

UNAVCO POLAR GPS SYSTEM TEST PROCEDURE

APPENDIX 5: HOW TO SETUP DATA DOWNLOADING

Appendix Version: **1.0**
Date: **May 20 2013**

I. DIAL-UP IRIDIUM, SINGLE MODEM

1. Request SIM Card

As far in advance as possible, request SIM card from USAP Iridium POC. As of May 2013 this is Dan Wagster, who handles Iridium for both the Antarctic and Arctic Programs. List the following in your SIM card request.

Project name	e.g. ANET	
Project PI	e.g. Wilson	
Project number	e.g. G-079	(USAP only)
Desired activation date		
Desired deactivation date		(end of project)
Dial-up only		

The physical SIM card may be received before it is activated. Although each SIM card has a serial number (ICCID) written on the card itself, the SIM card will not have an Iridium phone number (MSISDN) assigned prior to activation. Once activated, the Iridium POC will send notification of the card's MSISDN. Write this number on the card itself.

Note that Iridium users within the NSF-OPP use the DOD Iridium network, where MSISDN numbers begin with the prefix 008816763 but with the last 5 digits unique.

2. Update UNAVCO Polar Iridium SIM Inventory

Create new entry into the file "UNAVCO Polar Iridium Inventory.xls". This file is maintained by, and should only be edited by, the Polar Network Engineer.

3. Configure Iridium Modem

Configure the dial-up Iridium modem(s) according to the UNAVCO Polar Iridium Modem Configuration Form, available online.

4. Configure Download Computer

Log into skua and do the following

A. Create new SITE directory in the /iridium/sites/ directory. For pre-season testing, all receivers are assigned a "testing" name TSXX, where XX = 00-30. For all data received by skua from a site TSXX, the data files will automatically be archived to the polar "private" space on ftp://data-out.unavco.org. In this way, the files will be assembled and QC'd without creation of formal stations within the UNAVCO archive. See David Maggert for more information.

B. Create three subdirectories data/ graphs/ logs/ under the /iridium/sites/TSXX/ directory.

C. Edit /etc/hosts file to assign an IP to this SITE. Follow the convention of other dial-up sites already listed in this file. The IP address for a dial-up test site TSXX is 192.168.2XX.2, where XX is 00-30.

Note that before the system is deployed, you must change the receiver NAME and dial-up IP address to reflect the actual values which will be used for that site.

D. Edit the appropriate “ring” file (comfxy) in the /iridium/rings/ directory. Use a ring which is lightly loaded and enter sufficient instances of site TSXX in that file so it is called at least a few times per hour during the testing process.

5. Create Site Configuration File

On the skua machine, create site configuration file SITE.pm under the /iridium/sites/TSXX/ directory. Use configuration files for other sites as a template. An example configuration file is shown below. Here each option is shown on a separate line for clarity (which is acceptable syntax). Also note the single quotes (') surrounding many of the parameters, as well as the commas.

```
-----  
package SITE;  
use strict;  
  
# site config for site 'SITE'  
  
sub info {  
my $self= shift;  
  
return {  
    'rx' => 'NetR9',  
    'type' => '3',  
    'connection' => '008816763XXXXXX',  
    'days' => '100',  
    'fmt' => 'BNX',  
    'plot' => { 'volt' => [ 7, 16 ] },  
    }  
}  
1;  
-----
```

The parameters in this file are:

package	SITE;	Must have SITE name here
# site config...		Comment field starting with # symbol
'rx'	'Model',	Receiver model. Currently the /iridium/lib/rx.pm file defines types for Trimble NetRS and NetR9 models
'type'	'X',	Receiver type. Currently the rx.pm file defines several different “types” of NetRS and NetR9, corresponding to different firmware versions or datalogging structures.

'connection'	'008816763XXXXX',	All Iridium dial-up numbers used within the polar programs use the DOD Iridium network, and begin with the prefix 008816763. The last 5 digits are unique.
'days'	'X',	Number of days to look backward in time on the receiver for data downloads. Overrides the default of 40 days (stored in /iridium/bin/download.pl). Useful to catch up on data from sites that have been offline more than 40 days.
'fmt'	'FMT',	Extension of data file names on receiver. Overrides the default of T00, which is the UNAVCO polar standard.
'plot'	{ 'volt' => [Ymin, Ymax] },	Changes the Y-axis extents of SOH plots for voltage. Can also change temperature extents by substituting 'temp' for 'volt'. Overrides the defaults of 11 to 16V and -40 to +60C , stored in /iridium/bin/graph.pl.

6. Verify Connections

Verify that the modem answers a dial-up phone call, and that SOH and datafiles are retrieved from the receiver.

II. DIAL-UP IRIDIUM, DUAL MODEMS

Follow the steps above for each SIM card and modem. However since it is necessary to call both modems during the testing process, follow the steps below to automatically alternate the phone number used by skua during data calls.

1. Create Two Additional Site Configuration Files

In the /iridium/sites/TSXX/ directory, create two new configuration files named TSXX_1.pm and TSXX_2.pm. Both files are an exact copy of the configuration file TSXX.pm, however one contains the primary phone number and the other contains the secondary.

2. Edit the skua crontab

Edit the crontab with the command

```
crontab -e
```

This opens the crontab with the vi editor. Create two new lines with the following syntax:

```
0 0,2,4,6,8,10,12,14,16,18,20,22 * * * cp /iridium/sites/TSXX/TSXX_1.pm /iridium/sites/TSXX/TSXX.pm
0 1,3,5,7,9,11,13,15,17,19,21,23 * * * cp /iridium/sites/TSXX/TSXX_2.pm /iridium/sites/TSXX/TSXX.pm
```

This will cause the phone number in the TSXX.pm file to be changed once per hour, as that file is alternately overwritten by TSXX_1.pm and then TSXX_2.pm

III. XEOS RUDICS IRIDIUM

1. Request SIM Card

As far in advance as possible, request SIM card from USAP Iridium program coordinator. List the following in your SIM card request.

Project name	e.g. ANET	
Project PI	e.g. Wilson	
Project number	e.g. G-079	(USAP only)
Desired activation date		
Desired deactivation date		(end of project)
Modem IMEI	15-digit modem S/N	(for SBD messaging)
SBD email	xitunnel@gmail.com	(both addresses, for SBD messaging)
	xitunnel@unavco.org	
RUDICS IP:PORT	69.44.86.75:XXXX	XXXX = 4-digit port for RUDICS link from DOD Gateway to skua. See below.

The physical SIM card may be received before it is activated. Although each SIM card has a serial number (ICCID) written on the card itself, the SIM card will not have an Iridium phone number (MSISDN) assigned prior to activation. Once activated, the Iridium POC will send notification of the card's MSISDN. Write this number on the card itself.

Even if you do not have the exact XI-100 modem in hand (i.e. you do not know the IMEI), or if you have not yet assigned a RUDICS IP:PORT, still request the SIM cards and activation as far in advance as possible, since it can take up to a month to receive SIM cards and have them activated within Iridium. Since the SBD and RUDICS provisioning are much faster, usually within a few days, you can request the SBD and RUDICS provisioning later.

The PORT for RUDICS operation must be unique. Also, the UNAVCO firewall rules must allow this port on skua to be open for incoming RUDICS connections. Finally, certain ports are blocked within the DOD Gateway. The Iridium POC may be able to supply a short list of ports which are known to be un-blocked. Otherwise, it's trial and error.

2. Update UNAVCO Polar Iridium SIM Inventory

Create new entry into the file "UNAVCO Polar Iridium Inventory.xls". This file is maintained by, and should only be edited by, the Polar Network Engineer.

3. Configure Iridium Modem

Configure the XI-100 Iridium modem(s) according to the UNAVCO Polar Iridium Modem Configuration Form, available online.

4. Configure Download Computer

Log into skua and do the following

A. Create new SITE directory in the /iridium/sites/ directory. For pre-season testing, all receivers are assigned a "testing" name TSXX, where XX = 00-30. For all data received by skua from a site TSXX, the data files will automatically be archived to the polar "private" space on ftp://data-out.unavco.org. In this way, the files will be assembled and QC'd without creation of formal stations within the UNAVCO archive. See David Maggert for more information.

B. Create three subdirectories data/ graphs/ logs/ under the /iridium/sites/TSXX/ directory.

C. Edit the `/etc/hosts` file to assign an IP to this SITE. Follow the convention of other RUDICS sites already listed in this file. For RUDICS sites, the receiver's web interface (when connected) is available through a unique port on skua, which you define. Therefore the address and port for a RUDICS test site is `69.44.86.75:XXXX`, where `XXXX` must be higher than 2000. Each new RUDICS site uses the next number in line.

Note that before the system is deployed, you must change the receiver NAME to the actual name used for that site.

5. Create Site Configuration File

Create a site configuration file `SITE.pm` under the `/iridium/sites/TSXX` directory. Use configuration files for other sites as a template. An example configuration file is shown below. Here each option is shown on a separate line for clarity (which is acceptable syntax). Also note the single quotes (`'`) surrounding many of the parameters, as well as the commas.

```
-----
package SITE;
use strict;

# site config for site 'SITE'

sub info {
my $self= shift;

return {
    'rx' => 'NetR9',
    'type' => '3',
    'connection' => "",
    'days' => '100',
    'fmt' => 'BNX',
    'plot' => { 'volt' => [ 7, 16 ] },
}
}
1;
-----
```

The parameters in this file are:

<code>package</code>	<code>SITE;</code>	Must have SITE name here
<code># site config...</code>		Comment field starting with # symbol
<code>'rx'</code>	<code>'Model',</code>	Receiver model. Currently the <code>/iridium/lib/rx.pm</code> file defines types for Trimble NetRS and NetR9 models
<code>'type'</code>	<code>'X',</code>	Receiver type. Currently the <code>rx.pm</code> file defines several different "types" of NetRS and NetR9, corresponding to different firmware versions or datalogging structures.
<code>'connection'</code>	<code>",</code>	For Xeos RUDICS sites (or sites that are accessible through the internet) the field between the single quotes is empty, i.e. <code>'connection' => ""</code>

'days'	'X',	Number of days to look backward in time on the receiver for data downloads. Overrides the default of 40 days (stored in /iridium/bin/download.pl). Useful to catch up on data from sites that have been offline > 40 days.
'fmt'	'FMT',	Extension of data file names on receiver. Overrides the default of T00, which is the UNAVCO polar standard.
'plot'	{ 'volt' => [Ymin, Ymax] },	Changes the Y-axis extents of SOH plots for voltage. Can also change temperature extents by substituting 'temp' for 'volt'. Overrides the defaults of 11 to 16V and -40 to +60C , stored in /iridium/bin/graph.pl.

6. Create New Site on Xeos Tunnel Application (TA)

Pull up the TA web interface and login. Click the Add New Site button. This brings up the Details page for a new site. Fill in the fields as follows, making sure there are no typos.

<u>FIELD</u>	<u>VALUE</u>	<u>NOTES</u>
Enabled	checked	
Site Name	TSXX	
Iridium Listen IP:port	*:XXXX	XXXX is port on skua to which incoming RUDICS connections are directed by the DOD Gateway. This is defined by the RUDICS provisioning, which associates the ICCID of the SIM card with a specific IP:PORT. See above.
Log Path	/iridium/sites/TSXX/logs/	Make sure you create this directory first.
IMEI	xxxxxxxxxxxxxxx	15-digit serial number of Iridium modem inside the XI-100 modem. This is used for SBD provisioning, which associates the IMEI with email addresses for delivery of SBD emails.
Incoming Mail Server	POP3	IMAP doesn't work on skua...python bug.
Server	pop.gmail.com	
Server Port	995	
SSL Support	checked	
Login Password	recent:xitunnel@gmail.com starts with U	
SMTP Server	smtp.gmail.com	

SMTP Server Port	587	
SMTP SSL Support	checked	
SMTP Login	xitunnel@gmail.com	
SMTP Password	starts with U	
Name	TSXX	
Local ip:port	69.44.86.75:2XXX	2XXX is a 4-digit port on skua, which is forwarded to directly the remote receiver, and can be used to bring up the receiver's web interface in any browser when connected, i.e. http://skua:2XXX. Use the next highest port that is not currently used by another Xeos site. Note that this port must be greater than 2000.
Remote ip:port	192.168.0.XX:80	Actual IP programmed into the remote receiver's ethernet port. Convention is to make XX equal to the last two digits of the Local port above. For example, Local ip:port 69.44.86.75:2021 matches with Remote ip:port 192.168.0.21:80.
Protocol	TCP	

7. Set Tunnel to Auto RUDICS Mode

From the TA main page, click on Details for the new site. Set the SBD Check Interval and click that button. 10 minutes is a common SBD check interval for testing. You will receive two pop-up windows. One asks if you want to do this, and the second confirms that an SBD message has been sent with this change command.

Now set the Set Interval + Activate Auto RUDICS interval and click that button. 10 minutes is a common Auto RUDICS interval for testing. Again you will get a window asking if you want to do this. You should receive a second window confirming this has been done. However, often this second window does not appear.

Note: If the second window does not appear, the tunnel for this site has hung up due to a python bug. Another symptom of a hung tunnel is the word "Pending" appearing in the Next Auto RUDICS: field. If so, the entire TA must be restarted. Click the Shutdown button on the main page, then login to skua and change to the /usr/local/XITunnel/ directory. Execute the start command, which is stored in the start.sh file. On occasion the TA will not start up right away and you will have to wait up to 10 minutes to restart.

8. Verify Connections

Verify that the modem is connecting, and that SOH and datafiles are retrieved from the receiver. It may be useful to login to the xitunnel@gmail.com to verify that SBD messages are being received. It is also helpful to look at the Xeos TA logs for that site, which are stored in the /iridium/sites/TSXX/logs/ directory.

IV. POINT TO POINT RADIO

Note this procedure has not been formalized. Below is a draft outlining the general steps.

1. Configure Remote Radio

Configure the radio as it will be used in the field. Using one of the antenna drops to the cold chamber, install a Yagi antenna in place of the Iridium antenna on the UNAVCO roof.

2. Setup Base Radio

Install the base radio in the UNAVCO development lab. Run an antenna cable to the roof and install a Yagi antenna.

3. Configure GPS Receiver

Assign it a name TSXX, and give it an IP on the UNAVCO “testing” network, so the receiver can be online through the UNAVCO intranet, and downloaded through the base radio.

Note that before the system is deployed, you must change the receiver NAME and IP address to reflect the actual values which will be used for that site.

4. Configure Download Computer

- A. Edit the /etc/hosts file on skua to associate the name TSXX with the given IP address.
- B. Create the directories on skua as above, i.e. the /iridium/sites/TSXX directory with /data /logs /graphs subdirectories.
- C. Create the site configuration file TSXX.pm as above. Be sure to leave the “connection” field blank, i.e. 'connection' => "
- D. Edit the crontab file on skua to execute the /iridium/bin/query.pl and /iridium/bin/download.pl commands frequently during testing. 10 minutes is a common interval for testing.

5. Verify Connections

Verify that the modem is connecting, and that SOH and datafiles are retrieved from the receiver.