



Xeos
Technologies Inc.

ROVER User Manual

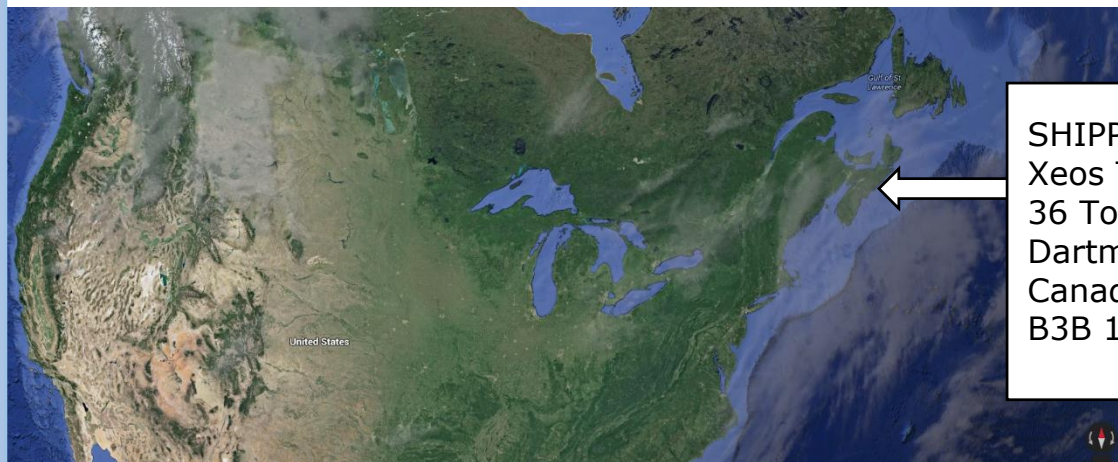
Surface Iridium Satellite Beacon with GPS Location



Version 2.3

July 2015

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Contents

Version History.....	5
General Description	5
Theory of Operation	5
Operating Instructions	6
Setting up Your Iridium Account	6
Battery Pack	7
Choosing Batteries.....	7
Adding/Replacing Batteries.....	7
Opening the Housing & O-Rings	8
On/Off Modes	9
Deployment of the ROVER	10
Antennas.....	11
Power Consumption	11
Sample Power Consumption Patterns.....	12
Understanding the Tilt Sensor	12
Testing Installation	13
Configuration of the ROVER.....	14
Timer Modes.....	15
Legend	15
ROVER Timers	15
Setting Timers.....	15
Notes.....	16
Understanding Position Information	17
Iridium Doppler position	17
Global Positioning System position	17
Tracking with Xeos Online	18
Remote Configuration of the ROVER	19
The ROVER Beacon Android App	21
Requirements	21

Downloading and Installing the App	21
Turning on Bluetooth	21
Connecting	22
Status Page	23
Configuration Page	24
Terminal Page	25
Firmware Update Page	26
Recovery and Storage	27
Maintenance	28
Battery Compartment	28
O-Rings	28
Lube	29
Firmware Updates	29
Specifications	30
Functionality	30
Mechanical	30
Electrical	30
Communication	31
Environmental	31
Warranty, Support and Limited Liability	32

Version History

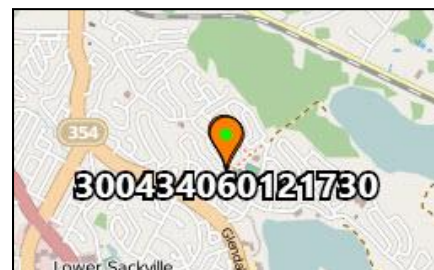
Version	Date	Description
1.0	October 2013	Original Document
1.1	October 2013	Added clarification about modes
1.2	January 2014	Added additional battery calculation information
1.3	June 2014	Added additional information on battery types, storage and maintenance
1.5	January 2015	Added clarification on timer settings
2.0	January 2015	Rewrite, added information on updating
2.1	March 2015	New pictures, various fixes
2.2	April 2015	Android App Information
2.3	July 2015	Added Roby Information

General Description

The ROVER Surface Iridium satellite mooring location beacon continuously monitors location for mobile surface assets and/or instrument moorings. ROVER makes use of the bi-directional, global, real time Iridium satellite Short Burst Data (SBD) network in combination with GPS position location. ROVER's sleek tubular design and internal dual Iridium/GPS antennas located at each end cap allow it to be easily retrofitted into a variety of surface mounts. Even surface installations which capsizes may be able to transmit location information.

Inside the ROVER is a 9603 Iridium satellite Short Burst Data core radio transceiver, a specialized low power Xeos digital controller with GPS, Iridium antenna and GPS antennas.

ROVER is intended for surface deployments and should not be deployed in situations which exceed 100 m in depth. Xeos Technologies Inc. (Xeos) manufactures other specific products for either surface, or subsurface applications to depths of 11,000 m.



See www.xeostech.com for details or call (902) 444-7650.

Theory of Operation

The ROVER is intended for providing regular location information on high value assets at the surface, drifting or moored. After being activated, the ROVER is deployed at the surface and begins sending location messages as per the user settings. The internal battery pack provides over 1500 messages or up to a 2 year deployment.

Operators can communicate with the surface deployed ROVER via Iridium using email commands. Status information can be obtained, including the health of the GPS system and battery voltage. Timings are settable and the default is one message every 3 hours. If you need

to make a change to settings, the ROVER will receive the command to change the timing the next time it checks for messages, as much as 3 hours after the command is sent.

The ROVER will continue to send position messages based on the timings, until it is manually turned off or the battery pack drops below the minimum voltage requirement of 7v.

Due to the location of dual Iridium/GPS antennas at **both** ends of the enclosure, the ROVER will continue to try and send position messages, even when inverted or capsized.

The ROBY Iridium Surface Tracking System

Description

The ROBY model is a modified ROVER unit, designed for surface tracking of oil spills. The ROBY incorporates a highly visible urethane foam float and watch circle functionality to keep track of spill movement.

The ROBY functions identically to the ROVER except for the removal of the inverted alarm mode. Therefore, the ROBY will transmit consistently from either end until it has exited its designated Watch Circle area.

Operating Instructions

Setting up Your Iridium Account

ROVER makes use of the [Iridium Satellite Systems](#) Short Burst Data (SBD) service for the 9603 transceiver. This service is a global (including the Polar Regions), two-way, real-time and email-based data delivery service with a maximum outbound (from beacon) message size of 340 bytes and a maximum inbound (to beacon) message size of 270 bytes.

ROVER end users must set up an approved data delivery account with their preferred service provider. This can only be done once Xeos has provided the user with an International Mobile Equipment Identity (IMEI) number. Each ROVER (9603 modem) has a unique IMEI number that must be registered with the preferred service provider. For a list of service providers in your area please contact [Iridium](#) for recommendations. Xeos Technologies is also able to provide Iridium SBD data service and accounts. Please contact activations@xeostech.com for more information or use the [online form](#) on our website.

Each IMEI number is capable of being associated with up to five (5) unique email addresses (this may vary between service providers). When registering your IMEI number, please provide the service provider with a temporary Xeos testing account email address.

This account is: **xeosbeacona@gmail.com**

This temporary email testing account can be deleted or replaced at any time after delivery of the ROVER. Once the SBD account has been activated, please contact your Xeos representative and confirm this.

ROVER makes use of a simple and robust, binary email protocol. Any email application can be used to send and receive messages to the ROVER, however, they are not human readable. Xeos Online is a web based monitoring system which allows users to view and manage information from the ROVER on a mapping system, as well as view the messages in a human readable format. Xeos Online allows setup of multiple kinds of message forwarders which can forward certain (or all) messages to a group of email addresses in a human readable form.

Sending messages and changing configuration can also be done through Xeos Online. See www.xeostech.com or your account manager for more information.

As a secondary method or one of last resort, command files can be sent directly using email to the ROVER. They are found on the Xeos Technologies [website](http://www.xeostech.com) or can be emailed directly by contacting sales@xeostech.com. Once downloaded to the PC, unzip the file, which contains four (4) command files that have ".sbd" extensions used to communicate with the ROVER. You are now ready to test the ROVER beacon and prepare it for deployment.

Battery Pack

The internal battery pack in the ROVER holds 18 AA batteries. There is no provision for external power.

Choosing Batteries

While the battery pack can hold and operate with any AA battery, some battery models might experience failure and are not recommended for use. In particular, Duracell batteries should not be used since the seal is more apt to fail and cause leakage in higher temperature conditions.

1. Xeos recommends the **Energizer EN91 AA alkaline** battery.¹
2. All new batteries should be used for each new deployment.
3. Each battery should be tested with a battery tester or voltmeter to ensure none of the cells are defective or discharged. Individual cells with a voltage measuring less than 1.5 V should be discarded.

Adding/Replacing Batteries

The batteries are configured in 6 columns of 3 batteries each. The battery pack column is magnetized to ensure the batteries stay in place properly. In order to add batteries to the battery pack, you must first open the housing.

¹ For Lithium AA recommendations, please call +1-902-444-7650.

Opening the Housing & O-Rings

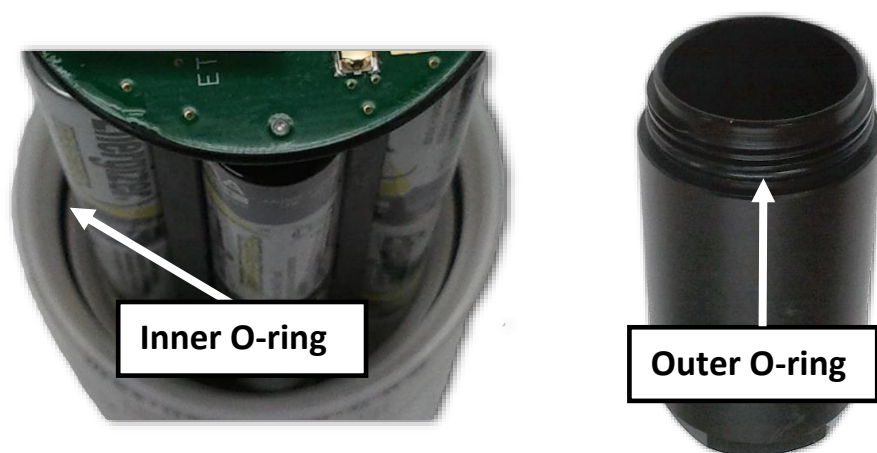
Using your hands, carefully unscrew the black bottom of the housing from the white portion. Inside the ROVER's acetyl housing, there are two (2) O-rings (568-137 70A DURO BUNA).



O-rings are critical to the waterproof nature of the ROVER. O-rings should be visually inspected to make sure they are properly seated in the groove or thread and to ensure there is no visible damage to the O-ring.

If the O-rings pass visual inspection and have been deployed for 2 months or less, the O-rings do not need to be replaced.

If the O-rings fail visual inspection or have been deployed for longer than 2 months, the O-rings should be replaced prior to re-deploying the ROVER.



To replace the O-Ring, remove the old O-ring, and clean all dirt away from the threads and grooves where it was seated. Apply a thin layer of O-ring lube (Parker Super 'O') to the new O-ring.

For the outer ring, gently slide the new O-Ring down over the threads of the black section of enclosure and into the O-ring groove, just above the lip of the enclosure.

Note: It is very important to be aware of where the O-ring is sitting in the two O-Ring locations. If the O-ring is not sitting perfectly in its groove, there will not be a perfect seal and could cause fatal damage to the unit.

For the inner ring, gently slide the new O-Ring down inside the white section of enclosure until it is seated in the O-Ring groove.

To remove the old batteries, simply remove one battery from each column and then turn the ROVER over to tip the other batteries out.

To replace the batteries, slide the first battery into each column with the correct orientation. Each column is labeled to show its orientation. Then add the second and third batteries, in the same orientation. The ROVER may beep to indicate changes in the battery voltage.



Once all the batteries have been replaced, the ROVER will stop beeping. The enclosure pieces can be reassembled, taking care to inspect and seat the O-Rings first.

The ROVER is now ready for testing, and/or deployment.

Note: If the batteries are low, or if some of the batteries have been inserted incorrectly, the ROVER will sound a quick intermittent beep and flash the red LED at the top for 5 minutes, or until the batteries have been corrected or replaced.

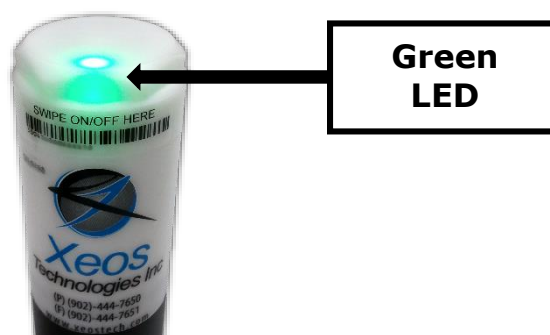
On/Off Modes

The ROVER beacon is turned ON and OFF through the use of an external magnet near an internal magnetic reed switch, and operation can be identified by viewing the LED through the top of the ROVER. To turn the ROVER ON, begin swiping the magnet quickly up and down at the location of the reed switch. The reed switch is located directly behind the Xeos Technologies Logo.

Note: if the initial color of the LED is Green that means that the ROVER is already in the on position.



A flashing green LED indicates the device is in the process of powering up, continue to swipe the magnet until you see a solid green LED. A solid green LED indicates that the device is powered and operational.



Note: It is important that the beacon has a good view of the sky during any test, therefore the beacon should be tested outside of a building.

To turn the ROVER OFF, repeat the above procedure with the magnet and watch the LED change from green to red. A red flashing LED indicates the device is powering down, continue to swipe the magnet until you see a solid red LED. A solid red LED indicates that the device is turned OFF.

At any time the magnet can be placed against the location of the reed switch *once* to see which mode the beacon is currently in. A red LED indicates the device is turned OFF. A green LED indicates the device is turned ON.

Note: It is important to let all LEDs stop illuminating before initiating another action.

Note: Cycling power for any reason, for example by using the switch to turn OFF/ON or by removing battery power, will initiate the Startup Alarm Mode.

Deployment of the ROVER

The ROVER contains custom dual GPS/Iridium antennas, one at each end of the enclosure. It also features an internal battery pack. All you need before deployment is:



1. ROVER with Iridium service activated (using IMEI provided by Xeos)
2. Batteries installed in internal battery pack (18 AA)
3. Magnet for turning the ROVER ON.

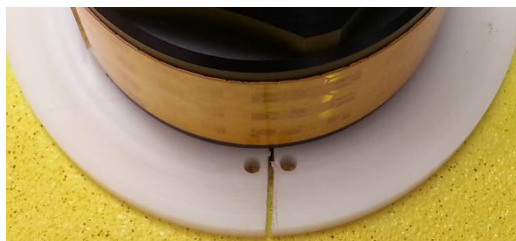
Antennas

To deploy the ROVER, ensure that one of the two cylinder ends has a clear view of the sky. For optimal deployment, **the white end should have a clear view of the sky** since it contains the primary antennas. For a concealed deployment, the antenna surface must not be obstructed by metal or wood. Thick amounts of other materials may also cause interference. Testing of concealed installations is strongly recommended.

Removing the ROBY float

Xeos does not recommend removing the ROBY's float unless it is necessary. The unit can be used and disassembled while the float remains on. However, it is possible to remove the float if it is deemed necessary.

1. Using a pair of internal snap ring pliers, stretch the top ABS brace until it can be slid off the ROBY's top cylinder.



2. Repeat step one for the bottom brace.
3. After both braces have been removed, the float can be slid off the ROBY.

Power Consumption

The ROVER has an internal battery enclosure that holds 18 AA batteries, lithium or alkaline. The batteries should be replaced whenever the ROVER is recovered. The battery voltage can be monitored with the Status command.

Current draws are as follows:

Typical sleep current	<100 μ A
Iridium Transmission current	70 mA (approx.. 30 sec duration)
GPS Acquisition, current	13 mA (max. 2 min duration)

This is the amount of current the device will draw between GPS checks and Iridium transmissions. The device has a life time of up to 2 years deployment (Lithium batteries) when taking a position and transmitting every 3 hours.

Sample Power Consumption Patterns

Note: these are calculated lifespans and not testing results. Environmental factors including temperature will affect these calculations.

GPS Position Interval	Iridium Call Interval	Consumption Per Cycle	Duration (EN91 Alkaline Batteries)	Duration (Lithium Batteries)
10 min (default)	10 min (default)	0.6913 mA	723.27 hours 30.13 days	1398.33 hours 58.26 days
30 min	30 min	0.7396 mA	2027.99 hours 84.50 days 2.82 months	3920.77 hours 163.37 days 5.45 months
60 min	60 min	0.7896 mA	3799.39 hours 158.31 days 5.29 months	7345.49 hours 306.06 days 10.20 months
3 hours	3 hours	0.9896 mA	9094.22 hours 378.93 days 12.63 months	17,582.15 hours 732.60 days 24.42 months
6 hours	6 hours	1.2896 mA	581.58 days 19.39 months 1.615 years	1,124.40 days 37.48 months 3.12 years
12 hours	12 hours	1.8851 mA	795.67 days 26.52 months 2.21 years	1538.29 days 51.28 months 4.27 years
24 hours	24 hours	3.0888 mA	971.25 days 32.38 months 2.70 years	1699.83 days 56.66 months 4.72 years

* Calculations subject to change without notice. Xeos conducts ongoing battery life and power consumption tests in an effort to provide more accurate information to customers.

Understanding the Tilt Sensor

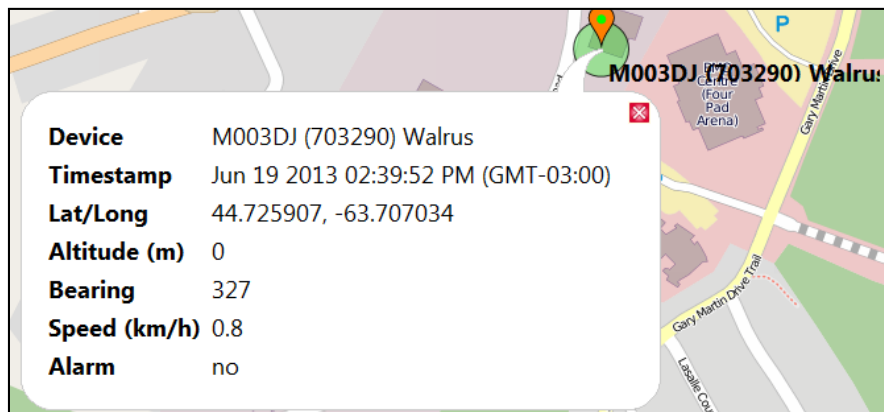
The ROVER comes equipped with a tilt sensor which allows it to determine which antenna to use for determining GPS position and communicate with the Iridium satellite network. The ROVER will automatically switch back and forth between the two antenna arrays as the tilt sensor detects shifts in position.

The tilt axis defaults to the horizontal axis, that is, if the ROVER is standing upright, it will operate using the custom dual antenna at the top of the enclosure. If the ROVER crosses the horizontal axis, i.e. orientated upside down, it will switch to using the dual antenna located at the bottom of the enclosure.

The tilt sensor is enabled by default. For more information please contact Xeos Technologies.

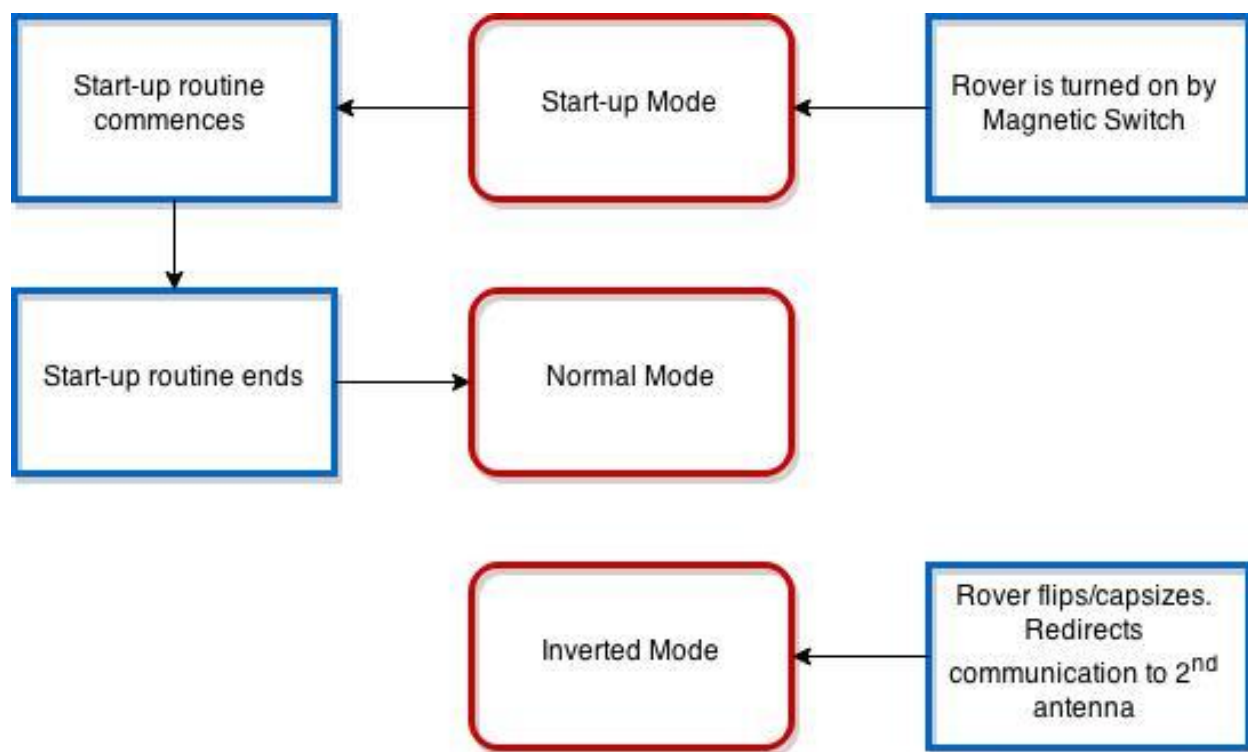
Testing Installation

Test the installation by checking the email addresses to which the Iridium account is sending notifications or Xeos Online. Xeos Online will display the last known position of the device as well as the time stamp of the GPS position.



Configuration of the ROVER

The ROVER has a combination of preset behaviors and configurable parameters. Here is an outline of its normal/default behavior:



- When the ROVER is turned on using the magnetic switch or power is applied, it goes into **Startup** mode
- **Startup** Mode lasts for one hour after the ROVER is powered on
- One hour after being powered on, the ROVER goes into **Normal** Mode and stays in that mode
- If the ROVER is capsized and triggers the tilt sensor, the ROVER goes into **Inverted** Mode.
- **Inverted** Mode can be configured differently from Normal mode to provide indication that the ROVER is inverted but the default is the same as Normal mode
- If the battery voltage drops below 7 VDC, the unit will change to **Low Battery** Mode to conserve power until the device can be retrieved.
- The ROBY will not enter **Inverted** Mode

Timer Modes

The following are the parameters for each mode. To change the preset parameters, see **Remote Configuration of the ROVER**.

Timer	T0	<T1>	T2	T3	T4	Min-Max
SBD	12h	10m	10m	12h	12h	5m – 1d
GPS	12h	10m	5m	12h	12h	5m – 1d

Legend

SBD: SBD (Iridium) transmission interval

GPS: GPS acquisition interval

T0 – T7: Timer number

<T#>: Timer currently in use

#s: Interval in seconds

#m: Interval in minutes

#h: Interval in hours

#d: Interval in days

Min: Minimum allowed interval for this timer

Max: Maximum allowed interval for this timer

ROVER Timers

Timer 0: Normal timer. This is used if none of the following modes are triggered

Timer 1: Start-up timer. This is used for the first hour after the unit is powered on

Timer 2: Inverted timer. This is used once the unit is inverted

Timer 3: Low battery: This mode is used when there is a low battery

Timer 4: No GPS Fix: This is used when the GPS module fails to acquire a fix

Setting Timers

\$timer (timer number) (value in s, m, h, or d)

Examples:

To set the inverted mode SBD and GPS timer to a 10 minute interval issue the following two commands:

\$timer SBD 2 10m

\$timer GPS 2 10m

To set the normal mode SBD timer to a 1 day interval, and the normal mode GPS timer to a 1 hour interval, issue the following two commands.

\$timer SBD 0 1d

\$timer GPS 0 1h

The configuration above will result in the unit acquiring a GPS position every hour, and sending all 24 GPS positions in a single SBD transmission once daily.

Setting the Watch Circle

The Watch Circle parameters can be set by sending the **\$setcircle** command using the following format: **\$setcircle Latitude Longitude Radius**. The minimum Radius is 50m, while the maximum is 15000m. Watch circle functionality is not enabled by default, contact support@xeostech.com to have the unit's watch circle enabled.

Example:

\$setcircle 44.72636 -63.70753 100

In this case:

- a) \$setcircle is the command
- b) Latitude is set to 44.72636
- c) Longitude is set to -63.70753
- d) Radius is set to 100 meters

NOTE:

If a Watch Circle is not set, the Rover will average its GPS location fixes for 48 hours. Then the Rover will create a Watch Circle using the 48 hour average as its center and a user definable radius (default radius is 100m)

Once the watch circle is set, the unit will operate normally until it approaches the watch circle radius, at which point the ROVER will send a warning message. Once the ROVER exits the watch circle radius, it will begin sending alarm messages with GPS coordinates every 10 minutes (timer 2) until the unit re-enters the watch circle, or is turned off.

Notes

- Setting a timer beyond its limit will result in the timer being set at the closest limit to the request.
- A maximum of 24 GPS positions can be included in a single SBD transmission.
- Unlike other settings, the watch circle resets at each power up.
- Watch circle alert and surface alert use the same timer.
- You can adjust the Watch Circle's radius alone by setting the latitude and longitude parameters to 0.

Understanding Position Information

There are two types of position information which will be sent via the Iridium Gateway.

Iridium Doppler position

The Iridium Gateway calculates the Iridium transceivers position on earth when it receives the transmission, using Doppler technology. As a result, it is often very inaccurate. This location is only visible to users getting emails directly from the ROVER, as opposed to emails forwarded by Xeos Online.

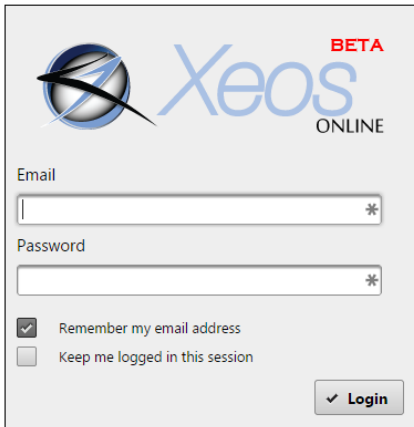
Global Positioning System position

The location information is embedded in the SBD attachment sent via the Iridium Gateway. Users of the Xeos Online system will only see this location. The GPS fix is much more accurate than the Doppler position provided by Iridium.

Tracking with Xeos Online

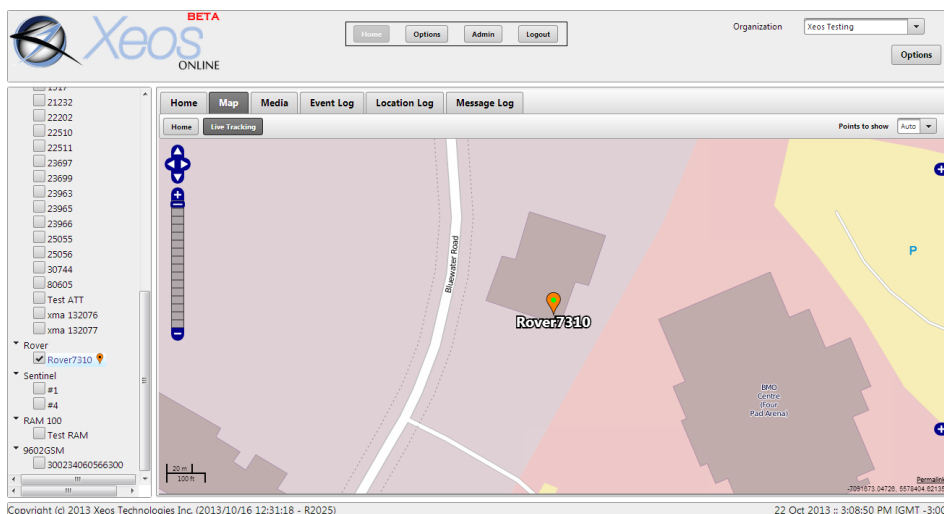
Setting up your company, usernames and devices in Xeos Online is covered in the Xeos Online User Manual and Xeos Organizational Administrator Manual available at <https://www.xeostech.com/science-downloads/xeos-online-manuals>² if you do not already have a copy.

1. Using your web browser, go to <http://online.xeostech.com>
2. Login to Xeos Online



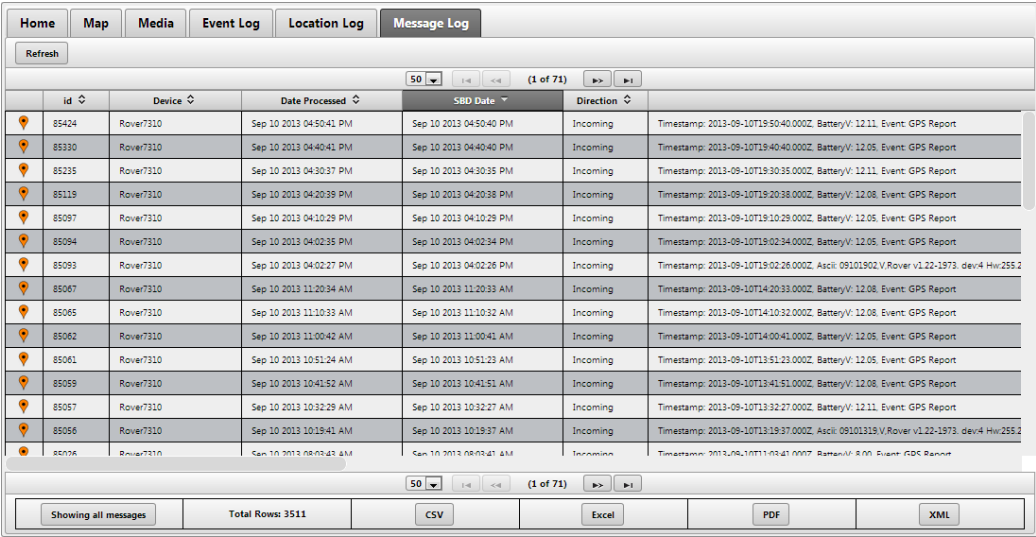
The login form features the Xeos logo and 'BETA ONLINE' text. It includes input fields for 'Email' and 'Password', each with a '*' icon indicating a required field. Below these fields are two checkboxes: 'Remember my email address' (checked) and 'Keep me logged in this session' (unchecked). A 'Login' button with a checkmark icon is positioned at the bottom right.

3. If you have not already setup your ROVER as a device in Xeos Online, click on the Admin tab and then devices to proceed
4. From the map view, click on your ROVER in the left hand side column. The last known location will appear on the map



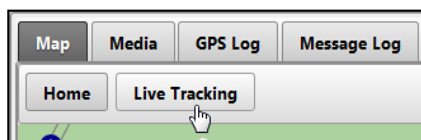
² Please note, you must have a valid website account in order to download files.

- To view messages, click on the Message Log tab above the map



ID	Device	Date Processed	SBD Date	Direction	Message Content
85424	Rover7310	Sep 10 2013 04:50:41 PM	Sep 10 2013 04:50:40 PM	Incoming	Timestamp: 2013-09-10T19:50:40.000Z, Battery/V: 12.11, Event: GPS Report
85330	Rover7310	Sep 10 2013 04:40:41 PM	Sep 10 2013 04:40:40 PM	Incoming	Timestamp: 2013-09-10T19:40:40.000Z, Battery/V: 12.05, Event: GPS Report
85235	Rover7310	Sep 10 2013 04:30:37 PM	Sep 10 2013 04:30:35 PM	Incoming	Timestamp: 2013-09-10T19:30:35.000Z, Battery/V: 12.11, Event: GPS Report
85119	Rover7310	Sep 10 2013 04:20:39 PM	Sep 10 2013 04:20:38 PM	Incoming	Timestamp: 2013-09-10T19:20:38.000Z, Battery/V: 12.08, Event: GPS Report
85097	Rover7310	Sep 10 2013 04:10:29 PM	Sep 10 2013 04:10:29 PM	Incoming	Timestamp: 2013-09-10T19:10:29.000Z, Battery/V: 12.05, Event: GPS Report
85094	Rover7310	Sep 10 2013 04:02:35 PM	Sep 10 2013 04:02:34 PM	Incoming	Timestamp: 2013-09-10T19:02:34.000Z, Battery/V: 12.05, Event: GPS Report
85093	Rover7310	Sep 10 2013 04:02:27 PM	Sep 10 2013 04:02:26 PM	Incoming	Timestamp: 2013-09-10T19:02:26.000Z, Ascii: 09101902.V/Rover.v1.22-1973, dev4 Hw255.2
85067	Rover7310	Sep 10 2013 11:20:34 AM	Sep 10 2013 11:20:33 AM	Incoming	Timestamp: 2013-09-10T14:20:33.000Z, Battery/V: 12.08, Event: GPS Report
85065	Rover7310	Sep 10 2013 11:10:33 AM	Sep 10 2013 11:10:32 AM	Incoming	Timestamp: 2013-09-10T14:10:32.000Z, Battery/V: 12.08, Event: GPS Report
85062	Rover7310	Sep 10 2013 11:00:42 AM	Sep 10 2013 11:00:41 AM	Incoming	Timestamp: 2013-09-10T14:00:41.000Z, Battery/V: 12.05, Event: GPS Report
85061	Rover7310	Sep 10 2013 10:51:24 AM	Sep 10 2013 10:51:23 AM	Incoming	Timestamp: 2013-09-10T13:51:23.000Z, Battery/V: 12.05, Event: GPS Report
85059	Rover7310	Sep 10 2013 10:41:52 AM	Sep 10 2013 10:41:51 AM	Incoming	Timestamp: 2013-09-10T13:41:51.000Z, Battery/V: 12.08, Event: GPS Report
85057	Rover7310	Sep 10 2013 10:32:29 AM	Sep 10 2013 10:32:27 AM	Incoming	Timestamp: 2013-09-10T13:32:27.000Z, Battery/V: 12.11, Event: GPS Report
85056	Rover7310	Sep 10 2013 10:19:41 AM	Sep 10 2013 10:19:37 AM	Incoming	Timestamp: 2013-09-10T13:19:37.000Z, Ascii: 09101319.V/Rover.v1.22-1973, dev4 Hw255.2
85036	Rover7310	Sep 10 2013 08:03:43 AM	Sep 10 2013 08:03:41 AM	Incoming	Timestamp: 2013-09-10T11:03:41.000Z, Battery/V: 8.00, Event: GPS Report

- Multiple targets can be viewed on the map simultaneously. Just click on all the devices you wish to monitor on the left hand list. To keep them all in view on the map as they update, click on the **Live Tracking** button

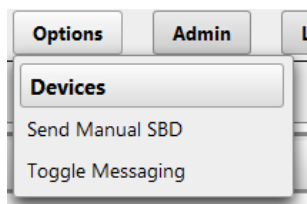


NOTE:

Position reports are sent based on the scheduled interval for Iridium calls **but** if the GPS interval is shorter, up to 24 GPS position locations can/will be sent in a single message from the Rover.

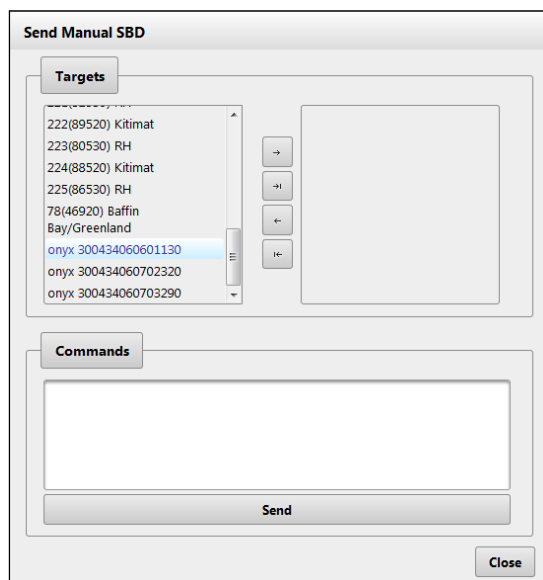
Remote Configuration of the ROVER

- To send a command to the remote ROVER, click on the Options tab in the top center of the window

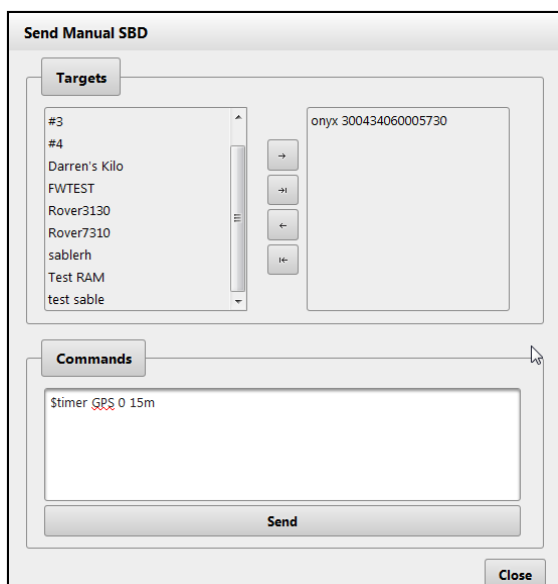


- Select **Send Manual SBD**

3. The following window comes up:



4. Select the ROVER (or multiple ROVERS) which should receive the message from the **Target** list. To select more than one, hold down the CTRL button while clicking on the appropriate devices
5. Click on the arrow to move them into the list box on the right.
6. Once you have the correct list of devices to receive the message, you need to format the command to change the parameter you are interested in. For parameter options, see: [Configuration of the ROVER](#)
7. Enter the command in the **Commands** text box and press **Send**



NOTE:

Change to configuration only takes place once the Rover **receives** the email. That means that if the Rover is set to check messages hourly, it will not change its operational behavior until it has checked at its scheduled time for changes.

The ROVER Beacon Android App

The ROVER can also be configured locally using the Rover Beacon Android App. Configuring your Rover with the App is quick, easy, and requires no disassembly.

Requirements

Using the App with your ROVER Beacon requires a few prerequisites:

- A ROVER beacon with Bluetooth enabled firmware. If you are unsure about this requirement, please contact Xeos Support (support@xeostech.com) with your ROVER Beacon's serial number.
- An Android Smartphone compatible with Bluetooth Low Energy devices.
- The Xeos Technologies ROVER BEACON Android App.

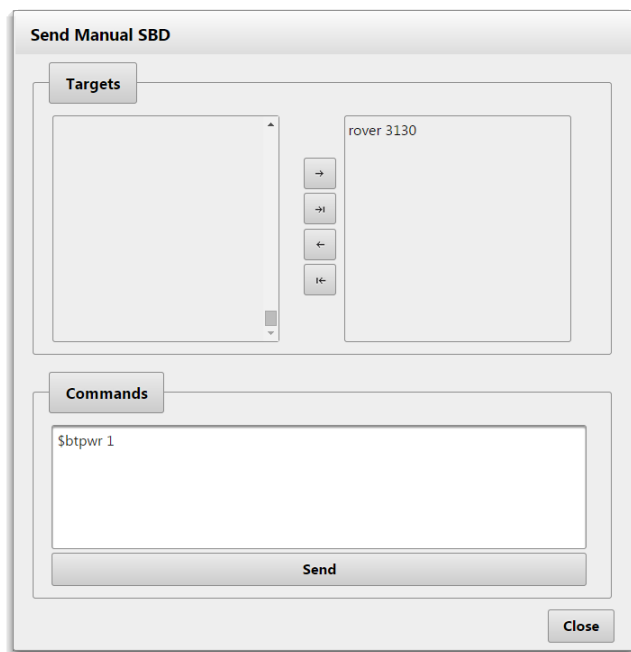
Downloading and Installing the App

The Xeos Bluetooth Low Energy App is still in development. If you wish to try the App, contact Xeos at sales@xeostech.com

Turning on Bluetooth

Before attempting to connect to your ROVER, make sure it is powered on and Bluetooth functionality is enabled. The latter can be done in one of 2 ways:

1. Turn the ROVER off and then on, using a magnet. See [On/Off Modes](#)
2. Send the ROVER the following command over Iridium:



NOTE:

Using Bluetooth will cause increased battery drain on the ROVER. For maximum battery life, remember to turn off Bluetooth with the command:

\$btpwr 0

Connecting

When the ROVER Beacon App is first opened, the user is presented with the **Connection Page**.



The App will list the name of any Bluetooth enabled device within range. By default the ROVER's Bluetooth name will be its IMEI number. Tap your ROVER's name to connect.

NOTE:

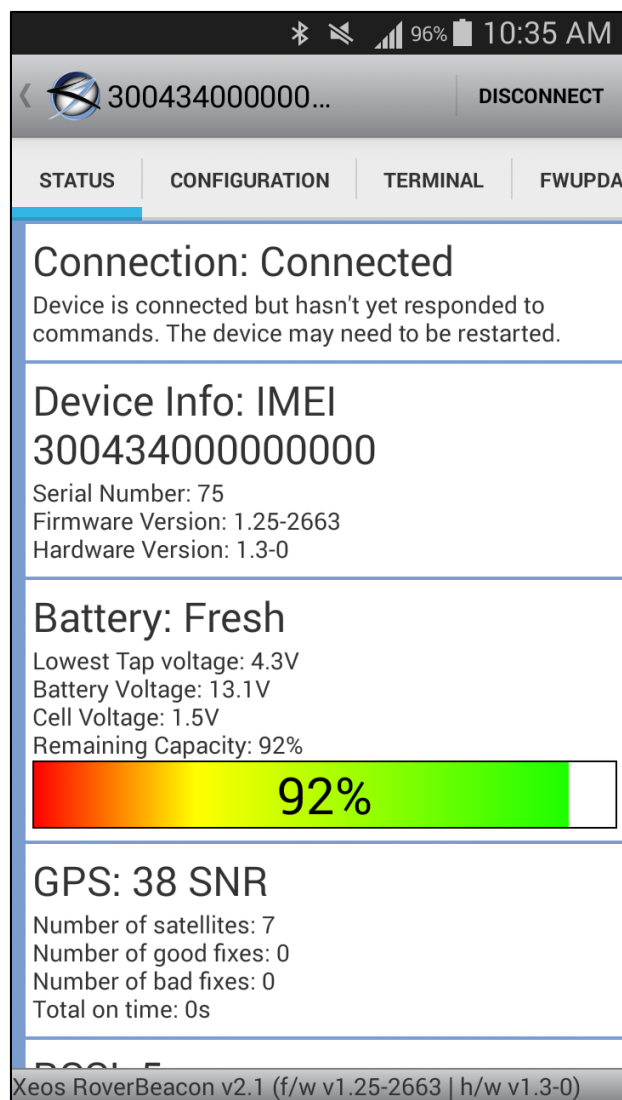
Your ROVER's Bluetooth name can be changed by issuing the following commands:

\$btname new_name

\$btcycle

Status Page

When you first connect to the ROVER, the App will default to the **Status Page**:

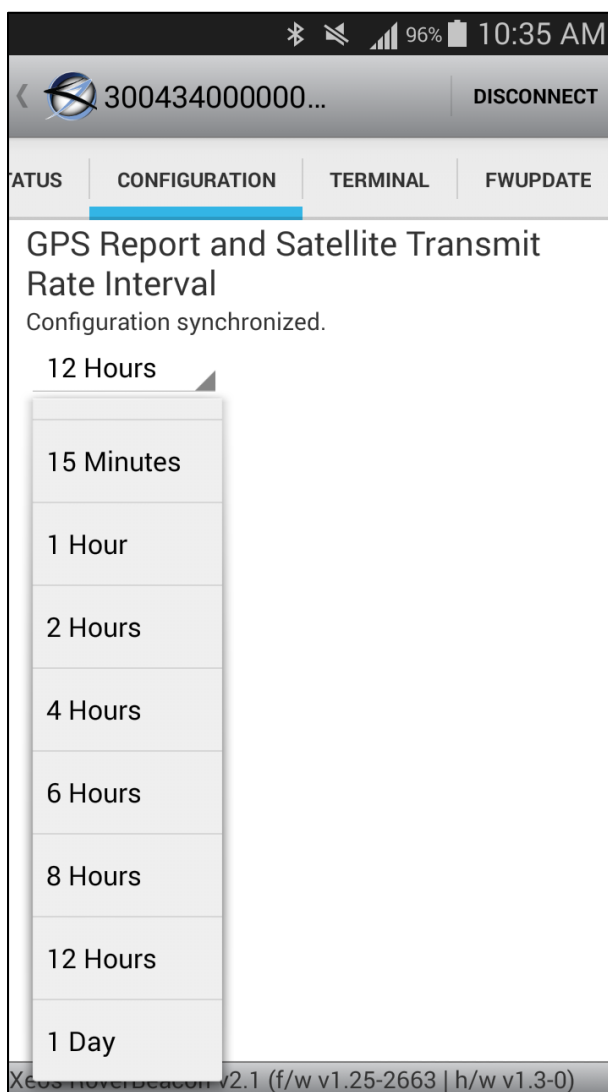


The Status Page shows all relevant information regarding the current state of your ROVER beacon including:

- Current firmware information
- Detailed battery information
- GPS statistics since the last power up
- Iridium RSSI strength

Configuration Page

Tapping the **Configuration** tab will bring up the **Configuration Page**:



Tap the **Interval List** for a drop-down menu of timings. Your selection will set Normal mode timings for both GPS and Iridium reporting. Once you've made your selection, the App will update the Rover and report back with a **Configuration synchronized** message.

Terminal Page

Tapping the **Terminal** tab will bring up the **Terminal Page**:

300434000000...

DISCONNECT

STATUS
CONFIGURATION
TERMINAL
FWUPDATE

1h (5m 1d)
ACS 1m 1m 1m 1m 1m 1m 1m
1m (5s 30m)
ORN 1h 1h 1h 1h 1h 1h 1h
1h (30s 1d)
TLT 30m 1m 1m 1m 30m 30m 30m
30m (5s 3h)
VMin=12390
VMin=12120
Batt: Tap=4.350 TxMin=13.140 VbNow=13.110
V=13.20/12.90/13.14 T=0.0 SNR=40 nSats=7
GPS:1/0/46 Ird:1/0/0 RSSI=5
(V=unloaded/Ird/GPS Temp MaxSnr nSats
GPS:ok/fails/secs Ird:msgs/sessions/secs)
43 iRx:+SBDIX: 32, 9269, 2, 0, 0, 0
VMin=12120
43 iTx: AT+SBDIX
43 iRx:OK (ignored)
43 iRx:+CIEV:0,0 RSSI=0
Batt: Tap=4.350 TxMin=13.140 VbNow=13.037
V=13.20/12.90/13.14 T=0.0 SNR=40 nSats=7
GPS:1/0/46 Ird:1/0/0 RSSI=5
(V=unloaded/Ird/GPS Temp MaxSnr nSats
GPS:ok/fails/secs Ird:msgs/sessions/secs)

\$ timer

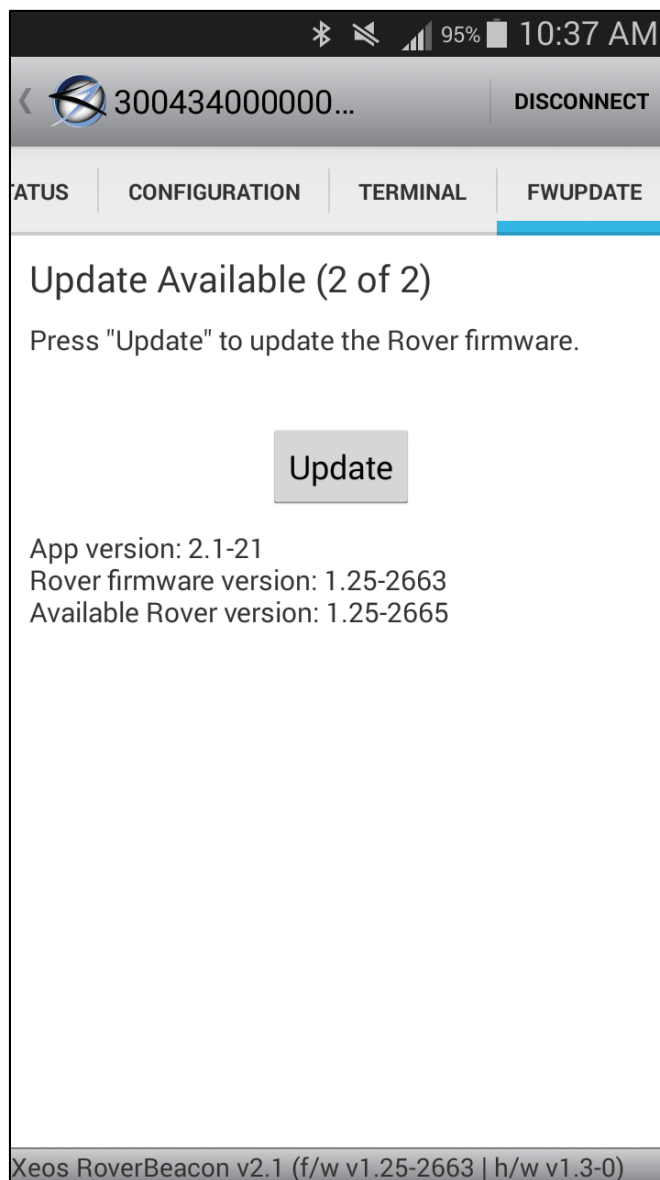
Send

Xeos RoverBeacon v2.1 (f/w v1.25-2663 | h/w v1.3-0)

The **Terminal Page** functions identically to a serial connection to the ROVER. Commands can be typed at the bottom of the page. Tap Send to transmit the command. Auto-Scroll can be disabled by tapping the terminal page once.

Firmware Update Page

Tapping the **FWUpdate** tab will bring up the **Firmware Update Page**:



If a firmware update is available for your ROVER you can upgrade your unit by pressing the **Update button**. The App will upload a new firmware image at 500 bytes per second. Once the upload is complete, the ROVER will perform a firmware upgrade on its next power-up. If the update is interrupted for any reason, simply restart the process.

Recovery and Storage

Once, the ROVER is recovered, its function is complete but it is important that it be stored and maintained properly for future deployments.

As soon as possible after the ROVER is recovered, all batteries should be removed and discarded. The ROVER should be cleaned and inspected for corrosion or water ingress. O-rings should be visually inspected. Any concerns should be discussed with Xeos support (+1-902-444-7650 or support@xeostech.com) prior to storage.

The ROVER should be stored as follows:

- Dry location
- Assembled, without batteries but with O-rings in place
- Ambient temperature of -40° c to +60° c
- Either horizontal or vertical storage is permitted

Maintenance

Battery Compartment

Purpose:	To provide power to the ROVER
Part Number:	N/A – integral to the ROVER
Source:	Repair or replacement must be done by Xeos Technologies Inc. +1-902-444-7650 or support@xeostech.com
Maintenance:	Only use new, approved batteries for deployments. In the event that used batteries are used for short term testing, batteries must have equivalent battery voltages to prevent reverse charge forming and subsequent battery leakage. Visual inspection of the battery compartment should be done after each deployment to ensure there has been no leakage. Signs of corrosion, leakage or water ingress should be reported to Xeos immediately.

O-Rings

Purpose:	To seal the ROVER against water ingress
Part Number:	The O-rings used on the ROVER are part number: 568-137 70A DURO BUNA
Source:	They may be purchased through Xeos Technologies Inc. or from a variety of vendors. Please call for assistance if required
Maintenance:	O-rings should be visually inspected prior to each deployment, no matter how short. Any evidence of wear or stretching requires that they be replaced. O-rings should always be replaced after a deployment of 2 months or more. O-rings should also be replaced after a series of short deployments adding up to 2 months.

NOTE:

It is very important to be aware of where the O-ring is sitting in the two O-Ring locations. If the O-ring is not sitting perfectly in its groove, there will not be a perfect seal and could cause fatal damage to the unit.

Lube

Purpose:	The use of lube with the O-Rings extends the life of the O-Ring by reducing the wear and tear from friction as well as the O-Ring drying out and becoming brittle
Part Number:	Parker Super 'O'
Source:	The lube may be purchased through Xeos Technologies Inc. or from a variety of vendors. Please call for assistance if required
Maintenance:	Lube should be used each time the O-Ring is removed and resealed
Procedure:	Squeeze a thin layer of lube onto the O-Ring. Gently spread the lube around the O-Ring until it is completely coated. Follow instructions for seating the O-Ring

Firmware Updates

Purpose:	Firmware controls the behavior of the ROVER and how it responds to its environment and incoming commands
Part Number:	At time of publishing
Source:	Firmware updates are published to the Xeos website (https://www.xeostech.com/science-downloads/rover-firmware). Validated users may log in and download the most up to date version as needed
Maintenance:	Prior to each deployment, the firmware version should be checked and updates applied, if needed. Call +1-902-444-7650 or email support@xeostech.com if you need assistance determining if you should apply a firmware update. Firmware updates can be uploaded via Iridium. No programming cables are required
Procedure:	A detailed instruction and procedure will accompany each firmware release

Specifications

Functionality

Base Function:	2-way Iridium communication
Serial Functions:	Serial Id, Repetition Period, transmit intervals, data message

Mechanical

Material:	All Polyoxymethylene (delrin)
Dimensions:	214.12 cm L x 63.5 cm (8.43" L x 2.5" H)
Weight:	875g - with lithium batteries 1055g - with alkaline batteries
Weight, in Water:	198 g – with lithium batteries 378 g – with alkaline batteries
O-Rings:	568-137 70A DURO BUNA
O-Ring Lube:	Parker Super 'O'

Electrical

Digital Controller:	Xeos IRDC-3
GPS Receiver:	48 channel SiRFstarIV, GSD4e GPS chip
Supply:	18 AA batteries (Lithium or alkaline)
Operational Time:	Dependent on operational settings. Example - Report & position every 3 hours Alkaline batteries – 12 months, Lithium batteries – 24 months
Sleep Current:	100uA
Iridium Transmit:	70mA
GPS Acquisition:	13 mA
Voltage:	+13.5V nominal
Capacity:	3.0 Amp Hours (alkaline), 5.8 Amp Hours (Lithium)

Communication

Iridium: 9603 modem

Environmental

Operating Temperature: -40° c to +60° c

**Specifications subject to change without notice.*

Warranty, Support and Limited Liability

Xeos Technologies Inc. warrants the ROVER Beacon to be free of defects in material or manufacturing for a period of one year following delivery. Liability is limited to repair or replacement of the defective part and will be done free of charge.

LIMITED WARRANTY: Xeos Technologies Inc. warrants that the product will perform substantially in accordance with the accompanying written materials for a period of one year from the date of receipt.

CUSTOMER REMEDIES: Xeos Technologies Inc. entire liability and your exclusive remedy shall be at Xeos Technologies Inc. option, either (a) return of the price paid or (b) repair or replacement of the product that does not meet Xeos Technologies Inc. Limited Warranty and that is returned to Xeos Technologies Inc. with a copy of your receipt. This Limited Warranty is void if failure of the product has resulted from accident, abuse, or misapplication. Any replacement product will be warranted for the remainder of the original warranty period or ninety (90) days, whichever is longer.

NO OTHER WARRANTIES: Xeos Technologies Inc. disclaims all other warranties, either express or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the product or the accompanying written materials. This limited warranty gives you specific legal rights. You may have others, which vary from state to state.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES: In no event shall Xeos Technologies Inc. or its suppliers be liable for any damages whatsoever (including, without limitation, damages for loss of equipment, for loss of business profits, business interruption, loss of business information, or other pecuniary loss) arising out of the use of or inability to use this Xeos Technologies Inc. product, even if Xeos Technologies Inc. has been advised of the possibility of such damages.