for approximately 60 seconds (it is not an error). If the state persists restart the system.
Yellow steady	Warning User recoverable	User recoverable continuous warning event detected, see active BITE event in the web interface as described in the section <i>BITE events (warning sign)</i> on page 6-12.
Green steady	Terminal ready	The terminal is operational and ready for use.
Red steady	Error (BDU, ADU or Iridium modem)	A fatal error is detected in the system. If possible, read out the event list. If a critical temperature is detected (overheating in the BDU) the product may be restarted after cooling has been provided. On other failures see the section <i>BITE events (warning sign)</i> on page 6-12 or contact your service partner.

Table 6-3: Terminal LED

Antenna LED

The antenna LED shows the status of the ADU and the Iridium link connection. In case of an error (red), it could be an error in the ADU or Iridium modem.

Indicator pattern	Meaning	Remedy
Off	Power off	Check if power is present.
Blue steady	Initializing (ADU/Iridium modem start-up and self-tests)	The antenna is not yet ready. This state may remain for approximately 120 seconds (this is not an error). If the state persists restart the unit).
Yellow flashing	Searching	Normal system state.
Green flashing	Signal available	Normal system state.
Green steady	Connected	Normal system state.

Table 6-4: Antenna LED

Indicator pattern	Meaning	Remedy
Yellow steady	Denied	Service is denied on the Iridium network. Check SIM card status matches the requested service.
Red steady	Error (ADU or Iridium modem)	A fatal error is detected in the system. See active BITE POST event in the web interface as described in the section <i>BITE events (warning sign)</i> on page 6-12.

Table 6-4: Antenna LED

Ethernet LEDs

The Ethernet RJ45 connectors have two LEDs built-in, Green and Yellow.

Indicator pattern	Meaning	Green - Remedy
Off	Power off or 10 Mbps	Check the LAN cable connection to PC or handsets. Check that handsets are not connected to the service port (left most).
On	100 Mbps	Normal.

Table 6-5: Ethernet LED - Green

Indicator pattern	Meaning	Yellow - Remedy
Off	Power off or no link pulse	Check LAN cable connection to PC or handsets. Check that handsets are not connected to the service port (left most).
On steady	Link	Normal.
Flashing	Traffic	Normal.

Table 6-6: Ethernet LED - Yellow

6.4.3 BITE events (warning sign)

BITE events are shown in the event list. The following table shows suggestions how to deal with the events.

BITE ID (HEX)	System component symptom	Remedy
8301 8302	ADU GPS module has no connection ADU GPS module has no fix.	Restart the terminal and see below. Inspect the ADU and check all cables. Compare position shown on Status page with vessel's main GPS.
8401 8402	ADU Temperature above warning level ADU Temperature above critical level.	The system will automatically decrease the transmit performance on temperature warnings. On detection of critical temperatures the system will protect itself by powering off the ADU. After a cool down period (30 minutes) the system will automatically restart.
8403 8404 8405 8406 8407 8408 8409 840A	ADU internal voltage errors.	Contact your service partner.
840B 840C	ADU PSU temperature above warning level ADU PSU temperature above critical level.	The system will automatically decrease the transmit performance on temperature warnings. On detection of critical temperatures the system will protect itself by powering off the ADU. After a cool down period (30 minutes) the system will automatically restart.
840D 840E	ADU Antenna switch temp. above warning level ADU Antenna switch temp. above critical level.	The system will automatically decrease the transmit performance on temperature warnings. On detection of critical temperatures the system will protect itself by powering off the ADU. After a cool down period (30 minutes) the system will automatically restart.
8501	No communication to Iridium modem.	Restart the terminal (see below).
8502	Iridium modem critical fault detected.	Restart the terminal (see below).
8503	High power amplifier control fault detected.	Restart the terminal. If persistent contact service partner.

Table 6-7: BITE events

BITE ID (HEX)	System component symptom	Remedy
8601 8602	HPA Temperature above warning level. HPA Temperature above critical level.	The system will automatically decrease the transmit performance on temperature warnings. On detection of critical temperatures the system will protect itself by powering off the ADU. After a cool down period (30 minutes) the system will automatically restart.
8A01	ADU boot-up problem. System services may be not available.	Restart the terminal (see below).
8C01	ADU GPS module has no connection.	Restart the terminal (see below).
8D01 8D02 8D03 8D04 8D05	ADU integrity check and configuration check failure.	Restart the terminal (see below). Contact your service partner and await instructions for reporting.
9001	BDU ADU communication check error.	Inspect antenna cable connection between BDU and ADU. Restart the terminal (see below).
9002 9003	BDU temperature above warning level. BDU temperature above critical level.	On temperature warnings try to provide sufficient ventilation to the terminal (opening lockers, check fans, etc.). On detection of critical temperatures the system will halt completely after 30 seconds. Manual restart is required after cooling has been provided.
9004 9005 9006 9007 9008 9009 900A	BDU Internal voltage errors.	Contact your service partner.
900C 900D	BDU PSU temperature above warning level. BDU PSU temperature above critical level. (System will enter a protection state).	On temperature warnings try to provide sufficient ventilation to the terminal (opening lockers, check fans, etc.). On detection of critical temperatures the system will halt completely after 30 seconds. Manual restart is required after cooling has been provided.

Table 6-7: BITE events

BITE ID (HEX)	System component symptom	Remedy
9101	BDU SIM card reader empty. No service.	Insert a valid SIM card.
9102	BDU cannot connect to the Iridium modem.	Restart the terminal (see below). Contact your service partner.
9104 9105 9106 9107 9108	Data connection not possible.	Contact Iridium service provider if the issue is persistent after a reboot.
9601	Iridium modem reports a reboot.	Observe the number of this event and report the event, if persistent, to your service partner.
9602 9603	Iridium modem temperature above warning level. Iridium modem temperature above critical level.	The system will automatically decrease the transmit performance on temperature warnings. On detection of critical temperatures the system will protect itself by powering off the ADU. After a cool down period (30 minutes) the system will automatically restart.
9604	Reduced number of active time slots.	None. Automatic recovery mode to prevent critical temperature.
9605	No SIM card connection.	Check SIM card or contact service partner.
9606	Service Denied.	See denial cause on dashboard. Contact service provider.
9607	Invalid SIM card detected.	Replace the SIM card, try the SIM card in another terminal or replace BDU.
9801 9802	BDU integrity check and configuration check failure.	Restart the terminal (see below). Contact your service partner and await instructions for reporting.
9803 9804	Unit firmware upgrade mismatch.	Restart the terminal (see below). If persistent contact your service partner.
9901	BDU SIM module reader error.	Contact your service partner.
9902	Iridium modem self-check error.	Contact your service partner.

Table 6-7: BITE events

BITE ID (HEX)	System component symptom	Remedy
9903	Iridium modem reports wrong antenna type configuration.	Contact your service partner.
9A01	BDU boot-up problem. System services may be not be available.	Restart the terminal (see below).

Table 6-7: BITE events

6.5 Inspections and minor repair tasks

6.5.1 Service shell

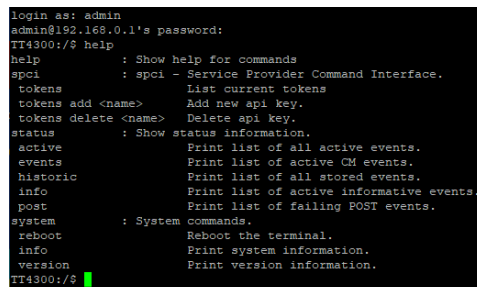
A service shell can be used for advanced configuration and to get status information not available through the web interface. If instructed, your service partner will ask you to use this shell interface for inspections and minor repair tasks. Access to the SAILOR 4300 L-Band System is protected by a username and password. This is the same username and password that is used in the web interface under **ADMINISTRATION**.

You can access the service shell via SSH through the service port.

The interface is on the SSH port 22. IP 192.168.0.1 (default).

To start a session do as follows:

1. Open a SSH client of your choice.
2. At the prompt, enter the IP address of the unit, default login **admin** and default password - see the label on the BDU.



```
login as: admin
admin@192.168.0.1's password:
TT4300:/$ help
help          : Show help for commands
spci          : spci - Service Provider Command Interface.
tokens        : List current tokens
tokens add <name>  Add new api key.
tokens delete <name> Delete api key.
status        : Show status information.
active        : Print list of all active events.
events        : Print list of active CM events.
historic      : Print list of all stored events.
info          : Print list of active informative events.
post          : Print list of failing POST events.
system        : System commands.
reboot        : Reboot the terminal.
info          : Print system information.
version       : Print version information.
TT4300:/$
```

Figure 6-11: Service shell, login

Enter help command to get an overview of available commands (see Figure 6-9).

6.6 Warranty and returning units for repair

Should your Cobham SATCOM product fail, please contact your dealer or installer, or the nearest Cobham SATCOM partner. You will find the partner details on www.cobham.com/satcom, **Technical Service Partner List**. You can also access the **Cobham SYNC Partner Portal** at <https://sync.cobham.com/satcom>, which may help you solve the problem. Your dealer, installer or Cobham SATCOM partner will assist you whether the need is user training, technical support, arranging on-site repair or sending the product for repair. Your dealer, installer or Cobham SATCOM partner will also take care of any warranty issue.

6.6.1 Repacking for shipment

Should you need to send the product for repair, please read the below information before packing the product.

The shipping carton has been carefully designed to protect the SAILOR 4300 L-Band System and its accessories during shipment. This carton and its associated packing material should be used when repacking for shipment. Attach a tag indicating the type of service required, return address, part number and full serial number. Mark the carton FRAGILE to ensure careful handling.

Note | Correct shipment is the customer's own responsibility.

If the original shipping carton is not available, the following general instructions should be used for repacking with commercially available material.

1. Wrap the defective unit in heavy paper or plastic. Attach a tag indicating the type of service required, return address, part number and full serial number.
2. Use a strong shipping container, e.g. a double walled carton.
3. Protect the front- and rear panel with cardboard and insert a layer of shock-absorbing material between all surfaces of the equipment and the sides of the container.
4. Seal the shipping container securely.
5. Mark the shipping container FRAGILE to ensure careful handling.

Failure to do so may invalidate the warranty.

Technical specifications

Item	Specification
Weight, BDU	3.5 kg
Weight, BDU, 19"	3.8 kg
Weight, ADU	9.5 kg
Dimensions, BDU	48 x 27 x 4 cm
Dimensions, BDU, 19"	48 x 49 x 4 cm
Dimensions, ADU	ø=38 cm, H=37 cm
Minimum safety distance	0.7 m
APPROVALS	
Iridium NEXT approved. Compliant to RED, CE Marked. Tested to FCC part 25	
FREQUENCY BAND	
Operating frequency range	1616 - 1626.5 MHz
Number of channels	30 sub bands + 0.5 MHz paging
Channel spacing	333.333 kHz
Output power	15.4 dBw
Bandwidth	41.667 kHz, 83.333 kHz, 333.333 kHz, 666.666 kHz
ITU Emission Designator	41K7Q1W,83K3Q1W,333KQ1W,333KQ7W,666KQ7W
Type of radio transmission	Frequency divide and multi carrier
Types of modulation	QPSK, 16APSK, SE-QPSK multi carrier
Number of antennas	7
Antenna gain	8.7 dB

Table A-1: Technical specifications

Item	Specification
RECOMMENDED ANTENNA CABLE	
Recommended antenna cable	RG214U up to 100 m
Requirements for antenna cable	<10 dB loss at 80 MHz. Max. 1.8 Ohm DC loop resistance
POWER SUPPLY AND CONSUMPTION	
Voltages	10.8 V to 31.2 VDC
Power consumption (max)	120 W @ 10.8-31.2 VDC
Heat dissipation for BDU	15 W max.
Current consumption	Approx. 4Aavg/15Apeak at 12VDC, 2Aavg/8Apeak at 24VDC
ENVIRONMENTAL CONDITIONS	
Operating temperature	-25 to +55°C
Storage temperature	-35 to +85°C
Survival temperature (power on, non functional)	-35 to +80°C
Automatic thermal surveillance shuts down system gradually in ease of own temperature	
BDU operating humidity	5% to 95% non-condensing at +40°C
ADU enclosure	IPX6
ADU operating humidity	5% to 95% Exposed according to EN 60945
BDU enclosure	IP31
Icing (survival)	Max 25 mm
VIBRATION (ADU)	
Vibration, operational	Random spectrum 0.92 g rms x 3 axes: 5 to 20 Hz: 0.01 g ² /Hz 20 to 500 Hz: -3 dB/octave
Vibration, non-operational	Random spectrum 1.7 g rms 2 h x 3 axes (6 h total): 5 to 20 Hz: 0.05 g ² /Hz, 20 to 150 Hz: -3 dB/octave

Table A-1: Technical specifications (Continued)

Item	Specification
SHIP MOTION	
Roll	+/- 30 deg. per 8 s, max. 0.5 g tan.
Pitch	+/- 15 deg. per 6 s, max. 0.5 g tan.
Yaw	+/- 10 deg. per 50 s, max. 0.2 g tan.
Surge	+/- 0.2 g
Sway	+/- 0.2 g
Heave	+/- 0.5 g
Turning rate	+/- 6°/s; ACC 1°/s ²
Headway speed	15 m/s (30 knots)
Wind	200 km/hr (108 knots)
MECHANICAL SHOCK	
Mechanical shock	20g/11 half-sine
ANTENNA CONNECTOR	
ADU	TNC, female
BDU	TNC, female
OTHER SPECIFICATIONS	
Standard IP data rate, up/down	Certus 350: 176/352 kbps Certus 700: 176/704 kbps
Ethernet/LAN	4 ports
I/O connector	1 connector
Status LED	Full status LED panel
SIM card slot	1 SIM card slot for Iridium SIM card

Table A-1: Technical specifications (Continued)

A.1 Outline drawings

A.1.1 ADU

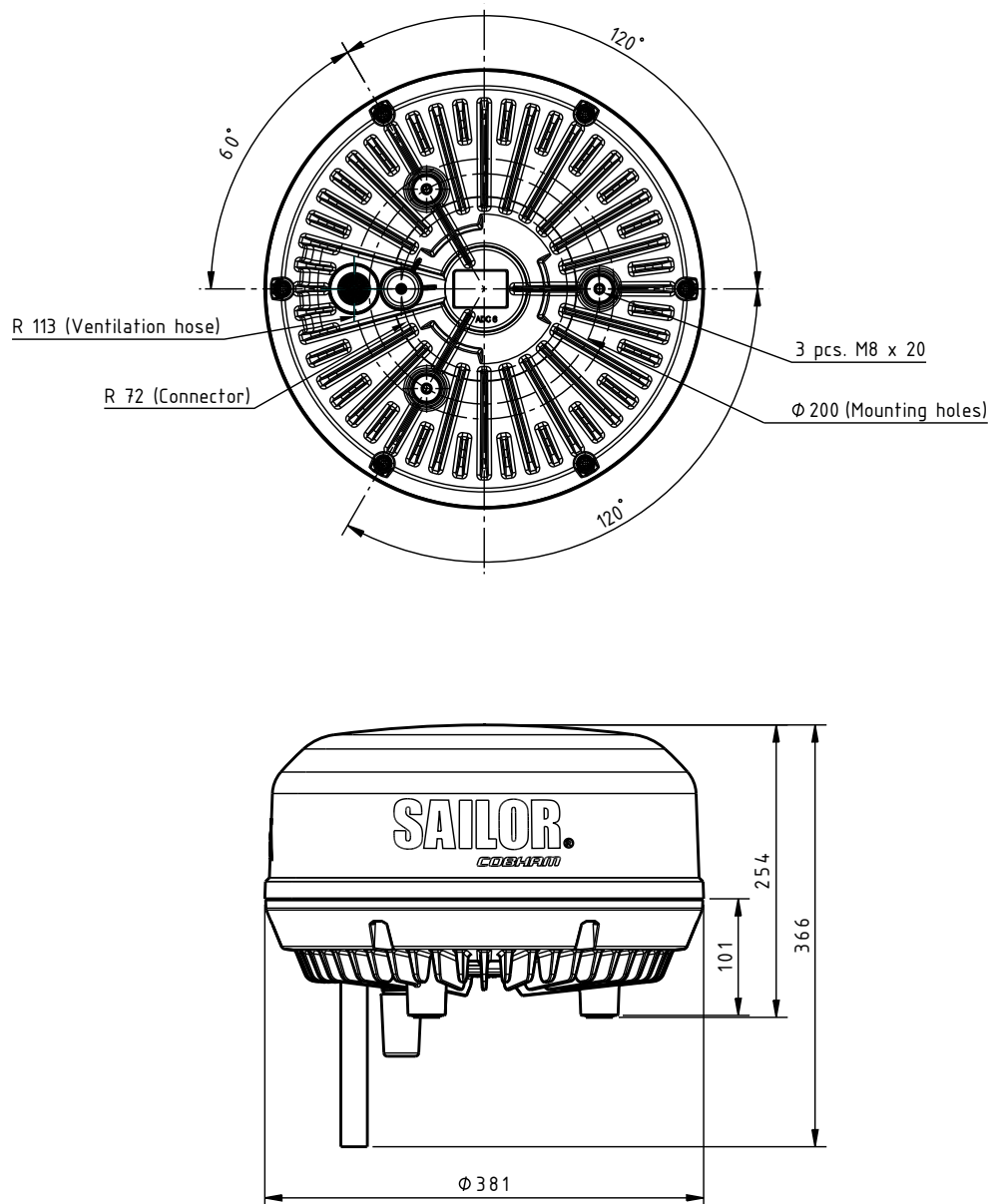


Figure A-1: Outline drawing of the ADU

A.1.2 BDU

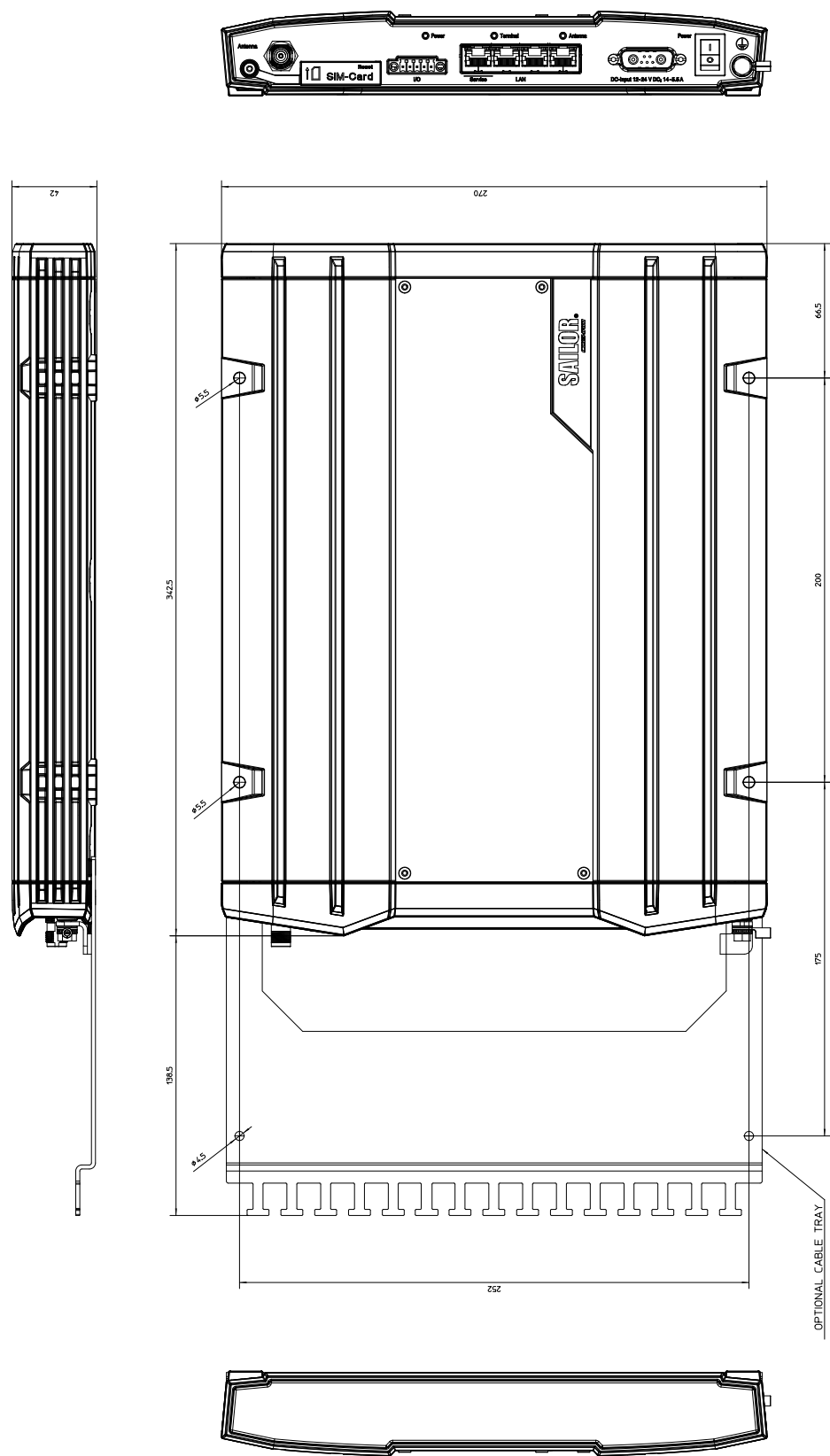


Figure A-2: Outline drawing of the BDU

A.1.3 BDU, 19" rack version

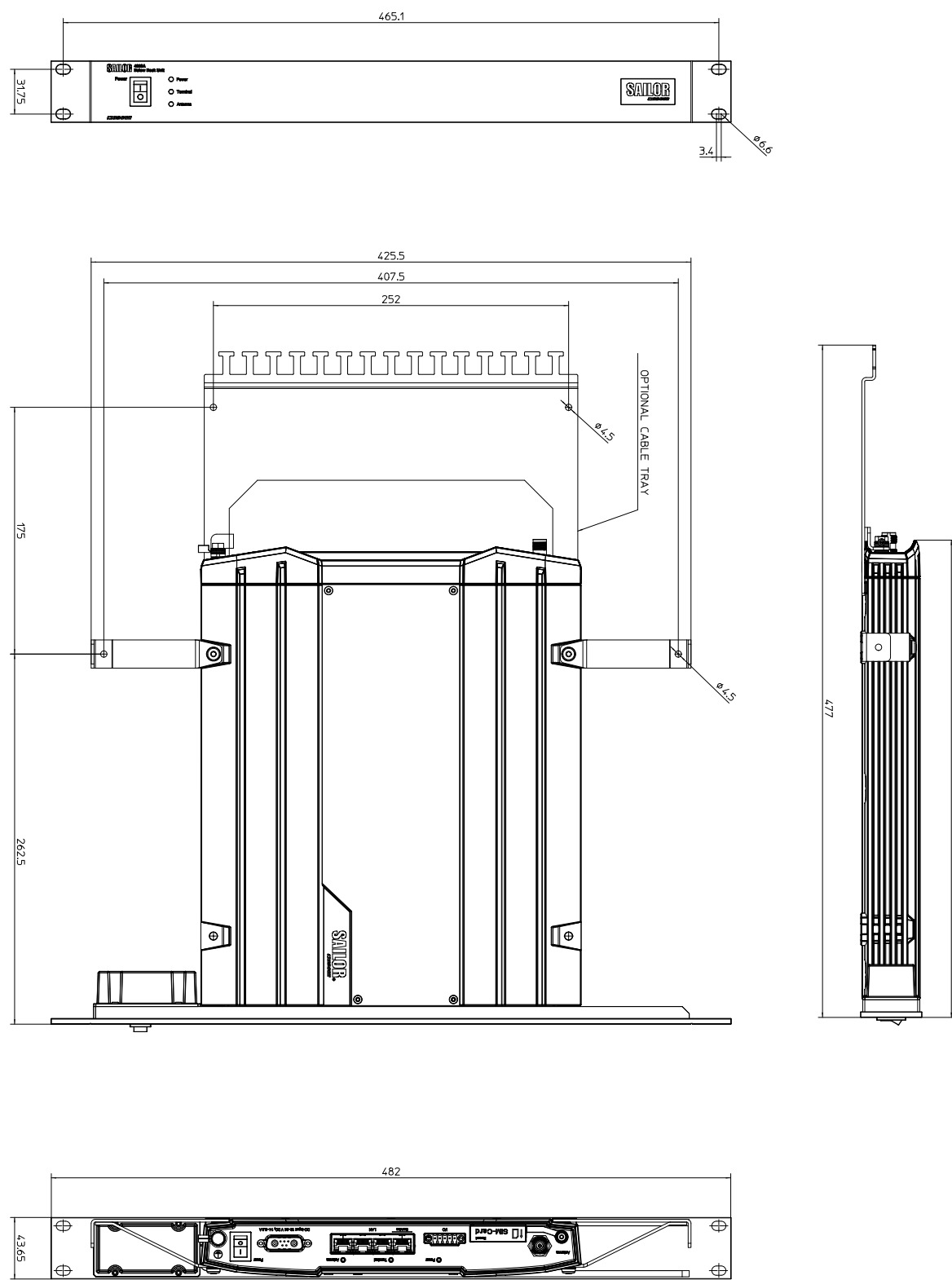


Figure A-3: Outline drawing of the BDU, 19" rack version

System messages

This appendix has the following sections:

- *Built-In Test Equipment (BITE)*
- *POST events*
- *CM events*

B.1 Built-In Test Equipment (BITE)

B.1.1 Overview

The equipment has built-in self-tests to support maintenance functions by identification or confirmation of a fault condition. The Iridium failure detection collects component BITE reports, including continuous monitoring (CM) and power on self-test (POST) results. With this functionality a fault can be isolated to a unit or interface, so it can be replaced or the fault can be corrected.

BITE events are result reports from POST and Continuous Monitoring.

- POST - Power-On Self-Test is a series of tests performed when the system is booted / power is initially applied.
- CM - Continuous Monitoring is a series of tests that run continuously, monitoring operational critical parameters and interfaces. The CM events start to be reported after POST.

B.1.2 Fault severity of BITE events

Reported BITE events have a defined fault severity.

Severity	Description
Error/Critical	Fault detected which fails in such a manner that the system is functional but with limited service.
Warning	External fault condition that causes service degradation or internal error without influence on basic services.
Notice/normal	Normal operation but significant operational state or condition.

Table B-1: Fault severities

B.2 POST events

A POST is run before the system is ready. It is used to stop the system before it damages itself or other parts of the network. The following sections describe the different sources of the events. POST events are always of severity Error.

Id (Hex)	Description	Provider
9902	(Iridium) Modem Self test	BDU_(Iridium) Modem
9903	(Iridium) Modem SE Class mark check	BDU_(Iridium) Modem

Table B-2: POST events, (Iridium) Modem

Id (Hex)	Description	Provider
8A01	All daemons started.	ACU_APP
8C01	GPS communication	ADU_NAV
8D01	File system integrity check	XDU_CTL
8D02	Production data verification	XDU_CTL
8D03	LNA Calibration Ranges	XDU_CTL
8D04	HPA Calibration Ranges	XDU_CTL
8D05	SWB Calibration Ranges	XDU_CTL

Table B-3: POST events, ADU

Id (Hex)	Description	Provider
9A01	All daemons started.	ACU_APP
9901	SIM module communication is active	BDU_(Iridium) Modem
9801	File system integrity check	XDU_CTL
9802	Production data verification	XDU_CTL
9803	ADU firmware upgrade failed	XDU_CTL
9804	(Iridium) Modem firmware mismatch	XDU_CTL

Table B-4: POST events, BDU

B.3 CM events

Continuous Monitoring events come from monitoring the health of a running system.

Id (Hex)	Description	State	Severity	Provider
9601	(Iridium) Modem rebooted	Single	Info	BDU_(Iridium) Modem
9602	Warning Temperature	State	Warning	BDU_(Iridium) Modem
9603	Critical Temperature	State	Critical	BDU_(Iridium) Modem
9604	Connection is throttled down due to heat	Single	Info	BDU_(Iridium) Modem
9605	No SIM card connection	Single	Info	BDU_(Iridium) Modem
9606	Service denied	State	Warning	BDU_(Iridium) Modem
9607	Invalid SIM card	State	Warning	BDU_(Iridium) Modem

Table B-5: CM events, (Iridium) Modem

Id (Hex)	Description	State	Severity	Provider
8301	No GPS Communication	Single	Info	ADU_NAV
8302	No GPS fix	State	Info	ADU_NAV
8401	Warning Main Temperature	State	Warning	ADU_CTL
8402	Critical Main Temperature	State	Critical	ADU_CTL
8403	Core voltage level warning	State	Warning	ADU_CTL
8404	MPU voltage level warning	State	Warning	ADU_CTL
8405	1V8 voltage level warning	State	Warning	ADU_CTL
8406	DDR voltage level warning	State	Warning	ADU_CTL
8407	3V3A voltage level warning	State	Warning	ADU_CTL
8408	3V3 voltage level warning	State	Warning	ADU_CTL
8409	5V voltage level warning	State	Warning	ADU_CTL
840A	1V2 voltage level warning	State	Warning	ADU_CTL
840B	Warning PSU Temperature	State	Warning	ADU_CTL
840C	Critical PSU Temperature	State	Critical	ADU_CTL

Table B-6: CM events, ADU

Id (Hex)	Description	State	Severity	Provider
840D	Warning Switch board Temperature	State	Warning	ADU_CTL
840E	Critical Switch board Temperature	State	Critical	ADU_CTL
840C	Critical PSU Temperature	State	Critical	ADU_CTL
8501	No (Iridium) Modem communication (CAN)	State	Critical	ADU_(Iridium) Modem
8502	(Iridium) Modem entered Fault Mode	State	Critical	ADU_(Iridium) Modem
8503	HPA control error	State	Critical	ADU_(Iridium) Modem

Table B-6: CM events, ADU (Continued)

Id (Hex)	Description	State	Severity	Provider
9101	No sim card detected	State	Warning	BDU_(Iridium) Modem
9102	No (Iridium) Modem Communication	State	Critical	BDU_(Iridium) Modem
9104	Data session not possible	State	Warning	BDU_(Iridium) Modem
9001	Lost ADU intercommunication	State	Critical	BDU_CTL
9002	Warning Temperature	State	Warning	BDU_CTL
9003	Critical Temperature	State	Critical	BDU_CTL
9004	Core voltage level warning	State	Warning	BDU_CTL
9005	MPU voltage level warning	State	Warning	BDU_CTL
9006	1V8 voltage level warning	State	Warning	BDU_CTL
9007	DDR voltage level warning	State	Warning	BDU_CTL
9008	3V3A voltage level warning	State	Warning	BDU_CTL
9009	3V3 voltage level warning	State	Warning	BDU_CTL
900A	5V voltage level warning	State	Warning	BDU_CTL
900C	PSU Warning Temperature	State	Warning	BDU_CTL
900D	PSU Critical Temperature	State	Critical	BDU_CTL

Table B-7: CM events, BDU

Id (Hex)	Description	State	Severity	Required	Provider
8601	Warning Temperature	State	Warning	N.a.	ADU_HPA
8602	Critical Temperature	State	Critical	N.a.	ADU_HPA

Table B-8: CM events, HPA

Approvals

This appendix lists the approvals for SAILOR 4300 L-Band System:

- *CE (RED)*

C.1 CE (RED)

The SAILOR 4300 L-Band System is CE certified (RED directive) as stated in the “Declaration of Conformity with RED Directive”. For more details see www.cobham.com/satcom, **Cobham SYNC Partner Portal**.

Grounding and RF protection

D.1 Why is grounding required?

D.1.1 Reasons for grounding

Grounding the SAILOR 4300 L-Band System is required for at least two reasons:

- Safety: Lightning protection of persons and equipment.
- Protection: ESD (ElectroStatic Discharge) protection of equipment.

D.1.2 Safety

First of all grounding of the system is required for safety reasons. In the event of a lightning strike at the ADU a proper grounding of the system will provide a low resistance path to divert the strike discharge to seawater.

In addition a more common phenomenon called electric rain may be observed. It is rain coming from an electrically charged cloud. Each drop carries an electrical charge which may accumulate on all ungrounded surfaces. These surfaces may be charged to very high voltages (kV). Proper grounding of the ADU mitigates this problem.

D.1.3 ESD Protection

The ESD protection circuits in the BDU rely on proper grounding of the system in order to work properly. Otherwise sensitive circuits within the BDU might be damaged due to ESD when you are handling the equipment.

D.2 Grounding Recommendations

D.2.1 To ground the BDU

The BDU provides galvanic isolation from its power terminals to the chassis/grounding stud.

1. Ground the BDU to the ship/hull.
2. As a minimum connect the grounding stud on the BDU to ground with a short thick copper strap/band or alternatively with a heavy gauge wire with tinned strands (minimum 6mm²).
3. You can get improved lightning protection by grounding the COAX cable shield directly to ground near the BDU. If needed, extend the ground plane with a short wide copper foil.

See the below drawing which shows the coax cable to the ADU to the left and a ground wire to the right.

To extend the ground plane

In some cases it may not be possible to access the hull and at the same time place the BDU in a suitable place. A way to ensure good grounding and at the same time make it possible to ground the coax cable - is to extend the ship ground plane by means of copper foil. The maximum length of the foil is determined by the width of the foil:

Copper foil 5 cm wide: Max 50 cm

Copper foil 10 cm wide: Max 100 cm

Copper foil 20 cm wide: Max 200 cm

Note The foil must be at least 0.1 mm thick.

1. Connect the foil to the hull by plenty of screws or hard-soldering.
2. Run the foil past the place where the short ADU cable is to be grounded and mount a grounding kit on top of the foil.

Note that the drawing below does not show the optional cable tray.

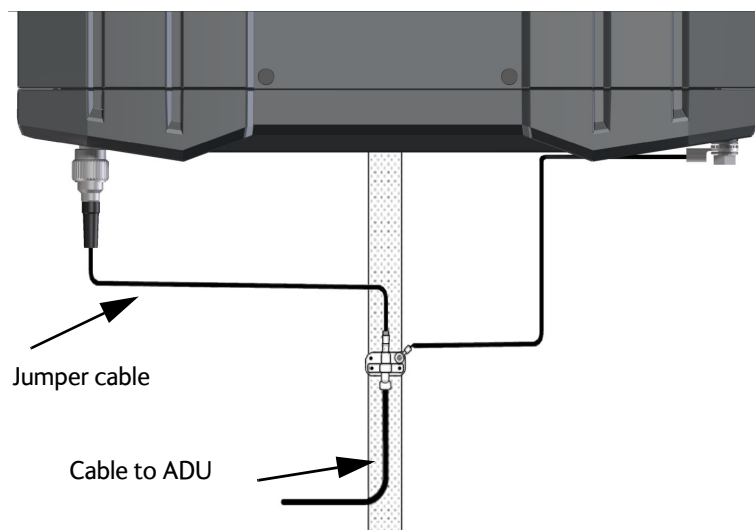


Figure D-1: Extending the ground plane

D.2.2 To ground the ADU

The ADU is mounted with three M8 mounting bolts. The threaded stainless steel bushings in the ADU are electrically isolated from the ADU to mitigate galvanic corrosion. The ADU is normally grounded via the connecting coax cable between the ADU and the grounded BDU. This grounding scheme is sufficient for most installations including installations which are exposed to electrical rain. The drawing below shows how to assemble the cables and the waterproofing grommet at the ADU.

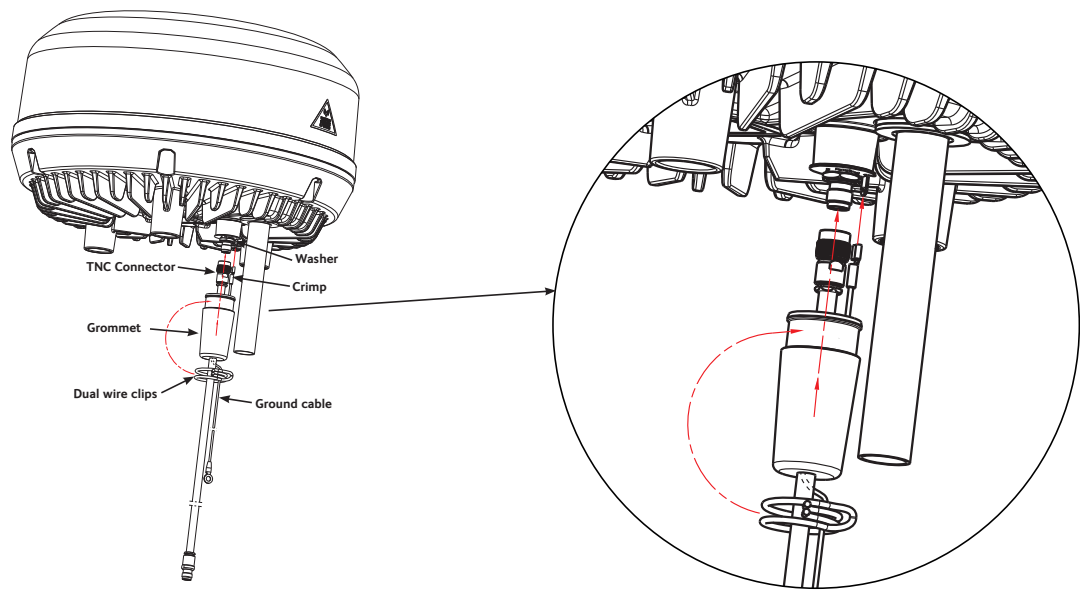


Figure D-2: Cable assembly and waterproofing grommet

You may ground the ADU in addition directly to the hull or mast with a short ground wire (supplied with the ADU). This cable connects to the spade connector located next to the TNC connector. See above drawing.

The other end of the ground cable must be electrically bonded to the hull or mast. Subsequently seal the area around this bonding properly to prevent corrosion.

If extended lightning protection is needed we recommend electrically bonding the shield of the coax cable directly to the hull or mast next the ADU. Subsequently seal the area around this bonding properly to prevent corrosion.

Important

Bear in mind that the ADU ground connection is to be made at the **same electrical ground potential as the BDU** (see *To ground the ADU*).

D.3 Alternative grounding for fibre glass hulls

D.3.1 To ground the BDU

1. Preferably ground the BDU with the short ADU cable and a grounding kit.
2. Ground the BDU at its grounding stud in order to ensure a proper grounding if the short ADU cable is disconnected.
3. Establish the ground connection at a dedicated RF ground (either capacitive or electrical coupled).

Important

Bear in mind that the ADU ground connection is to be made at the **same electrical ground potential** as the BDU (see *To ground the ADU*).

4. Make sure as a minimum that the ship's ground is in connection with the sea in order to prevent charge buildup from electrical rain.

D.3.2 To ground the ADU

The ADU is normally grounded via the coax cable.

If the ADU grounding stud is used for grounding it is important that the grounding cable runs in parallel close to the coax cable down to the BDU grounding kit. See drawing below.

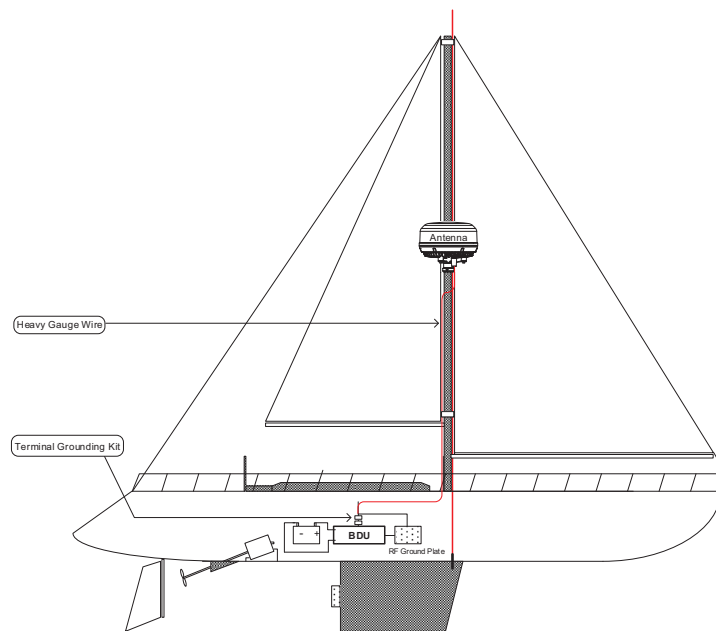


Figure D-3: Alternative grounding for fibreglass hulls

D.4 RF interference

Interference induced from nearby high-power RF transmitters might cause system failures and in extreme cases permanent damage to the SAILOR 4300 L-Band System equipment. If there are problems with interference from HF transmitters, it is advisable to mount ferrite clamps on the coax cable in order to provide suppression of induced RF. The ferrites will have no effect on the differential-mode signals but increases the impedance in relation to common-mode RFI.

A

ADU Above Deck Unit

B

BCX Broadband Core Transceiver

BDU Below Deck Unit

C

CTL Control (BDU Control or ADU Control)

E

ESD ElectroStatic Discharge

F

FBB FleetBroadband

G

GPL General Public License

H

HPA High Power Amplifier

L

LAN Local Area Network. A computer network covering a small physical area, like a home, office, school or airport. The defining characteristics of LANs, in contrast to wide-area networks (WANs), include their usually higher data-transfer rates, smaller geographic area, and lack of a need for leased telecommunication lines.

LGPL Lesser General Public License

P

POST Power On Self Test. A system test that is activated each time the system is powered on.

PSU Power Supply Unit

R

RFI Radio Frequency Interference. A non-desired radio signal which creates noise or dropouts in the wireless system or noise in a sound system.

RTP Real-time Transport Protocol, defines a standardized packet format for delivering audio

S

SIP Session Initiation Protocol. An application-layer control (signaling) protocol for creating, modifying, and terminating sessions with one or more participants. Used e.g. for Internet telephony.

T

TMA Thrane Management Application

TNC Threaded Neill-Concelman. A type of RF connector used for terminating coaxial cables. The TNC connector is a threaded version of the BNC connector. The connector has a 50 Ohm impedance and operates best in the 0-11 GHz frequency spectrum.

X

XDU BDU or ADU

