Doc. No. 99-102813 Rev. 1.02

LT-4100 Certus® 100

- Technical Training Presentation

February 2022

Headlines

- Overview
- What’s in the box
- Accessories
- Installation
- Services (Voice, Data, GNSS, and Bluetooth)
- Accredited Solutions

Iridium® Services for Maritime

2.4 Kbps

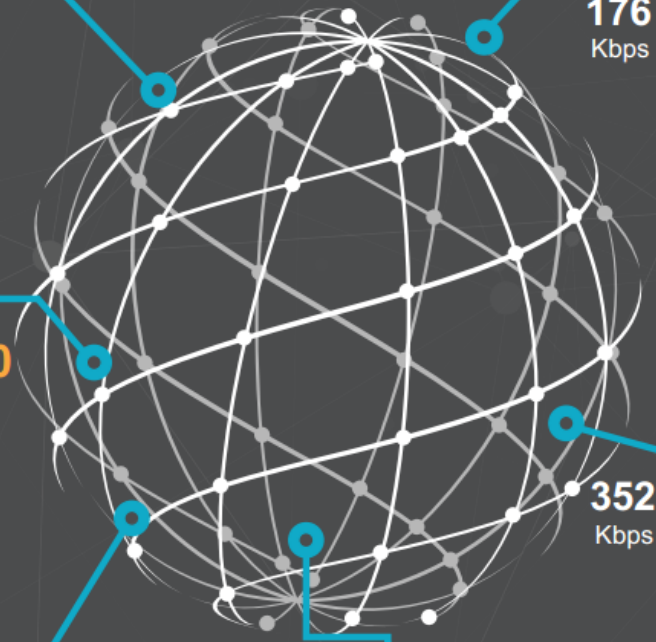
NARROWBAND
Iridium Narrowband
- Telemetry
- Asset Tracking
- SSAS
- LRIT
- Vessel Monitoring System (VMS)
- Global Maritime Distress & Safety System (GMDSS)*

22 Kbps

MIDBAND
Iridium Certus® 20
- IoT Connected Ship
- Regulatory Compliance: SSAS, Man-Over-Board (MOB)
- Vessel Monitoring System (VMS)
- Autonomous Systems
- Cargo Tracking
- GMDSS*

88 Kbps

MIDBAND
Iridium Certus® 100
- Email, Messaging, and Web Browsing
- Multiple High-Quality Voice Lines
- Electronic Chart Display and Information System (ECDIS) Updates
- IoT Connected Ship
- Regulatory Compliance: SSAS, LRIT, Citadel, VMS, e-Log
- Autonomous Water Craft
- GMDSS*



176 Kbps

BROADBAND
Iridium Certus® 200
- Email, Messaging, and Web Browsing
- Multiple High-Quality Voice Lines
- ECDIS Updates
- Remote Diagnostics, Engine, and Fuel Monitoring
- Autonomous Water Craft
- Regulatory Compliance: SSAS, LRIT, Citadel, VMS, e-Log
- Hybrid Cellular / VSAT System
- Smartphone Access
- GMDSS*

352 Kbps

BROADBAND
Iridium Certus® 350
- Email, Messaging, and Web Browsing
- Multiple High-Quality Voice Lines
- GMDSS*

704 Kbps

BROADBAND
Iridium Certus® 700
- Email, Messaging, and Web Browsing
- Multiple High-Quality Voice Lines
- Database Sync
- File Transfer
- Weather Data
- Hybrid Cellular / VSAT System
- Remote Diagnostics
- Engine Monitoring
- Fuel Monitoring
- Oceanographic Data
- Buoy Data
- Messaging Apps
- Smartphone Access
- Regulatory Compliance: SSAS, LRIT, Citadel,VMS, e-Log
- Prepaid Enablement
- Cargo Tracking
- Automous Water Craft
- GMDSS*

The Iridium network is capable of supporting speeds up to 1408 Kbps. Future development of Iridium Certus 1400 service is dependent on market demand.
*Narrowband GMDSS service began in 2020; Iridium Certus GMDSS service is expected at a future date.

iridium®

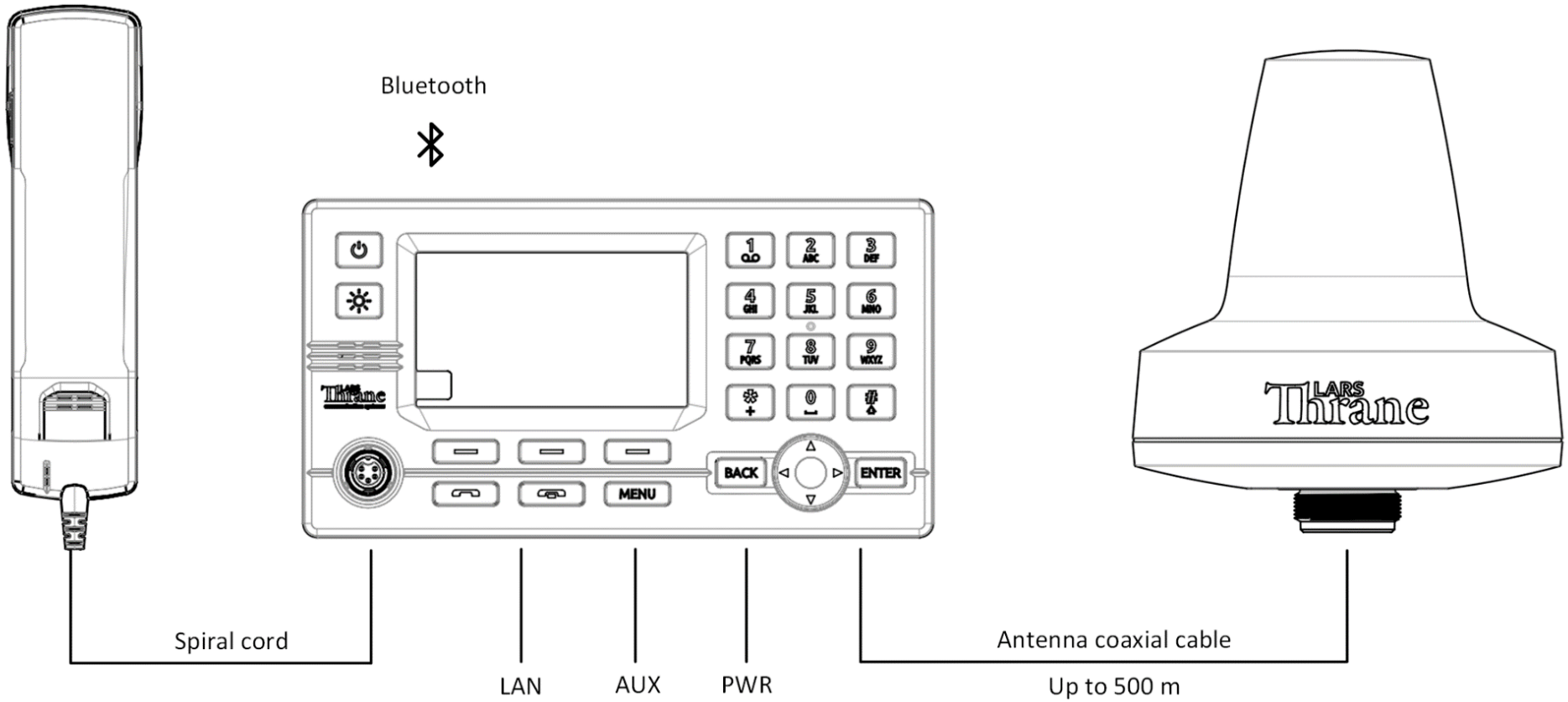
LARS Thrane communication systems

LT-4100 System (Certus® 100)

Features:

- New Antenna Unit -40°C to +55°C (-40°F to +131°F)
- Up to 500m Coaxial Cable
- 2 x Voice Channels (high quality)
- IP-data: 22/88 kbps (up/down)
- Built-in GNSS Receiver
- Future GMDSS

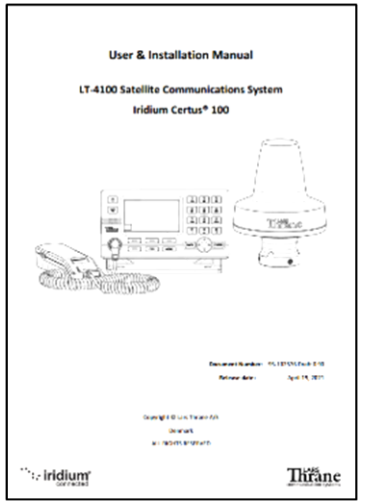
LT-4100 System - Overview



What's in the box?

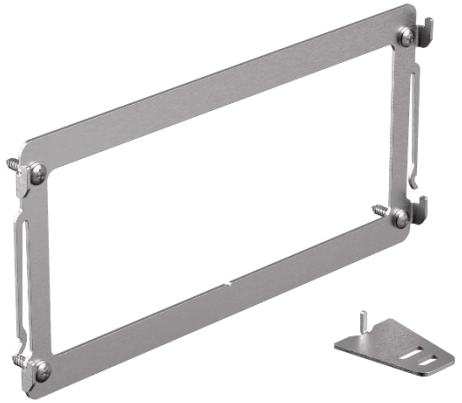
LT-4100 System - Basic, consists of:

- LT-4110 Control Unit
- LT-4130 Antenna Unit
- LT-3120 Handset
- LT-3121 Cradle
- Bracket Mount for Control Unit
- 3m DC Power Cable
- User & Installation Manual



Accessories

- Pole Mount (1.5” or 2,0” pipe)
- Flush Mount for Control Unit
- Aux Cable, 3m
- Antenna cables
  - FF195LSFROH Ø4.9mm
  - FF400LSFROH Ø10.3mm
- N Connectors for antenna cables

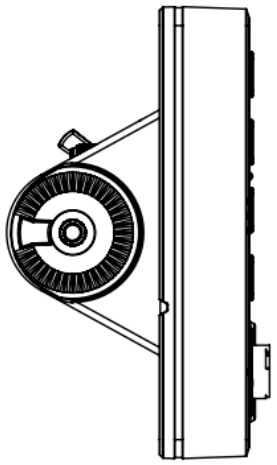


IMPORTANT	*Due to the design of the Antenna Unit, you must use mounts made by Lars Thrane.*

LT-4100 System - Installation

LT-4110 Control Unit

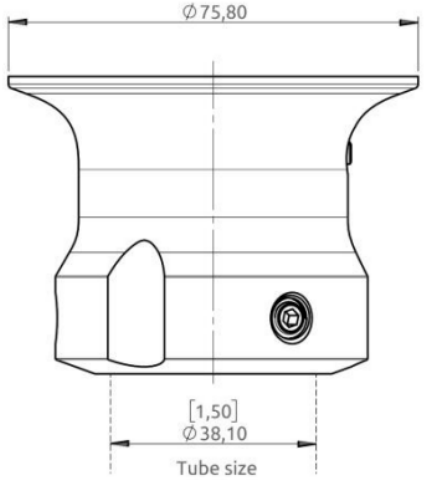
- Similar design as LT-3110
- 4.3” TFT Display
- Day/Night mode
- SIM Card
- LAN - RJ-45 type
- AUX (Serial port)
- Flush Mount or Bracket Mount

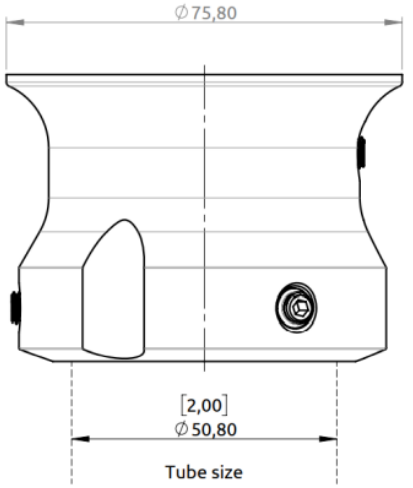


LT-4100 System - Installation

LT-4130 Antenna Unit

- Antenna Connector - N type
- Pole mounts for 1.5” or 2.0“ tube
- Single antenna cable solution with DC Power and data
- Antenna weight: 1.39 kg (3.05 lbs)





LT-4100 System - Installation

LT-4130 Antenna Unit

- Do not use tools for installation
- Fasten by hand
- N-connector max torque: 2 Nm

LT-4100 System - Installation

Antenna Coaxial Cable

- Antenna cable length: **Up to 500 meters** separation between Antenna & Control Unit (Standard coaxial cable)

Maximum Coaxial Cable Length		
Cable Type	12 VDC Supply	24 VDC Supply
FF195LSFROH (4.9mm)	41 m	135 m
FF400LSFROH (10.3mm)	154 m	500 m

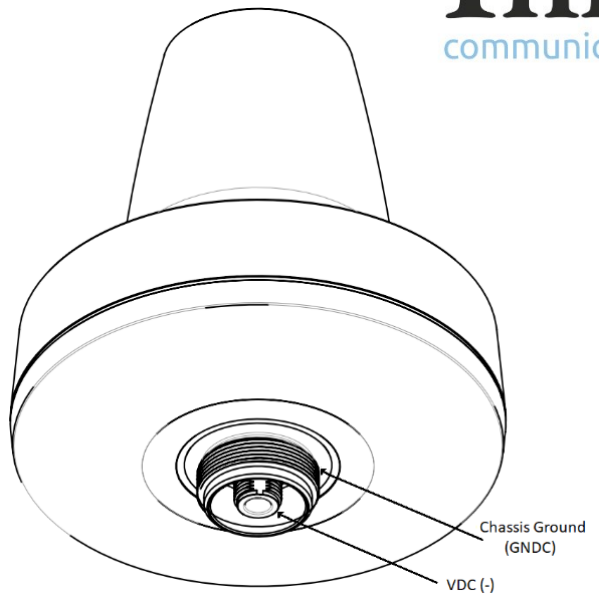
DC Coaxial Cable Requirements	
Power Source	Maximum DC Resistance
12 VDC	1.7 Ω
24 VDC	5.5 Ω

RF Coaxial Cable Requirements	
Requirement	Specification
Cable impedance	50 Ω
Maximum signal loss	45 dB/100 m @ 1.5 GHz

More information in the 95-102576 LT-4100 User & Installation Manual

LT-4100 System - Installation

The LT-4100 System must be installed with respect to DC isolation resistance and vessel chassis ground

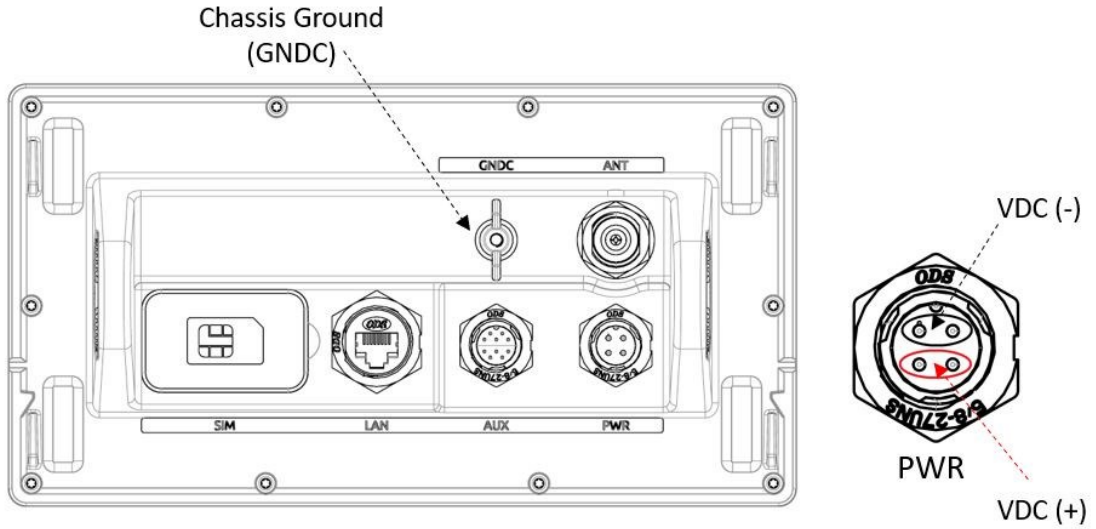


DC Isolation Resistance

- DC isolation resistance measured on a disconnected LT-4110 Control Unit or LT-4130 Antenna Unit, between GNDC and VDC (-), is above 50 MΩ

Vessel Chassis Ground (GNDC)

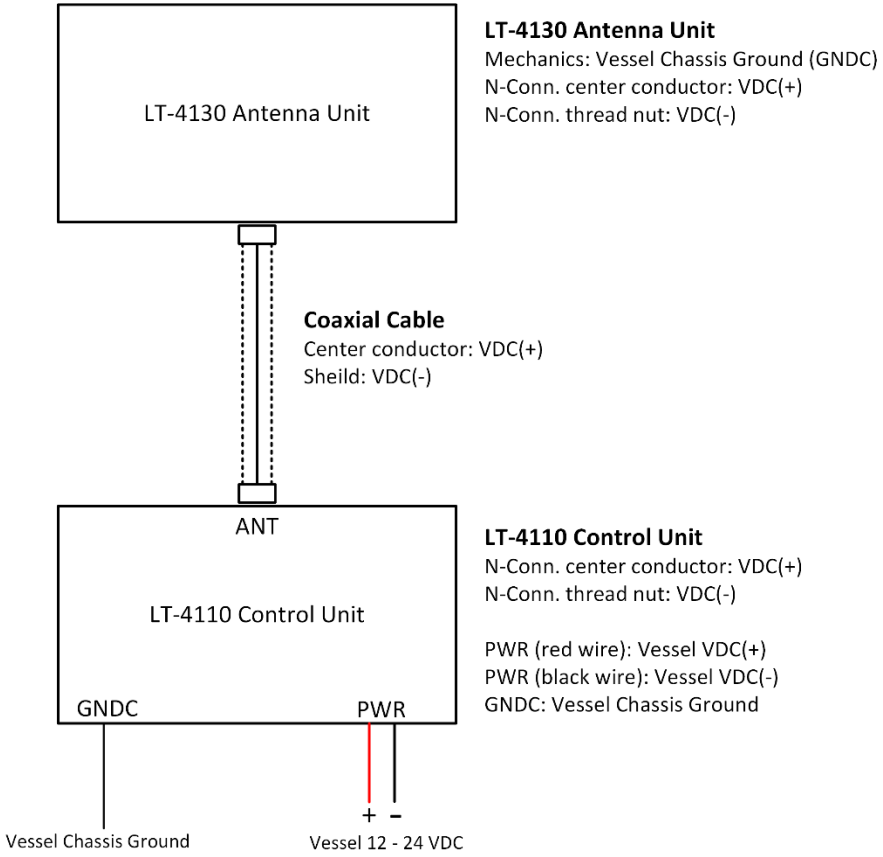
- Vessel Chassis ground (GNDC) must be connected to the LT-4110 Control Unit and LT-3130 Antenna Unit (see illustrations)



LT-4100 System - Installation

Coaxial Cable

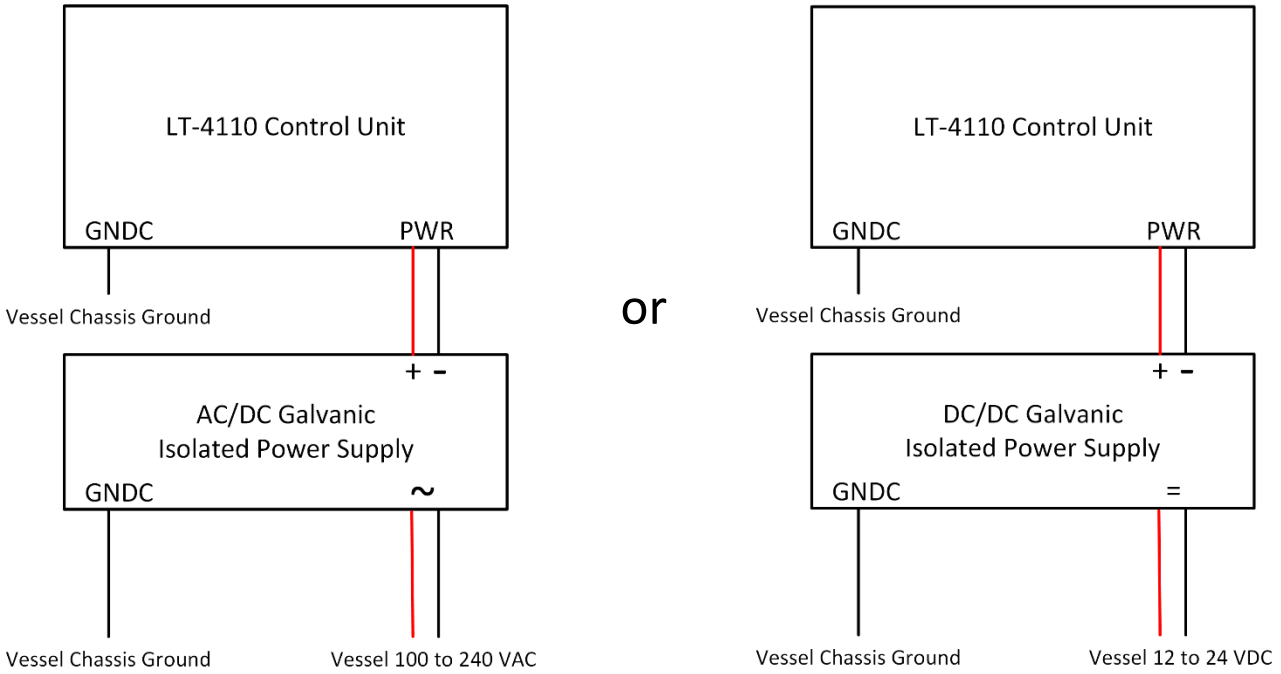
- Connect only the coaxial cable to the LT-4110 Control Unit and LT-4130 Antenna Unit N-Conn.
- Do not connect the coaxial cable shield to vessel chassis ground (GNDC)



LT-4100 System - Installation

Galvanic Isolated Power Supply

- Use an IEC 60945 approved AC/DC or DC/DC galvanic isolated power supply for the LT-4100 system
- Galvanic isolation is a requirement to protect the LT-4100 system



LT-4100 System - Installation

Power Supply

- 12 or 24 VDC power source
- Max consumption: 24 W
- Idle consumption: ~9 W

24 VDC Maximum Power Consumption (Watt)	
System Unit	Power [W]
Total Power (maximum)	24

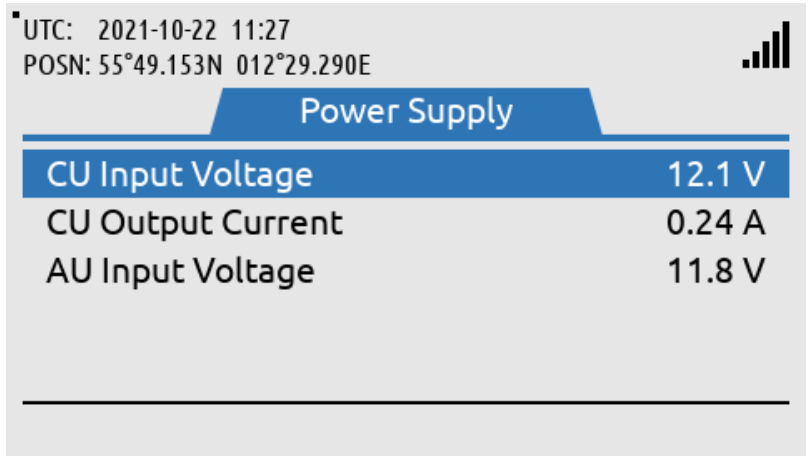
12 VDC Maximum Power Consumption (Watt)	
System Units	Power [W]
Total Power (maximum)	24

WARNING – Input Power

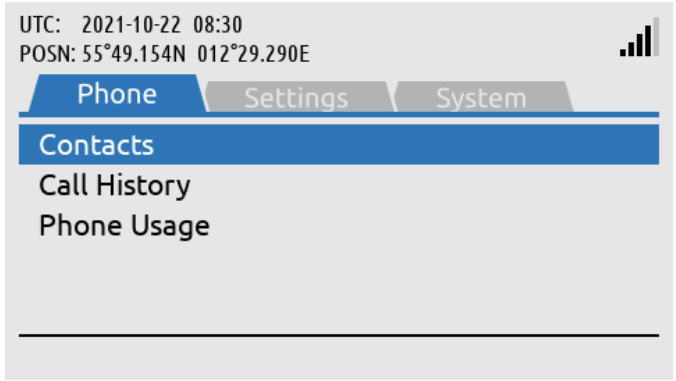
The input voltage range is: 12-24 VDC.

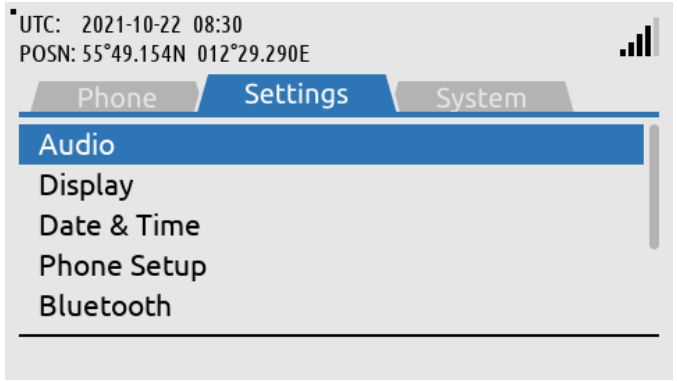
WARNING – Power supply protection

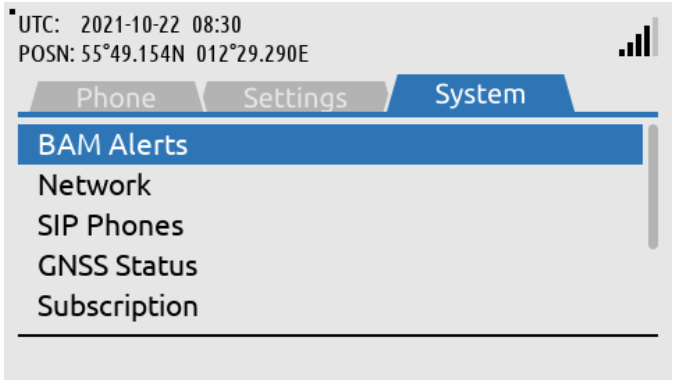
Make sure that the power supply is adequately protected by a fuse or an automatic circuit breaker when installing the equipment (max. 7.5 A).



LT-4100 System - MENU Layout







Phone
- Contacts
- Call History
- Phone Usage

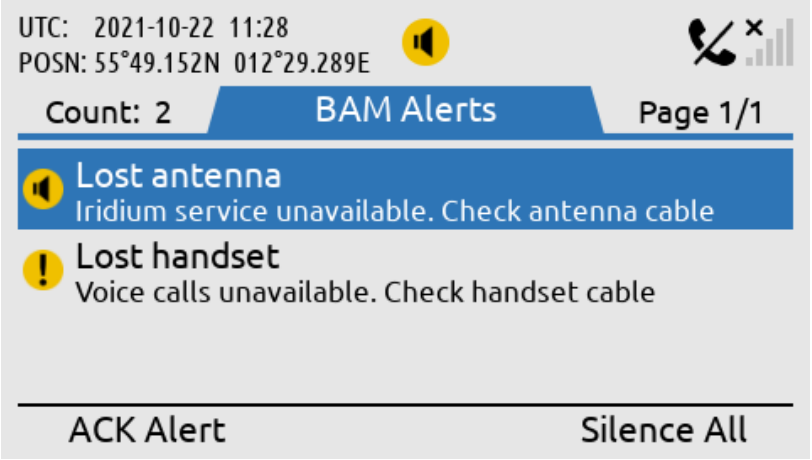
Settings
- Audio
- Display
- Date & Time
- Phone Setup
- Bluetooth
- IP Data
- Remote Access
- Reset Options

System
- BAM Alerts
- Network
- SIP Phones
- GNSS Status
- Subscription
- System Info
- Power Supply

LT-4100 System - BAM & Warnings

Bridge Alert Management

- Compliant with IEC 62923-1 and IEC 62923-2
- Transmit and receive BAM sentences
- Supports CAM via RS-422 interface



Alerts

- Lost antenna
- Lost handset
- Lost connection
- Lost SIM card

Sentences Received by SES		
Sentence	Name	Comment
ACN	Alert Command	Alert command for instance acknowledge
HBT	Heartbeat	Support reliable alert related communication
Sentences Transmitted by SES		
Sentence	Name	Comment
ARC, ALC, ALF	Alert information	

LT-4100 System - BAM & Warnings

BAM Alert Icons, Priority and Stat				
Priority	Icon	State	Condition	Audible signal
Warning		Active – unacknowledged	Alert condition present. Alert not acknowledged.	Yes
		Active – silenced	Alert condition present. Alert not acknowledged, but audible signal has been silenced by the operator.	No
		Active – acknowledged	Alert condition present. Alert acknowledged by the operator.	No
		Active – responsibility transferred	Alert condition present. A function of the BAM compliant equipment with additional system knowledge has taken over.	No
		Rectified – unacknowledged	Alert condition rectified. Alert still unacknowledged.	No
	None	Normal	No alert condition present.	No
Caution		Active	Alert condition present.	No
	None	Normal	No alert condition present.	No

LT-4100 System - Services

- Services:
  - Voice — 2 x Voice Channels
  - Data — IP-data: 22/88 kbps (up/down)
  - GNSS/GPS — 72-ch. GNSS receiver
  - Bluetooth — PAN-profile

LT-4100 System - Services (Voice)

- Voice
- Data
- GNSS/GPS
- Bluetooth

✓ 2 x voice channels enabling simultaneous voice calls

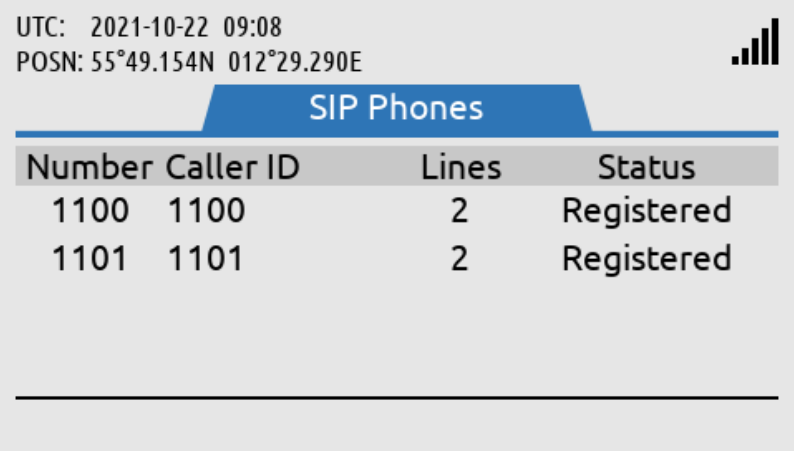
✓ Prepaid and postpaid voice options

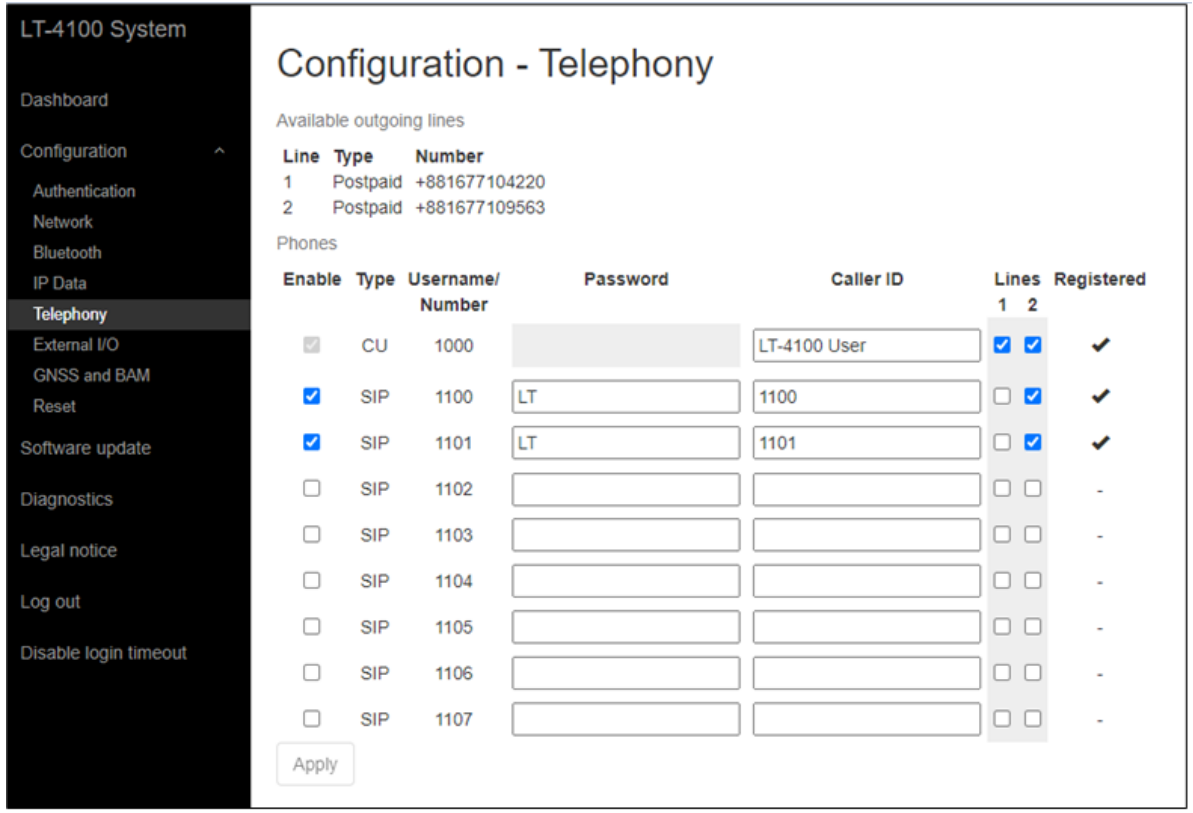
✓ Support up to 8 external SIP phones or PABX SIP trunk

✓ Voice via Bluetooth (PAN profile)

LT-4100 System - Services (Voice)

- 2 x Voice Channels (high quality)
- Configure two voice channels (lines) in the web server





LT-4100 System - Services (Data)

- Voice
- Data
- GNSS/GPS
- Bluetooth

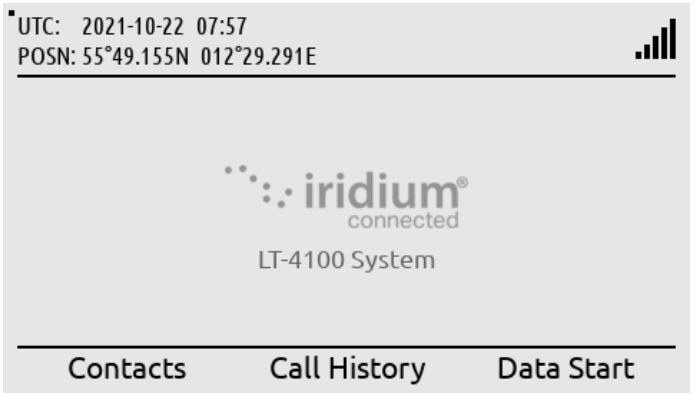
✓ IP-data: 22/88 kbps (up/down)
  - ✓ Two data modes (Always-On or Manual/Start stop)
  - ✓ Outgoing Firewall
  - ✓ Port Forwarding (public IP-address required)
  - ✓ Remote Management (public IP-address required)

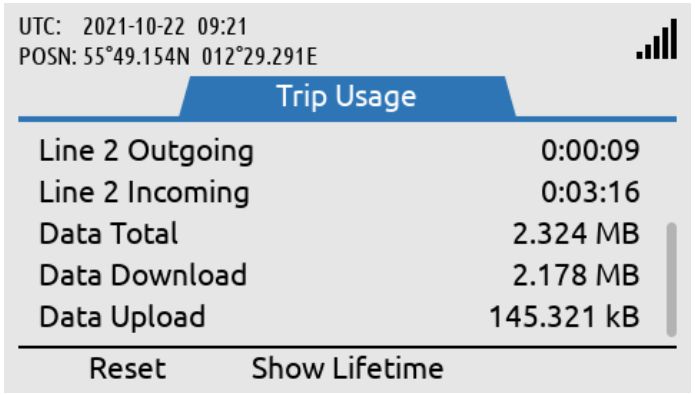
✓ External Wi-Fi Access Point (via LAN)

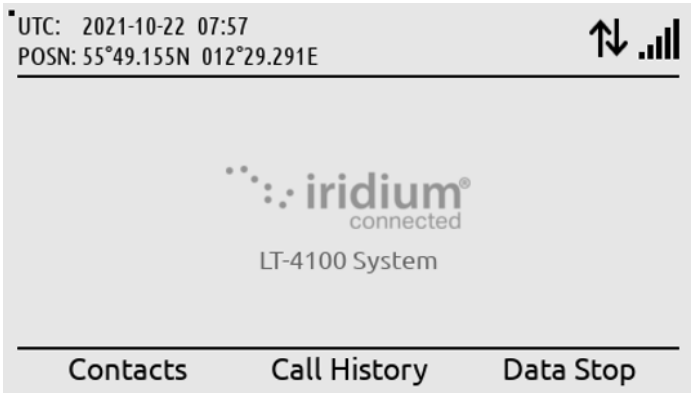
LT-4100 System - Services (Data)

Data modes:

- Always On (data always available)
- Manual start/stop (control from GUI)

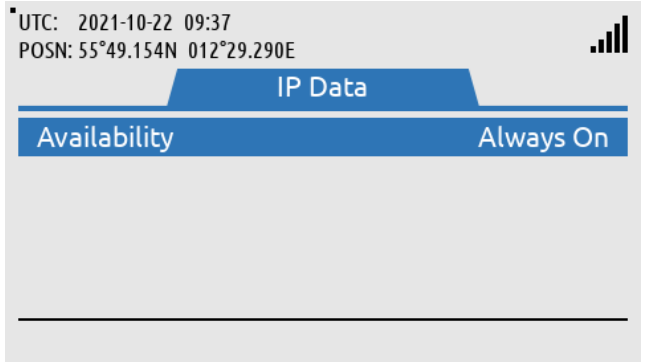


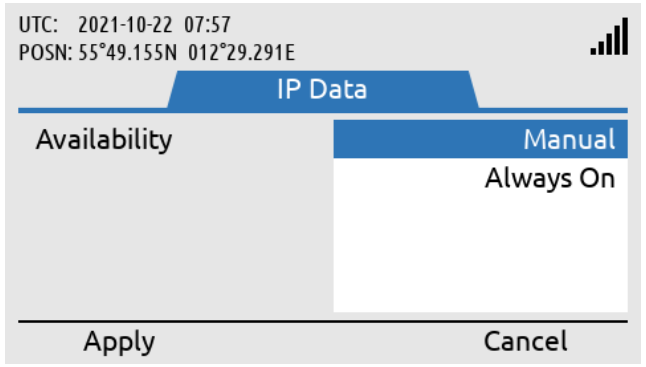


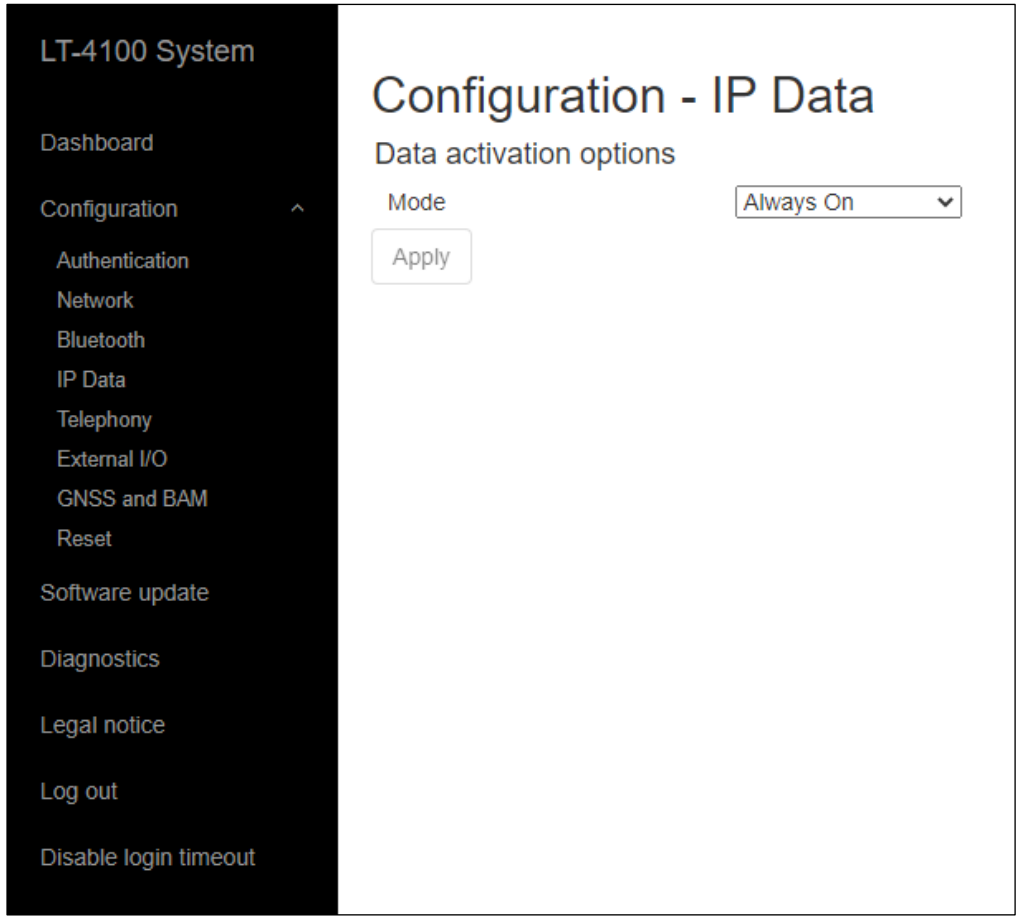


LT-4100 System - Services (Data)

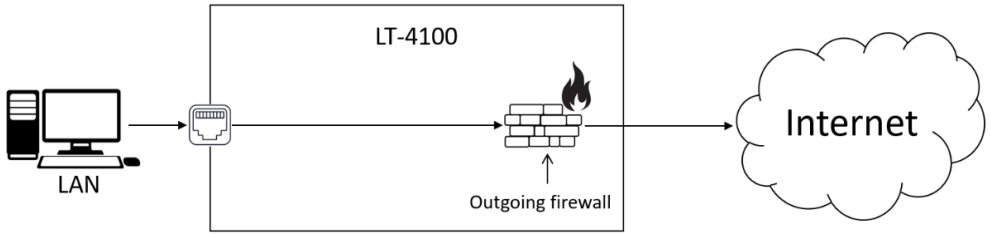
- Data mode configurable in GUI and web server





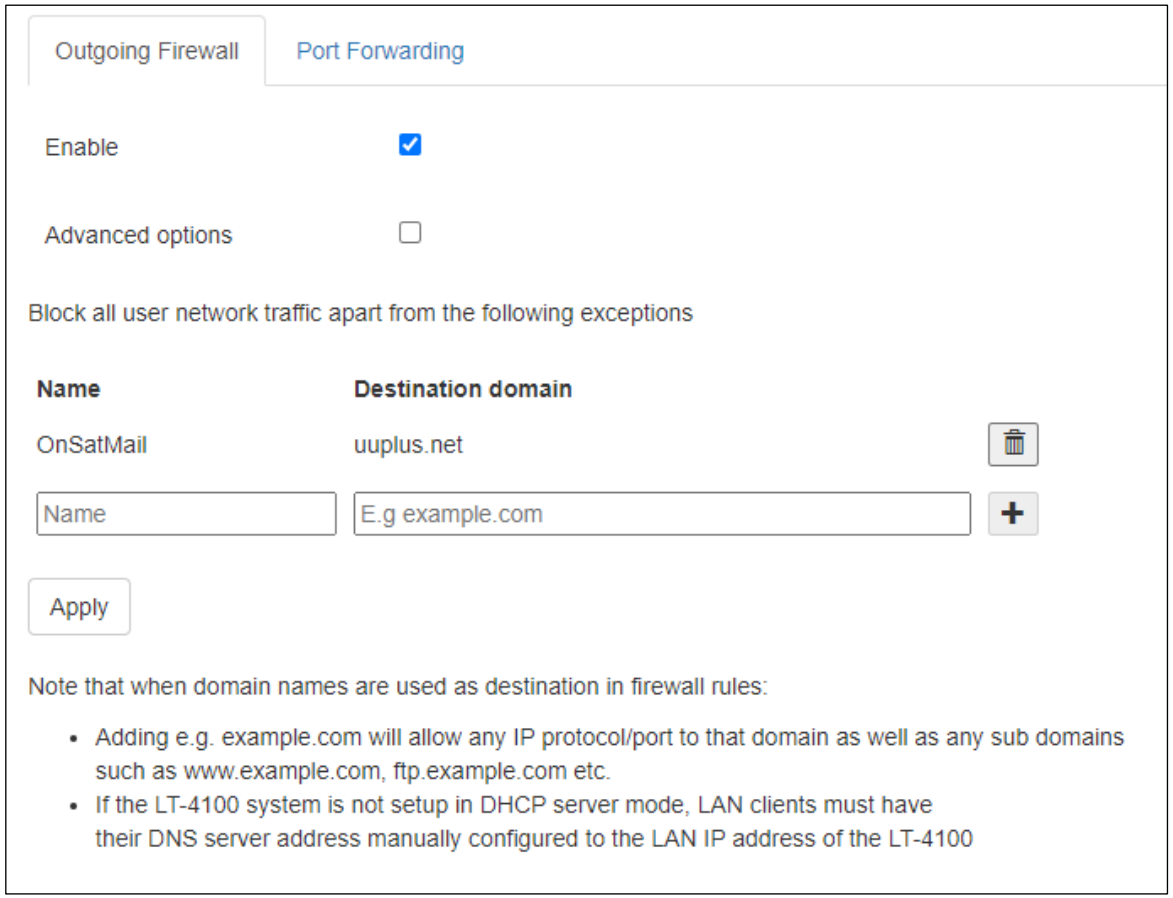


LT-4100 System - Services (Data)

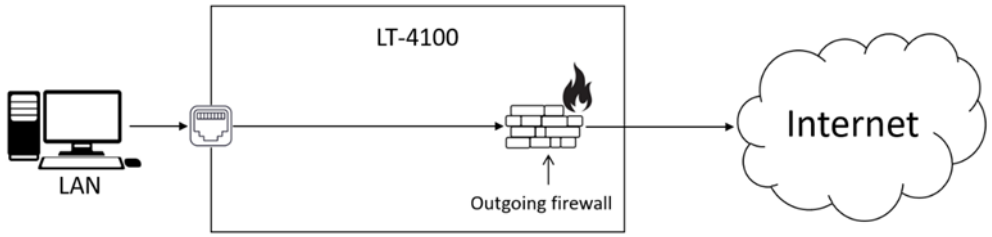


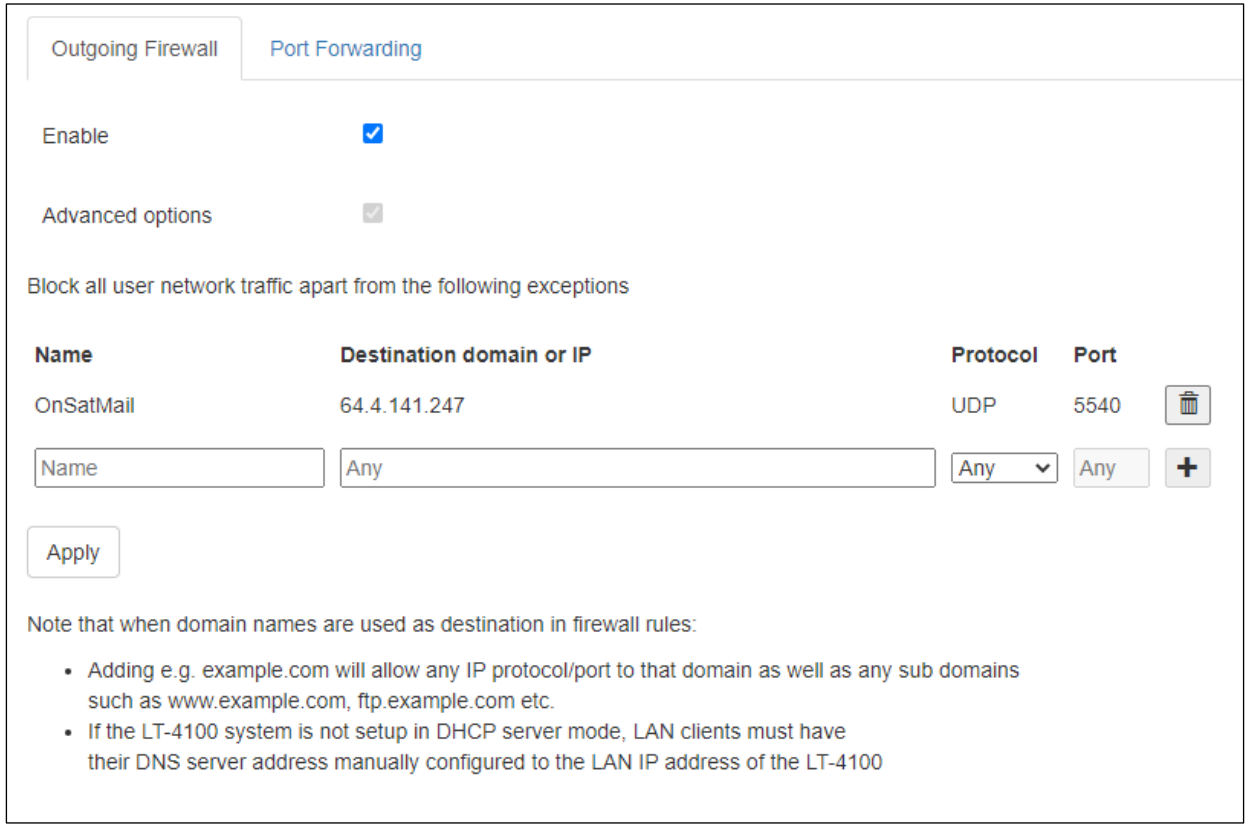
Outgoing Firewall

- Allow specific network traffic (domain)
- Destination domain (e.g., OnSatMail / uuplus.net)



LT-4100 System - Services (Data)

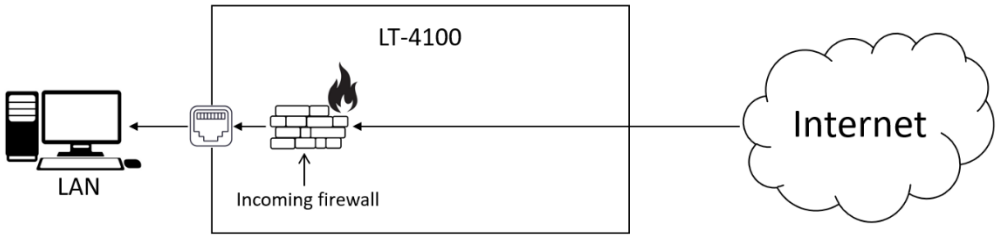


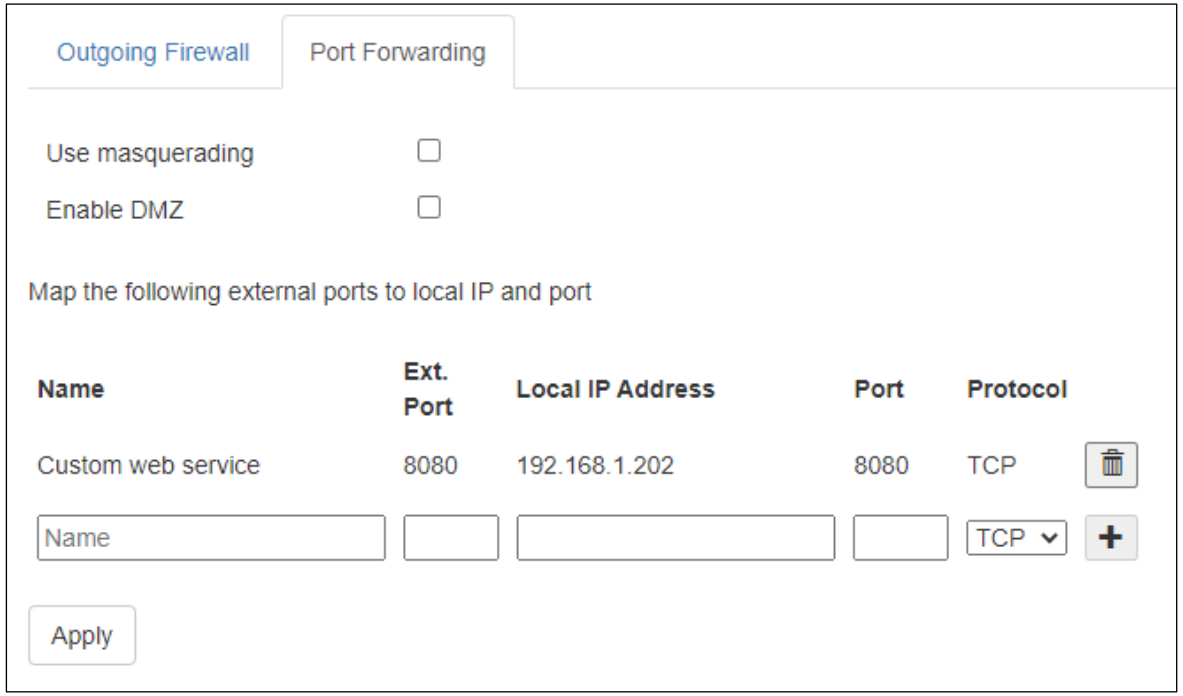


Outgoing Firewall (Advanced)

- Either Domain or IP address
- Optional: configure specific protocol and port

LT-4100 System - Services (Data)





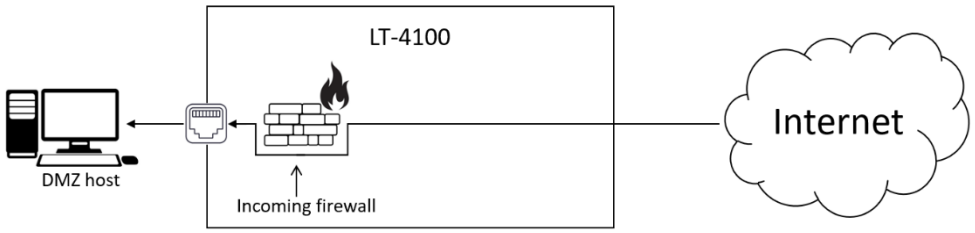
Port forwarding

- Remote access IP data services running on user equipment connected to the LT-4100 LAN port

Public IP address

- Must use public and statically assigned IP address
- Based on IMEI and ICCID numbers provisioned by Iridium

LT-4100 System - Services (Data)

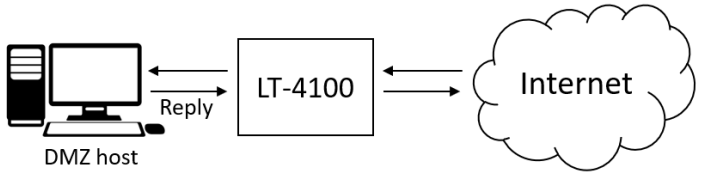


Port Forwarding

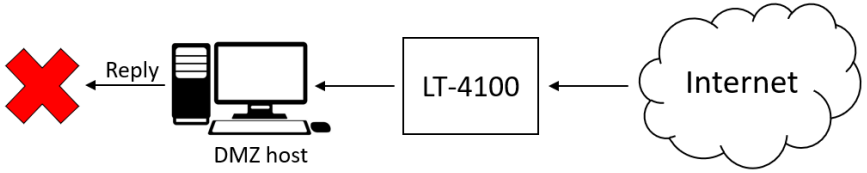
- Demilitarized zone (DMZ)
- Forwards all incoming IP data to specific IP address without firewall filtering
- Input DMZ host IP address

LT-4100 System - Services (Data)

Masquerading



No masquerading



Port Forwarding

- Masquerading
- Changes source IP address to IP address of LT-4100 LAN port
- Forces use of the LT-4100 data connection

LT-4100 System - Services (GNSS/GPS)

- Voice
- Data
- GNSS/GPS
- Bluetooth

✓ GNSS output via NMEA 0183 (RS-422/LAN/Bluetooth)

✓ GPS (incl. SBAS), Galileo, GLONASS & BeiDou

✓ Position accuracy: < 1 m. in 63 % of the time
< 2 m. in 96 % of the time

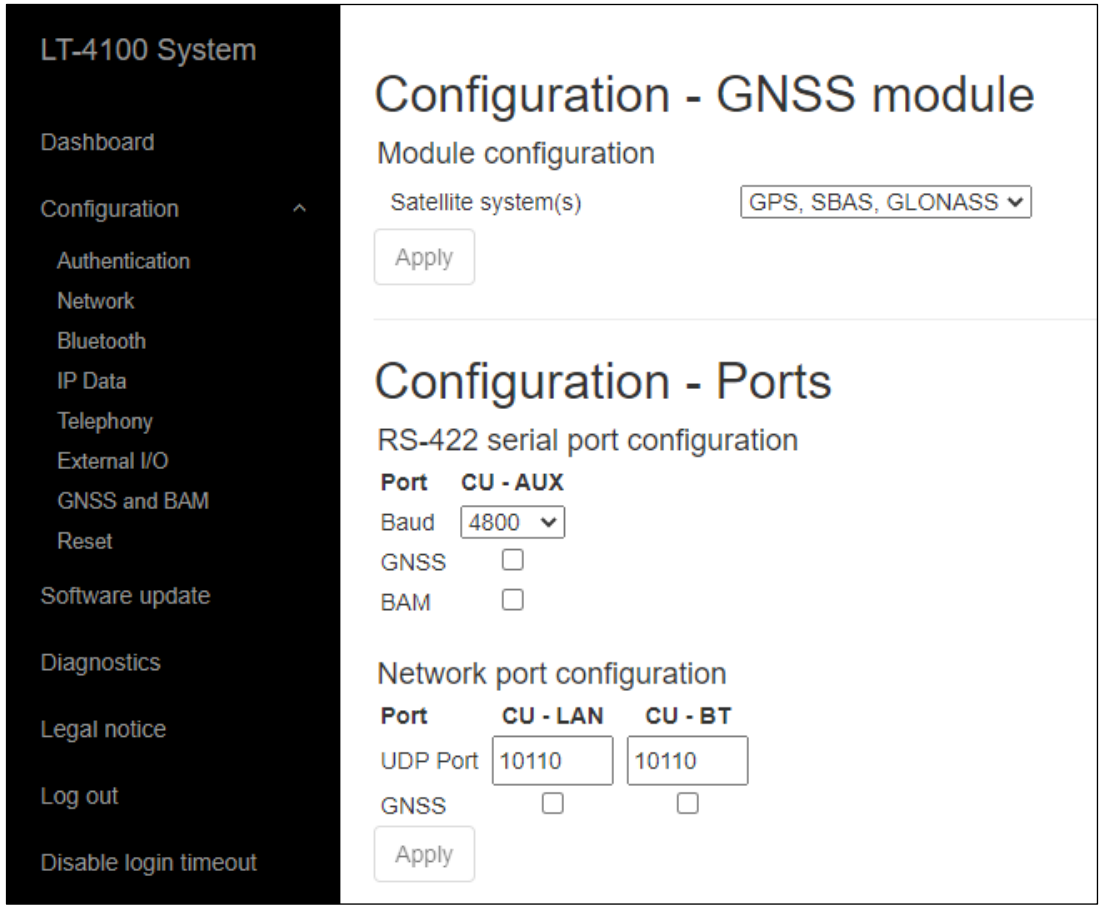
✓ Future Tracking functionality will be added, if this is requested by end-customers and partners

LT-4100 System - Services (GNSS/GPS)

- GNSS receiver settings can be configured in the LT-4100 Web server
- Satellite System (~Talker ID)

GNSS Receiver configuration	
GNSS Receiver	Talker ID
GPS, SBAS, GLONASS	GN
GPS, SBAS, BeiDou	GN
GPS, SBAS	GP
GPS	GP
GLONASS	GL
BeiDou	GB

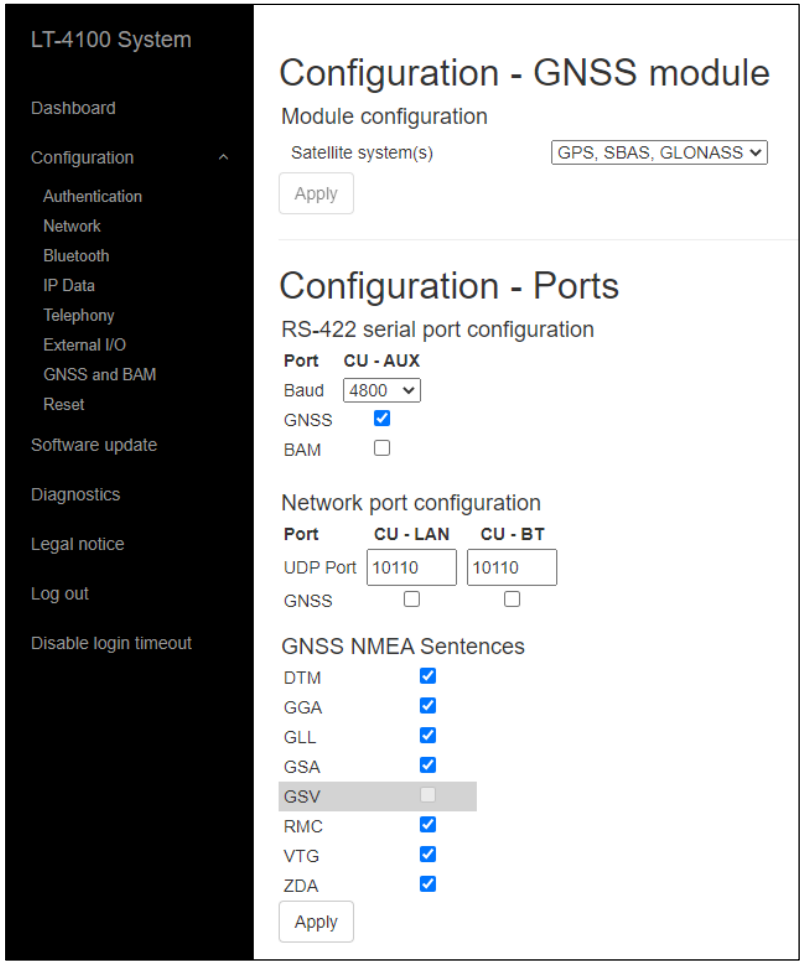
- GNSS NMEA 0183 output sentences:
  - AUX interface (RS-422) or
  - LAN or
  - Bluetooth



LT-4100 System - Services (GNSS/GPS)

- It is only possible to send NMEA 0183 sentences on one interface at a time
- GSV sentence not transmittable on AUX at 4.800 Baud rate

GNSS Sentences			
Sentence	Baud Rate		
	4.800	9.600	38.400
DTM	X	X	X
GGA	X	X	X
GLL	X	X	X
GSA	X	X	X
GSV	-	X	X
RMC	X	X	X
VTG	X	X	X
ZDA	X	X	X



LT-4100 System - Services (Bluetooth)

- Voice
- Data
- GNSS/GPS
- Bluetooth

✓Connect using a personal area network (PAN)

✓Emulates an ethernet connection

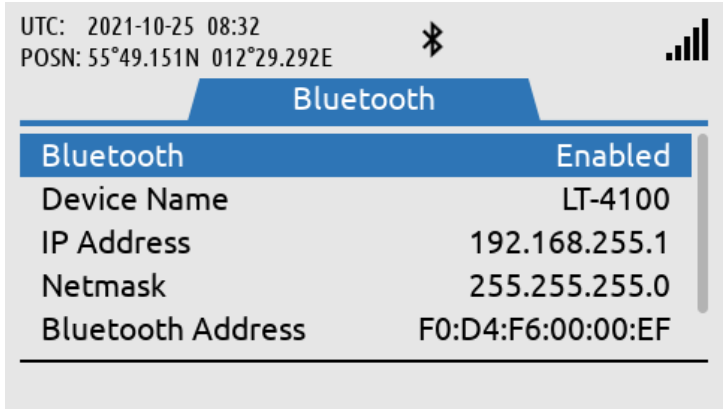
✓Use LT-4100 Certus® 100 data connection on Bluetooth connected equipment

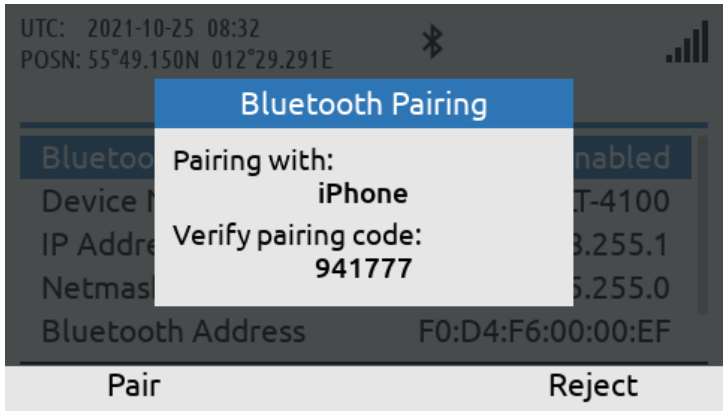
✓Data transmission governed by rules set for Outgoing firewall

✓Connect 8 devices simultaneously

LT-4100 System - Services (Bluetooth)

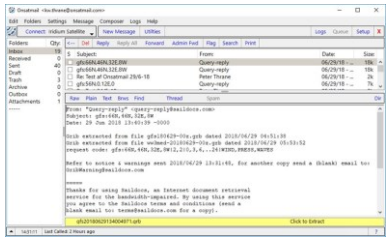
- Uses PAN profile emulating an ethernet connection
- PAN is currently the only supported Bluetooth profile
- Governed by Outgoing firewall rules
- Access LT-4100 web server through Bluetooth connected device





LT-4100 Accredited Soltions

Mail programs



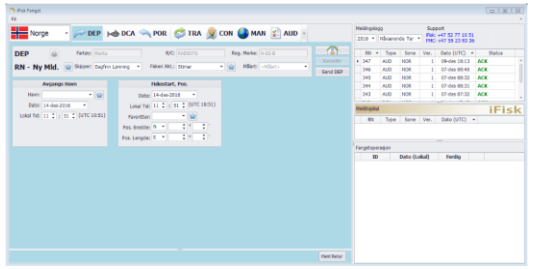
Desktop Applications

WiFi Routers

WhatsApp

SIP Softphones & Text (BT & WiFi)

Fishery Reports

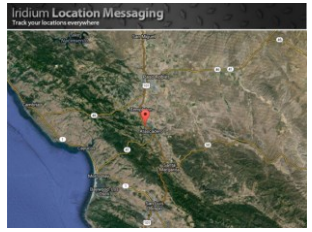


RED BOX

RedPort

POTS phone

Tracking Portals (future)



Weather

Routers (~PoE)

SIP Phones

POTS adaptor

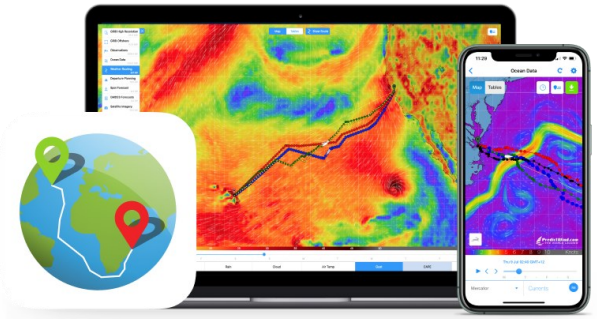
LT-4100 - PredictWind Offshore

PredictWind Offshore App:

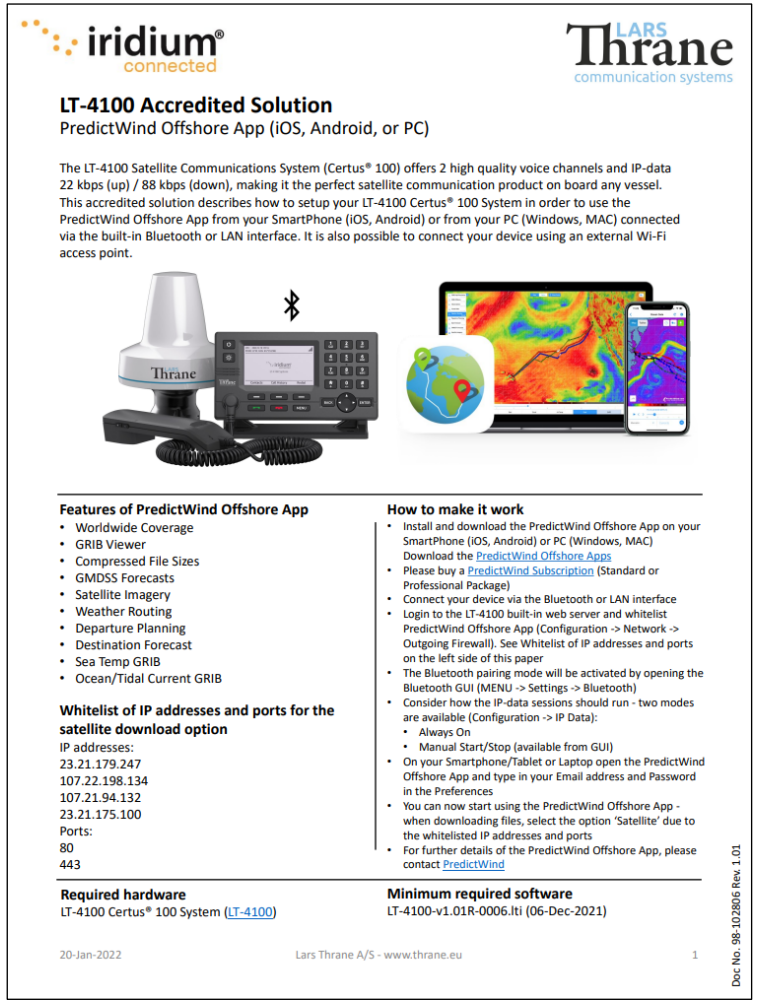
- SmartPhone App (iOS, Android)
- PC (Windows, MAC)
- Bluetooth or LAN

Features:

- Weather forecasting
- Worldwide coverage
- Weather routing



LT-4100 Accredited Solution for PredictWind Offshore App:
https://thrane.eu/lt-4100-iridium-certus-100/



LT-4100 Accredited Solution
PredictWind Offshore App (iOS, Android, or PC)

The LT-4100 Satellite Communications System (Certus® 100) offers 2 high quality voice channels and IP-data 22 kbps (up) / 88 kbps (down), making it the perfect satellite communication product on board any vessel. This accredited solution describes how to setup your LT-4100 Certus® 100 System in order to use the PredictWind Offshore App from your SmartPhone (iOS, Android) or from your PC (Windows, MAC) connected via the built-in Bluetooth or LAN interface. It is also possible to connect your device using an external Wi-Fi access point.

Features of PredictWind Offshore App
- Worldwide Coverage
- GRIB Viewer
- Compressed File Sizes
- GMDSS Forecasts
- Satellite Imagery
- Weather Routing
- Departure Planning
- Destination Forecast
- Sea Temp GRIB
- Ocean/Tidal Current GRIB

Whitelist of IP addresses and ports for the satellite download option
IP addresses:
23.21.179.247
107.22.198.134
107.21.94.132
23.21.175.100
Ports:
80
443

How to make it work
- Install and download the PredictWind Offshore App on your SmartPhone (iOS, Android) or PC (Windows, MAC) Download the PredictWind Offshore Apps
- Please buy a PredictWind Subscription (Standard or Professional Package)
- Connect your device via the Bluetooth or LAN interface
- Login to the LT-4100 built-in web server and whitelist PredictWind Offshore App (Configuration -> Network -> Outgoing Firewall). See Whitelist of IP addresses and ports on the left side of this paper
- The Bluetooth pairing mode will be activated by opening the Bluetooth GUI (MENU -> Settings -> Bluetooth)
- Consider how the IP-data sessions should run - two modes are available (Configuration -> IP Data):
  - Always On
  - Manual Start/Stop (available from GUI)
- On your Smartphone/Tablet or Laptop open the PredictWind Offshore App and type in your Email address and Password in the Preferences
- You can now start using the PredictWind Offshore App - when downloading files, select the option 'Satellite' due to the whitelisted IP addresses and ports
- For further details of the PredictWind Offshore App, please contact PredictWind

Required hardware
LT-4100 Certus® 100 System (LT-4100)

Minimum required software
LT-4100-v1.01R-0006.lti (06-Dec-2021)

20-Jan-2022 Lars Thrane A/S - www.thrane.eu 1

Doc No. 98-102806 Rev. 1.01

LT-4100 - WhatsApp

WhatsApp:

- SmartPhone App (iOS, Android)
- Bluetooth

Features:

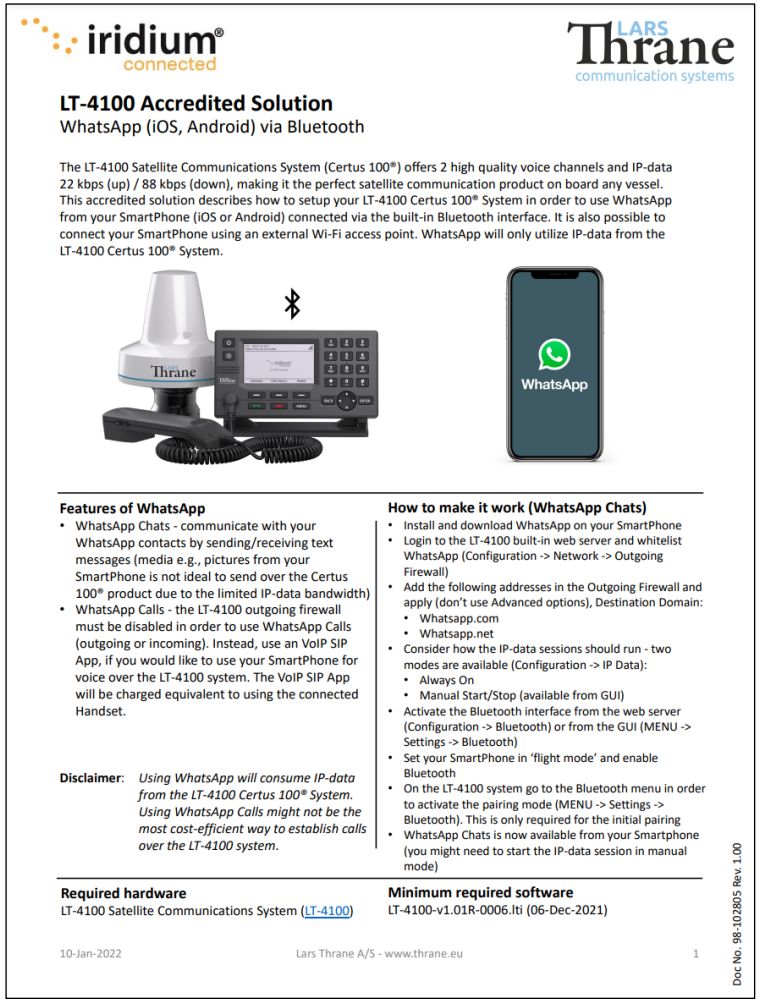
- WhatsApp Chats
- WhatsApp Calls

Disclaimer

Using WhatsApp will consume IP-data from the LT-4100 Certus 100® System. Using WhatsApp Calls might not be the most cost-efficient way to establish calls over the LT-4100 system

LT-4100 Accredited Solution for WhatsApp:

https://thrane.eu/lt-4100-iridium-certus-100/



LT-4100 Accredited Solution

WhatsApp (iOS, Android) via Bluetooth

The LT-4100 Satellite Communications System (Certus 100®) offers 2 high quality voice channels and IP-data 22 kbps (up) / 88 kbps (down), making it the perfect satellite communication product on board any vessel. This accredited solution describes how to setup your LT-4100 Certus 100® System in order to use WhatsApp from your SmartPhone (iOS or Android) connected via the built-in Bluetooth interface. It is also possible to connect your SmartPhone using an external Wi-Fi access point. WhatsApp will only utilize IP-data from the LT-4100 Certus 100® System.

Features of WhatsApp

- WhatsApp Chats - communicate with your WhatsApp contacts by sending/receiving text messages (media e.g., pictures from your SmartPhone is not ideal to send over the Certus 100® product due to the limited IP-data bandwidth)
- WhatsApp Calls - the LT-4100 outgoing firewall must be disabled in order to use WhatsApp Calls (outgoing or incoming). Instead, use an VoIP SIP App, if you would like to use your SmartPhone for voice over the LT-4100 system. The VoIP SIP App will be charged equivalent to using the connected Handset.

Disclaimer: *Using WhatsApp will consume IP-data from the LT-4100 Certus 100® System. Using WhatsApp Calls might not be the most cost-efficient way to establish calls over the LT-4100 system.*

How to make it work (WhatsApp Chats)

- Install and download WhatsApp on your SmartPhone
- Login to the LT-4100 built-in web server and whitelist WhatsApp (Configuration -> Network -> Outgoing Firewall)
- Add the following addresses in the Outgoing Firewall and apply (don't use Advanced options), Destination Domain:
  - Whatsapp.com
  - Whatsapp.net
- Consider how the IP-data sessions should run - two modes are available (Configuration -> IP Data):
  - Always On
  - Manual Start/Stop (available from GUI)
- Activate the Bluetooth interface from the web server (Configuration -> Bluetooth) or from the GUI (MENU -> Settings -> Bluetooth)
- Set your SmartPhone in 'flight mode' and enable Bluetooth
- On the LT-4100 system go to the Bluetooth menu in order to activate the pairing mode (MENU -> Settings -> Bluetooth). This is only required for the initial pairing
- WhatsApp Chats is now available from your Smartphone (you might need to start the IP-data session in manual mode)

Required hardware

LT-4100 Satellite Communications System (LT-4100)

Minimum required software

LT-4100-v1.01R-0006.lti (06-Dec-2021)

10-Jan-2022 Lars Thrane A/S - www.thrane.eu 1

Doc No. 98-102805 Rev. 1.00

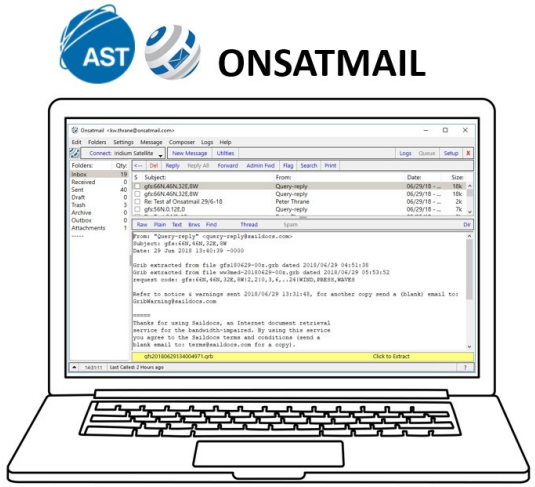
LT-4100 - OnSatMail

OnSatMail Personal:

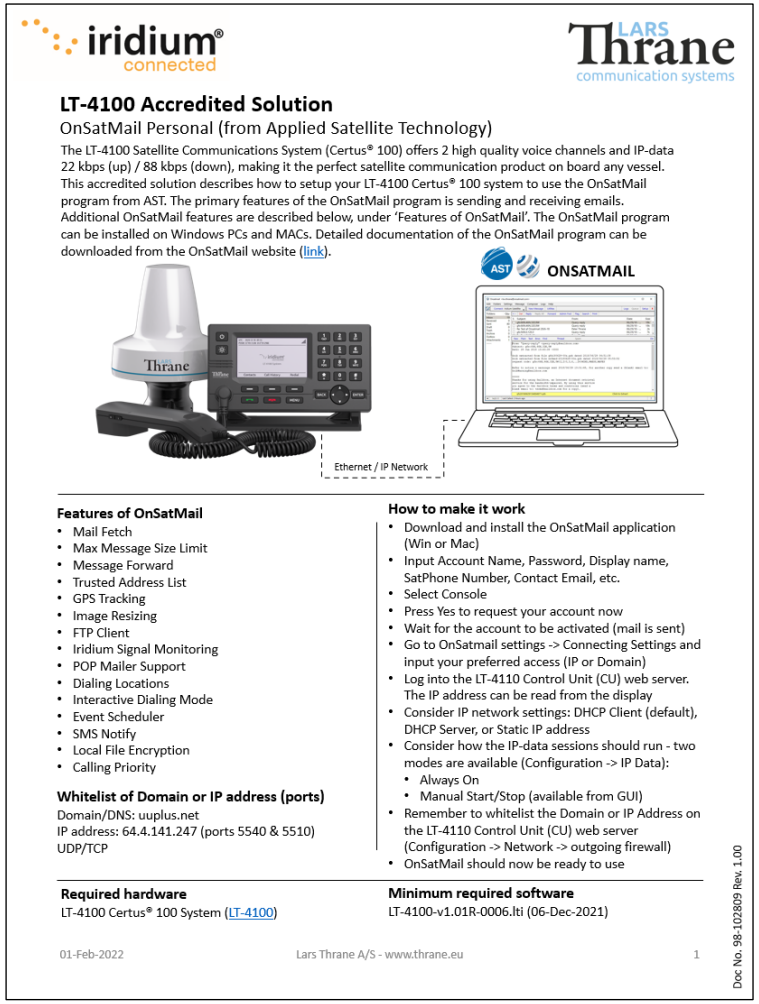
- SmartPhone App (iOS, Android)
- PC (Windows, MAC)
- Bluetooth or LAN
- Requires a valid/active SIM card with AST

Features:

- Dedicated Email program
- Send and receive Email
- Mail Fetch
- Local File Encryption



LT-4100 Accredited Solution for OnSatMail:
https://thrane.eu/lt-4100-iridium-certus-100/



LT-4100 Accredited Solution

OnSatMail Personal (from Applied Satellite Technology)

The LT-4100 Satellite Communications System (Certus® 100) offers 2 high quality voice channels and IP-data 22 kbps (up) / 88 kbps (down), making it the perfect satellite communication product on board any vessel. This accredited solution describes how to setup your LT-4100 Certus® 100 system to use the OnSatMail program from AST. The primary features of the OnSatMail program is sending and receiving emails. Additional OnSatMail features are described below, under 'Features of OnSatMail'. The OnSatMail program can be installed on Windows PCs and MACs. Detailed documentation of the OnSatMail program can be downloaded from the OnSatMail website (link).

ONSATMAIL

Ethernet / IP Network

Features of OnSatMail

- Mail Fetch
- Max Message Size Limit
- Message Forward
- Trusted Address List
- GPS Tracking
- Image Resizing
- FTP Client
- Iridium Signal Monitoring
- POP Mailer Support
- Dialing Locations
- Interactive Dialing Mode
- Event Scheduler
- SMS Notify
- Local File Encryption
- Calling Priority

Whitelist of Domain or IP address (ports)

Domain/DNS: uuplus.net
IP address: 64.4.141.247 (ports 5540 & 5510)
UDP/TCP

How to make it work

- Download and install the OnSatMail application (Win or Mac)
- Input Account Name, Password, Display name, SatPhone Number, Contact Email, etc.
- Select Console
- Press Yes to request your account now
- Wait for the account to be activated (mail is sent)
- Go to OnSatmail settings -> Connecting Settings and input your preferred access (IP or Domain)
- Log into the LT-4110 Control Unit (CU) web server. The IP address can be read from the display
- Consider IP network settings: DHCP Client (default), DHCP Server, or Static IP address
- Consider how the IP-data sessions should run - two modes are available (Configuration -> IP Data):
  - Always On
  - Manual Start/Stop (available from GUI)
- Remember to whitelist the Domain or IP Address on the LT-4110 Control Unit (CU) web server (Configuration -> Network -> outgoing firewall)
- OnSatMail should now be ready to use

Required hardware

LT-4100 Certus® 100 System (LT-4100)

Minimum required software

LT-4100-v1.01R-0006.lti (06-Dec-2021)

01-Feb-2022 Lars Thrane A/S - www.thrane.eu 1

Doc No. 98-102809 Rev. 1.00

Planned Releases & New Features

LT-4100 SW v1.02R (-> Feb 2022)

- Support for new Mainboard
- Web server dashboard start/stop of data sessions

LT-4100 SW v1.03R (-> Apr 2022)

- Web server dashboard info
- Support for PPPoE

LT-4100 SW v1.04R (TBD)

- Tracking

END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