3G iPackGPS Network Operator Detection and Band Locking

Introduction

This document provides instructions for querying and modifying network and band settings for the 3G iPackGPS (model 7984) using Symphonie Data Retriever (SDR) software and a PC. The 3G iPackGPS provides 3G network support and is backward compatible with EDGE or GPRS as needed. The 3G iPackGPS modem provides three different levels of handling for band and network operator:

- **Fully automatic**: Band and network operator are automatically selected by the 3G modem (this is the recommended mode of operation and is the factory default).
- **Locked band**: User manually sets band operation, and the network operator is automatically selected by the 3G modem.
- **Locked network operator**: User manually sets band selection and network operator.

Generally, a user should leave the modem in the default auto-detection mode. However, under certain special circumstances such as when there are many competing networks providing signal in the area, it may be helpful to lock the band, or to lock the band and network operator. In this way, a user can over-ride the automatic detection algorithms. Because the default settings of the iPackGPS will be over-ridden when locking, it is important to be mindful of the steps performed, and to keep a record of the actions in your site notes.

Important: These settings should be used carefully as they can result in locking the modem to an incompatible band or network. Please contact Technical Support with questions or assistance when using this feature for the first time.

## Symphonie Data Retriever - How to open the "Phone Diagnose" Window

1. **Open Symphonie Data Retriever (SDR)**
   Version 7.07 or higher is required. The latest version of SDR can be downloaded from the renewablenrgsystems.com technical support page.
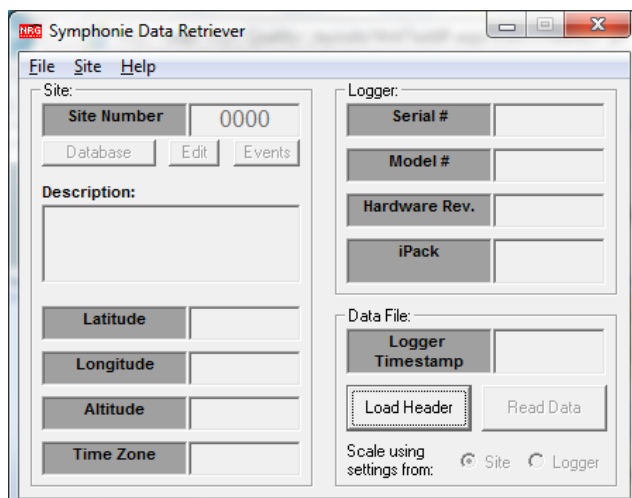
2. Open the "Phone Diagnose" window

Once the SDR home screen comes up, type "nrgphone" on the keyboard and the "Phone Diagnose" window will open. Wait a moment for the AT commands to complete and the message "Connected at..." will be displayed.
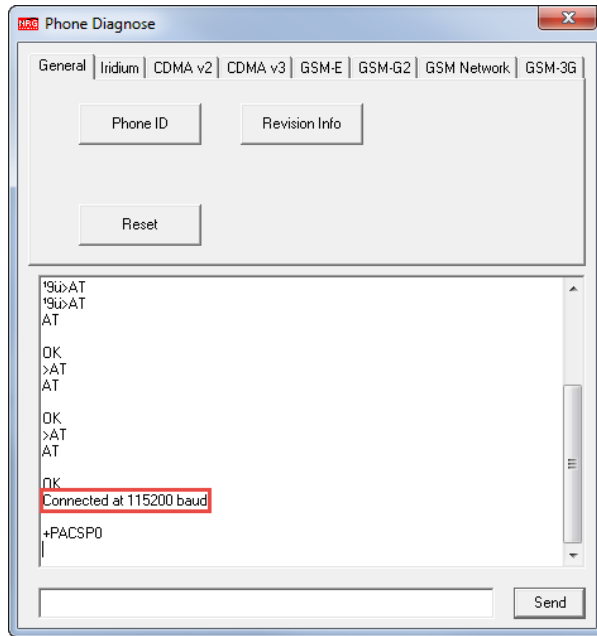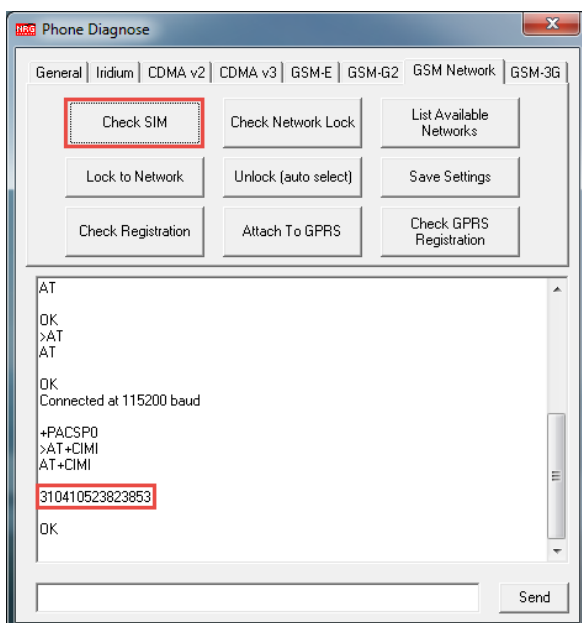

How to Determine the Network Carrier and Check the SIM Card

### 1. Click on the "GSM Network" tab
2. Click the "Check SIM" button

This will return the Internal Mobile Subscriber Identity (IMSI) stored on the SIM card. If a SIM is not installed, the command will return an error.

3. **Click "Check Network Lock"**
   The network currently locked to will be displayed in the main window. The network description shown will look similar to "+COPS: 0,0, "AT&T",2" . If the first number is 0, the modem network is not locked and was chosen automatically.
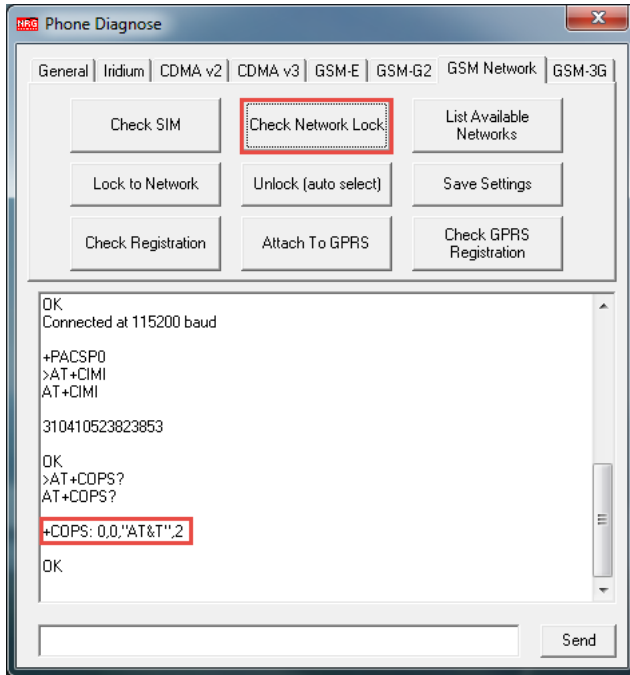

4. **Click "List Available Networks"**
   A list of GSM networks the phone can see will be displayed in the main window, including name and a 5-6 digit code. Note this action can take 15 seconds to complete.

How to Lock to a Specific Network Operator

Once you determine what networks are available, you can lock to a specific network. To lock to a network, click "Lock to Network". An entry window will pop up. Enter the code for the desired network and verify the system returns an OK. If you want to undo this, click "Unlock (auto select)" instead. The following example shows locking to the AT&T network in Hinesburg, Vermont, USA.
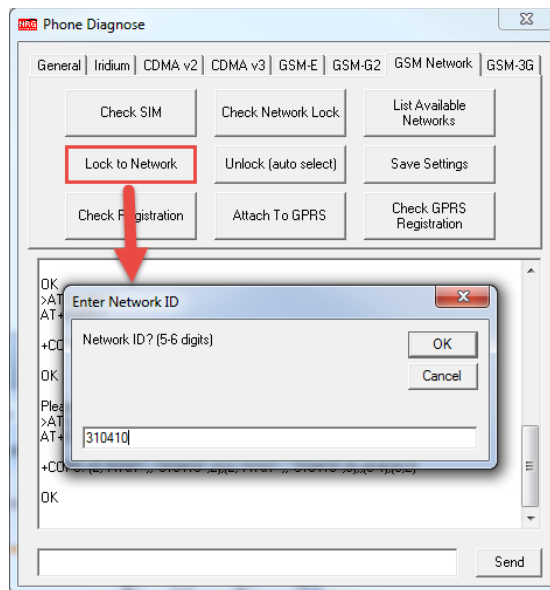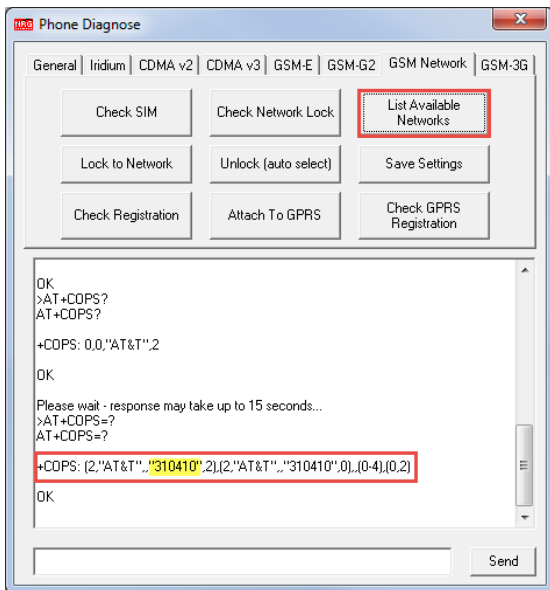
Once you have locked to a network by entering the Network ID and clicking "OK", click "Save Settings".

Click "Check Registration". This checks whether or not the phone is on the network. You will see a result like "+CREG: 0, X". X is the status - you want a 1 or 5. All possible status results are shown below:

- 0,0 - Not registered, Mobile Equipment is not currently searching for a new operator.
- 0,1 - Registered, home network.
- 0,2 - Not registered, Mobile Equipment currently searching for a new operator to register to.
- 0,3 - Registration denied.
- 0,4 - Unknown.
- 0,5 - Registered, roaming.

In our example, we locked to AT&T and are using an AT&T SIM card, so it shows we are registered on the home network.
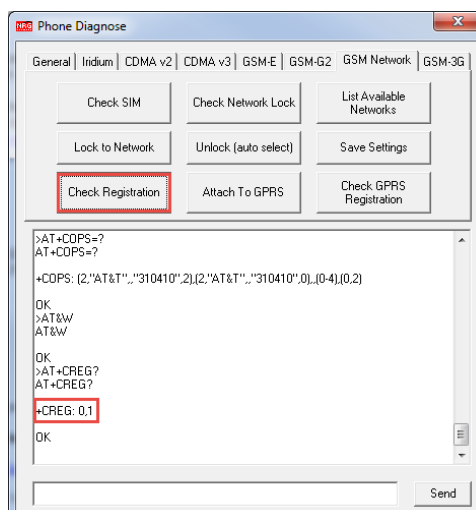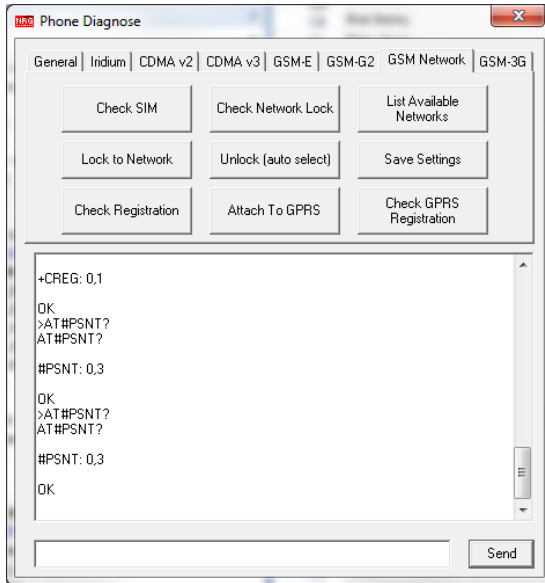

How to Check the Current Frequency Band

1. **Check Network Type**
   There is a text entry box and "Send" button at the bottom of the screen which can be used to send commands to the modem. To determine if you are registered on a 2G or 3G network, type AT#PSNT? and press send. Results can be interpreted as follows:
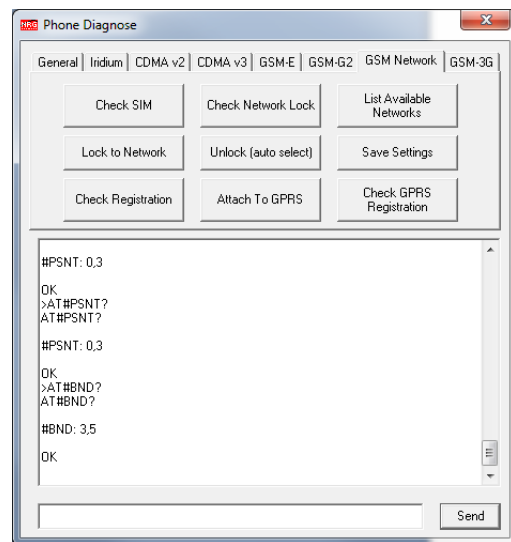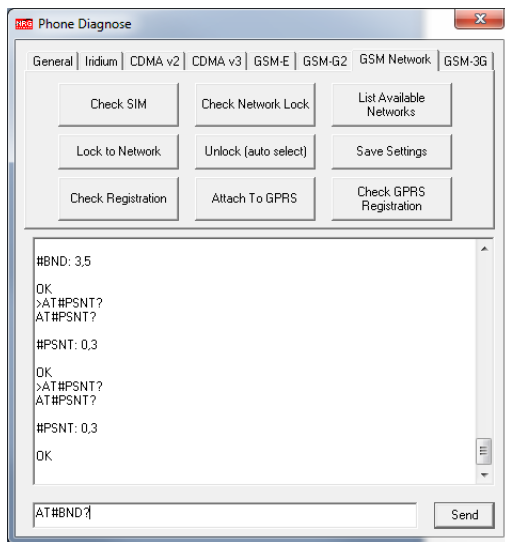
#PSNT: 0,0 is GPRS (2G)
#PSNT: 0,1 is EDGE (2G)
#PSNT: 0,2 is 3G
#PSNT: 0,3 is 3G

In this case, the result #PSNT: 0,3 indicates a 3G network. Remember your result.

2. Check Frequency Band
In order to see the currently selected bands, use the command AT#BND?

Based on the result from the network type command in the previous step (AT#PSNT?), the user can know which network type is being used (2G or 3G). It also guides the user on how to interpret the results of the BND command.

If the network type was 2G, the first digit in the response is the key (#BND: 3,5), and if the network type was 3G, the second digit is the key (#BND: 3,5).

In our example, the results were (#PSNT: 0,3) and (#BND: 3,5), which means the iPackGPS is operating on a 3G network on 3G band 5 in the table below.

Possible Band Selections

<2G Band>	
0	GSM 900MHz + DCS 1800MHz → **Default**
1	GSM 900MHz + PCS 1900MHz
2	GSM 850MHz + DCS 1800MHz
3	GSM 850MHz + PCS 1900MHz
<3G Band>	
0	2100MHz(FDD I)
1	1900MHz(FDD II)
2	850MHz(FDD V)
3	2100MHz(FDD I) + 1900MHz(FDD II) + 850MHz(FDD V)
4	1900MHz(FDD II) + 850MHz(FDD V)
5	900MHz(FDD VIII) → **Default**
6	2100MHz(FDD I) + 900MHz(FDD VIII)
7	2100MHz(FDD IV)

How to Lock to a Specific Band

If you need to lock to a specific band, the modem auto band selection needs to be toggled off, a network type defined, and a band selected. When defining network type, the AT+WS46 command is used and the following applies:

> AT+WS46=12 sets to 2G only
> AT+WS46=22 sets to 3G only
> AT+WS46=25 sets to 3G and 2G automatic. Default is 25.

For example, to lock to 2G band 3 "GSM 850MHz + PCS 1900 MHz", enter the following sequence of commands:

> AT#AUTOBND=0 [this toggles the modem out of automatic mode]

> AT+WS46=12 [this locks the modem to 2G networks only]

> AT#BND=3,5 [this locks the modem to band 3 in the table under 2G which is GSM 850MHz + PCS 1900 MHz]

How to Return to Automatic Mode

Finally, if locking to a band, or locking to both an operator and band does not improve communications, or if the iPackGPS is being moved to another location, be certain to set the iPackGPS back to the fully automatic (default) mode.

The command sequence to set automatic band mode is:

AT+COPS=0 [this sets the network operator selection to automatic]

AT+WS46=25 [this sets the network type selection to automatic]

AT#AUTOBND=2 [this sets the network band selection to automatic]

Final Note – Logger LCD Information

Band, network operator, and other connection status information can also be read from the logger LCD on site by navigating to the iPackGPS menus. This is useful when at the site and no PC is available. It is not recommended to use the logger UI to navigate to these status screens when simultaneously connected to the PC using the NRG phone mode, because logger UI activity can disrupt the connection between the software and the iPackGPS.