4.4 Lightning Protection

In order to proactively protect the DSPbR from static discharges, power surges or lightning strikes we recommend the use of additional lightning protection products.

The AC Mains

Although the DSPbR complies with the basic mains surge protection requirement according to EN 61000-4-5, it is recommended that in areas where the mains voltage is susceptible to voltage variations and surges, that medium or coarse voltage conditioning and surge protection be installed.

RF Coaxial Cabling

All RF coaxial cabling exposed to proximity or direct lightning discharges should be well grounded prior to entry into the DSPbR with suitable voltage differential protection between the outer and inner conductors.

Ethernet connection

As network cabling may also be susceptible to surges, the IP Ethernet connection should be provided sufficient protection using a product such as the Polyphaser, NetGuard or NX Series products.

GPS and GPRS/3G Antenna; Suitable coaxial cable protection should also be afforded to the GPS and cellular modem antenna cables prior to termination into the DSPbR.

4.5 Antenna Installation

As the DSPbR amplifies and rebroadcasts low levels of received RF, it is very important to ensure a sufficient margin over minimal receiver to transmitter antenna isolation – typically +15dB greater than the highest (UL/DL) programmed gain figure. Where frequency translation is not used and the same frequency received is rebroadcast, the required isolation is greater.

Scenario 1; When installing antennas and the respective coaxial interconnect cables for a system that does not use frequency or band translation, it is important to achieve a relatively high donor to extended coverage area antenna isolation. The settable gain of the channel must remain within a safe margin below the donor to extended range antenna isolation.

The higher the isolation between the two antennas, the higher the usable channel gain / output power into the extended coverage area and visa versa without unwanted feedback.

Scenario 2; where rebroadcast frequencies have a Tx to Rx offset, the following graph is illustrative of the minimum antenna isolation requirement.

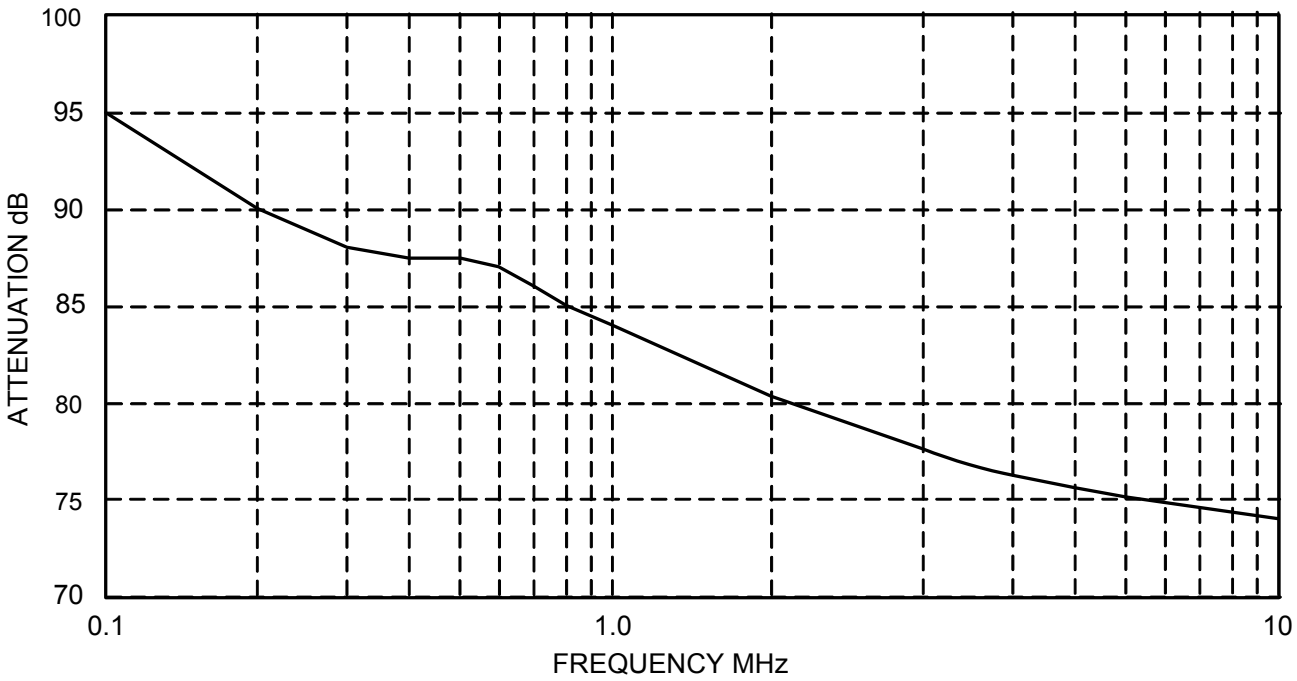


Figure 21 – DSPbR Antenna Isolation Chart

Please note that this minimum isolation requirement will be applicable to the duplexer on shared uplink/downlink antenna systems.

4.6 External / Internal Alarm Interface

At the rear of the chassis protruding from the back of the Ref Gen module is the DB15 female (socket) alarm interface connector.

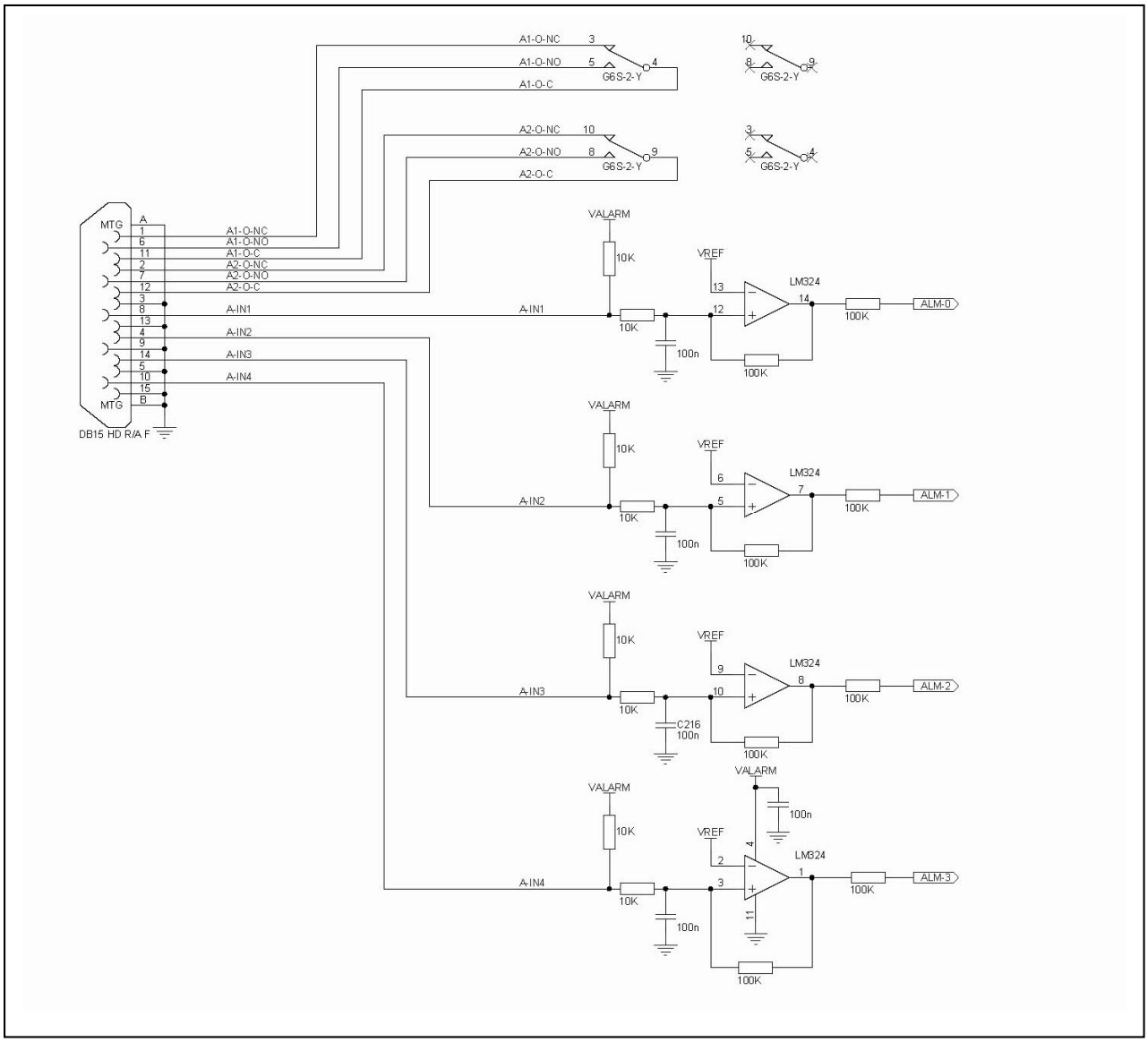


Figure 22 – Alarm Interface Circuit Diagram

The alarm interface drawing details the respective alarm input and output circuits with the DB15 connector pins.

The DSPbR caters for coupling into the unit and reporting up to four external alarm inputs. All four inputs require shorting to ground to activate the respective alarm. The open circuit voltage is 12V DC.

5. Start – Up

5.1 Connectivity

Ethernet – via RJ45 sockets, refer to Chapter 5.2 for connection details.

RS232 – via serial DB9 connector. The serial interface allows either a local or remote terminal to configure the DSPbR and access alarm information. This is achieved through pre-configured factory accessible CLI (Command Line Interface) script.

USB – via USB Type "B" socket. The USB interface allows a local terminal session to configure the DSPbR and access alarm information. This is achieved through pre-configured factory accessible CLI using hyperterminal in a TCP/IP session.

Wireless - Multiband Cell Modem (optional). The optional cell modem is capable of using an SMS format to deliver alarm information to appointed recipients.

5.2 Ethernet Connection Set-up

5.2.1. Web Browser GUI (Graphical User Interface)

The DSPbR utilises an on board web server to provide web browser access to the GUI. This can be accessed directly connecting via a short Ethernet cable jumper from a laptop/notebook directly to the DSPbR or remotely via a TCP/IP network.

A standard Ethernet CAT5e jumper terminated with RJ45 connectors is provided with the unit for your convenience. Use either the rear or front IP Ethernet RJ45 sockets to connect. The DSPbR can be configured either locally or remotely via either of these IP Ethernet sockets.

Any one of the common web browsers can be used to access the DSPbR GUI.

5.2.2 IP Address

Connect Ethernet jumper cable between laptop / notebook and DSPbR.

Initiate the your preferred web browser such as Internet Explorer, and type in the address field the following default address; http://192.168.1.200 (factory default address).

Connectivity to the DSPbR is successful when the "log in" page appears.

Should the web browser be unable to open this session, it may be necessary to set the IP address of your laptop / notebook to a nominated address such as 192.168.1.180. This is done for example in windows XP in the following manner;

Step

1. Select "Start" from status menu
2. Single click – "Control Panel"
3. Double click – " Network Connections"
4. Double click - "Local Area Connection"
5. In Local Area Connections Status box, single click the "Properties" tab.
6. When the Local Area Connection Properties box opens, select the "Internet Protocol (TCP/IP)" choice.
7. Click "Properties" tab.
8. Enter under IP address 192.168.1.180
9. Enter under subnet mask 255.255.255.0
10. Enter under default gateway 192.168.1.254
11. Click "OK" to initiate changes.

Should you still be unable to successfully connect to the DSPbR via the default IP address then the chances are that this may have already been changed.

Current Ethernet address settings

The current IP/subnet/gateway addresses are revealed via the LCD front panel when the mode button is depressed once. When connectivity to the DSPbR cannot be established from your PC or Laptop, or you may have simply forgotten your username and password, it may be necessary to reset the unit to the factory default settings.

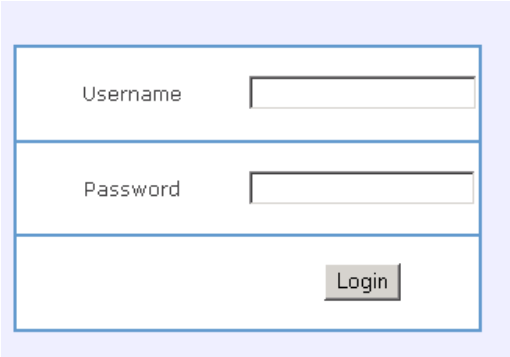
Reset to factory default Ethernet addressing.

To reset / re-boot the system Ethernet addressing, simply press and hold down the "mode" button on the CSC module underneath the LCD display for 5 continuous seconds. This will cause the IP address, subnet and gateway addresses to reset back to factory default addresses. Factory default address settings:

Static IP address: 192.168.1.200
Subnet: 255.255.255.0
Gateway: 192.168.1.254
Level 2 User name: admin
Level 2 Password: admin
Serial interconnect baud rate: 115200

Please note that resetting / re-booting will not change the last known configuration settings within the DSPbR.

5.2.3 Log in Page



Please note: If the incorrect username and password has been entered in succession more then three times, the interface to the repeater will be blocked for 5 minutes. Refer to chapter 5.2.2 IP Address - Reset to factory default Ethernet addressing for default user name and password.

5.2.4 GUI Tree

The GUI has been structured into two user name and password access levels.

Level 1 (lower): Display and provide access to the Introduction, Status and Logout pages.
Level 2 (higher): Display and provide access to all pages.

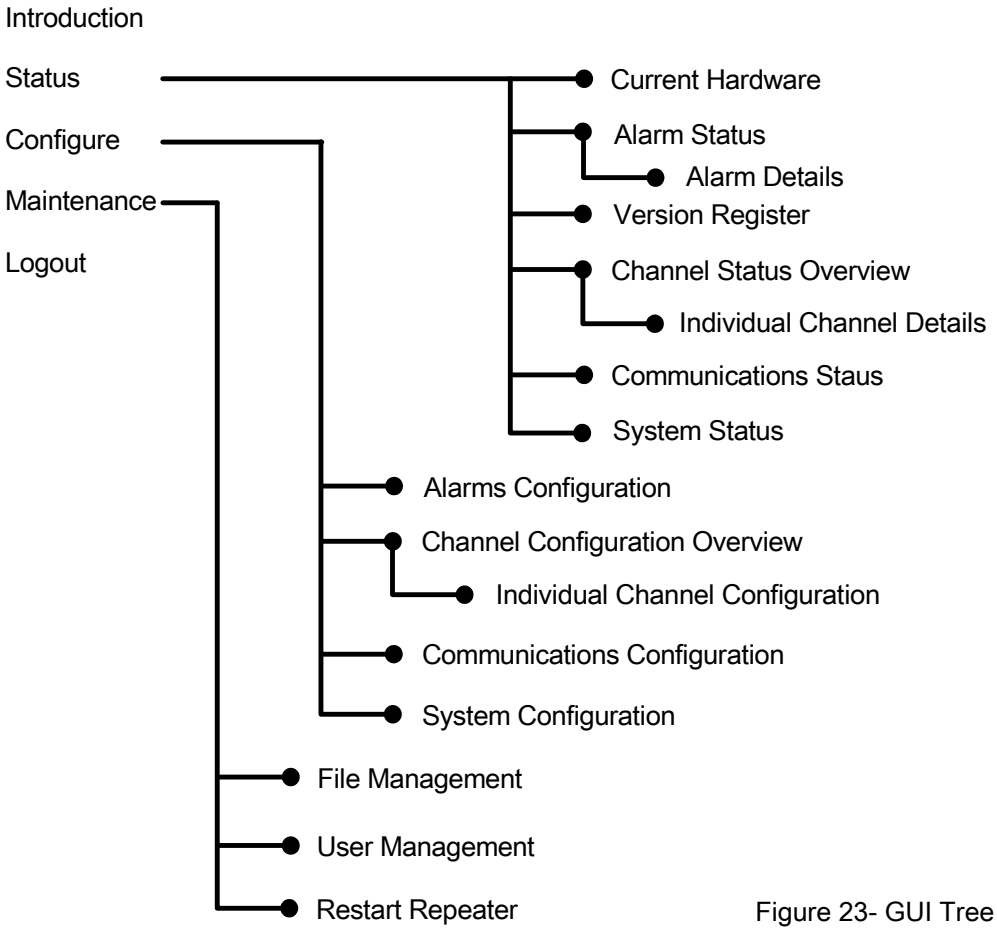
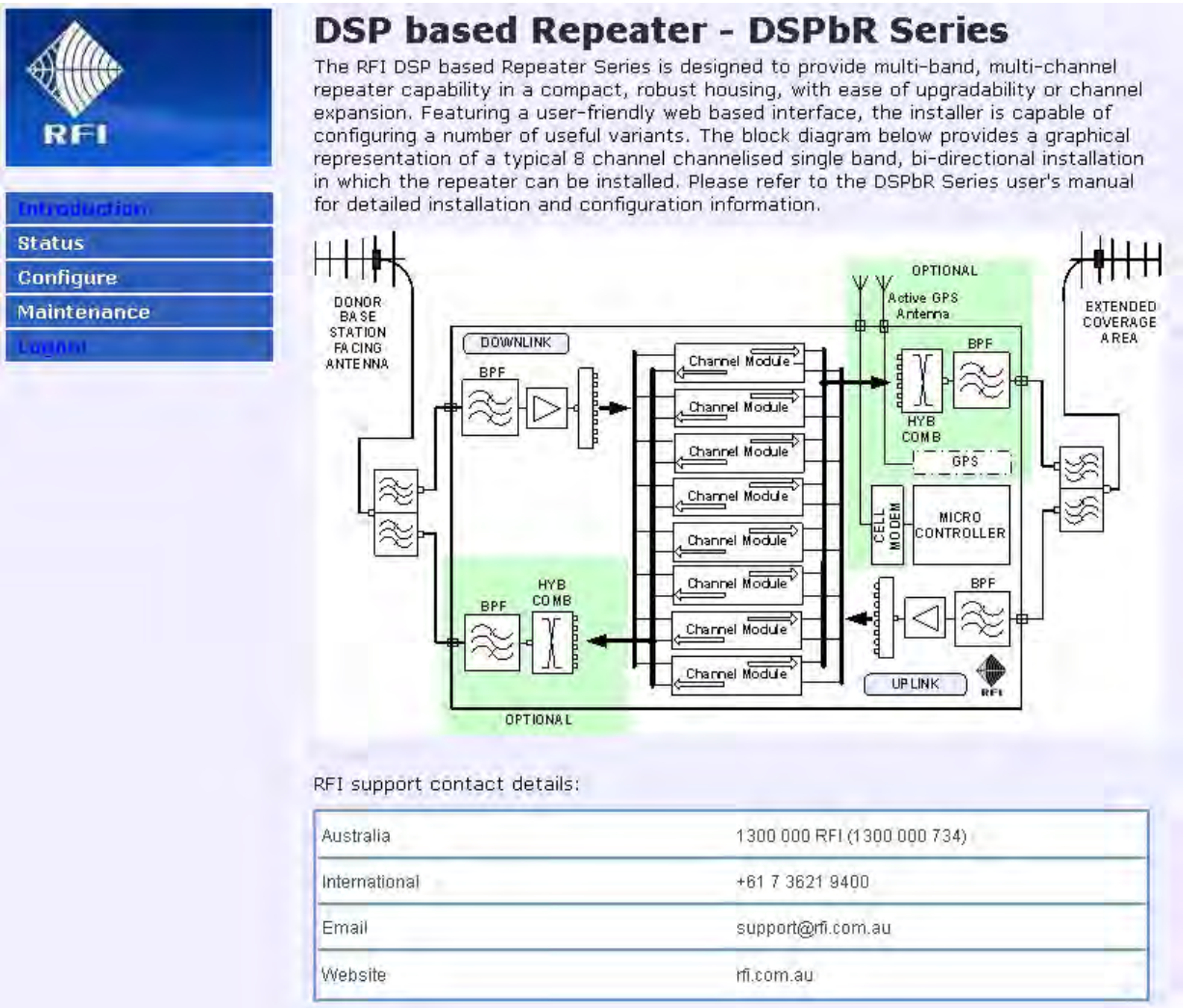


Figure 23- GUI Tree

5.2.5 Introduction

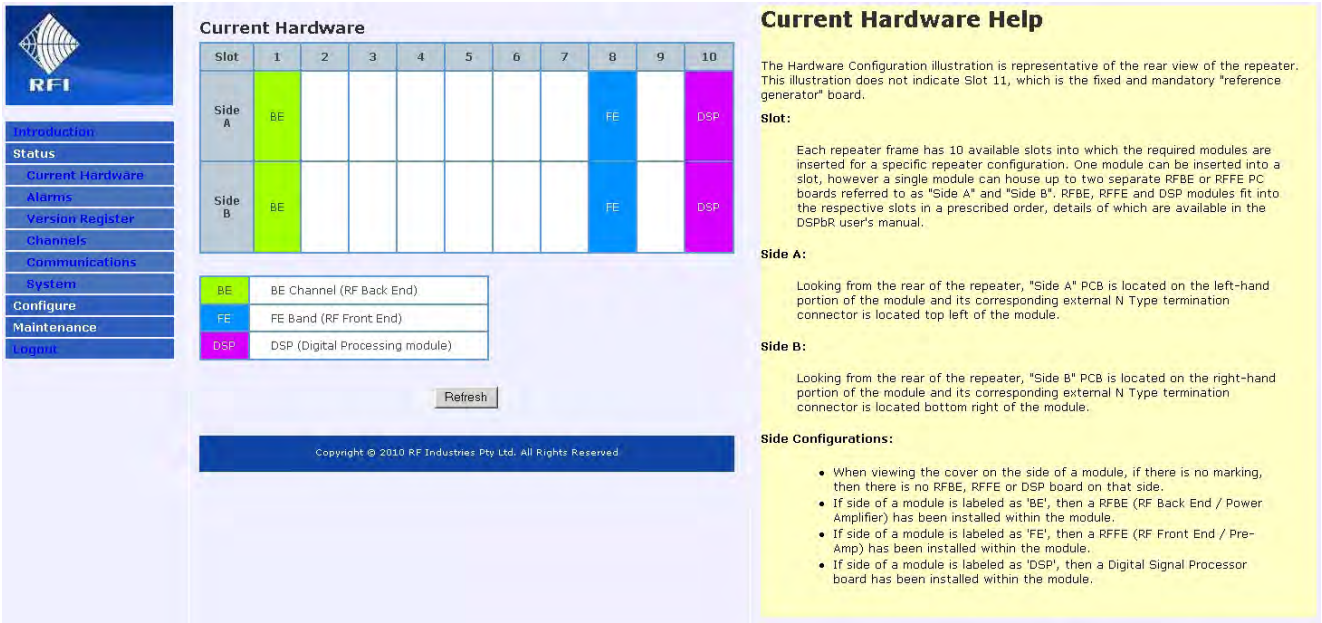
The following Level 2 pages are screen images of the respective pages accessible via the web browser.

These pages are for the most part self-explanatory with adjacently located help notes.

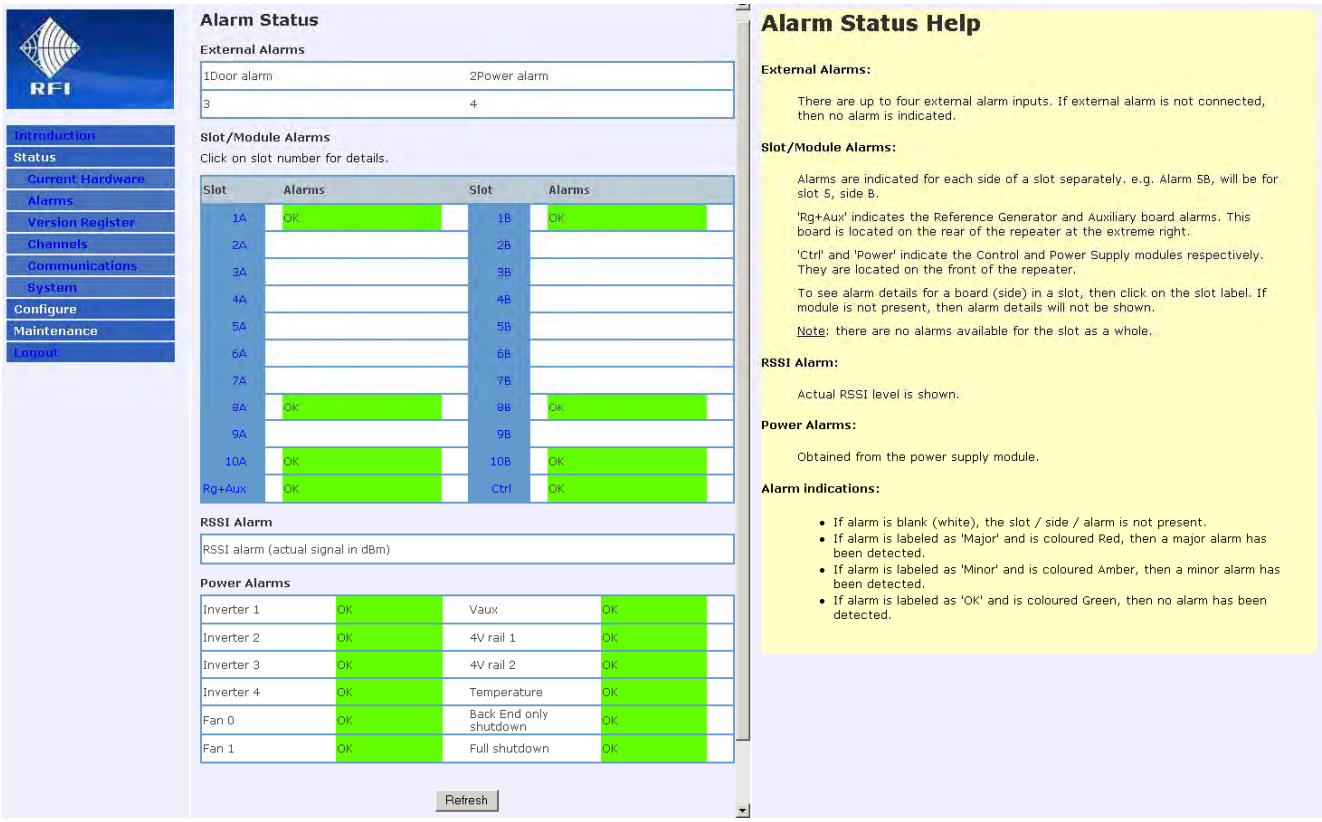


5.2.6 Status Pages

Status\Current Hardware

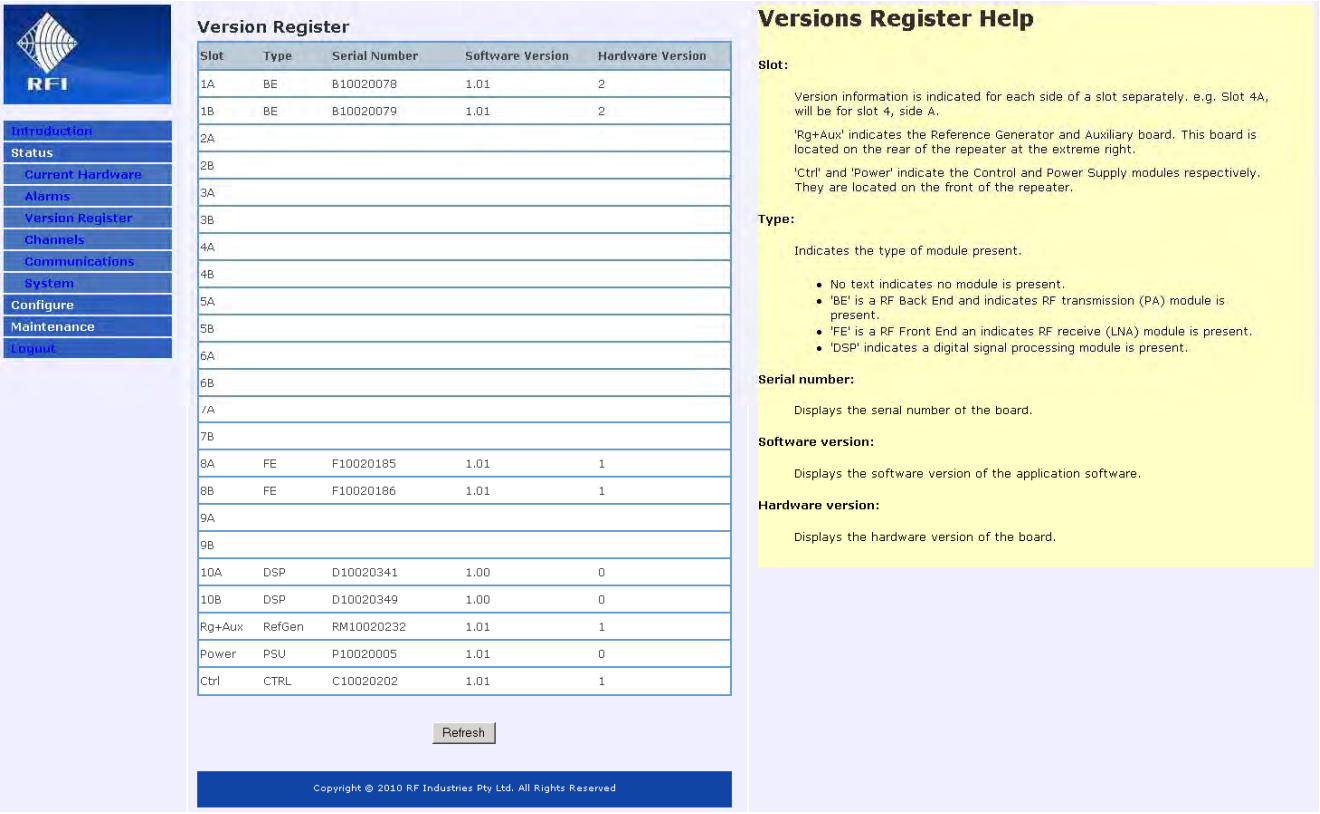


Status\Alarm Status



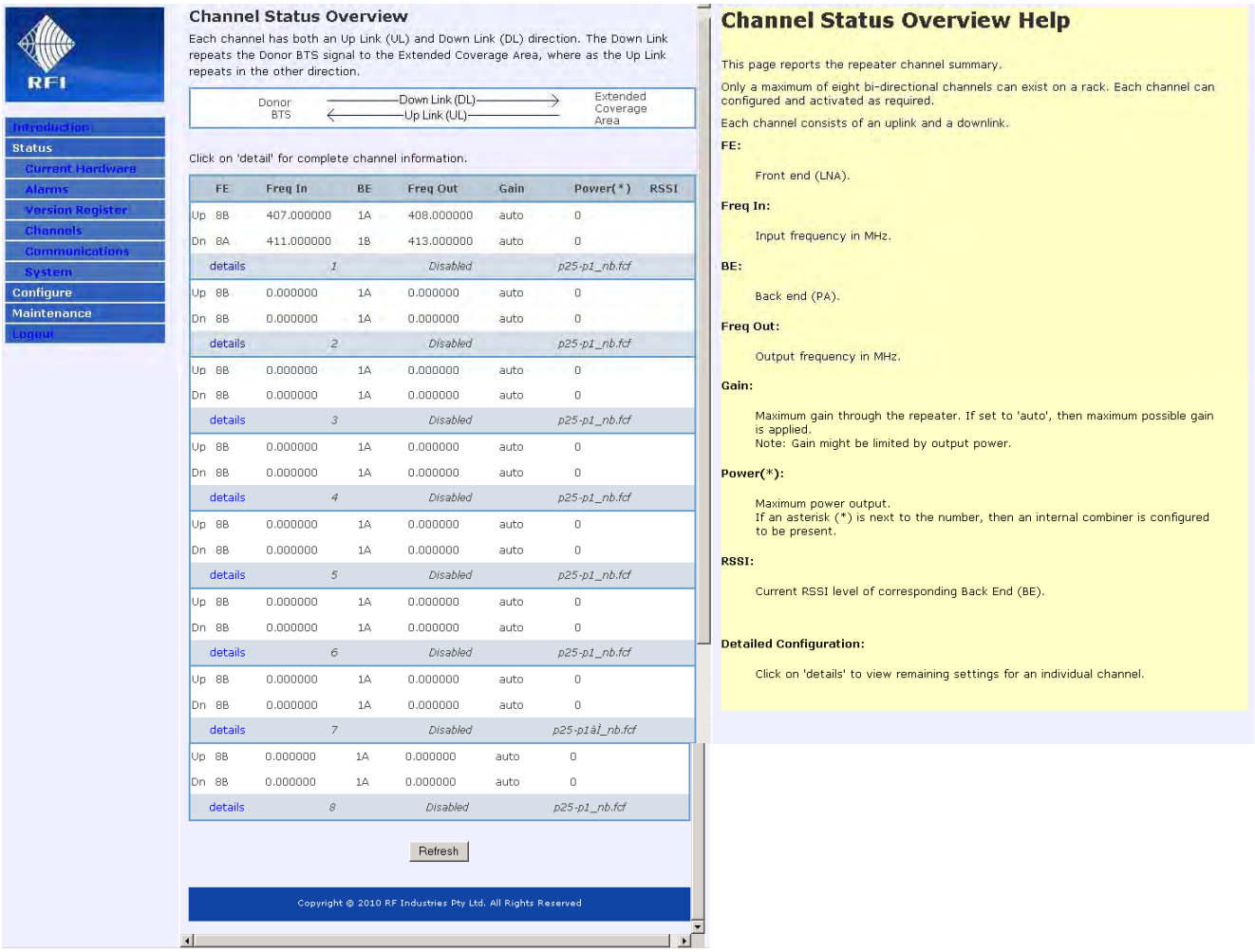
Status\Alarm Status\Details

Status\Version Register



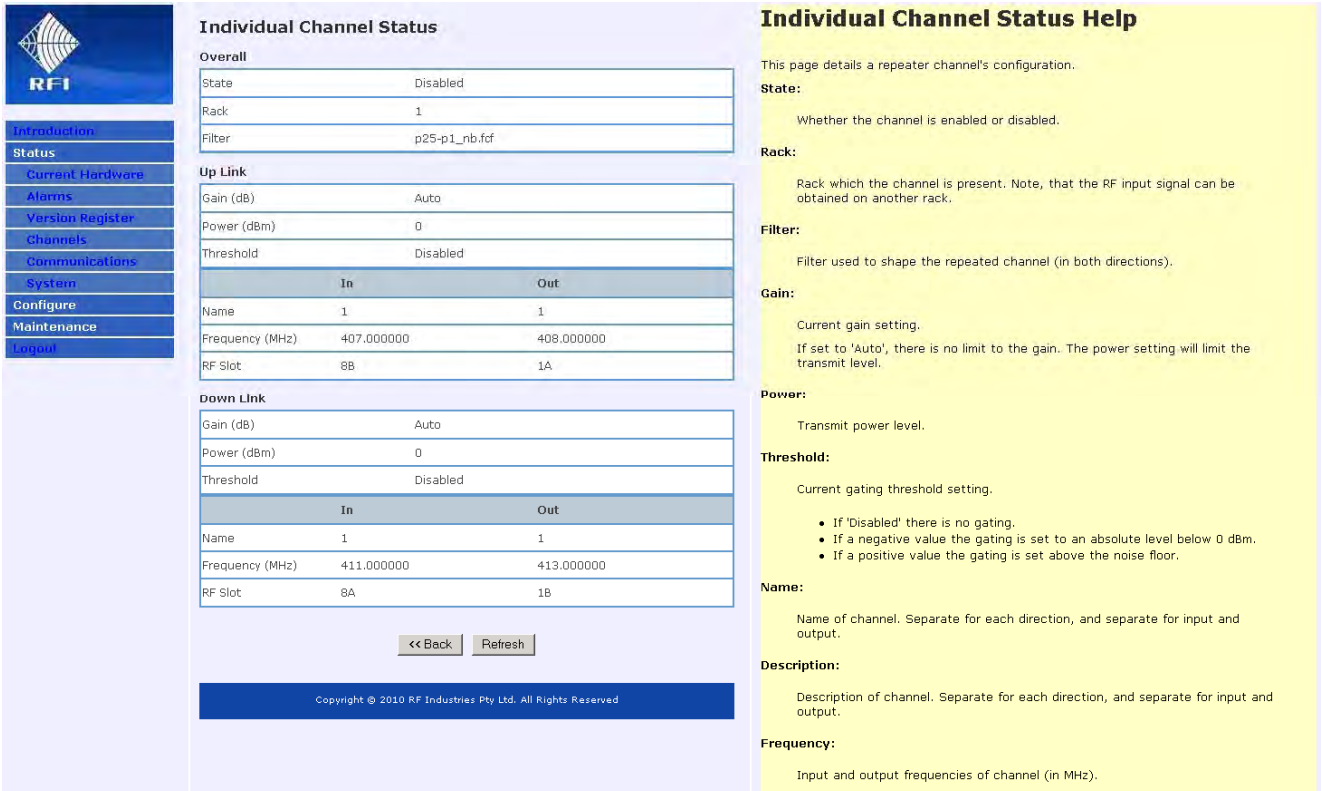
Slot	Type	Serial Number	Software Version	Hardware Version
1A	BE	B10020078	1.01	2
1B	BE	B10020079	1.01	2
2A				
2B				
3A				
3B				
4A				
4B				
5A				
5B				
6A				
6B				
7A				
7B				
8A	FE	F10020185	1.01	1
8B	FE	F10020186	1.01	1
9A				
9B				
10A	DSP	D10020341	1.00	0
10B	DSP	D10020349	1.00	0
Rg+Aux	RefGen	RM10020232	1.01	1
Power	PSU	P10020005	1.01	0
Ctrl	CTRL	C10020202	1.01	1

Status\Channel Status Overview



Note: Frequency translation is shown in the above example screen. Frequency translation is not permitted under FCC Part 90 rules, and can only be programmed when the DSPbR is being operated in accordance with FCC Part 22 rules.

Status\Individual Channel Status



RFI

Introduction
Status
Current Hardware
Alarms
Version Register
Channels
Communications
System
Configure
Maintenance
Logout

Individual Channel Status

Overall

State	Disabled
Rack	1
Filter	p25-p1_nb.fcf

Up Link

Gain (dB)	Auto	
Power (dBm)	0	
Threshold	Disabled	
	In	**Out**
Name	1	1
Frequency (MHz)	407.000000	408.000000
RF Slot	8B	1A

Down Link

Gain (dB)	Auto	
Power (dBm)	0	
Threshold	Disabled	
	In	**Out**
Name	1	1
Frequency (MHz)	411.000000	413.000000
RF Slot	8A	1B

<< Back Refresh

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Individual Channel Status Help

This page details a repeater channel's configuration.

State:

Whether the channel is enabled or disabled.

Rack:

Rack which the channel is present. Note, that the RF input signal can be obtained on another rack.

Filter:

Filter used to shape the repeated channel (in both directions).

Gain:

Current gain setting.

If set to 'Auto', there is no limit to the gain. The power setting will limit the transmit level.

Power:

Transmit power level.

Threshold:

Current gating threshold setting.

- If 'Disabled' there is no gating.
- If a negative value the gating is set to an absolute level below 0 dBm.
- If a positive value the gating is set above the noise floor.

Name:

Name of channel. Separate for each direction, and separate for input and output.

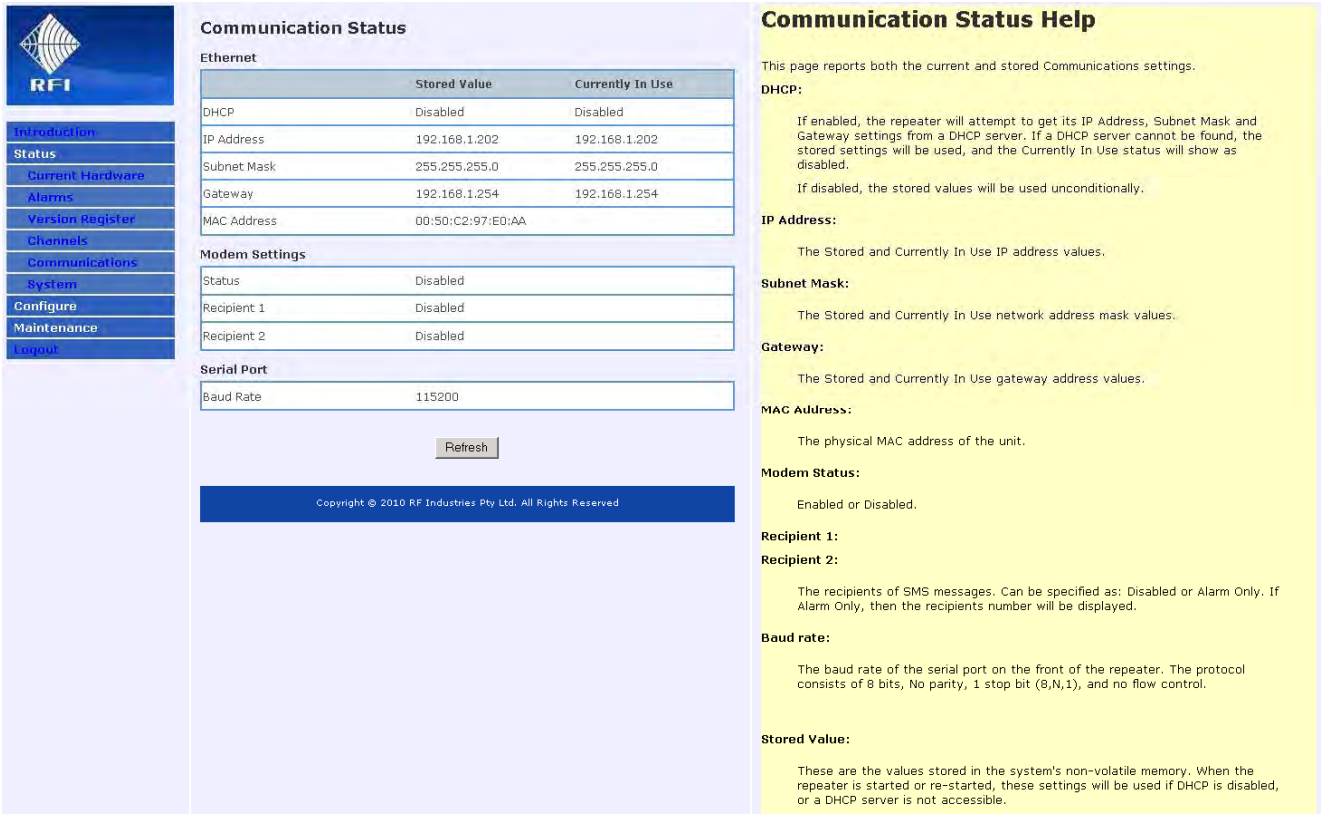
Description:

Description of channel. Separate for each direction, and separate for input and output.

Frequency:

Input and output frequencies of channel (in MHz).

Status\Communications Status



RFI

Introduction
Status
Current Hardware
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Communication Status

Ethernet

	Stored Value	Currently In Use
DHCP	Disabled	Disabled
IP Address	192.168.1.202	192.168.1.202
Subnet Mask	255.255.255.0	255.255.255.0
Gateway	192.168.1.254	192.168.1.254
MAC Address	00:50:C2:97:E0:AA	

Modem Settings

Status	Disabled
Recipient 1	Disabled
Recipient 2	Disabled

Serial Port

Baud Rate	115200

Refresh

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Communication Status Help

This page reports both the current and stored Communications settings.

DHCP:

If enabled, the repeater will attempt to get its IP Address, Subnet Mask and Gateway settings from a DHCP server. If a DHCP server cannot be found, the stored settings will be used, and the Currently In Use status will show as disabled.

If disabled, the stored values will be used unconditionally.

IP Address:

The Stored and Currently In Use IP address values.

Subnet Mask:

The Stored and Currently In Use network address mask values.

Gateway:

The Stored and Currently In Use gateway address values.

MAC Address:

The physical MAC address of the unit.

Modem Status:

Enabled or Disabled.

Recipient 1:

Recipient 2:

The recipients of SMS messages. Can be specified as: Disabled or Alarm Only. If Alarm Only, then the recipients number will be displayed.

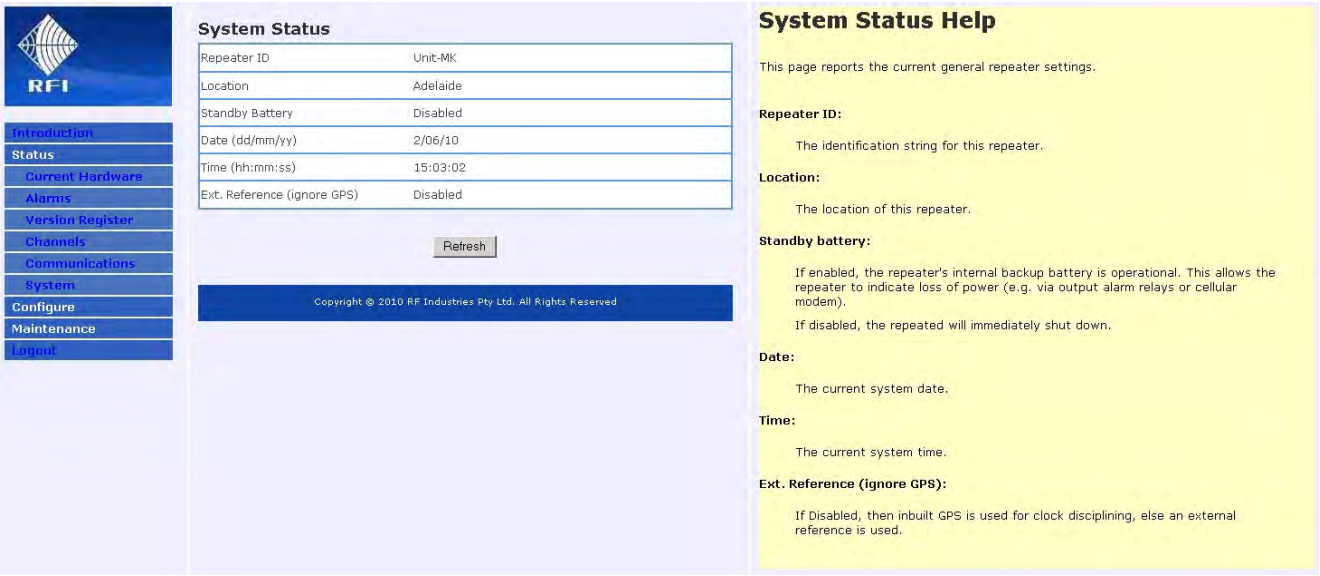
Baud rate:

The baud rate of the serial port on the front of the repeater. The protocol consists of 8 bits, No parity, 1 stop bit (8,N,1), and no flow control.

Stored Value:

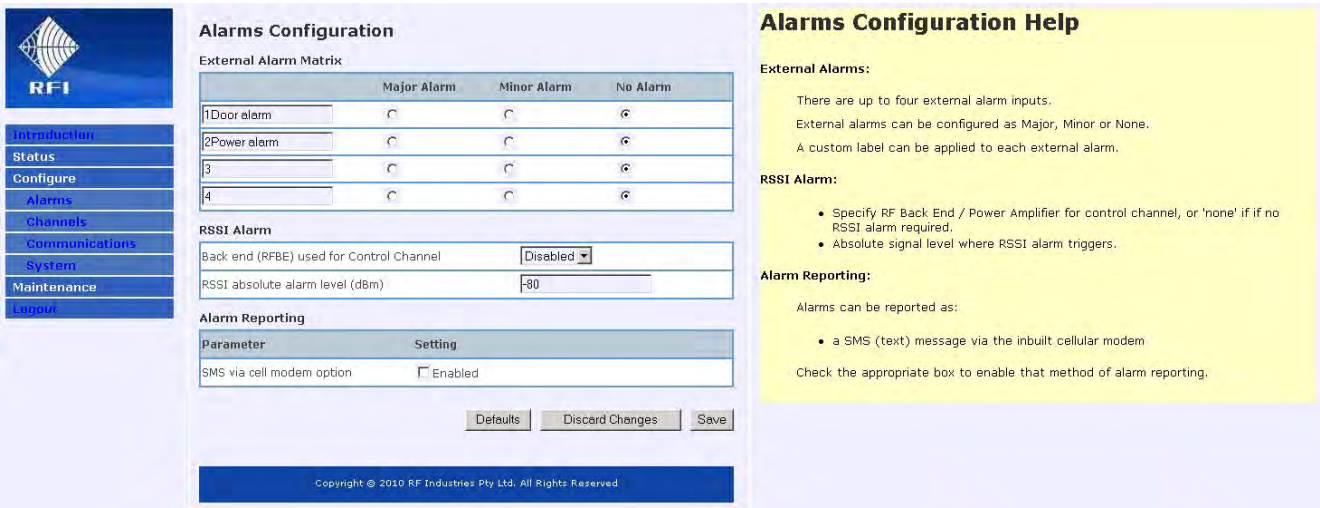
These are the values stored in the system's non-volatile memory. When the repeater is started or re-started, these settings will be used if DHCP is disabled, or a DHCP server is not accessible.

Status\System Status

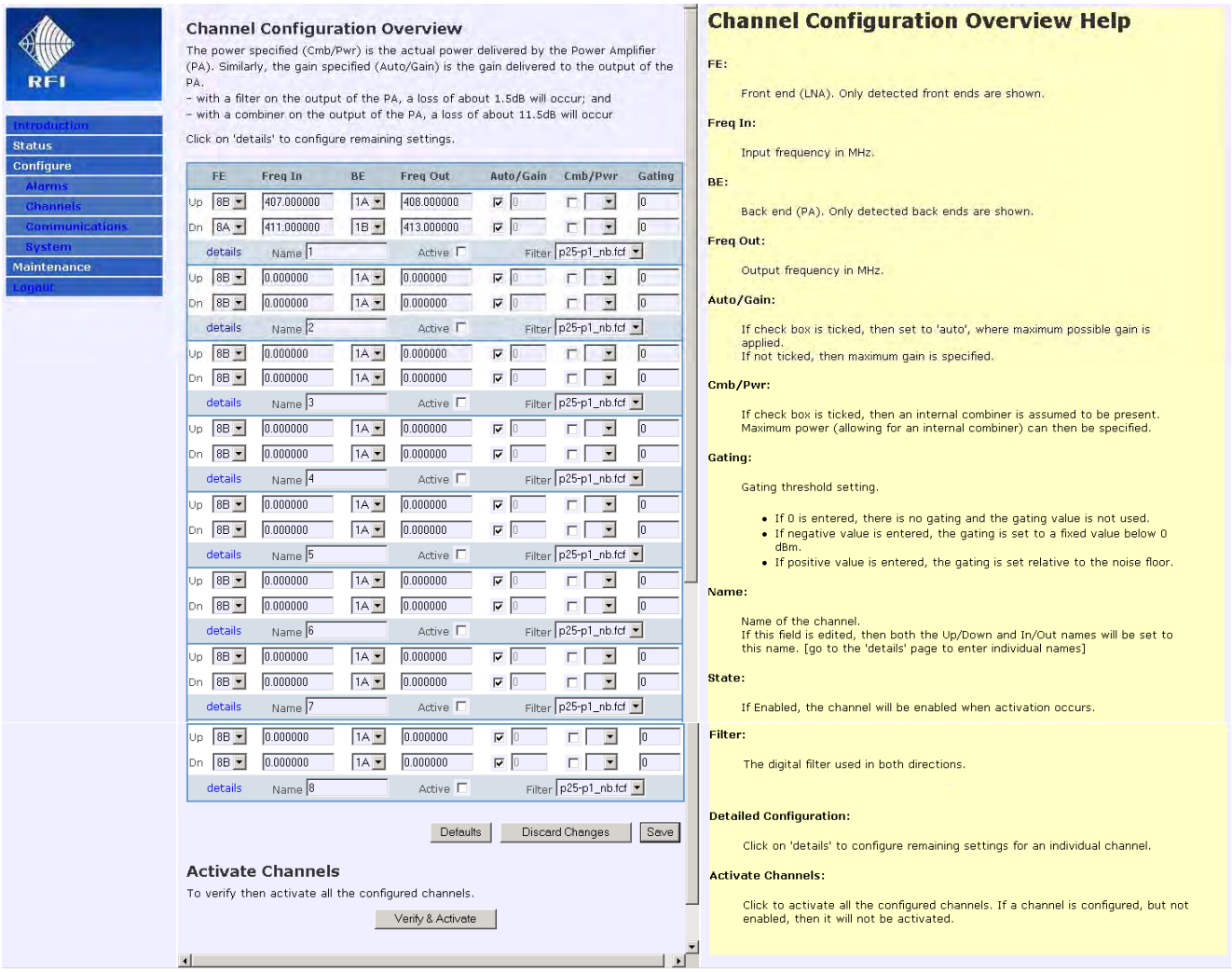


5.2.7 Configure Pages

Configure\Alarms Configuration

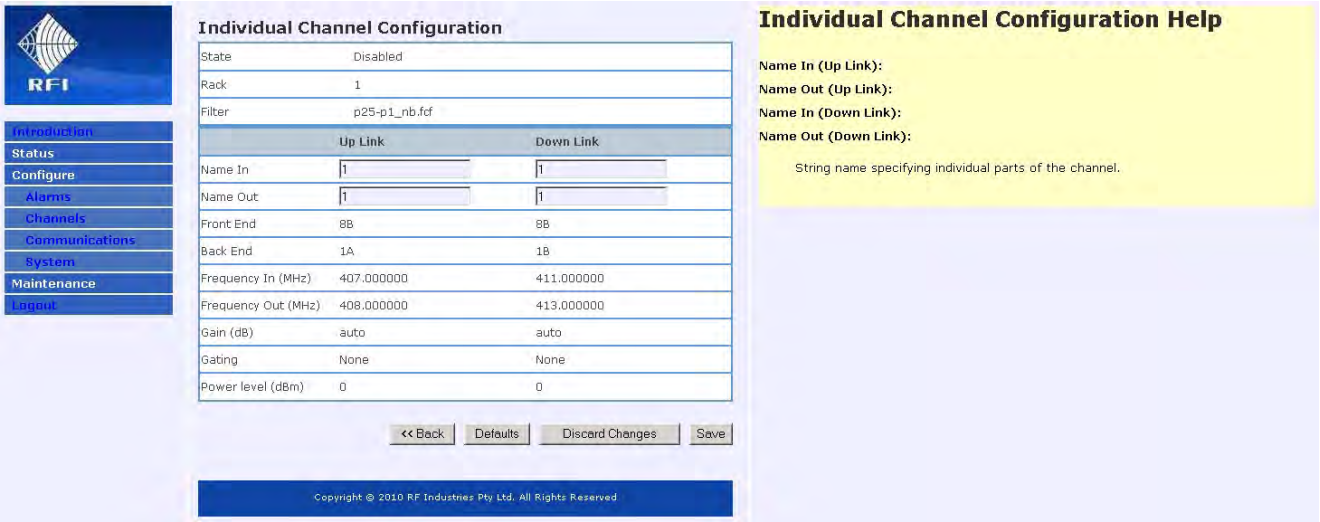


Configure\Channel Configuration Overview

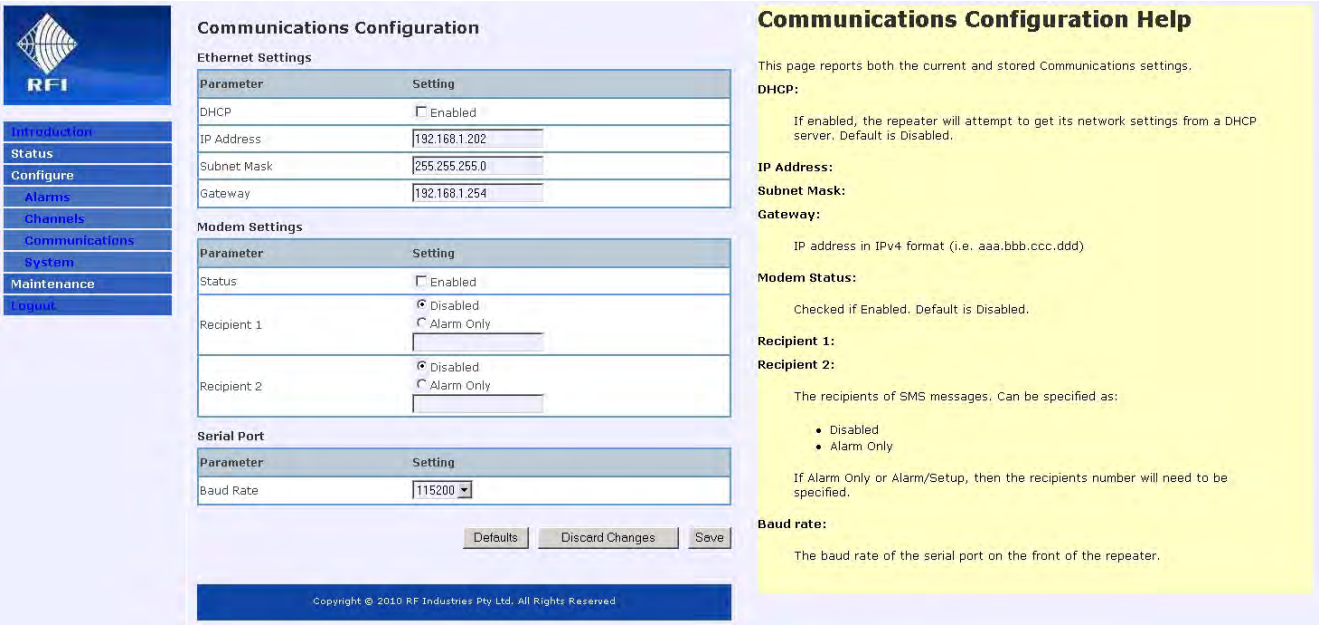


Note: Frequency translation is shown in the above example screen. Frequency translation is not permitted under FCC Part 90 rules, and can only be programmed when the DSPbR is being operated in accordance with FCC Part 22 rules.

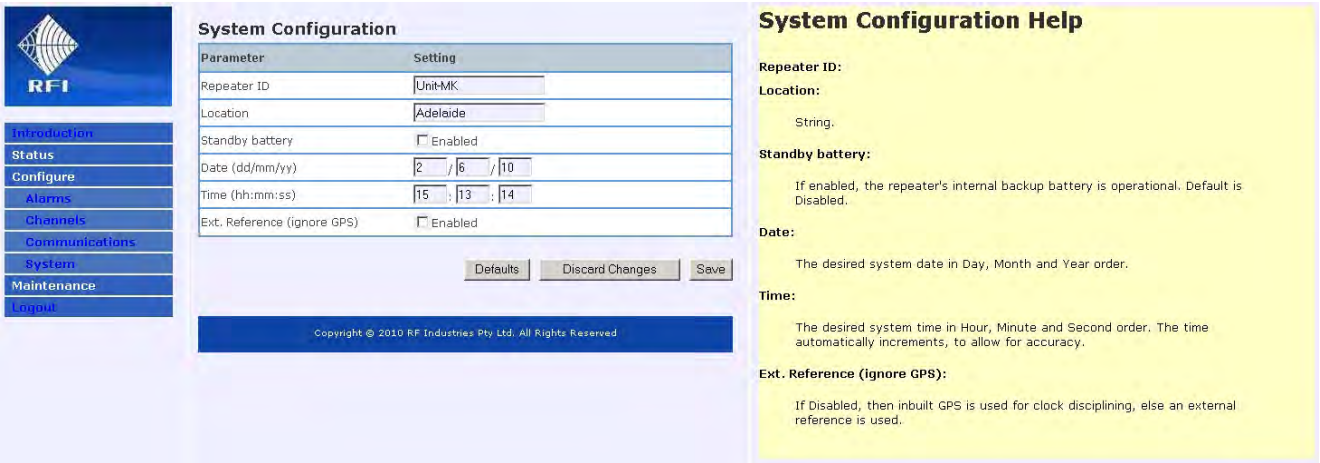
Configure\Individual Channel Configuration Overview



Configure\Communications Configuration

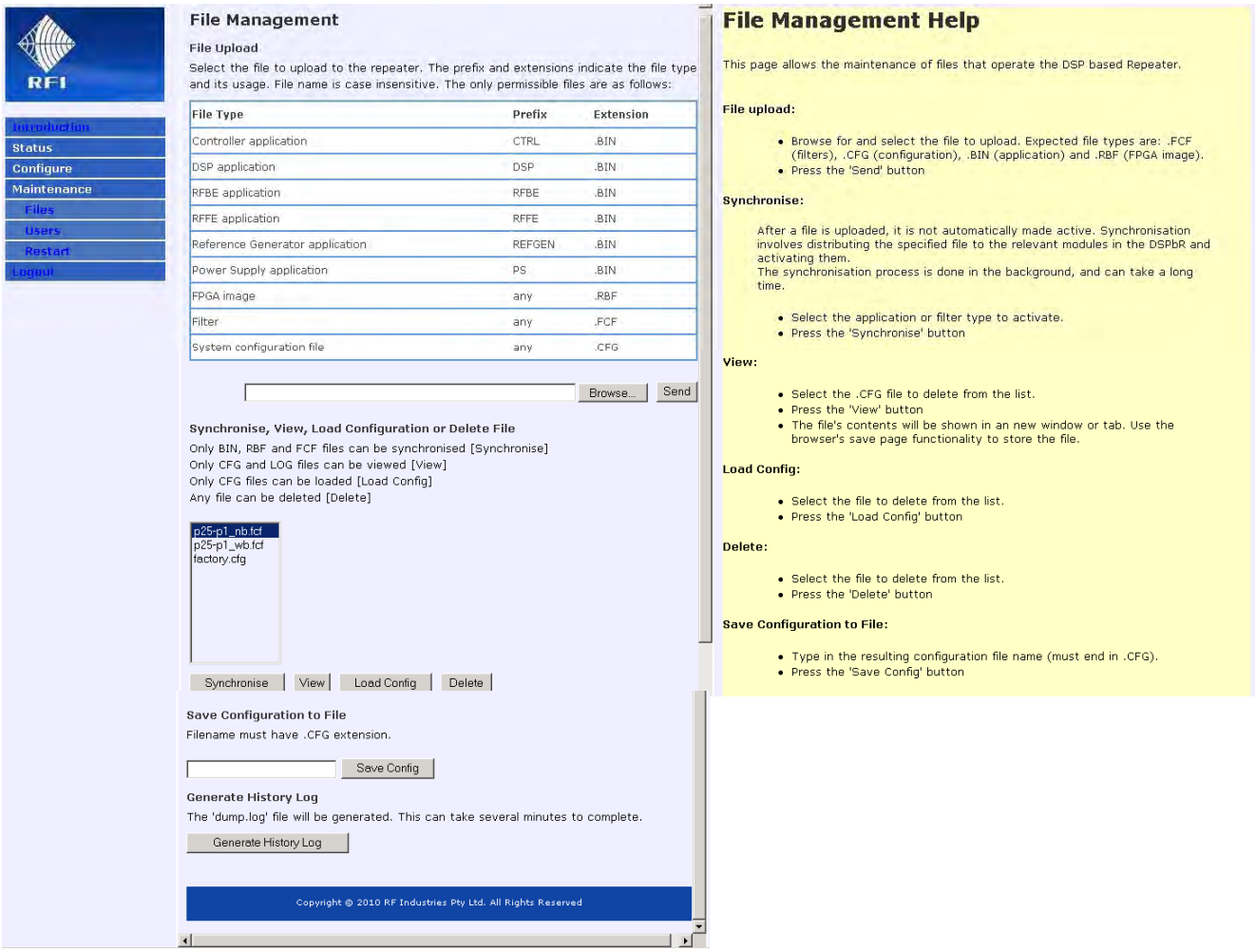


Configure\System Configuration

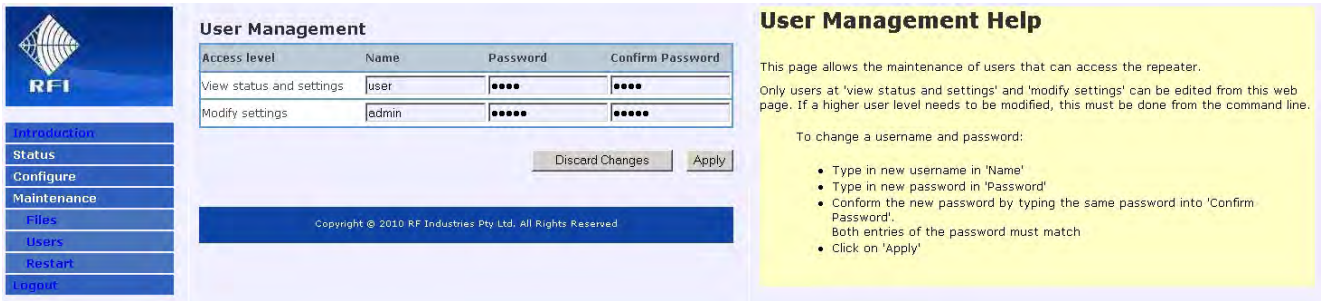


5.2.8 Maintenance

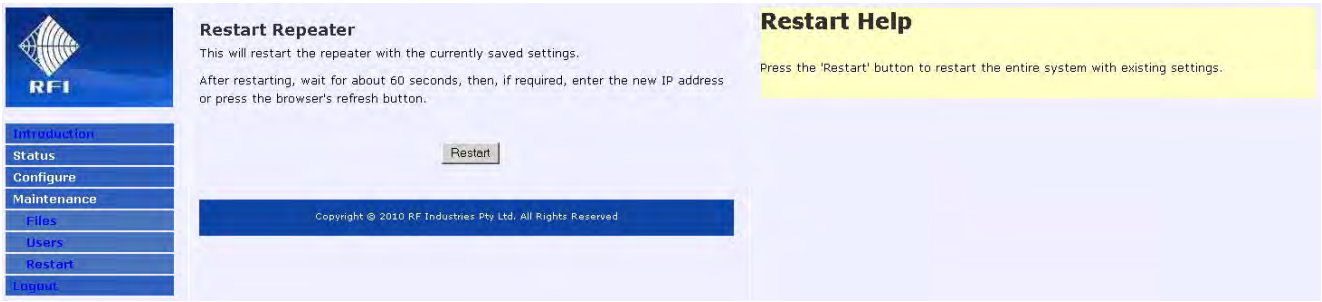
Maintenance\File Management



Maintenance\User Management



Maintenance\Restart Repeater



5.2.9 Logout

5.3 RF Gen + Aux Module - GPS, Ext/Internal 10MHz clock reference and Cell Modem options.

The Ref Gen + Aux module located at the rear of the DSPbR has a number of optional functions to assist in the synchronisation of time-based functions when more then one DSPbR is used.

The Ref Gen + Aux module provides interconnectivity to and from optional signal reference sources such as GPS and an external 10MHz signal.

GPS clock reference disciplining.

When a GPS signal is required to discipline the reference generator clock frequency, an active GPS antenna must be connected to the GPS Antenna input where the output voltage on the SMA (F) connector is 6VDC rated at 0.5A. An active GPS antenna option is listed under Chapter 10 - Ancillary Equipment and Spare Parts.

Once the active GPS antenna is terminated onto the SMA (F) connector, the DSPbR will sense its presence and auto-activate the disciplining function. If the clock reference fails to respond to the disciplining then a minor alarm will be raised.

The GPS receiver is not used to provide location information.

Ext / Internal 10MHz clock reference

The "EXT REF" SMA (F) connector is used to lock the internal reference clock with an external 10MHz reference. The required stability of this reference is +/- 3PPM with a nominal input signal level of 0dBm (0.22V RMS into 50 Ohms). The user via a tick box using the GUI interface under the Systems Configuration page enables this function. If the external reference does not lock the internal reference clock with the enable function activated via the GUI tick box, a minor alarm will be raised.

The "REF MON" SMA (F) connector provides a 10MHz reference low impedance signal output at a nominal 0dBm. The output is daisy chained through each Ref Gen module that requires the clock reference. When daisy chained the Ref Gen modules will buffer the 10 MHz reference prior to forwarding onto the next module.

Cell modem installation and configuration.

The cell modem fitted onto the Ref Gen + Aux board is optional and can be retrofitted. The DSPbR will have to be powered down by switching off the supply power. The Ref Gen + Aux board can then be unscrewed from the rear of the sub rack frame and removed. The multi-band cell modem is fitted into the multi-pin socket on the board as illustrated.

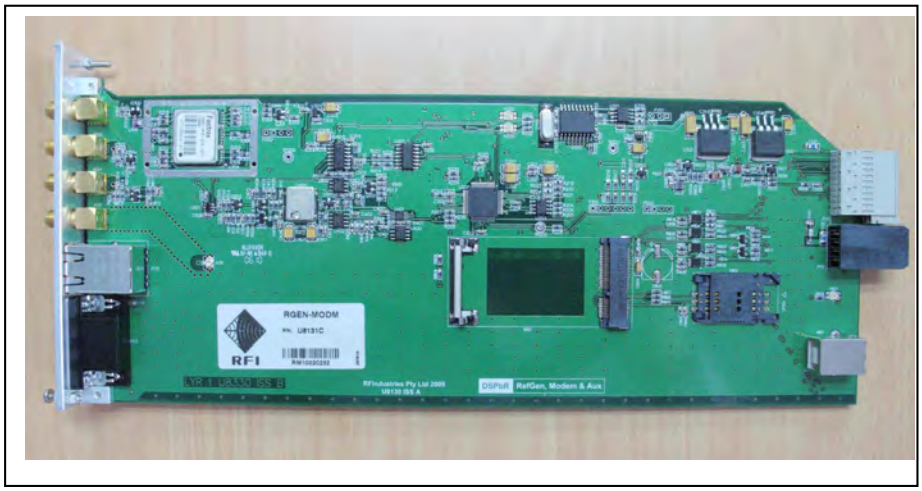


Figure 24 – Ref Gen + Aux Board

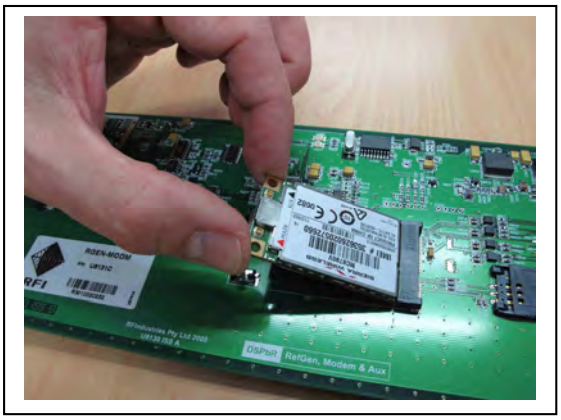


Figure 25 – Cell Modem Installation

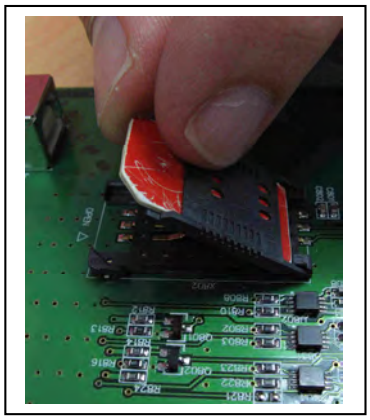


Figure 26 – SIM Card Installation

Cell modem installation instructions

STEPS.

Cellular Modem Installation (Figure 25)

1. Remove Ref Gen + Aux board from DSPbR Sub Rack Frame
   - Unscrew the two (2) screws retaining both the DSP Module and Ref Gen + Aux board into the frame
   - Pressing the lever handles outwards, carefully "pull out" the DSP module.
   - Once DSP module removed access to the Ref Gen board is easier, carefully pull out the Reg Gen + Aux board.
2. Lay Ref Gen + Aux board on a flat anti-static surface
3. Remove the modem from the Cellular Modem Kit
4. Insert the modem into the mini-PCI connector (X801) at an angle of 30 degrees from the main PC board Ensure the modem is fully inserted.
5. Press down on the floating end of the modem, until the retaining clips are securing the modem.
6. From the Cellular Modem Kit, unpack the U.FL to U.FL interconnect cable.
7. Align one end of the U.FL cable to the U.FL socket on the Ref Gen + Aux board (J105)
8. Firmly press on top of the U.FL connector
9. Align the other end of the U.FL cable with the main antenna port on the modem.
10. Firmly press on top of the U.FL connector
11. Ensure that the U.FL cable is not overhanging the Ref Gen + Aux board
12. Insert SIM card (refer to instructions below)
13. Correctly orientate and insert Ref Gen back into the DSPbR sub rack frame
14. Originate and insert the DSP module, back into the DSPbR sub rack frame
15. Tighten both DSP and Ref Gen board retaining screws.

SIM card Installation (Figure 26)

1. Unpack the SIM card.
2. Ensure there is no PIN enabled
3. Push along the top of the SIM card holder (X802) until the hinged SIM holder is loose
4. Lift the hinge SIM holder
5. Ensure the SIM card is correctly orientated and insert into the hinged holding sleeve.
6. Close the hinged SIM holder
7. Push along the top of the SIM card-holder until the hinged SIM holder is locked in place.

Once the cell modem has been fitted into the Ref Gen + Aux board, the allocated SIM card inserted and securely locked down and the Ref Gen board secured and fastened into the sub rack frame, the modem can be

configured via the Communications Configure page – Modem Settings. For alarm notification via SMS messaging, enable the setting tick box under the Alarms configuration page.

5.4 CSC Front Panel LCD Display, Mode Button and LED's

Figure 27 – LCD Display and LED Indicators

Green Active LED – Lights up and stays on once DSPbR has finished booting up.

Red ALM1 LED – Lights up on critical alarm relay activation. Stays on for duration of relay activation

Red ALM2 LED – Lights up on minor alarm relay activation. Stays on for duration of relay activation

LCD Display

When the DSPbR is switched on the RFI Logo is displayed with a backlight on for up to 45 seconds. After this initial period, the logo remains on and the backlight turns off.

Pressing the Mode Button once will activate the backlight.

With sequential Mode Button pressing, the following real time current information is written and displayed within the 4 lines of the LCD screen

Second Press: Current IP Address/Subnet /Gateway/MAC address
Third: Set Date and Time
Fourth: PSU rail voltage / battery voltage
Fifth: Modules detected and enabled
Sixth: Module temperatures
Seventh: RSSI levels per channel

The LCD display, backlight and information is powered by the standby battery in power failure mode.

5.5 Uploading / Downloading firmware Configurations

The facility to dump and save a current configuration file is possible via the GUI Maintenance\File Management page, uploading and downloading a configuration file is also possible in the same manner.

More than one configuration file can be saved and loaded into the DSPbR

All file data is human readable.

Firmware Upgrade Option

New firmware upgrades can be loaded via the GUI interface. Whether you know the file location source address or wish to have the option to browse for the file, both upload options are available.

Filter profiles

Filter profiles will be available for selected analogue and digital modulation schemes. The filter profile header will bear the name of the technology. Ensure you have the correct technology profile for your application.

History Logging

A current history log file can be generated and loaded into the onboard files folder, downloadable or viewed on line. Navigate to GUI Maintenance\File Management page.

History data in time and date order for each module in sequence will be saved to the file. Alarms and events will be in a human readable format and can be separated. This file is downloadable. Should assistance be required in reading this data, please refer to support@rfi.com.au

6. Temperature Management

The hottest module adjusts corresponding fan speed. All modules except for the CSC have temperature sensors. Low temperatures are not given limits and are therefore not alarmed.

7. Alarming and Supervision

Human readable alarm SMS messages are sent to two appointed recipients. The multi-band cellular modem option has to be fitted in order to facilitate this. The modem can be configured via the Communications Configure page – Modem Settings. For alarm notification via SMS messages enable the setting tick box under the Alarms configuration page. Assuming a permanent TCP/IP network connection, once an alarm has been