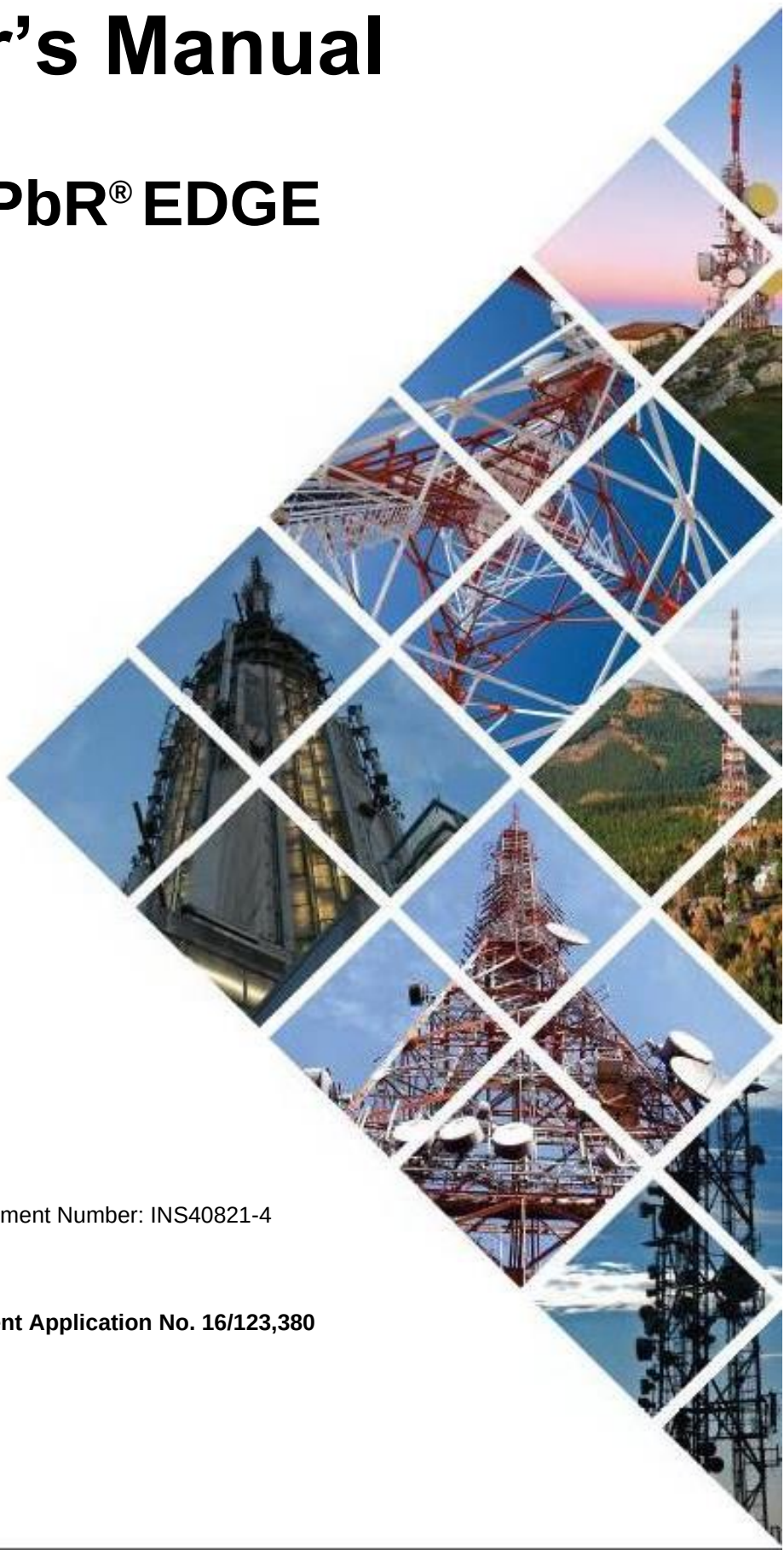
User's Manual

DSPbR® EDGE



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Company Overview

RFI has been serving the needs of the wireless communications market for over 40 years. First founded as a manufacturer of antenna systems, RFI has grown to be a key player in the development, manufacturing and distribution of wireless technology and energy products. Through our extensive network of resellers, systems integrators and retail outlets, RFI is a key supplier to both industry and Government.

Our research and manufacturing facilities have talented people, sophisticated test equipment, state of the art software with class leading manufacturing systems and techniques. Additionally, we have in place a quality management program which is certified to ISO9001, environmental management system certification to ISO14001 and occupational health and safety standard AS4801 giving you complete confidence in everything we do.

RFI's products are truly innovative and as a result we are active around the globe taking our Australian designed and manufactured products to key markets in Asia Pacific, the Americas and EMEA regions via offices 'In-region' in addition to exporting directly to in excess of 50 countries.

One of RFI's key principals is to remain totally customer focused as we recognise our future depends on the success of our customers. We know that to be chosen as your supplier we must add value to your business and to achieve this we will work hard to deliver the best product when and where you need it and back this up with the very best technical support available.

Disclaimer

Product part numbering in photographs and drawings is accurate at the time of printing. Part number labels on RFI products supersede part numbers given within this manual. Information is subject to change without notice.

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The information contained in this document is subject to change without notice.

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For further information or help with this product contact your nearest RFI sales office or through the following;

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Sales email	webmaster@rfi.com.au	sales@rfiemea.com	webmaster@rfi.com.au
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1. DSPbR EDGE - Electrical and Mechanical Specifications

Table 1

Model Number	DSPbR EDGE Series
Available Frequency Bands	400-430MHz, 430-450MHz, 450-470MHz and 470-490MHz (other bands under development)
Filtering	Internal (Duplexers) or External (Custom)
Internal Duplexers – if fitted (minimum)	Full Bandpass – 5MHz passband (fixed), 4MHz guardband
External (Custom) Filtering	As required for specific frequencies (contact RFI)
Channel Capacity per Chassis	Up to 8 Bi-Directional
Modes of Operation	On-Frequency, Frequency-Translating or P25 Trunking Extender
Maximum Output Power per Channel (typical)	1ch @ 36dBm,4ch @ +30dBm, 8ch @ 27dBm
Output Power Adjustment Range	Output Power per channel +0dBm / -20dBm (in 1dB steps)
Gain Range (1dB steps) Service & Donor	60-100dB typ.
RF Channel Bandwidth	12.5kHz and 25kHz
RF Group Delay	To suit regulatory or application requirements
Noise Figure (maximum)	6dB @ max. gain
Receiver Sensitivity (typical)	-116dBm @ 12dBS or 5% BER
Tx Spurious Emissions (typical)	-30dBm (ACMA and FCC compliant)
Maximum Input Po – no damage / normal operation	+10dBm / -25dBm
User Access - Ethernet	3 levels of username and password
User Interface - Ethernet	GUI (web browser enabled Graphical User Interface)
Configuration and Alarm Diagnostics Connectivity	Ethernet port / Cellular Modem
Alarm Interface Termination Connector	Screw terminals
External Alarm Inputs	Three (3) configurable as: -60vdc to +60vdc or logic 0 = < +2.5VDC / logic 1 = > +2.5VDC One (1) Temperature (compatible with RFI SAM0000-TS Temperature Sensor)
Alarm Relay Outputs (Minor / Major)	Two (2) N.O. / CMN / N.C. @ 30VDC 2A 125VAC 0.5A
System Impedance	50 ohms
RF Input (donor) and Output (Service) Connectors	N (F)
Cellular Modem / Wi-Fi / Bluetooth Connectors	SMA (F)
Power Supply Options	Mains 90-264VAC or 48VDC (single or hot/standby versions)
Input Power	130W (typ)
Cooling	Passive (convection)
Environmental Protection Rating	IP65
Installation Environment	In-building, In-tunnel or Outdoor
Chassis Earthing	Dual M6 studs
Dimensions (WxDxH)	450x220x660mm / 17.7x8.7x26in (unit only) 450x250x660mm / 17.7x9.8x26in (inc. wall brackets)
Weight (fully populated)	31.5kgs / 69.5lbs (unit only) 34kgs / 75lbs (inc. wall brackets)
Operational Temperature Range	-10°C to +60°C / 14°F to 140°F
Compliances	FCC Part 15, FCC Part 22, FCC Part 90 RSS-102, RSS-131, ICES-003 ACMA AS/NZS4295 AS/NZS4768, AS/NZS60950.1:2015, EN60950-1:2006 AS/NZS CISPR 32: 2015 – Class A IEC 60529:2004 – IP65 RoHS (Contact RFI for details of other approvals)

2. Warnings

2.1. *Occupational Health & Safety / Work Safe and Safety Warnings*

Only a suitably qualified person should be allowed to install and commission this equipment after becoming familiar with all the safety and installation instructions contained in this User's Manual. It will be assumed that a qualified person will have a fundamental knowledge of the installation's objectives and use common sense where safety warnings are not necessarily explicit.

The unit is heavy and appropriately considered a two-man lift. Handles are provided to the front of the equipment to assist in removal of the DSPbR® from the packaging and during installation.

On unpacking the equipment, familiarise yourself with the equipment, reading and following all warning labels attached to the equipment. Please ensure that the warning labels are kept in a legible condition and replace if necessary.

Ensure all general, regional, and site-specific installation and safety regulations are adhered to when working on high voltage installations, as well as regulations covering use of tools and personal protective equipment.

It is the responsibility of the network operator or service provider to have in place and implemented compliant Occupational Health and Safety (OHS) / Work Health and Safety (WHS) procedures as applicable, detailing prevention measures to avoid health hazards which may be associated with radiation from the antenna(s) connected to this equipment. Please ensure familiarisation and compliance to country specific regulations on RF exposure.

Ensure all adjustable repeater settings comply with intended use and applicable National, State and Regional regulatory requirements.

Ensure that access to this equipment is restricted to qualified personnel only.

NOTE: For AS/NZS60950 compliance DSPbR Edge shall be powered using an Australian approved supply cord and plug.

The mains power socket outlet shall be installed near the equipment and shall be easily accessible.

There is no On/Off switch on DSPbR EDGE unit. The unit becomes active and commences its start-up routine as soon as power is connected via the provided power cable.

Do not allow DSPbR EDGE or any associated equipment to become wet or to be subjected to a corrosive environment, humidity, or temperatures outside the specified operating ranges.

Do not operate the unit near any flammable substances or in a flammable atmosphere.

Ensure that all RF termination connectors are fully mated and tightened using correct torque values.

Should an upgrade or maintenance require any further deconstruction or access to the equipment, the AC or DC power supply should be disconnected and isolated.

Earth Bonding

An equipment earthing/grounding threaded stud is provided on the base of the unit. The DSPbR must be adequately bonded to the installation site's earth/grounding connection point using the stud provided.

Temperature

Owing to probable power dissipation within the equipment, the exposed rear portion of the equipment may reach relatively elevated temperatures above ambient.

High Voltage and Surge Protection

The DSPbR has been tested compliant to AS/NZS 60950. When operated from an AC power source this unit complies with the Australian AS/NZS 60950 equipment safety standard.

There is limited surge protection built into the PSU of the DSPbR, however additional site-specific lighting protection, voltage surge protection and earth bonding may be required to reduce the risk of damage.

Regarding external antennas connections to the DSPbR, RFI recommend the use of adequate coaxial lighting protection and earth bonding through grounding kits on the RF feeder cables prior to termination into the respective RF termination connectors on the DSPbR repeater.

AC or DC mains should also be afforded surge protection, along with the IP Ethernet connection (if connected) into the repeater.

2.2. Other Warnings

2.2.1. Electrostatic Discharge

Although the modules and exposure of the interconnect sockets / pins have been designed to significantly reduce the risk of electrostatic discharge (ESD), precautions must be observed during installation and maintenance to protect all the modules within the equipment.

2.2.2. EMC Class A Warning for AS/NZS CISPR32 :2015 Class A

Operation of this equipment in a residential environment could cause radio interference.

3. Operation of DSPbR EDGE in North America

3.1. Compliance and declaration of conformity for North America

3.1.1. FCC Parts 15, 22, & 90

3.1.1.1. Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications.
Operation of this equipment in a residential area could cause RF interference in which case the user will be required to correct the interference at their own expense.

3.1.1.2. Parts 22 and 90

PART 90 and Part 22 Signal Booster

This is a 90.219 Class A Device.

WARNING. This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.

Part 90 and Part 22 Signal Booster THIS IS A 90.219 CLASS A DEVICE

WARNING. This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.

3.1.1.3. RF Exposure and antenna selection - FCC

DSPbR Edge can be used with a range of antennas depending on site specific application. The maximum composite output level of DSPBR Edge can be operated at a composite output level of +36 dBm (4W) over a range of carriers between 1 and 8.

DSPbR Edge has been evaluated against FCC Part 1.1310 and found to be compliant to the uncontrolled Maximum Permissible Exposure (MPE) limit of 0.300 mW/cm^2, at its lowest operating frequency of 450 MHz, for a distance greater than or equal to 36.6 cm for an antenna gain of 1 dBi (1.26 numeric).

If a higher gain antenna is required, then the minimum exposure distance needs to be re-calculated, or DSPbR Edge composite output level needs to be reduced to achieve the MPE limit of 0.300 mW/cm^2. Based on:

$$R = \sqrt{PG/4\pi L} \quad ,$$

where R = distance (cm), ***P*** = power (mW), ***G*** = antenna gain (numeric), L = exposure limit (mW/cm^2).

P and ***G*** can be varied to determine R to meet the MPE limit L.

Any detachable external 50 Ohm antenna in the correct frequency range can be used as long as the above MPE

limit is met at the minimum distance from the antenna.

3.1.2. ISED – ICES-03, RSS-102, RSS-131, RSS-Gen

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme ICES-003 du Canada.

CAN ICES-003(A) / NMB-003(A)

This equipment complies with RSS-102 and RSS-131 requirements as set forth by industry Canada (IC). Operation is subject to the following two conditions:

(1) This device may not cause interference, and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conformé aux normes d'Industrie Canada RSS-102 et RSS-131. Le fonctionnement est soumis aux deux conditions suivantes:

(1) Cet appareil ne doit pas provoquer d'interférences, et
(2) Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.

WARNING: Industrial zone enhancers are NOT consumer devices. They are designed for installation by ISED licensees and qualified installers who have recognized RF training. You MUST be an ISED licensee or have the express consent of an ISED licensee to install or operate this device.

AVERTISSEMENT: Les enrichisseurs de zone industriels ne sont PAS des appareils de CONSOMMATION. Ils sont conçus pour être installés par des titulaires de licence d'ISDE et des installateurs qualifiés qui ont reçu une formation reconnue en RF. Vous DEVEZ être le titulaire de licence d'ISDE ou avoir le consentement exprès du titulaire de licence d'ISDE pour installer ou exploiter cet appareil.

3.1.2.1.1. RF Exposure and antenna selection - ISED, IC RSS-102

DSPbR Edge can be used with a range of antennas depending on site specific application. The maximum composite output level of DSPBR Edge can be operated at a composite output level of +36 dBm (4W) over a range of carriers between 1 and 8.

DSPbR Edge has been evaluated against RSS-102 and found to be compliant to the General Public (uncontrolled) Maximum Permissible Exposure (MPE) limit of 0.1703 mW/cm^2, at its lowest operating frequency of 450 MHz, for a distance greater than or equal to 48.5 cm for an antenna gain of 1 dBi (1.26 numeric).

If a higher gain antenna is required, then the minimum exposure distance needs to be re-calculated, or DSPbR Edge composite output level needs to be reduced to achieve the MPE limit of 0.1703 mW/cm^2. Based on:

$$R = \sqrt{PG/4\pi L} \quad ,$$

where R = distance (cm), ***P*** = power (mW), ***G*** = antenna gain (numeric), L = exposure limit (mW/cm^2).

P and ***G*** can be varied to determine R to meet the MPE limit L.

Any detachable external 50 Ohm antenna in the correct frequency range can be used as long as the above MPE limit is met at the minimum distance from the antenna.

3.1.3. Warning – Use of unauthorized items connected to DSPbR Edge

The use of unauthorized Antennas, cables and/or coupling devices may impact on the operation of tDSPbR Edge causing ERP/EIRP limits to be exceeded which will void the users authority to operate the equipment.

3.2. Certifications

DSPbR EDGE is certified for operation in the United States of America by the Federal Communications Commission (FCC) and in Canada by Industry Canada (IC). It may only be operated in the certified frequency ranges and at the approved frequencies approved at each location.

FCC Approved Frequency Range:

FCC Identification/Certification Number	Frequency Range
YK7040004901CXXXM	450-490MHz

IC Approved Frequency Range:

IC Identification/Certification Number	Frequency Range
31365-DEDGE400490	450-490MHz

3.3. Antenna, Cable and Passive Components installation and requirements

The technician in charge of installation must ensure that the equipment is set up accurately according to the manufacturer's guidelines and installation plan. It is crucial to adhere to sound engineering practices to prevent any potential radio frequency (RF) interference. If necessary, the output level of the system should be decreased to address any issues with intermodulation distortion (IMD) interference that may occur.

This section proposes the recommended specifications for donor and service antennas, couplers and passive components as well as suitable cabling for use with this Repeater. It also covers the installation specifications for the antennas, coupling devices, and cables.

NOTE: Donor and service antennas can be installed and set up (without being connected to DSPbR EDGE) before installing the unit, if necessary, as long as provisions are made for connecting RF coaxial cables.

3.3.1. Antennas (Donor and Service)

3.3.1.1. Donor Antenna Information

The Donor antenna is typically installed outdoors and is usually a directional antenna, such as a yagi antenna, mounted so that the main radiation lobe is pointing directly at the Donor site. Typical yagi antenna characteristics are:

- 6 element yagi with 11 dBi gain having a beamwidth of 47°, or
- 9 element yagi with 13 dBi gain having a beamwidth of 42°.

The selection of a suitable Donor antenna needs to be made with regard to compliance with FCC radiation limits. The maximum Donor antenna gain will be determined by the following:

- Type and loss characteristics of the coaxial feeder cable used to connect the Donor antenna to the Repeater. The actual feeder cable loss needs to be calculated based upon this information.
- Donor antenna positioning height (to determine the feeder cable length)

Maximum Donor antenna gain

FCC Part 90.219 limits the Effective Radiated Power (ERP) from the Donor antenna to 37 dBm (5 Watts), which equates to 39.1 dBm EIRP. The maximum power output of DSPbR EDGE is 36 dBm, therefore the maximum allowable Donor antenna gain, to satisfy the EIRP limits, is given by the following equation:

Maximum Donor antenna gain (dBi) = 39.1 – 36 + feeder cable loss (in dB)

If, for example, the feeder cable loss is 2 dB, we have:

Maximum Donor antenna gain = 39.1 - 36 + 2 = 5.1 dBi.

3.3.1.1.1. Installation

Conduct a site survey to determine a suitable location for the Donor antenna, based on the following parameters:

- Ease of access to the antenna.
- Minimal RF obstructions between the antenna and the Donor Site.
- Adequate received RF signal level from the Donor Site to meet signal strength budgets.
- Adequate isolation between the Donor antenna and the Service Antenna(s) / DAS / Radiating Cable to minimize the possibility of feedback where frequency translation is not utilised.

Install the Donor antenna at the selected location, whilst tuning the orientation of the antenna to provide maximum received signal strength from the Donor Site.

3.3.1.2. Service Antenna Information

The Service antenna type selection depends on the Service coverage requirements.

3.3.1.2.1. Single Antenna Coverage

The maximum Service antenna gain is calculated in the same manner that the maximum Donor antenna gain was calculated in section 3.3.1.1, bearing in mind that the type of antenna needed in this case may not necessarily be directional.

3.3.1.2.2. Multiple Antenna Coverage

Coverage of indoor environments such as office spaces, shopping malls and car parks often require multiple antennas to be deployed in a Distributed Antenna System (DAS) network. Conventional antennas used in these applications are wall or ceiling mounted panels and side-mount dipoles.

Typical DAS antenna characteristics are:

- Low-profile ceiling mount panel with 2 dBi gain having a beamwidth of 110°, or
- Single side-mount dipole with 4 dBi gain having 70° beamwidth.

The selection of suitable Service antennas needs to be made with regard to compliance with FCC radiation limits. The maximum Service antenna gains will be determined by the following:

- Type and loss characteristics of the coaxial feeder cables used to connect the Service antennas to the Repeater. The actual feeder cable losses need to be calculated based upon this information.
- Service antenna locations (to determine feeder cable lengths).
- Splitter loss associated with the DAS network. This is determined by converting the number of antennas (N) in the DAS to a logarithmic dB value (10*Log10(N)) which will represent the splitting loss.

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Maximum Service antenna gain

As mentioned previously, FCC Part 90.219 limits the Effective Radiated Power (ERP) from any single Service Antenna to 37 dBm (5 Watts), which equates to 39.1 dBm EIRP. The maximum power output of the Repeater is 36 dBm, therefore the maximum allowable Service antenna gain, to satisfy the EIRP limits, is given by the following equation:

Maximum Service antenna gain (dBi) = 39.1 – 36 + n + feeder cable loss (in dB)

Where N = No. of antennas, and n = $10*\text{Log}_{10}(N)$.

If, for example, the feeder cable loss is 2 dB, and there are a total of 4 antennas, we have:

Maximum Service antenna gain = 39.1 – 36 + 6 + 2 = 11.1 dBi

3.3.1.2.3. Radiating Coaxial Cable Coverage

Coverage in tunnel environments is best served through the use of radiating (leaky) coaxial cable. The radiation characteristics of the cables are defined by the coupling loss and longitudinal loss values with respect to the operating frequency band and cable diameter.

A typical coupling loss value for a 7/8" diameter radiating coaxial cable in the UHF band is 52 dB, measured at a distance of 2 m from the cable as prescribed in IEC 61196-4.

Maximum Service radiating cable input power

As mentioned previously, FCC Part 90.219 limits the Effective Radiated Power (ERP) from the Service radiating cable to 37 dBm (5 Watts), which equates to 39.1 dBm EIRP. In this case, the input power to the Service radiating coaxial cable needs to be attenuated such that the 39.1 dBm EIRP limit is not exceeded.

The maximum input power to the Service radiating coaxial cable, to satisfy the EIRP limits, may be approximated by:

Maximum Service radiating coaxial cable input power = 39.1 + CL (in dB) – FSPL (in dB)

Where CL is the coupling loss of the cable and FSPL is the free space path loss at the operating frequency band over the 2 m coupling loss measurement distance.

FSPL can be calculated using this formula:

$$\mathbf{FSPL = 20*\log_{10}(d) + 20*\log_{10}(f) – 20*Log(4*\pi/c)}$$

Where d is distance in meters, f is the frequency in Hz, and c is the speed of light/radio signals in m/s.

If, for example, the coupling loss is 52 dB, and the frequency is 450 MHz, we have:

$$FSPL = 20*\log_{10}(2) + 20*\log_{10}(450*10\text{^}6) – 147.55 = 31.5 \text{ dB}$$

Maximum Service radiating coaxial cable input power = 39.1 + 52 – 31.5 = 59.6 dBm

In this scenario the maximum power output of the Repeater is well below the level required to reach the maximum EIRP threshold, so no further attenuation is necessary to comply with the EIRP limit.

3.3.1.2.4. Installation

Conduct a site survey to determine a suitable location for the Service antenna / DAS / Radiating Cable based on the following parameters:

- Ease of access to the antenna(s)
- Minimal RF obstructions between the antenna and the radio terminals.
- Adequate received RF signal level from the Service Antenna(s) to radio terminals to meet signal strength budgets.
- Adequate isolation between the Service Antenna / DAS / Radiating Cable and the Donor antenna to minimize the possibility of feedback where frequency translation is not utilised.

Install the Service antenna / DAS / Radiating Cable at the selected location(s), aligning the antenna/s towards the Service area as appropriate where directional antennas are deployed.

Antennas and Radiating Cables must be installed with adequate clearance from metallic obstructions to mitigate VSWR degradation.

3.3.2. Splitters and Couplers

A comprehensive range of splitters, couplers, and passive components is available if required to complete the installation of the Repeater's Donor and Service antenna networks.

RFI splitters are available in 2, 3 and 4 ways with split losses of 3.2dB, 5dB, and 6.4dB over the operational frequency range of DSPbR EDGE.

Similarly, RFI couplers are available with 5dB, 6dB, 8dB, 10dB, 12dB, 15dB, 20dB and 30dB coupling values with through line insertion losses of 2.2dB, 1.8dB, 1.2dB, 0.8dB, 0.5dB, 0.4dB, 0.3dB and 0.3dB respectively over the operational frequency range of DSPbR EDGE.

Please contact RFI for further details.

3.3.3. RF cabling

A comprehensive range of coaxial cables and connectors is available if required to complete the installation of the Donor and Service antenna networks.

Please contact RFI for further details.

3.3.4. System Design & Installation Recommendations

The following recommendations should be observed to ensure optimal System performance:

- High-quality, high-performance components should be used throughout the installation, including all splitters, couplers, passives, cables and connectors.
- All components, including cables and connectors, must be PIM rated to meet operational requirements.
- Cables and connectors must be compatible, and impedances must be 50 ohms.
- Cables and connectors must be rated to suit the operating environment and installed with the application of appropriate weatherproofing measures such as self-amalgamating tape.
- Care must be taken during installation not to damage or soil any components.
- Minimum bending radii of coaxial cables must be observed when routing cables. Coaxial cables must not be kinked, cut, or damaged in any way.
- Cables should be installed neatly and retained appropriately along their length.
- Connections must not be cross-threaded and should be torqued appropriately relative to the type of connector in use.

4. Firmware License Agreement

This statement must be read in its entirety prior to the loading or use of the Firmware provided by RFI.

Introduction.

By loading any product related Firmware you agree without reserve with all the conditions as detailed in this RFI Firmware License Agreement.

The term "Firmware" for the sake of this statement includes all software or firmware upgrades, either as a new installation, revision, patches or upgrades. Any reference to software, for the purposes of this license agreement, will therefore be included in the term Firmware.

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From time to time RFI may provide notice through the RFI web site of any available updates or Firmware revision downloads.

Fees.

RFI reserves the right to charge fees for upgrades or revisions of the applicable Firmware download.

Disclaimer.

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RFI will not be liable to the user for claims and liabilities of any kind arising out of or in any way related to the use of the Firmware by the user or any third party.

The failure of RFI to exercise or enforce any right or provision of this Firmware License Agreement shall not constitute a waiver of such right or provision.

5. Installation

WARNING: Power should not be applied to electrical equipment during installation, and cabling connection/disconnection activities.

There is no On/Off switch on the unit – it becomes active as soon as AC or DC power is connected via the provided AC mains cable or DC power source.

Apply power only when all installation and cabling activities have been completed.

The DSPbR EDGE is designed to be mounted on a wall, pole, tower or into a standard EIA 19" rack frame. A mounting kit is supplied with the DSPbR EDGE that will suit a variety of these installation scenarios. For specific installations additional or different mounting hardware may be required to complete an appropriate installation.

The DSPbR EDGE should be installed into an environment appropriate to its IP rating and avoiding areas of undue levels of moisture, heat or humidity and direct sunlight.

Good quality double shielded or solid jacket low-loss coaxial cables are recommended for RF connections to the DSPbR EDGE. The connectors on these cables should be torqued to manufacturer's recommended values upon completion of installation and commissioning activities

An installation guide is included with the DSPbR EDGE, also shown in Appendix 1 of this document, and should be read to review installation requirements and procedures.

Details relating to installation procedures for power, RF cables, and antenna selection and adjustment guidelines are also contained in the installation guide shown in Appendix 1 of this document.

6. Operation

When the power source to the DSPbR EDGE has been switched on, check that the "Power" LED light on the front controller panel, and the base plate "Status" LED (next to the power input connector) are illuminated.

These LEDs will be off during power up and self-test, and will become green when the unit is ready and if there are no current alarm conditions. The external Status LED mimics the unit's alarm status – 'green' when there are no alarms present, 'orange' when there is a Minor alarm present, and 'red' when there is a Major alarm present.

Any other illuminated LEDs will be reflecting the current state of the RF Paths' status' and the various alarms - based on the current programmed configuration.

A User Manual, Installation Guide, firmware updates, SNMP MIB files and other supporting information is available for downloading from the RFI website (www.rfi.com.au).

For additional information and product support please contact the RFI Technical Support team.

6.1Ethernet Connection, Set-up, and Reset

Web Browser GUI (Graphical User Interface)

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

A standard Ethernet CAT5e jumper cable terminated with RJ45 connectors at either end is provided for convenience in the packing box with the DSPbR EDGE. Plug one end of this Ethernet jumper cable into the DSPbR EDGE and the other end into your computer Ethernet socket.

The DSPbR EDGE has been tested on the following browsers:

- Chrome 83
- Firefox 76
- Edge 83
- Internet Explorer (IE) 11

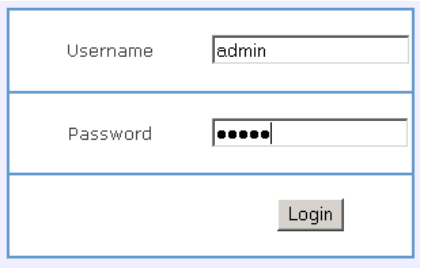
NOTE: There are documented issues with Internet Explorer™ Version 10.
This may impact the presentation of some GUI features.
The use of an alternate web browser is recommended.

IP Address

Initiate your web browser and type in the address field the following default address;

http://192.168.1.200 (DSPbR EDGE factory default address).

Connectivity to the DSPbR EDGE is successful when the following "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 computer to an address in the same IP range (i.e. 192.168.1.180).

This is done for example in Windows XP™ in the following manner;

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" button.
6. When the Local Area Connection Properties box opens, select only the "Internet Protocol (TCP/IP)" choice.
7. Click "Properties" button.
8. Click "Use the following IP address.
9. Enter next to *IP address* 192.168.1.180
10. Enter next to *Subnet mask* 255.255.255.0
11. Enter next to *Default gateway* 192.168.1.254
12. Click "OK" to initiate changes.

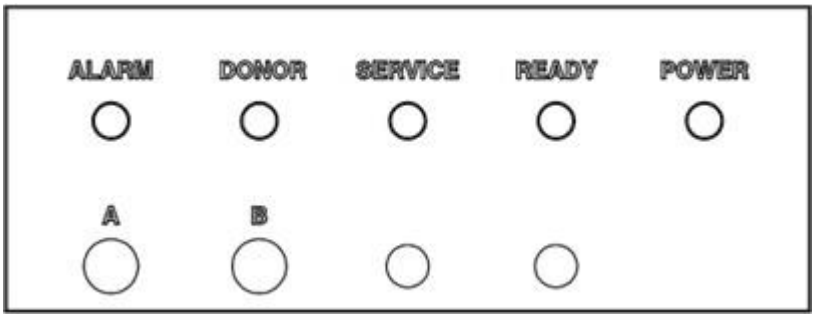
This is done for example in Windows 7™ in the following manner;

1. Select "Start" from status menu
2. Single click – "Control Panel"
3. Single click – " Network and Sharing Center"
4. Single click - "Change Adapter Settings" on the left-hand side menu
5. Single Click – "Local Area Connection" box
6. Single Click – "Change Settings of this Connection"
6. When the Local Area Connection Properties box opens, select only the "Internet Protocol 4 (TCP/IPv4)" choice.
7. Click "Properties" button.
8. Click "Use the following IP address".
9. Enter next to *IP address* 192.168.1.180
10. Enter next to *Subnet mask* 255.255.255.0
11. Enter next to *Default gateway* 192.168.1.254
12. Click "OK" to initiate changes.

Should you still be unable to successfully connect to the DSPbR EDGE via the default IP address then the IP address may have already been changed. If there is no possibility of recovering the changed IP address, then it will be necessary to reset the DSPbR EDGE to the factory default settings.

Reset Factory Default Ethernet Addresses and Access.

To reset the DSPbR EDGE back to the Factory Default settings will mean a complete reset of all RF configuration settings and alarm threshold parameters as well as the IP address parameters. To do this, simply press and hold buttons "A" and "B" for more than 10 seconds while the READY LED is on.



"A" and "B" buttons on front of System Controller panel

NOTE: This will cause the IP address, subnet and gateway addresses and all other configuration data to be reset back to factory default address.

Factory Default settings

DHCP - Disabled
IP Address - 192.168.1.200
Subnet Mask - 255.255.255.0
Gateway - 192.168.1.254
Level 1 Username: user
Level 1 Password: user
Level 2 Username: admin
Level 2 Password: admin
Level 3 Username: master
Level 3 Password: master

6.2 Log In Page

The default Username is "master" and Password is "master". This default Username and Password provides complete and unrestricted access to the DSPbR EDGE (Level 3).

Once logged in, this can be changed via the *Configuration/Access Management* screen.

Username and Password Levels

Level 1: Username and password access via the web browser GUI interface displays only status screens.

Level 2: Username and password access via the web browser GUI interface facilitates status, configure and maintenance screens. The 'unit-specific' sensitive fields (such as Communications Settings, SMTP Alarm email account passwords, etc.) are hidden to prevent accidental modification or disclosure to unauthorised persons.

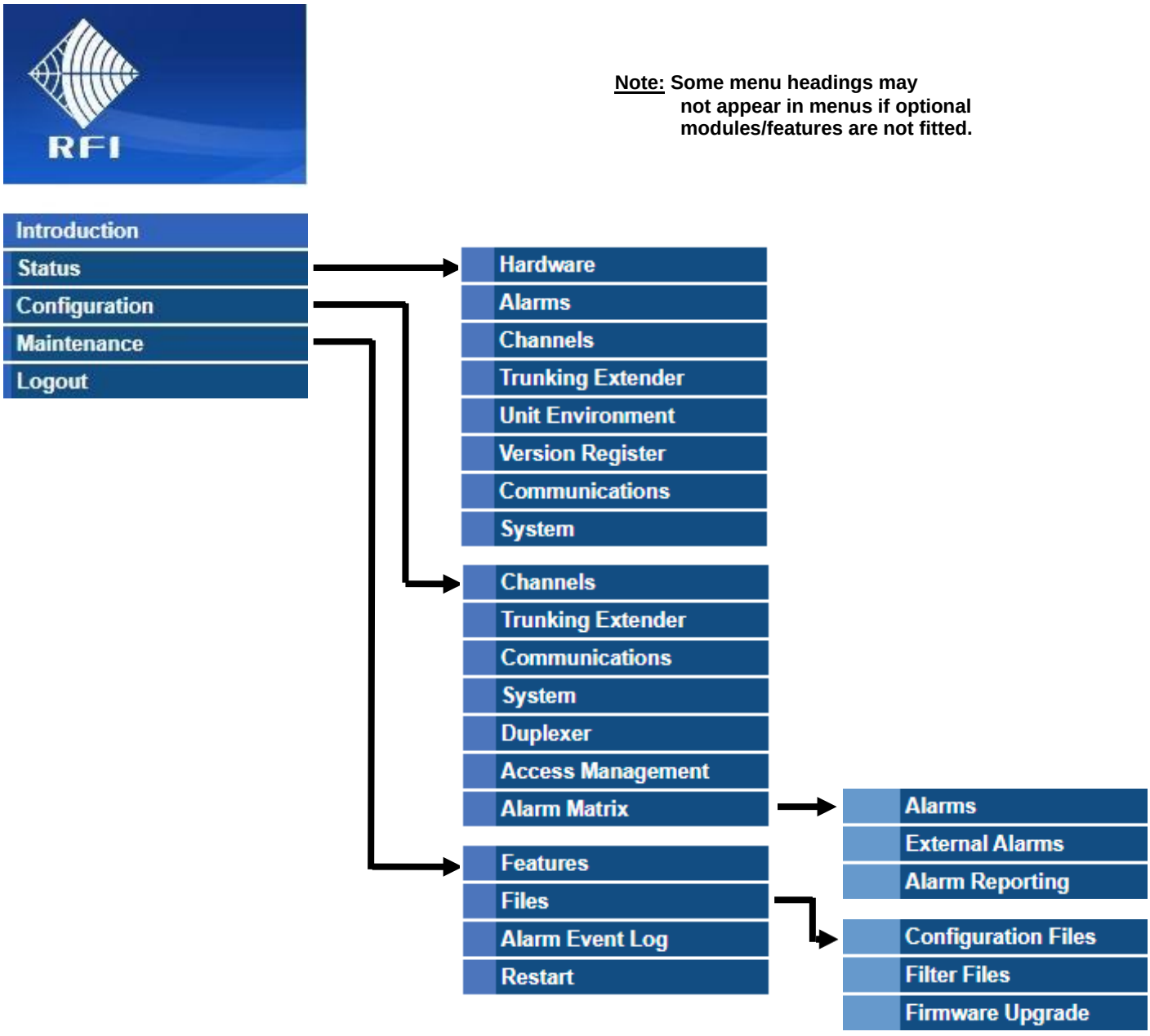
Level 3: Username and password access via the web browser GUI interface facilitates status, configure and maintenance screens. The 'unit-specific' sensitive fields (such as Communications Settings, SMTP Alarm email account passwords, etc.) are all displayed and available for editing.

Once the correct Username and Password is entered the GUI will open to the first page of the GUI.

6.3 GUI Tree

The DSPbR EDGE features an integral webserver Graphical User Interface (GUI) that allows the unit to be conveniently configured using an internet browser and a computer.

The GUI Navigation is mapped out as illustrated;

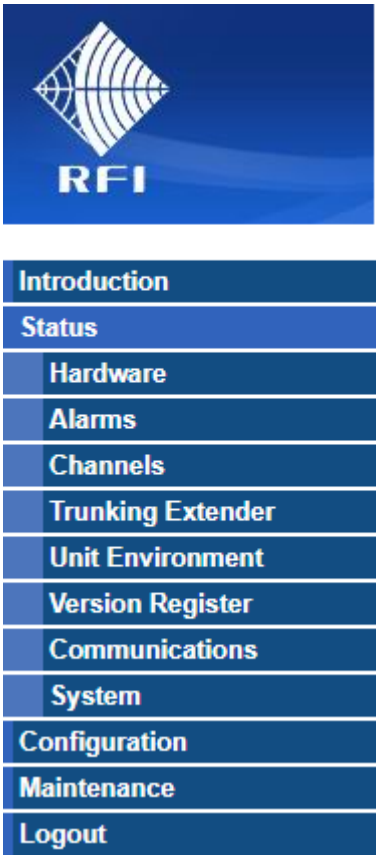


Note: Some menu headings may not appear in menus if optional modules/features are not fitted.

6.4 Status Menu

The "Status" menu allows all of the DSPbR EDGEs configuration to be viewed.

Selecting each indented topic under "Status" will display that item as a separate display page.



Note: The "Trunking Extender" menu item only appears in the menu if this option is fitted.

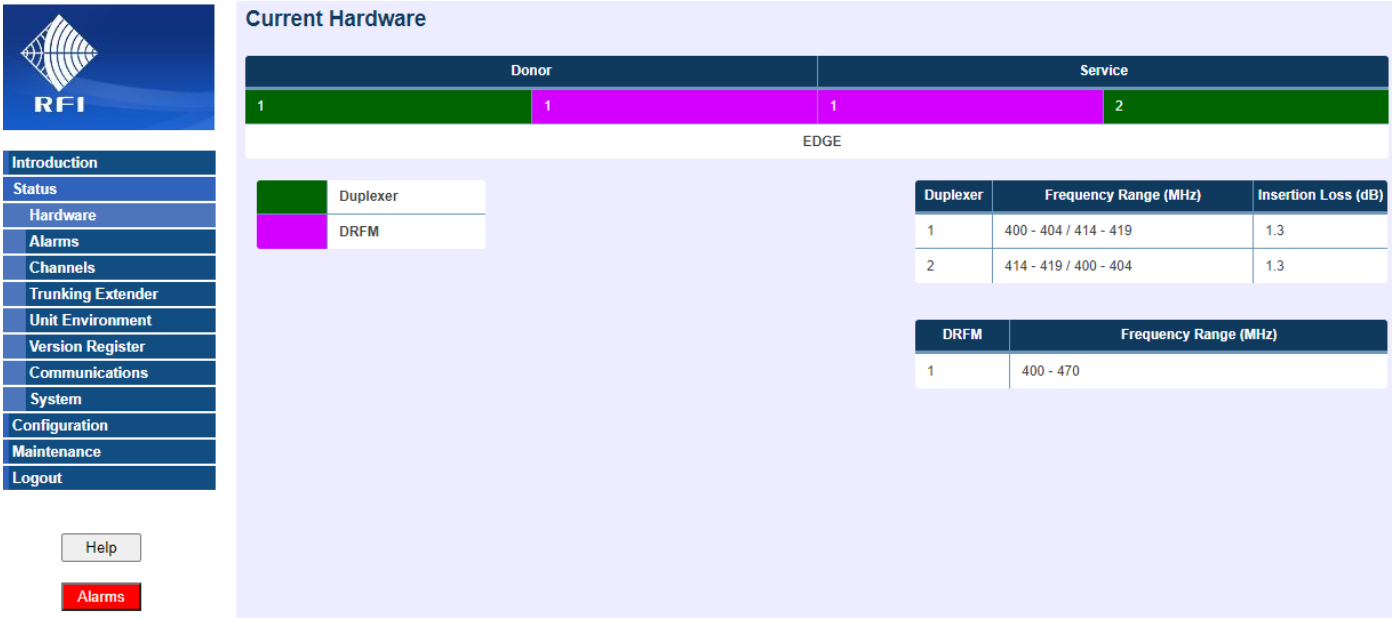
Username and Password Levels

Level 1: Username and password access via the web browser GUI interface displays only status screens.

Level 2: Username and password access via the web browser GUI interface facilitates status, configure and maintenance screens. The 'unit-specific' sensitive fields (such as Communications Settings, SMTP Alarm email account passwords, etc.) are hidden to prevent accidental modification or disclosure to unauthorised persons.

Level 3: Username and password access via the web browser GUI interface facilitates status, configure and maintenance screens. The 'unit-specific' sensitive fields (such as Communications Settings, SMTP Alarm email account passwords, etc.) are all displayed and available for editing.

6.5 Status - Hardware



CURRENT HARDWARE:

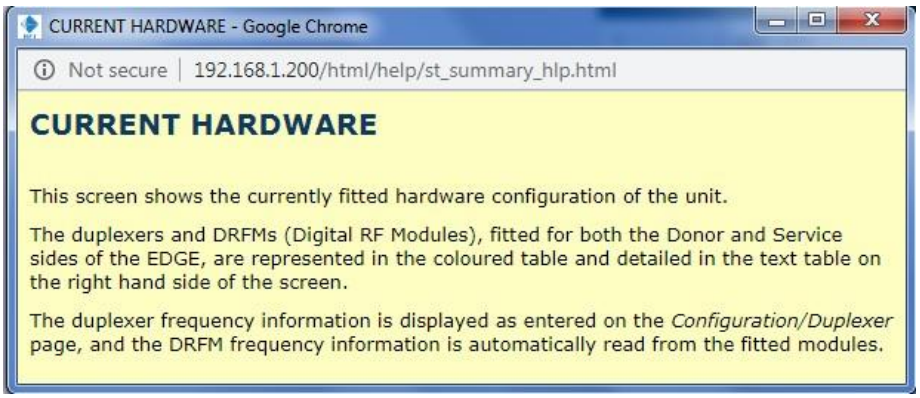
This page shows the currently fitted hardware configuration of the unit.

The duplexers and Digital RF Modules (DRFMs). Fitted for both the Donor and Service sides of the DSPbR EDGE, are represented in the coloured table and detailed in the text table on the right-hand side of the screen.

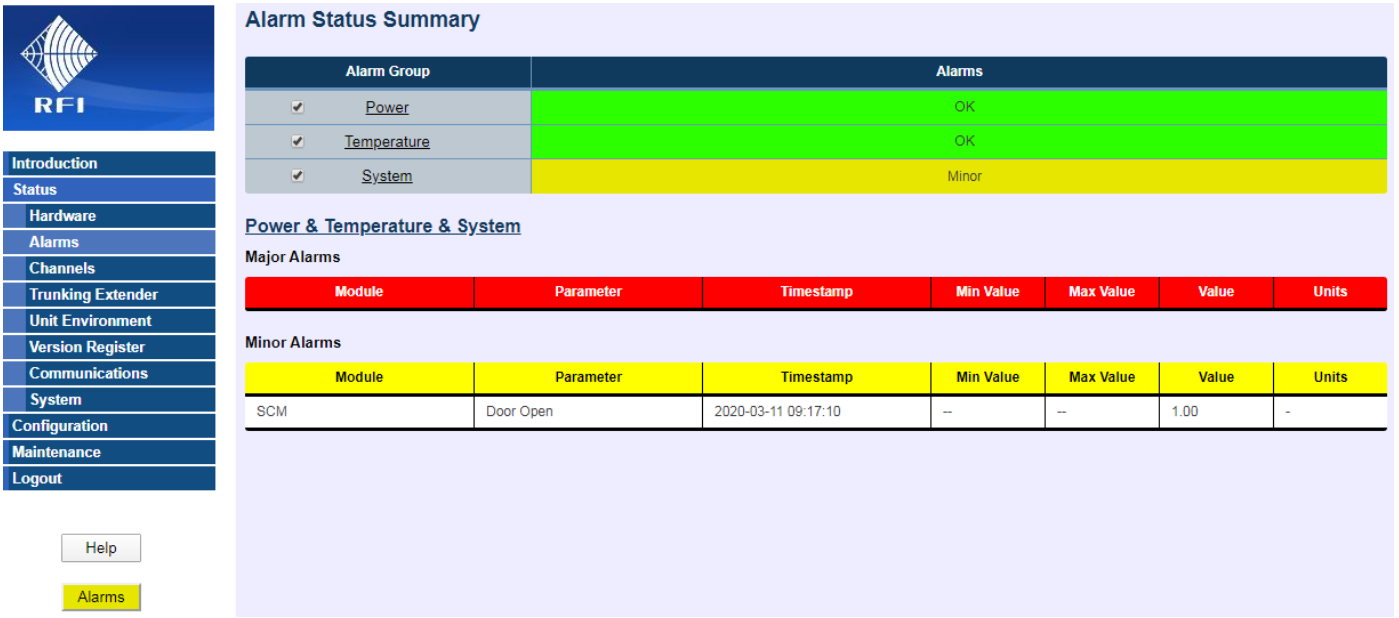
The duplexer frequency information is displayed as entered on the *Configuration/Duplexer* page, and DRFM frequency information is automatically read from the fitted modules.

Help Screen

A Help screen is available for each GUI page, and may be viewed by clicking the Help button at any time.



6.6 Status - Alarms



This is the opening page of the GUI and displays an overview of the unit's current Alarm status.

ALARM SYSTEM SUMMARY:

Alarms are grouped into three categories ('Power', 'Temperature' and 'System').

If no alarms are present then each field will display 'OK' and the field's background will be green.

If an alarm is present, the 'OK' will change and the field's background colour will change based on the alarm severity (Red = 'Major' or Yellow = 'Minor'). Detail of any present alarms will be listed under the Major Alarms and Minor Alarms headings.

The alarm's source (Module), it's parameter (i.e. Door Open), a time/date stamp and associated alarm thresholds and the measured value are shown for information and fault-finding assistance.

The contents of the page are described in the Help screen.

6.7 Status – Channels

	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
Channel	Active	Active	Active	Active	Active	Active	Active	Active
Channel Name	PCC	SCC	TC1	TC2	TC3	TC4	TC5	TC6

Trunking Extender	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
Type	Primary	Secondary	Traffic	Traffic	Traffic	Traffic	Traffic	Traffic
Donor Band plan	Plan A	Plan B	Plan B	Plan A	Plan B	Plan B	Plan A	Plan B
Donor Channel No.	67	15	55	14	175	75	207	135
Extender Band plan	Plan A	Plan A	Plan A	Plan A	Plan A	Plan A	Plan A	Plan A
Extender Channel No.	22	618	626	634	642	650	658	666

Downlink	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
Gating (dBm)	-65.0	-65.0	-65.0	-65.0	-65.0	-65.0	-65.0	-65.0
Filter	P25P1_12K5	P25P1_12K5	P25P1_12K5	DMR	DMR	FM12K5	P25P1_12K5	FM25K
Delay (µsec)	0	0	0	0	0	0	0	0
TX Limit (dBm)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
TX Power (dBm)	--	--	--	--	--	--	--	--
RSSI	-131.7	-131.7	-131.7	-131.7	-131.7	-131.7	-131.7	-127.3

Uplink	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8
Service In (MHz)	411.000000	411.300000	411.625000	412.162500	412.450000	412.300000	410.962500	413.737500
Donor Out (MHz)	411.000000	411.300000	411.625000	412.362500	412.450000	412.300000	410.962500	413.737500
Gating (dBm)	-70.0	-70.0	-70.0	-70.0	-70.0	-70.0	-70.0	-70.0
Filter	P25P1_12K5	P25P1_12K5	P25P1_12K5	DMR	DMR	P25P1_12K5	P25P1_12K5	FM25K
Delay (µsec)	0	0	0	0	0	0	0	0
TX Limit (dBm)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
TX Power (dBm)	--	--	--	--	--	--	--	--
RSSI	-131.4	-131.4	-131.4	-131.8	-131.8	-131.4	-131.4	-127.0
TX Power (dBm)	--	--	--	--	--	--	--	--
RSSI	-131.0	-131.0	-130.2	-130.6	-131.0	-131.0	-130.6	-130.6

CHANNELS STATUS:

The unit's configured channels and current operational status in both the Downlink and Uplink paths is presented on this page.

Channel parameters are configurable on the *Configuration/Channels* page, and specific P25 Trunking Extender (if this option is fitted) parameters are configurable on the *Configuration/Trunking Extender* page.

Off-air Receive RSSI and TX Output power is refreshed and displayed on a per-channel basis to show respective channels' activity.

Note: Interference, Intermodulation and Receiver Desense symptoms can often be seen in these fields that can aid rebroadcast system and coverage fault-finding.

Note: The Trunking Extender fields are only active if this option is enabled in the unit.

Trunking Extender Master (channels 1-8):

This field appears if the EDGE has been configured to be part of a multi-chassis Trunking Extender (TRex) system. In such a system, this line displays which TRex channels are configured in this unit.

Channel and Channel Name:

Displays if each channel is Active/Disabled and its configured Name.

Trunking Extender (visible if option fitted)

Type:

Displays each channel's type; Standard (or non-trunking), Primary or Secondary Control Channel, or Traffic channel.

Donor Band Plan:

The selected Donor site's Band Plan for each channel.

Donor Channel Number:

The off-air Donor channel number for each channel.

Extender Band Plan:

The unit's rebroadcast Band Plan for each channel.

Extender Channel Number:

The unit's rebroadcast channel number for each channel.

Downlink and Uplink

Donor In and Service In (MHz):

Displays the current off-air RX frequency (in MHz) for each channel.

Service Out and Donor Out (MHz):

Displays the current output TX frequency (in MHz) for each channel.

Gating (dBm):

Displays the current RX gating threshold value for each channel.

Filter:

The currently selected channel filter mask selected for each channel.

Delay:

A value that adds delay to the passing of RF signals by the channel's selected Filter group delay. This value can be entered to synchronise the output signals of multiple EDGE units (i.e. simulcasting).

TX Limit (dBm):

The configured TX RF output power for each channel.

TX Power (dBm):

The current TX output power for each channel. TX output power will only be present if the off-air receive signal for the channel exceeds the Gating threshold. The TX output power may be below the configured TX Limit level if the off-air receive signal is too low to achieve the configured TX Limit value at the unit's 100dB maximum gain. Above this minimum off-air receive level, the gain of the unit will automatically adjust ('auto-gain') to maintain the configured TX Limit value for each channel.

RSSI:

Displays the current off-air RX signal level for each channel. When no signal is present this value is the current noise floor present in the channel.

The contents of the page are described in the Help screen.

6.8 Status – Trunking Extender

- Introduction
- Status
  - Hardware
  - Alarms
  - Channels
  - Trunking Extender
  - Unit Environment
  - Version Register
  - Communications
  - System
- Configuration
- Maintenance
- Logout

Help

Alarms

Trunking Extender Status

Configuration	Donor			Extender		
WACN ID	781824			781824		
System ID	988			988		
NAC Code	977			977		
RFSS ID	1			1		
Site ID	2			77		
Default Band Plan	Plan A			Plan A		
	Base Freq (MHz)	Spacing (kHz)	Tx Offset (MHz)	Base Freq (MHz)	Spacing (kHz)	Tx Offset (MHz)
	412.475000	12.50	-9.45	412.475000	12.50	-9.45

Primary Control Channel

	Donor				Extender			
Channel Name	Band Plan	No.	Tx Freq (MHz)	Rx Freq (MHz)	Band Plan	No.	Tx Freq (MHz)	Rx Freq (MHz)
PCC	Plan A	67	413.312500	403.862500	Plan A	22	412.750000	403.300000

Secondary Control Channel

	Donor				Extender			
Channel Name	Band Plan	No.	Tx Freq (MHz)	Rx Freq (MHz)	Band Plan	No.	Tx Freq (MHz)	Rx Freq (MHz)
SCC	Plan B	15	415.312500	405.862500	Plan A	618	420.200000	410.750000

Traffic Channels

	Donor				Extender			
Channel Name	Band Plan	No.	Tx Freq (MHz)	Rx Freq (MHz)	Band Plan	No.	Tx Freq (MHz)	Rx Freq (MHz)
TC1	Plan B	55	415.812500	406.362500	Plan A	626	420.300000	410.850000
TC2	Plan A	14	412.650000	403.200000	Plan A	634	420.400000	410.950000
TC3	Plan B	175	417.312500	407.862500	Plan A	642	420.500000	411.050000
TC4	Plan B	75	416.062500	406.612500	Plan A	650	420.600000	411.150000
TC5	Plan A	207	415.062500	405.612500	Plan A	658	420.700000	411.250000
TC6	Plan B	135	416.812500	407.362500	Plan A	666	420.800000	411.350000
TC7	Plan B	115	416.562500	407.112500	Plan A	690	421.100000	411.650000
TC8	Plan B	295	418.812500	409.362500	Plan A	698	421.200000	411.750000
TC9	Plan A	7	412.562500	403.112500	Plan A	706	421.300000	411.850000
TC10	Plan B	155	417.062500	407.612500	Plan A	714	421.400000	411.950000
TC11	Plan A	27	412.812500	403.362500	Plan A	722	421.500000	412.050000
TC12	Plan A	54	413.150000	403.700000	Plan A	730	421.600000	412.150000
TC13	Plan B	275	418.562500	409.112500	Plan A	738	421.700000	412.250000
TC14	Plan B	215	417.812500	408.362500	Plan A	746	421.800000	412.350000

Advertised Adjacent Control Channels - Extender (Updated)

Band Plan	No.	Site Tx Freq (MHz)	Site Rx Freq (MHz)	RFSS ID	Site ID
Plan A	67	413.312500	403.862500	1	2
Plan C	36	420.237500	425.437500	1	140

Advertised Adjacent Control Channels - Donor

Band Plan	No.	Site Tx Freq (MHz)	Site Rx Freq (MHz)	RFSS ID	Site ID
Plan A	69	413.337500	403.887500	1	4
Plan A	78	413.450000	404.000000	1	5
Plan A	59	413.212500	403.762500	1	6
Plan A	58	413.200000	403.750000	1	7
Plan A	22	412.750000	403.300000	1	77
Plan C	22	420.150000	425.350000	1	82
Plan A	56	413.175000	403.725000	1	128
Plan D	80	468.000000	458.000000	1	137
Plan C	36	420.237500	425.437500	1	140
Plan A	41	412.987500	403.537500	1	97
Plan A	63	413.262500	403.812500	1	1
Plan A	57	413.187500	403.737500	1	3
Plan A	41	412.987500	403.537500	1	96

TRUNKING EXTENDER STATUS

The unit's configured P25 Trunking Extender option's configuration is presented on this page.

P25 Trunking Extender (if fitted) parameters are configurable on the *Configuration/Trunking Extender* page.

Trunking Extender Status (Network 'Donor' side and EDGE rebroadcast 'Extender' sides)

WACN ID:

Displays the WACN (Wide Area Communications Network) ID for the network. One or more systems may be joined into a network of systems. The WACN identifies the network. The WACN ID combined with the System ID will uniquely identify a system.

Note: The WACN ID should always be the same for both the Donor and Extender fields.

System ID:

Displays the System ID for the system. One or more systems may be joined into a network of systems. The System ID identifies one of those systems within the network. The WACN ID combined with the System ID will uniquely identify a system.

NAC Code:

The Network Access Code (NAC) in P25 similar to CTCSS or DCS for analogue radios. The correct NAC code must be configured to ensure radios in the rebroadcast area will unsquelch on valid signals.

Note: This field will display '0' if the Trunking Extender is not receiving a valid control channel off-air, despite the value shown in this field on the Configuration/Trunking Extender GUI page.

Note: The NAC Code should always be the same for both the Donor and Extender fields.

RFSS ID:

In addition to the WACN ID and System ID, a radio site will also broadcast its Radio Frequency Sub-System ID, or RFSS Identity. Along with the Site ID, the RFSS ID uniquely identifies every site within a system or network.

Site ID:

The Site ID identifies a single trunked site. The combination of RFSS and Site ID uniquely identify a trunked site within a system or network.

Default Band Plan:

The selected Band Plan for the Trunking Extender's operation. Both a Donor (off-air) and Service (rebroadcast) band plan must be configured.

Primary Control Channel

Displays the nominated Primary Control Channel (PCC) for both the Donor (off-air) and Service (rebroadcast) sides of the Trunking Extender. The channel's nominated Band Plan, Channel No. and Tx/Rx Frequencies are displayed. In multi-chassis systems, the Control Channel and Secondary Control Channel must both reside in the Master TRex chassis.

Secondary Control Channel

Displays the nominated Secondary Control Channel (SCC) for both the Donor (off-air) and Service (rebroadcast) sides of the Trunking Extender. The channel's nominated Band Plan, Channel No. and Tx/Rx Frequencies are displayed. In multi-chassis systems, the Control Channel and Secondary Control Channel must both reside in the Master TRex chassis.

Traffic Channels

Displays the nominated Traffic Channels (TC) for both the Donor (off-air) and Service (rebroadcast) sides of the Trunking Extender. The channel's nominated Band Plan, Channel No. and Tx/Rx Frequencies are displayed. All channels on the donor network site should be entered in this screen, even though some traffic channels may be repeated in other chassis'.

Advertised Adjacent Control Channels - Extender

Displays the currently configured AACC channels rebroadcast by the Trunking Extender.

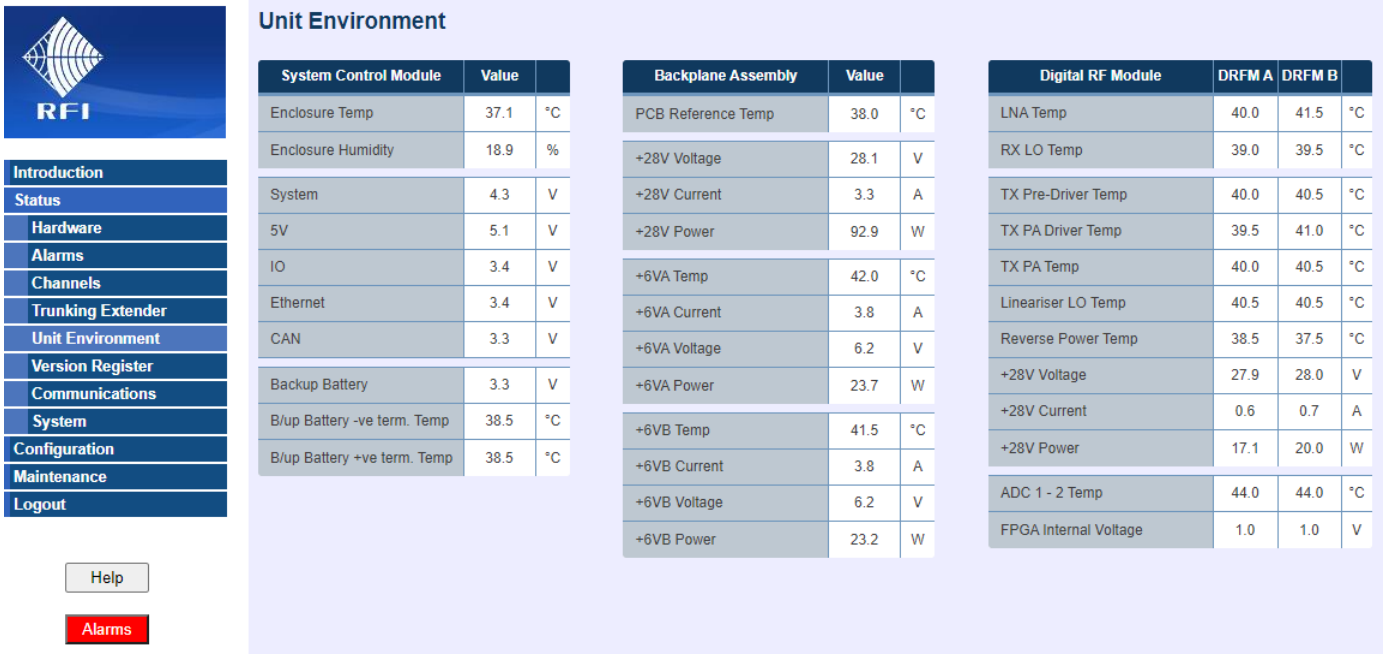
Advertised Adjacent Control Channels - Donor

Displays the AACC channels being received by the Trunking Extender from the nominated Donor network site.

Note: There will be no channels displayed if the Trunking Extender is not receiving a valid control channel off-air.

The contents of the page are described in the Help screen.

6.9 Status – Unit Environment



UNIT ENVIRONMENT

The unit's monitored internal operating conditions presented on this page.
Detailed monitoring of the System Control Module (SCM), the Backplane Assembly and Digital RF Module (DRFM) modules' temperature, humidity, voltage and current measurements are provided to assist the evaluation of the operation of the unit and for detailed maintenance and fault analysis if required.

The contents of the page are described in the Help screen.

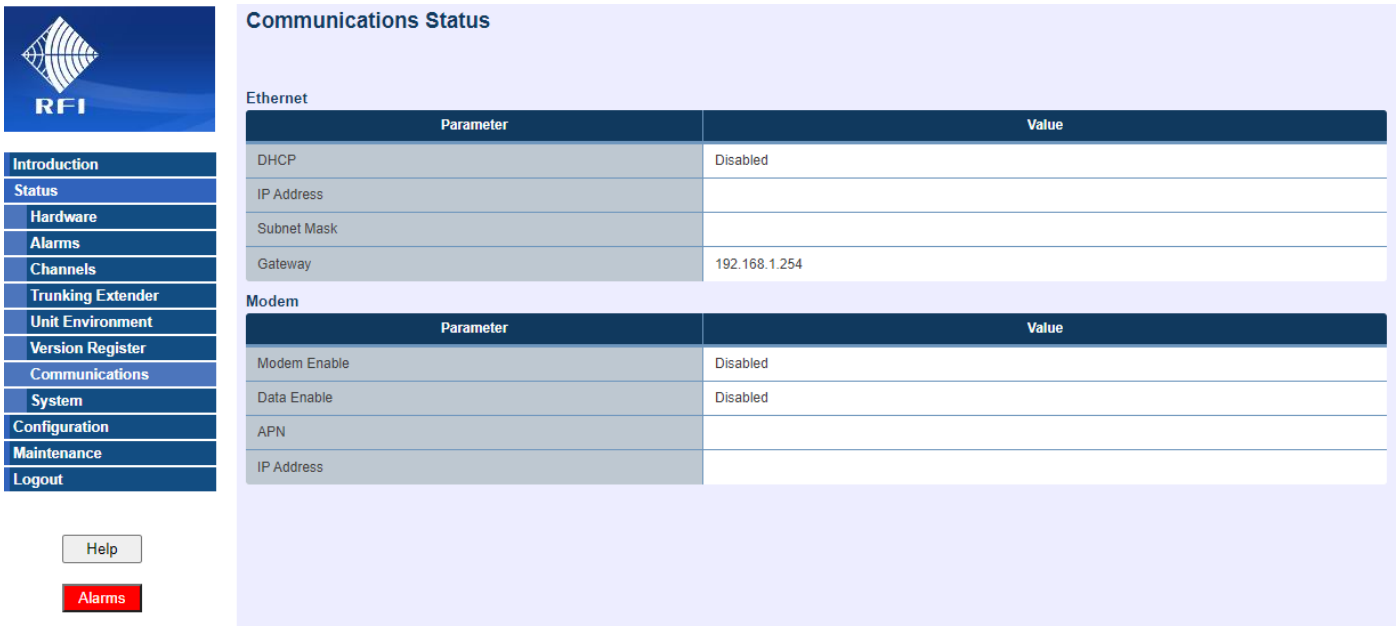
6.10 Status – Version Register

VERSION REGISTER

The unit's fitted modules' serial numbers and currently operating firmware versions are displayed on this page.

The contents of the page are described in the Help screen.

6.11 Status – Communications



COMMUNICATIONS

The unit's Ethernet port and Cellular Modem configurations are displayed on this page.

These settings are configured on the Configuration/Communications page.

Ethernet

The Ethernet port parameters apply to the externally-accessible Ethernet port located on the base plate on the housing. There is also a second Ethernet port inside the unit, on the front of the SCM module. This port's address is fixed as:

Address:192.168.1.200

Subnet:255.255.255.0

Gateway:192.168.1.254

(Cellular) Modem Settings

Modem Enable:

If enabled, the repeater's cellular modem is available for use.

Data Enable:

If enabled, the repeater's cellular modem will provide remote access to the unit's GUI for remote configuration.

APN:

An Access Point Name (APN) is the name of a gateway between a mobile network and another computer network, frequently the public Internet. Your cellular provider will provide their APN that should be entered in this field.

The contents of the page are described in the Help screen.

6.12 Status – System

SYSTEM STATUS

The unit's Name, Location and Serial Number are displayed on this page. The system's Date, Time, NTP and Standby Battery status are also displayed.

These settings are configured on the Configuration/Communications page.

EDGE Details

Repeater Name:

The Repeater Name field is available to use to name the EDGE unit.

Repeater Location:

The Repeater Location field is also available to use to identify the location of EDGE unit.

Repeater Serial Number:

The Repeater Serial Number uniquely identifies the EDGE unit.

Time Settings

Date:

The EDGE's internal Date value.

Time:

The EDGE's internal Time value.

Enable Network Time:

Displays if NTP server synchronisation is enabled.

Standby Battery

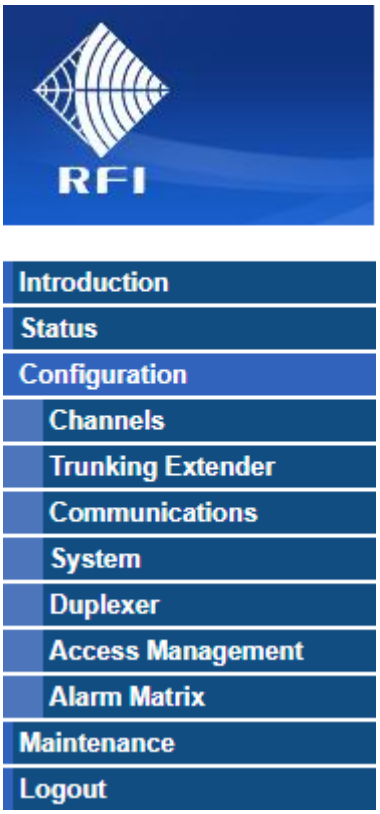
Displays if the internal Standby Battery is enabled/disabled.

The contents of the page are described in the Help screen.

6.13 Configuration Menu

The "Configuration" menu allows all of the DSPbR EDGEs configuration to be edited.

Selecting each indented topic under "Configuration" will display that item as a separate display page.



Note: The "Trunking Extender" menu item only appears in the menu if this option is fitted.

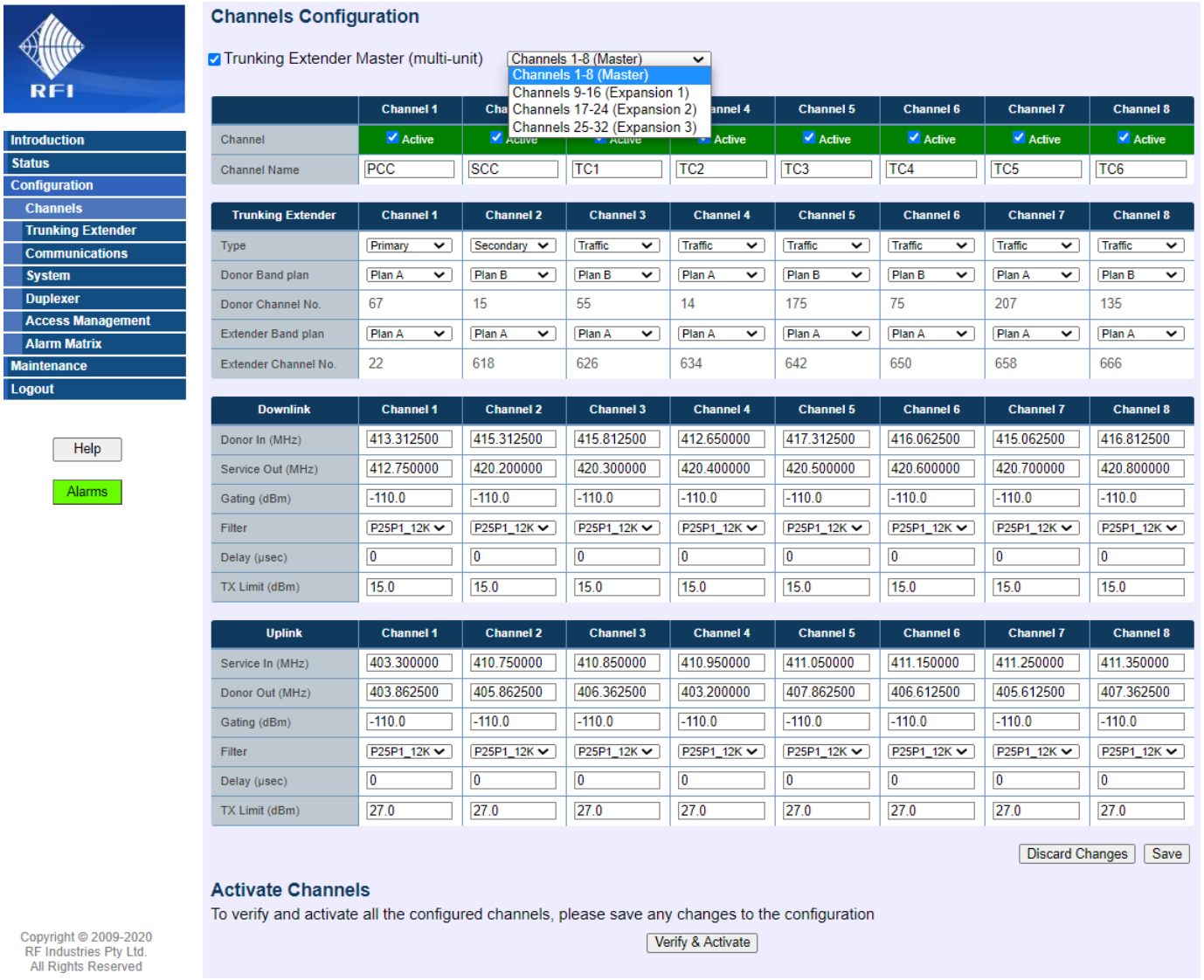
Username and Password Levels

Level 1: Username and password access via the web browser GUI interface displays only status screens.

Level 2: Username and password access via the web browser GUI interface facilitates status, configure and maintenance screens. The 'unit-specific' sensitive fields (such as Communications Settings, SMTP Alarm email account passwords, etc) are hidden to prevent accidental modification or disclosure to unauthorised persons.

Level 3: Username and password access via the web browser GUI interface facilitates status, configure and maintenance screens. The 'unit-specific' sensitive fields (such as Communications Settings, SMTP Alarm email account passwords, etc) are all displayed and available for editing.

6.14 Configuration - Channels



CHANNELS CONFIGURATION

The unit's channels parameters in both the Downlink and Uplink paths are configured on this page.

Specific P25 Trunking Extender (if fitted) parameters are configurable on the *Configuration/Trunking Extender* page.

When finished entering or changing any fields on this page click 'Save' and wait for the Save cycle to finish and the page display to refresh. Then click 'Verify & Activate' to validate the ages fields and enable them.

The 'Save' and 'Verify & Activate' process must be used any time a field on this *Channels/Configuration* page in the GUI needs to be updated and loaded into the unit.

Changes may be discarded at any time prior to saving by clicking the 'Discard Changes' button.

Channels Configuration

Channel:

Individual channels can be enabled/disabled by selecting their respective tick box.

Channel Name:

A Channel Name can be entered to identify each channel if desired.

Trunking Extender (visible if option fitted)

Type:

Selects each channel's type; Standard (or non-trunking), Primary or Secondary Control Channel, or Traffic channel.

Donor Band Plan:

Selects the Donor site's Band Plan for each channel.

Donor Channel Number:

Displays the selected Donor Band Plan's channel number based on the Donor In frequency entered further down the page.

Extender Band Plan:

Selects the unit's rebroadcast Band Plan for each channel.

Extender Channel Number:

Displays the selected Extender Band Plan's channel number based on the Service Out frequency entered further down the page.

Downlink and Uplink

Donor In and Service In (MHz):

Sets the off-air RX frequency (in MHz) for each channel.

Service Out and Donor Out (MHz):

Sets the output TX frequency (in MHz) for each channel.

Gating (dBm):

Sets the RX gating threshold value for each channel.

Filter:

Selects the channel filter mask selected for each channel.

Delay:

Sets a value that adds delay to the passing of RF signals by the channel's selected Filter group delay. This value can be entered to synchronise the output signals of multiple EDGE units (i.e. simulcasting).

TX Limit (dBm):

The configured TX RF output power for each channel.

The contents of the page are described in the Help screen.

6.15 Configuration - Trunking Extender

- Introduction
- Status
- Configuration
  - Channels
  - Trunking Extender
  - Communications
  - System
  - Duplexer
  - Access Management
  - Alarm Matrix
- Maintenance
- Logout

Help

Alarms

Trunking Extender Configuration

Configuration	Donor			Extender		
WACN ID	1246			1246		
System ID	1			1		
NAC Code	370			370		
RFSS ID	1			1		
Site ID	1			1		
Default Band Plan	Plan A			Plan A		
	Base Freq (MHz)	Spacing (kHz)	Tx Offset (MHz)	Base Freq (MHz)	Spacing (kHz)	Tx Offset (MHz)
	418.100000	6.25	-9.45	418.100000	6.25	-9.45

Advertised Adjacent Control Channels - Extender

Band Plan	No.	Site Tx Freq (MHz)	Site Rx Freq (MHz)	RFSS ID	Site ID
Plan A	700	422.475000	413.025000	1	88
Plan B	262	422.900000	428.400000	4	116

Discard Changes Save

Band Plan Table

Name	Base Freq (MHz)	B/W (kHz)	Spacing (kHz)	Tx Offset (MHz)
Plan A	418.100000	12.50	6.25	-9.45
Plan B	421.262500	12.50	6.25	5.50
Plan C	420.012500	12.50	6.25	6.00
Plan D	425.262500	12.50	6.25	4.00
Plan E	465.075000	12.50	6.25	-9.50
Plan F	467.512500	12.50	6.25	-10.00
Plan G	162.050000	12.50	12.50	-4.60
Plan H	165.187500	12.50	12.50	4.60

TRUNKING EXTENDER CONFIGURATION

The unit's configured P25 Trunking Extender option's parameters may be configured on this page.

When finished entering or changing any fields on this page click 'Save' and wait for the Save cycle to finish and the page display to refresh. The 'Save' process must be used any time a field on this Trunking Extender Configuration page in the GUI needs to be updated and loaded into the unit.

Changes may be discarded at any time prior to saving by clicking the 'Discard Changes' button.

Configuration (Network 'Donor' side and EDGE rebroadcast 'Extender' sides)

The 'Extender' WACN ID, System ID and NAC code must match the 'Donor' values, so these fields are not editable on the 'Extender' side of table. If a valid donor site's control channel frequency is entered in the Configuration/Channels page then the WACN ID, System ID and NAC Code of the donor site will be decoded off-air and auto-populated in the Status/Channels page for information purposes.

WACN ID:

Displays the WACN (Wide Area Communications Network) ID for the network. One or more systems may be joined into a network of systems. The WACN identifies the network. The WACN ID combined with the System ID will uniquely identify a system.

Note: The WACN ID should always be the same for both the Donor and Extender fields.

System ID:

Displays the System ID for the system. One or more systems may be joined into a network of systems. The System ID identifies one of those systems within the network. The WACN ID combined with the System ID will uniquely identify a system.

NAC Code:

The Network Access Code (NAC) in P25 similar to CTCSS or DCS for analogue radios. The correct NAC code must be configured to ensure radios in the rebroadcast area will unsquelch on valid signals.

Note: The Donor field can have a value entered, the Extender field appears editable but will copy the Donor value. If the Trunking Extender is receiving a valid control channel off-air, these fields in the Status/Trunking Extender GUI page will display the off-air decoded NAC Code, or '0' if the Trunking Extender is receiving a valid control channel off-air.

Note: The NAC Code should always be the same for both the Donor and Extender fields.

RFSS ID:

The required RFSS ID for the Donor and Extender sites should be entered in these fields.

Site ID:

The required Site ID for the Donor and Extender sites should be entered in these fields.

Default Band Plan:

The required Band Plan for the received Donor and rebroadcast Extender sites should be selected in these fields. When selected the band plans frequency details will be displayed below the selection fields.

Advertised Adjacent Control Channels - Extender

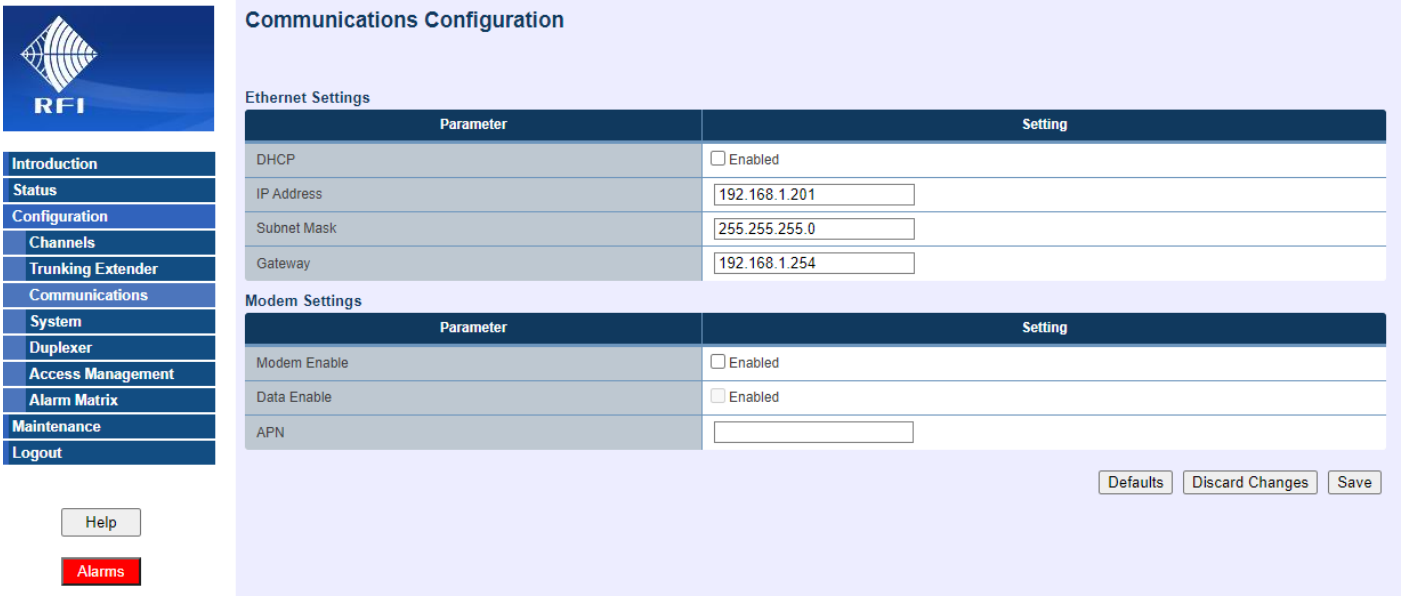
The AACC channels to be rebroadcast by the Trunking Extender can be configured in this table.

Band Plan Table

Displays Band Plans available for selection. Additional band plans may be loaded into the unit using the *Maintenance/Files/Configuration Files* page.

The contents of the page are described in the Help screen.

6.16 Configuration – Communications



COMMUNICATIONS CONFIGURATION

The unit's Ethernet port and Cellular Modem settings are configured on this page.

The Ethernet port parameters apply to the externally-accessible Ethernet port located on the base plate on the housing.

Ethernet Settings

DHCP:

If enabled, the repeater will attempt to get its network settings from a DHCP server. The default is Enabled not to be ticked (i.e. 'Disabled').

IP Address:

IP address in IPv4 format (i.e. aaa.bbb.ccc.ddd).

Subnet Mask:

IP address in IPv4 format (i.e. aaa.bbb.ccc.ddd).

Gateway:

IP address in IPv4 format (i.e. aaa.bbb.ccc.ddd).

There is a second Ethernet port inside the unit, on the front of the SCM module. This port's address is fixed as:

Address:192.168.1.200

Subnet:255.255.255.0

Gateway:192.168.1.254

(Cellular) Modem Settings

Modem Enable:

If selected, the repeater's cellular modem is enabled for use.

Data Enable:

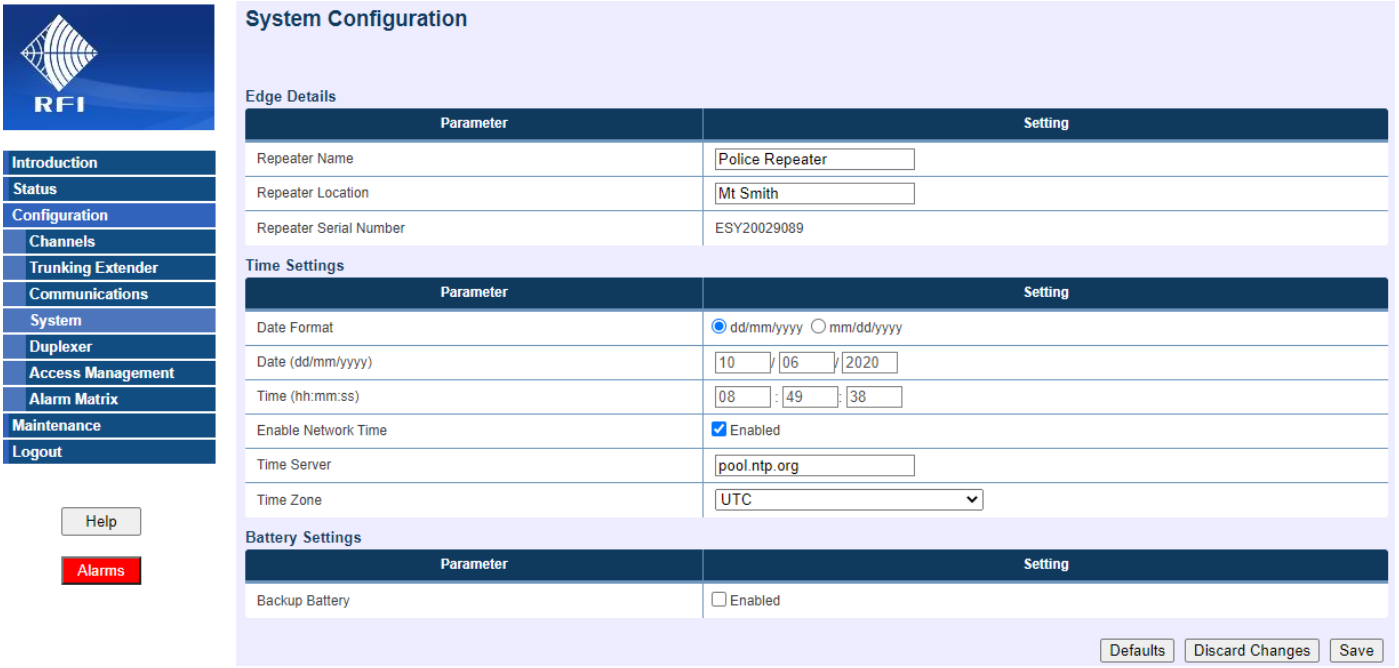
If selected, the repeater's cellular modem will provide remote access to the unit's GUI for remote configuration.

APN:

An Access Point Name (APN) is the name of a gateway between a mobile network and another computer network, frequently the public Internet. Your cellular provider will provide their APN that should be entered in this field.

The contents of the page are described in the Help screen.

6.17 Configuration – System



SYSTEM CONFIGURATION

The unit's Name and Location can be entered on this page. The system's Date, Time, NTP, NTP Server and Standby Battery connection are also selectable.

EDGE Details

Repeater Name:

The Repeater Name field is available to use to name the EDGE unit.

Repeater Location:

The Repeater Location field is also available to use to identify the location of EDGE unit.

Repeater Serial Number:

The Repeater Serial Number is displayed for reference.

Time Settings

Date Format:

The EDGE's Date Format may be selected here.

Date:

The EDGE's internal Date value may be set here.

Time:

The EDGE's internal Time value may be set here.

Enable Network Time:

The use of an NTP server for time/date synchronisation may be selected here.

Time Server

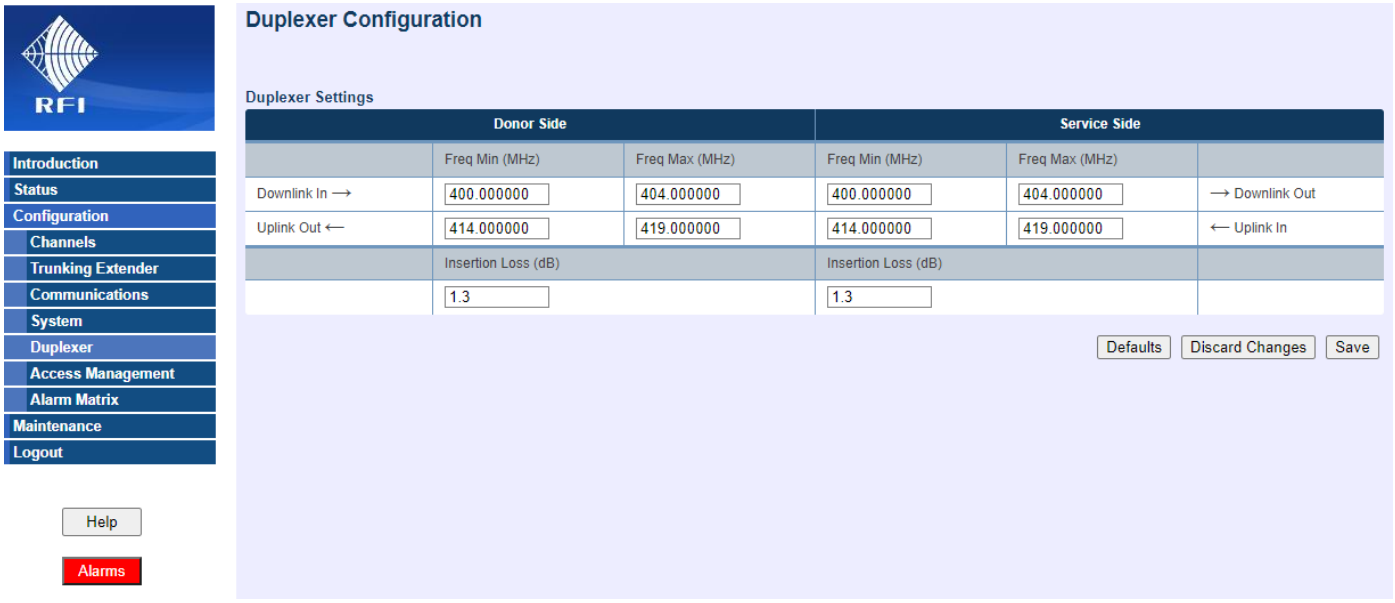
The identity of a chosen NTP server may be entered here.

Battery Settings

The connection of the internal Standby Battery is enabled/disabled here.

The contents of the page are described in the Help screen.

6.18 Configuration – Duplexer



DUPLEXER CONFIGURATION

The unit's Duplexer tuned frequency passbands and insertion loss values can be entered on this page.

Duplexer Settings ('Donor' side and 'Service' sides)

Downlink In:

The Donor and Service side duplexer passband frequencies (in MHz) in the downlink (donor-to-service) path. A lower end (Freq Min) and upper end (Freq Max) value is required.

Uplink Out:
The Donor and Service side duplexer passband frequencies (in MHz) in the uplink (service-to-donor) path. A lower end (Freq Min) and upper end (Freq Max) value is required.

Insertion Loss:
The insertion loss values here are used within the EDGE to calculate unit Tx output power values. The insertion loss value should be the average insertion loss of the passband across its nominated frequency range.

Note: This information is also used to populate the Duplexer section of the *Status/Hardware* GUI page.

The contents of the page are described in the Help screen.

6.19 Configuration – Access Management

ACCESS MANAGEMENT

The unit's access username and passwords are managed on this page.

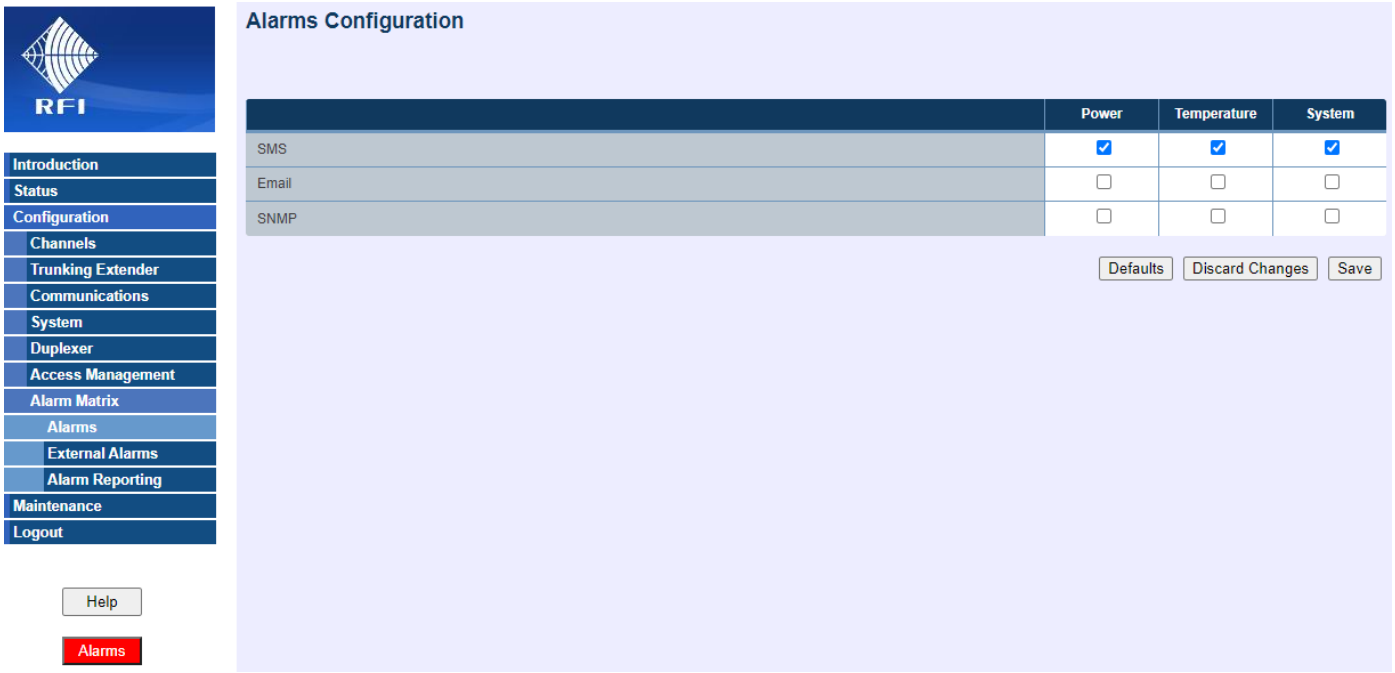
There are three (3) access levels available in the DSPbR EDGE:

- User: Allows viewing of information only
- Admin: Allows viewing and editing of information (except unit sensitive parameters such as IP addresses etc)
- Master: Allows viewing and editing of information (including unit sensitive parameters such as IP addresses etc)

Note: Only password information for the level used to log into the unit, and below, is displayed. Low level access users cannot view or change higher access levels.

The contents of the page are described in the Help screen.

6.20Configuration – Alarm Matrix - Alarms



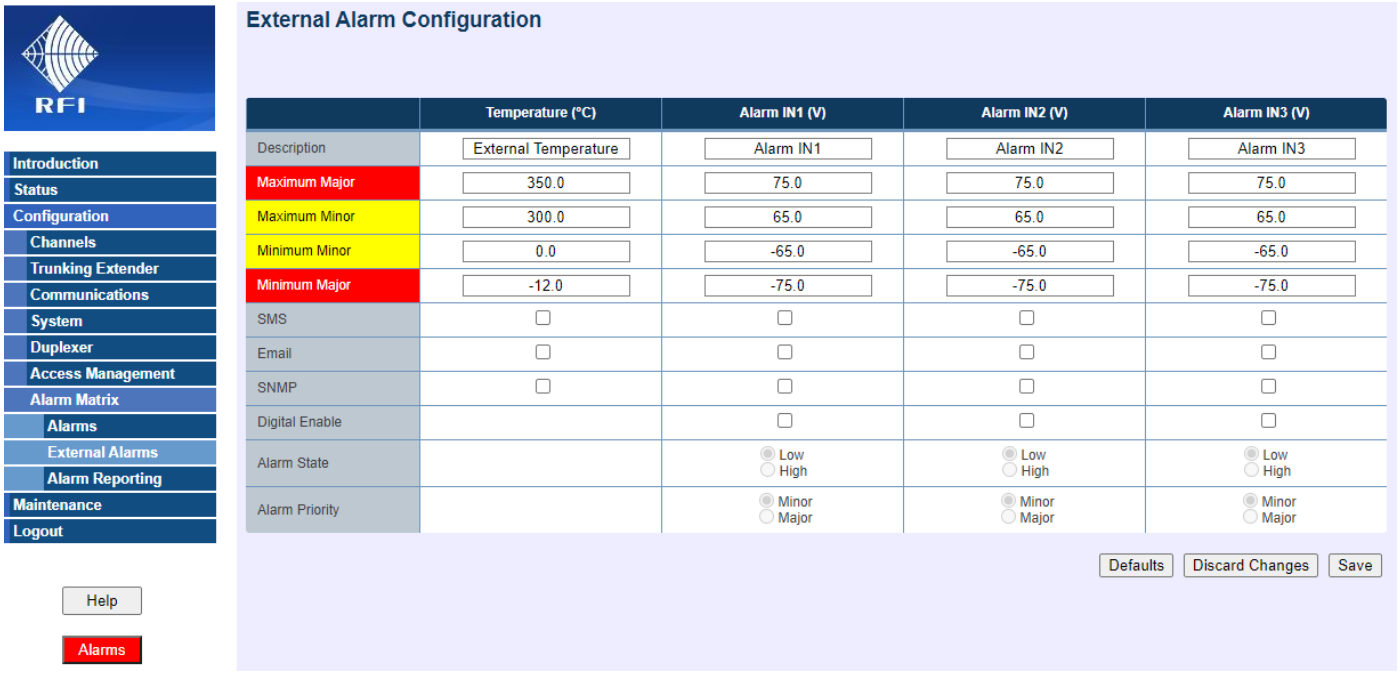
ALARMS CONFIGURATION

The unit's assignments of Power, Temperature and System alarms to the SMS, Email and SNMP reporting paths are managed on this page.

The assignment of each of the alarm types to the reporting paths may be matrixed as desired.

The contents of the page are described in the Help screen.

6.21Configuration – Alarm Matrix – External Alarms



EXTERNAL ALARMS CONFIGURATION

The unit's characterisation, naming and assignment of External Alarms monitoring is managed on this page.

The assignment of each of the alarm types to the reporting paths may be made in a matrix as desired.

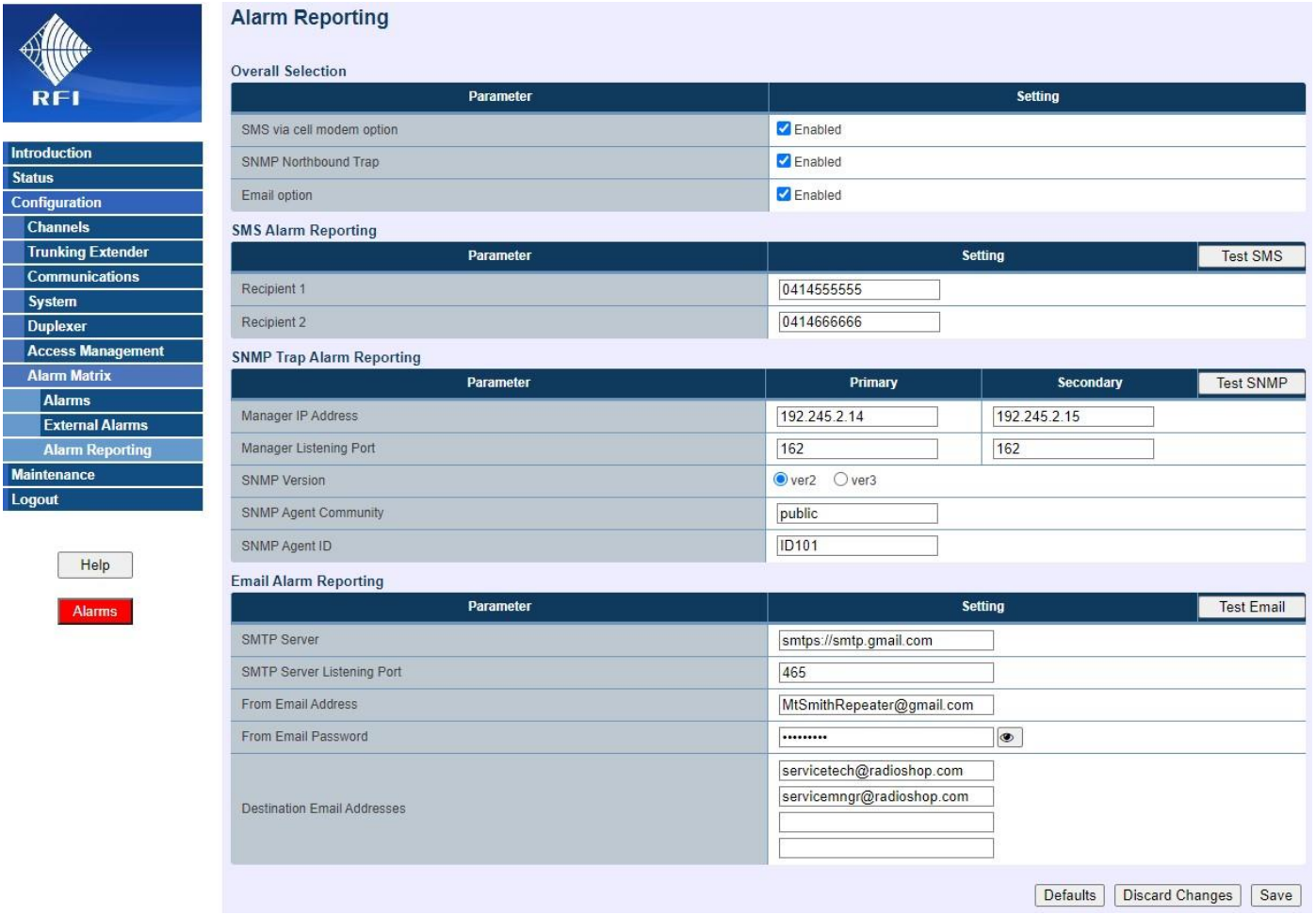
Four (4) external alarm monitoring inputs are available; one for temperature, and three for voltage.

Any of the three (3) voltage alarms may be configured as Digital inputs for logic state monitoring if desired by checking the Digital Enable tick box. When configured as a Digital alarm, each input can also be configured as a logic 'hi' or 'low' active state and its resulting alarm state may be assigned as a Minor or Major alarm event.

A Maximum and Minimum threshold can be entered for both Minor and Major alarm types, with any of the SMS, Email or SNMP reporting paths being assignable to each of the four (4) external alarm inputs.

The contents of the page are described in the Help screen.

6.22Configuration – Alarm Matrix – Alarm Reporting



ALARM REPORTING CONFIGURATION

The unit's alarm reporting paths are managed on this page.

Overall Selection

SMS via cell modem option:

The sending of SMS alarms is Enabled here. When Enabled, an SMS Alarm Reporting table will appear - allowing the entry of two (2) recipients mobile phone numbers.

Example entries in these fields may look like:

Recipient 1:0414555555

Recipient 2:0414666666

SNMP Northbound Trap:

The sending of SNMP Northbound Traps is Enabled here. When Enabled, an SNMP Trap Alarm Reporting table will appear - allowing the entry of a Primary and Secondary SNMP server addresses and associated listening port IDs. The SNMP version (v1/2 or v3), Community String and Agent ID can also be configured here.

Example entries in these fields may look like:

Manager IP Address:	210.243.202.182
Manager Listening Port:	161
SNMP Version:	ver 2
SNMP Agent Community:	public
SNMP Agent ID:	ID101

Email (SMTP):

The sending of Email (SMTP) alarm notifications is Enabled here. When Enabled, an Email Alarm Reporting table will appear - allowing the entry of the destination SMTP Server, SMTP port, a 'from' email account name and password for the chosen email service provider, and up to four (4) destination email addresses that the alarm notifications will be sent to.

Example entries in these fields may look like:

SMTP Server:	smtps://smtp.gmail.com
SMTP Server Listening Port:	465
From Email Address:	MtSmithRepeater@gmail.com
From Email Password:	********
Destination Email Addresses:	duty_tech@radioshop.com service_mngr@radioshop.com

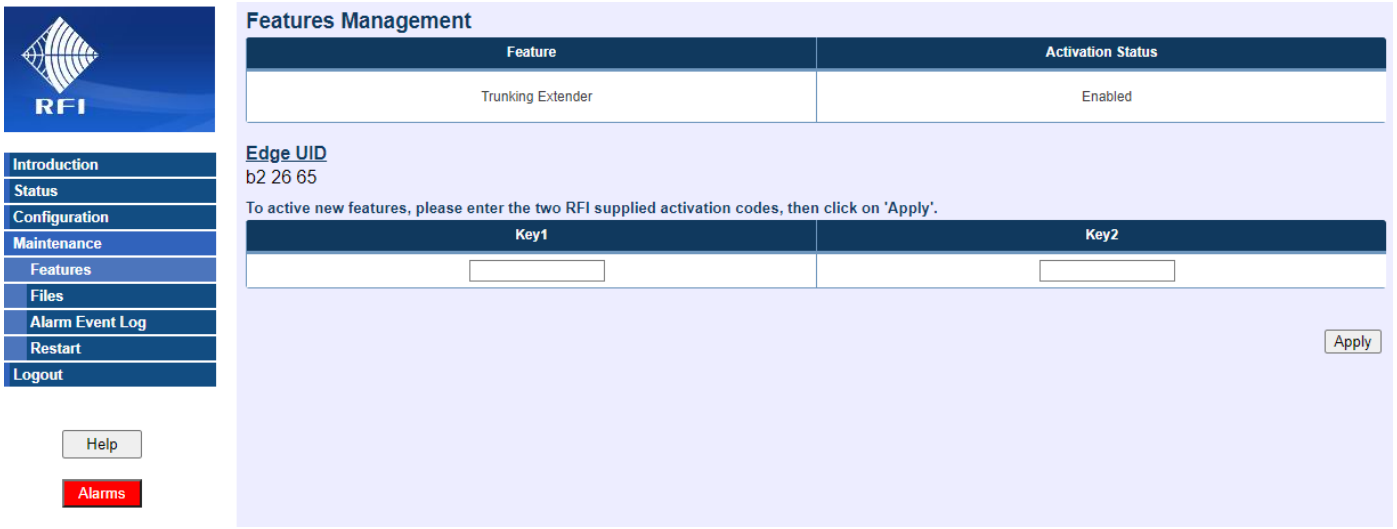
The contents of the page are described in the Help screen.

6.23Maintenance Menu

The "Maintenance" menu allows all of the DSPbR EDGEs maintenance features to be accessed.

Selecting each indented topic under "Maintenance" will display that item as a separate display page.

6.24Maintenance – Features



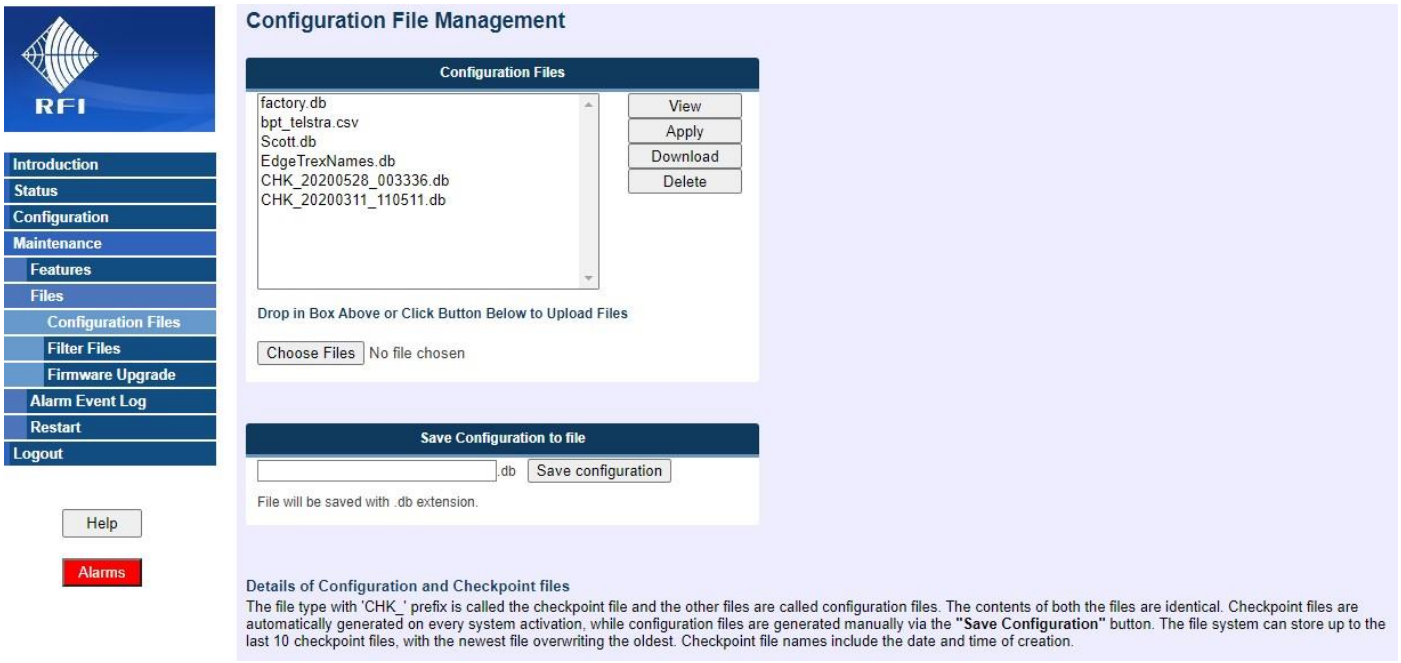
FEATURES MANAGEMENT

This page displays currently enabled DSPbR EDGE options (i.e. Trunking Extender "TRex")

New optional features may be activated and enabled by entering RFI-provided Key1/Key2 licence keys, and then clicking the 'Apply' button.

The contents of the page are described in the Help screen.

6.25Maintenance – Files – Configuration Files



CONFIGURATION FILE MANAGEMENT

The unit's configuration, checkpoint and band plan files are managed on this page. Several functions are supported and may be used as required.

Configuration Files

Selecting a file:

A file already stored in the unit's file system may be selected by scrolling to it in the files window and clicking on it to select it. Once selected, the action for that file may be chosen. Available actions are:

View:
Selecting this action will display the contents of the file on your device's default text file viewer (i.e. Notepad).

Apply:
Selecting this action will activate the selected file in the EDGE unit. This action would be used to activate a stored configuration file, or add a band plan file into the displayed list of files on the Configuration/Trunking Extender page, etc.

Download:

Selecting this action will download the selected file to your device (for backup or archiving purposes).

Delete:

Selecting this action will delete the chosen file from the EDGE unit's file system. **NOTE:** Once deleted, a file cannot be recovered. It is recommended to download a file for archiving prior to a delete action.

Upload:

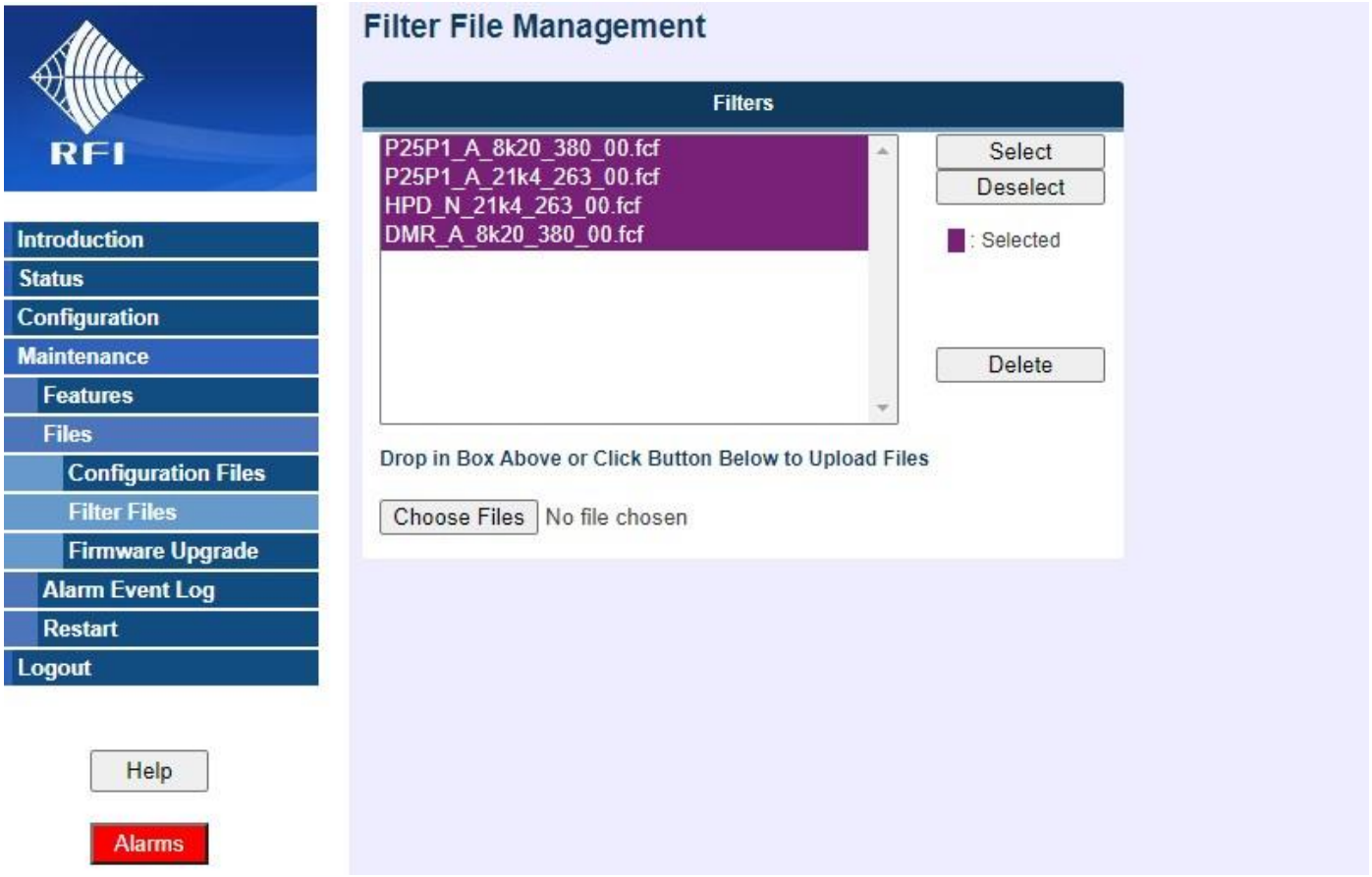
A new file can be uploaded from your device to the EDGE file system by clicking the 'Choose Files' button. Your device's file explorer will open, allowing you to select a file for upload to the EDGE unit. Once uploaded, the above actions can be used to View, Apply or Delete that file.

Save Configuration to file

The current configuration of the EDGE unit may be saved in the unit's file system. Clicking on the blank filename box will allow a chosen file name to be entered. Clicking 'Save Configuration' will then save the unit's current configuration using that file name - which will appear in the files window when the save is completed.

The contents of the page are described in the Help screen.

6.26Maintenance – Files – Filter Files



FILTER FILE MANAGEMENT

The unit's channel filter profile files are managed on this page. Several functions are supported and may be used as required.

Filters

Selecting or Deselecting files:

Channel filter profile files may be selected or deselected in the files window. Only selected files appear in the Configuration/Channels page for selection in each channel's parameters.

A file may be selected by scrolling to it in the files window and clicking on it to highlight it. Once selected, the action for that file may be chosen. Available actions are:

Select:

Clicking this button will add the selected file to the available list on the Configuration/Channels page.

Deselect:

Clicking this button will remove the selected file from the available list on the Configuration/Channels page.

Upload:

A new file can be uploaded from your device to the EDGE file system by clicking the 'Choose Files' button. Your device's file explorer will open, allowing you to select a channel filter profile file for upload to the EDGE unit. Once uploaded, the above actions can be used to Select or Deselect that file on the Configuration/Channels page.

The contents of the page are described in the Help screen.

6.27Maintenance – Files – Filter Files

FIRMWARE UPGRADE

The upgrading of the unit's firmware is managed on this page.

Upgrade:

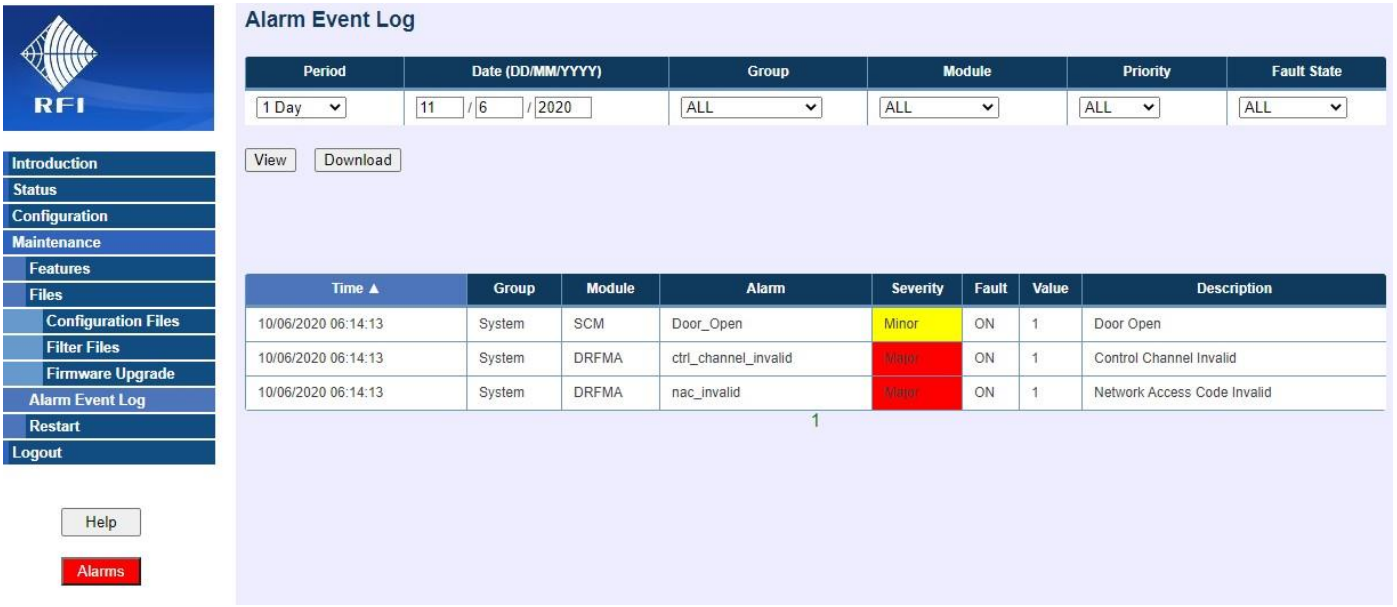
A new firmware version can be uploaded from your device to the EDGE by clicking the 'Choose File' button. Your device's file explorer will open, allowing you to select a firmware file for upload to the EDGE unit.

After selecting the firmware upgrade file in your devices file explorer, the upgrade process is commenced by clicking on the 'Send' button. An upload progress bar will appear and a completion message will be displayed when the firmware upgrade file transfer is complete and the unit has activated the upgraded firmware.

Note: Downgrading firmware should not be attempted and may lead to problems resulting in unstable or failed operation of the EDGE unit.

The contents of the page are described in the Help screen.

6.28Maintenance – Alarm Event Log



ALARM EVENT LOG

A comprehensive Alarm Event Log is stored in the EDGE. Alarm events can be searched by selected Period (from a start Date), Group, Module, Priority or Fault State.

View:

Clicking the 'View' button will search the stored log and display any alarm events matching the search selections.

Download:

Clicking the 'Download' button will download any alarm events from the log that match the search selections to your device for later analysis, archiving or other uses (such as inclusion in maintenance contract reports, etc).

The contents of the page are described in the Help screen.

6.29Maintenance – Restart

RESTART

Restart Repeater:

Press the 'Restart' button to restart the entire system with existing settings.

Default RF Settings:

Press the 'RF Default' button to set the channel configuration to default settings, while preserving all other settings.

Note: The IP address information is not defaulted. This can be done in the *Configure/Communications* page.

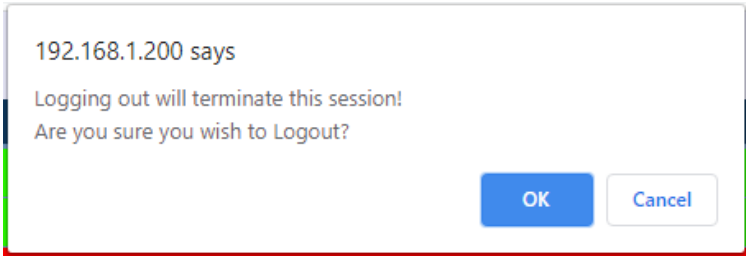
Full Factory Default Settings:

Press the 'Full Default' button to set all settings to default.

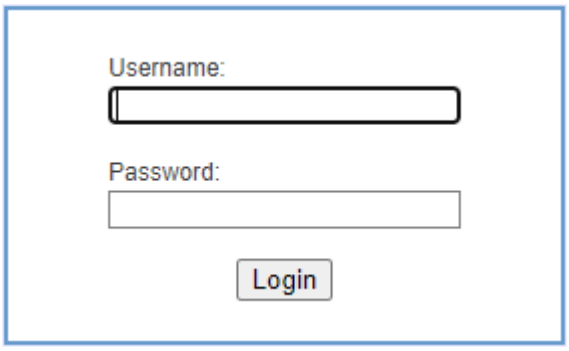
The contents of the page are described in the Help screen.

6.30 Logout

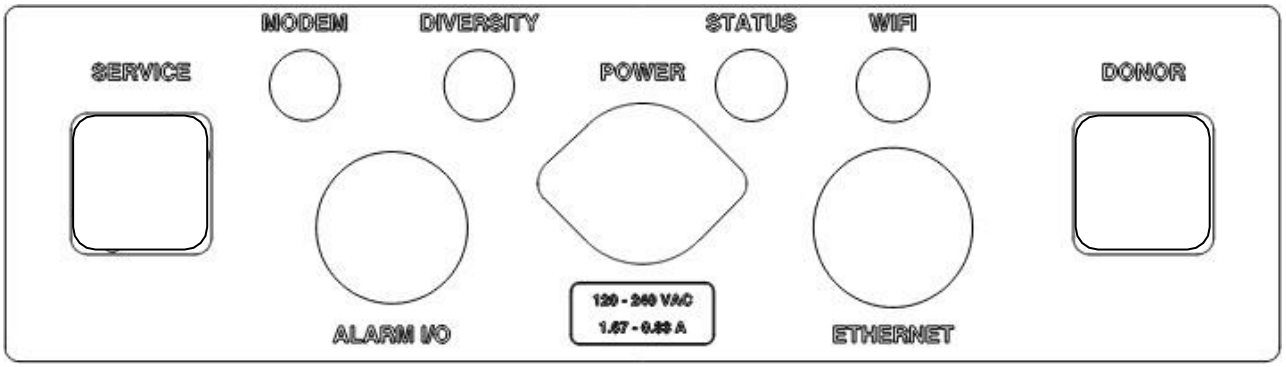
Clicking on this selection will present the "Log out" message box.



If "OK" is selected, the user will be logged out of the current webserver session and the original "Log in" screen will be presented, ready for a new session…..



7. Indicators and Connectors



The DSPbR EDGE baseplate connector, indicator and gland locations

MAIN CONNECTORS:

Donor:

The RF input/output connection to the donor site's source signal (i.e. the off-air antenna facing the outdoor network).

Service:

The RF input/output connection to the rebroadcast area (i.e. the in-building antenna system).

Power:

The AC or DC power input connector.

ANCILLARY CONNECTORS:

Ethernet:

The external Ethernet connection for the EDGE.

Modem / Diversity:

The cellular modem primary antenna, and the 4G Diversity antenna connectors.

Wi-Fi / Bluetooth:

The external Wi-Fi / Bluetooth antenna connector. (Wi-Fi and Bluetooth features are to be available in a future firmware release).

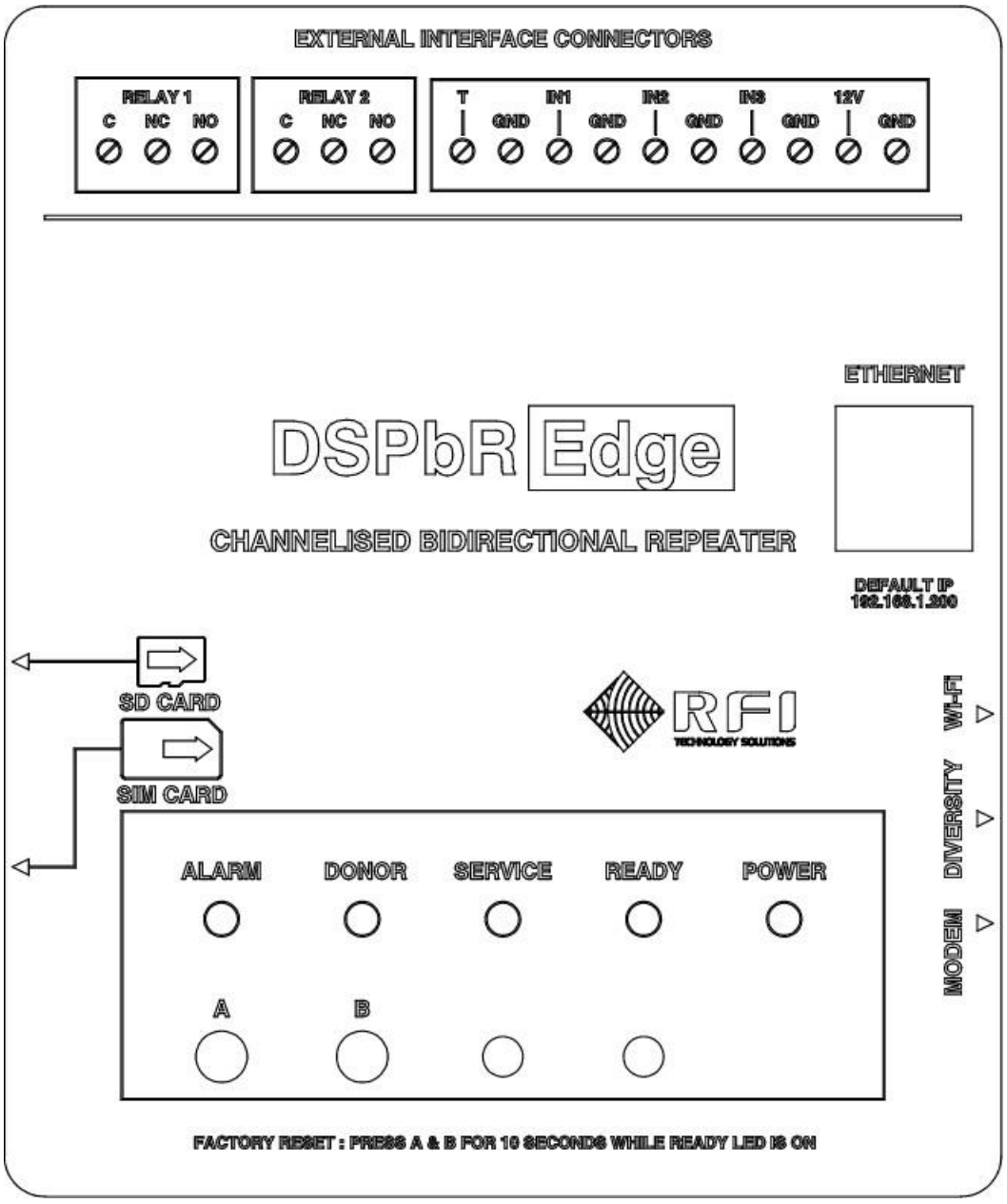
Alarm I/O:

The gland through which the Alarm I/O cable can pass between the EDGE and external I/O equipment(s).

STATUS INDICATOR:

Indicates the unit's Status and Alarm Summary.

DSPbR EDGE System Controller Panel Layout (and External Interface Connector pinout):



The DSPbR EDGE System Controller (SC) module front panel layout

INDICATORS:

Power:

Indicates power is applied to the EDGE unit.

The LED is off when there is no power. The LED is green under normal power conditions. The LED is orange when the +5V is OK, and the 4.4V is failed. The LED is red when the +5V and the 4.4V have failed and the System Controller module is powered by the backup battery.

Ready:

Indicates the EDGE unit has completed its power-on self-test and is ready for use.

The LED is off during start-up and whenever the unit is not ready to receiver user input. The LED is green once the unit is up and running, and ready to receive suer input. The LED is red and flashing during the factory reset process and will continue to flash until the unit has restarted.

Alarm:

Indicates the alarm status of the EDGE. 'Green' indicates no alarm conditions are present. 'Orange' indicates minor alarm conditions are present. 'Red' indicates major alarm conditions are present.

The LED is off during start-up. The LED is green when there are no alarms present (the 'Door Open' Minor alarm does not indicate on this LED). The LED is orange to indicate a Minor Alarm. The LED is red to indicate a Major Alarm.

Donor:

Indicates whether the unit is transmitting the signal received from the Donor source.

The LED is off during start-up and when not ready to repeat. The LED is green when the unit is ready to transmit. The LED is orange when transmitting (i.e.un-gated) and returns to green when transmission stops. The LED will typically alternate between green and orange to indicate healthy operation while repeating.

Service:

Indicates whether the unit is transmitting the signal received from the Service area.

The LED is off during start-up and when not ready to repeat. The LED is green when the unit is ready to transmit. The LED is orange when transmitting (i.e.un-gated) and returns to green when transmission stops. The LED will typically alternate between green and orange to indicate healthy operation while repeating.

External Indicator:

This LED will be off during power up and self-test. After this time the external Status LED mimics the unit's alarm status – 'green' when there are no alarms present, 'orange' when there is a Minor alarm present, and 'red' when there is a Major alarm present.

BUTTONS:

To reset the DSPbR EDGE back to the Factory Default settings will mean a complete reset of all RF configuration settings and alarm threshold parameters as well as the IP address parameters. To do this, simply press and hold buttons "A" and "B" for more than 10 seconds while the READY LED is on.

NOTE: This will cause the IP address, subnet and gateway addresses and all other configuration data to be reset back to factory default address.

Factory Default settings

DHCP - Disabled
IP Address - 192.168.1.200
Subnet Mask - 255.255.255.0
Gateway - 192.168.1.254
Level 1 Username: user
Level 1 Password: user
Level 2 Username: admin
Level 2 Password: admin
Level 3 Username: master
Level 3 Password: master

LABELS:

External Interface Connectors:

Shows the layout of the External Interface Connectors located on the backplane adjacent to the System Controller (SC) module.

EXTERNAL ALARM INPUTS:

The DSPbR EDGE has four (4) external alarm monitoring inputs. These inputs are rated as follows;

Three (3) inputs are configurable for analogue or digital operation.

Analog Voltage Sense:	-60 to +60 V sense.	
Digital Voltage Sense:	Logic "0" < 2.5VDC.	Logic "1" > 2.5VDC.

One (1) input is compatible with the RFI SAM0000-TS Temperature Sensor.

All four (4) inputs are protected for -75 to +75 V

ALARM RELAY OUTPUTS:

The DSPbR EDGE has two (2) alarm relays (Minor and Major alarms' outputs).

The contacts on these relays are rated as follows;

N.O. / CMN / N.C.	30VDC 2A or 125VAC 0.5A

8. SNMP Overview

Overview:

The DSPbR Edge SNMP Interface is defined by the following MIB files:

RF-INDUSTRIES-MIB.txt
RFI-EDGE-ALARM-MIB.txt

The RFI-EDGE-ALARM-MIB file provides details of the various objects (OIDs) within every trap that is sent whenever an alarm status change occurs.

Every trap includes the following objects:

Trap Objects:

edgeAlarmCustName

OID 1.3.6.1.4.1.32327.2.2.4.1.2.1
Syntax Text String

Description Provides the Customer Name string as configured on the User Data Configuration page.

edgeAlarmSiteName

OID 1.3.6.1.4.1.32327.2.2.4.1.2.2
Syntax Text String

Description Provides the Site Name string as configured on the User Data Configuration page.

edgeAlarmModule

OID 1.3.6.1.4.1.32327.2.2.4.1.2.3
Syntax Text String

Description Identifies the hardware module type under alarm condition. Edge unit has following hardware module types.

SCM

The System Control Module is the main controller module that provides the user interface and system wide control.
Backplane

The Backplane module provides some auxiliary functionality to the system and is the main interface between the SCM and two DRFMs

DRFM(1)

This is one half of the Digital RF module that handles the digital RF communication.

DRFM(2)

This is the other half of the Digital RF module that handles the digital RF communication.

edgeAlarmType

OID 1.3.6.1.4.1.32327.2.2.4.1.2.4
Syntax Text String

Description Identifies the DSPbR Edge alarm type. DSPbR Edge unit has following alarm types.

Power

Any power supply status and rail voltage related alarms are reported under this class.

Temperature

Any over or under temperature related alarms are reported under this class.

System

Any system or RF level faults are reported under this class.

edgeAlarmDescription

OID 1.3.6.1.4.1.32327.2.2.4.1.2.5
Syntax Text String

Description This is a brief textual description of the generated alarm.

axmAlarmState

OID 1.3.6.1.4.1.32327.2.2.2.1.2.6
Syntax Text String

Description The alarm status for this trap. A value of 1 represents OK, a value of 2 is FAIL.

axmAlarmDateTime

OID 1.3.6.1.4.1.32327.2.2.2.1.2.7
Syntax Text String

Description The time stamp for when this trap was sent.

GET Requests:

DSPbR Edge SNMP GET requests supports only five generic MIB-2 system parameters as described below;

sysDescr
sysObjectID
sysUpTime
sysContact
sysName

9. Maintenance, Inspection and Repair Advice

No special maintenance program is required for the DSPbR EDGE.

Firmware upgrades may periodically be made available and may be uploaded into the DSPbR EDGE if desired using the *Maintenance/Files/Firmware Upgrade* feature within the GUI.

Checking that the RF connectors on the feeder cables from the combiner and to the antenna are correctly torqued (as per manufacturers recommendations) onto the corresponding Coupler termination connectors is considered good practice. Checking all N Male termination connectors on the RF coaxial connectors on both the DSPbR EDGE and Coupler/s is also recommended.

All other connectors must be firmly located and pushed into their corresponding mating sockets, with fastening screws tightened securely.

The individual modules in the DSPbR EDGE are not considered field repairable. Should it be considered that any unit may be faulty through diagnosis, it should be replaced and the faulty unit returned to RFI for repair.

10. Supporting Information

For additional support information on the DSPbR EDGE series products including;

DSPbR EDGE Product Brief
DSPbR EDGE User Manual
DSPbR EDGE Service Bulletins
DSPbR EDGE Firmware Files
DSPbR EDGE SNMP MIB Files

please visit the RFI website at:

http://www.rfiwireless.com.au/multicoupling-monitoring/monitoring.html

Contact Information

If you would like more information on the DSPbR EDGE product and its applications, please contact your nearest RFI Sales Office.

For more information on RFI products, please visit us at **http://www.rfiwireless.com.au/**

11. User Notes:

12. Appendix 1 – Physical Installation Guide

DE-XXXX-0001-AC or DC

DSPbR Edge Channelised UHF Repeater

PHYSICAL INSTALLATION Ui02C

1 INTRODUCTION

This note provides details for the physical installation of the RFI DSPbR Edge Channelised UHF Repeater (the "Edge Repeater") only. For all other connection & operation information refer to the Edge Repeater manual available at: -

https://rfi.com.au/

For either AC mains or DC power connector cabling assembly instructions, refer to Appendix 1.

2 UNPACKING

The Edge Repeater is shipped in an appropriate cardboard shipping box. Inspect the shipped box before unpacking the equipment. Document and report any visual damage to the shipping company or to RFI prior to installation.

Verify that all the shipped content, as listed below, is included, otherwise contact RFI prior to installation.

2.1 Shipped Content

Checklist of delivered items;
Edge Repeater;
Test Results sheet;
2 x Mounting brackets for either wall, pole or rack mounting;
4 x M8 bolts & washers for attaching the Edge Repeater to the mounting brackets;
Security Hex Allen Key for the Edge Repeater front door M10 Hex bolts;
Mains OR DC mating connector;
External user interface connectors (1 off 10-way & 2 off 3-way Phoenix plugs). These are assembled onto the Edge Repeater Backplane Assembly;
Any other specifically ordered items.

3 GENERAL

CAUTION!!

It is recommended that two people lift the Edge Repeater as it weighs approximately 32 kg (depending upon the configuration).

ATTENTION!!

The Edge Repeater housing should be closed using the 4 captive M10 Hex bolts in the front door. These bolts must be tightened to a torque of 5 Nm. This can be achieved by tightening the bolts using the supplied security Hex Allen Key, using the long end fitted to the M10 Hex bolt sockets and hand tightening to maximum, commencing from the non-hinge side of the front door first. Failure to do so may affect the IP65 compliance and therefore any warranty.

4 INSTALLATION

The Edge Repeater is designed for indoor or outdoor wall and pole or indoor rack mounting installation. Installation details follow.

4.1 Required Tools and Materials

4.1.1 13 mm spanner or socket to suit M8 mounting bracket bolts;
4.1.2 4 x M10, 50-75 mm long masonry anchor bolts for masonry wall-mount installations (section 0);
4.1.3 Spanner or socket to suit 0 above if applicable;
4.1.4 2 x sets of UC1 clamps for pole-mount installations (section 0). These clamps are suitable for pole diameters ranging from 20 mm to 75 mm;
4.1.5 2 x 18 mm spanners to suit 0 above if applicable;
4.1.6 Drills, PPE, torque wrench and other tools as deemed necessary for selected mounting method.

4.2 Wall Mounting Procedure

4.2.1 Choose the wall location noting the dimensions shown in Figure 1 &

Figure 2, and with consideration to the following:

4.2.1.1 Wall compatibility – The Edge Repeater, including wall mount bracket assemblies, should only be fixed to a solid wall (such as brick, block work, or concrete). Hollow cavity/cavity wall mounting is NOT recommended due to the weight of the Edge Repeater. Other methods utilising best industry practice should also be considered.

4.2.1.2 Connection cable clearances – The RF, power & optical (where fitted) connections are located on the bottom/feet end of the Edge Repeater and will need at least 300 mm of vertical clearance below the Edge Repeater to enable the connections to be made. The minimum bend radius for RF and optical (where fitted) cables must not be less than the recommendations made by the cable manufacturer. Plan the cable runs and ensure adequate space is available;

4.2.1.3 Front door opening - Ensure there is enough space at the front of the Edge Repeater to allow the front door to be fully opened and for maintenance personnel to obtain access to the Edge Repeater with interface or test equipment. Allow an additional 500 mm of space in front of the Edge Repeater when the door is fully open. Refer to relevant building codes if mounted internally.

4.2.2 Mark the mounting bolt drill hole centres on the wall. Note that the packing box accessory insert, when unfolded as shown in Figure 3, has the positions of the fixing bolts punched into the cardboard and may be used as a convenient template in this regard;

IMPORTANT!
Ensure there are no pipes or cables hidden in the wall behind the area to be drilled.

4.2.3 Drill the mounting bolt holes to a depth in accordance with the masonry anchor bolt manufacturer's recommendations, insert the bolts and mount the wall brackets with the orientation as shown in

Figure 2;

4.2.4 Lift and carefully place the repeater, with factory fitted M8 shoulder bolts, onto and in the M8 open slots of the top bracket. This is best done with 2 persons lifting the Edge Repeater and with the repeater slightly angled away from the wall at its base end;

4.2.5 Once the Edge Repeater is located on the top bracket, align all the other M8 fixing holes with the mounting bracket fixing holes and fit the M8 securing bolts, including spring washers, through the mounting bracket holes into the Edge Repeater, tightening to a torque of 17 Nm.

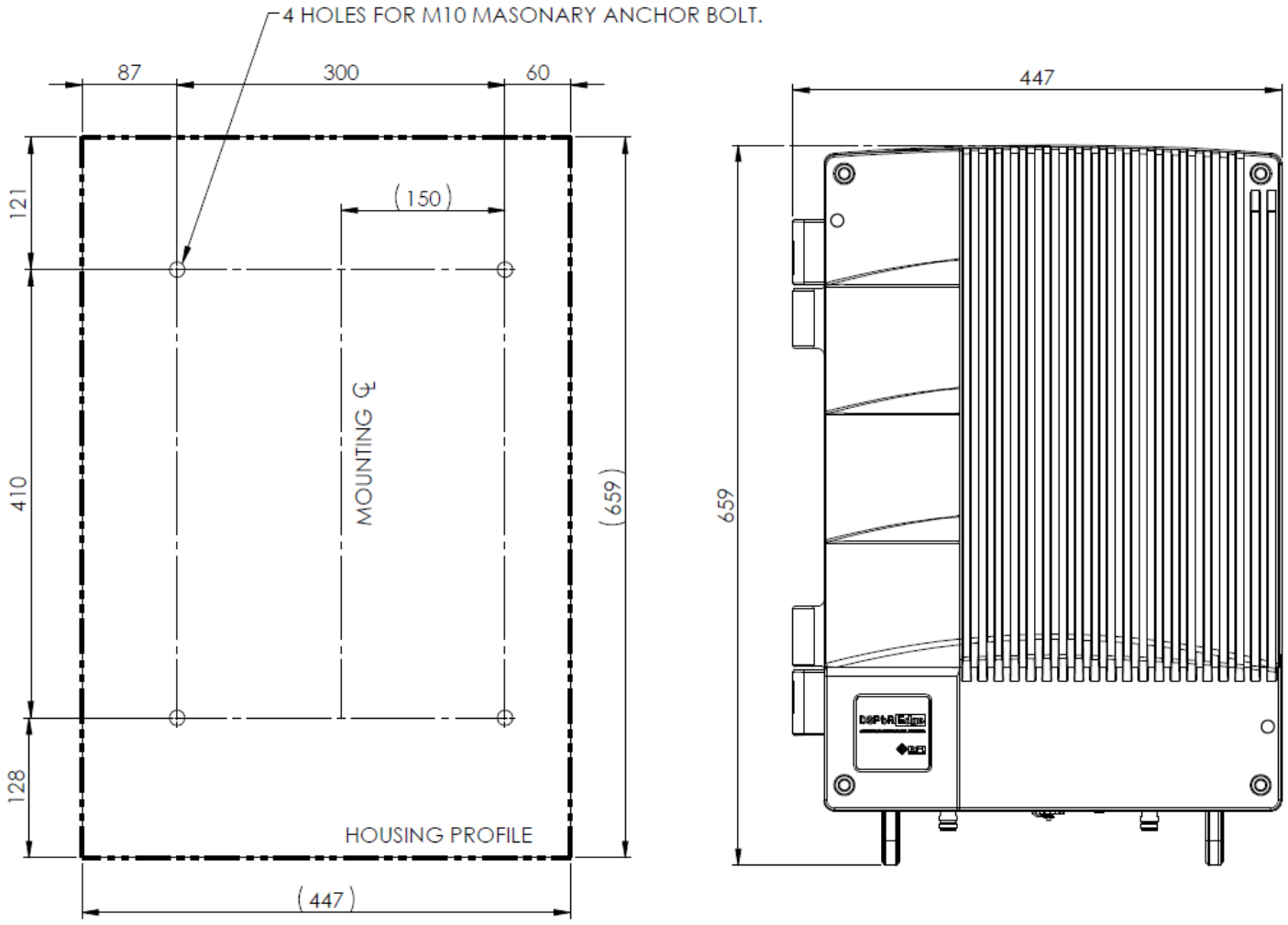


Figure 1: Wall mount fixing dimensions & centres and Edge Repeater front elevation view.

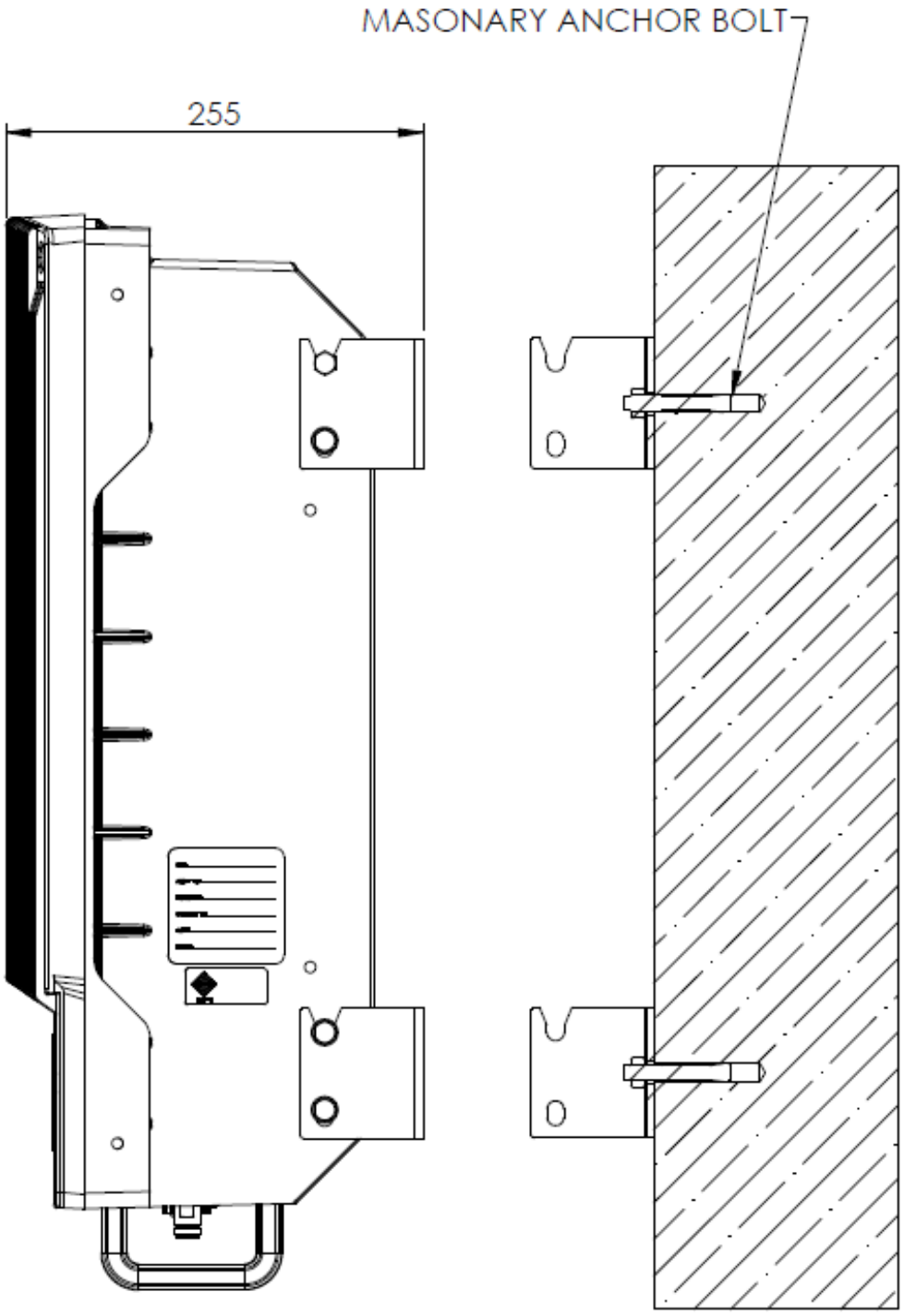


Figure 2: Edge Repeater wall mount side elevation view.

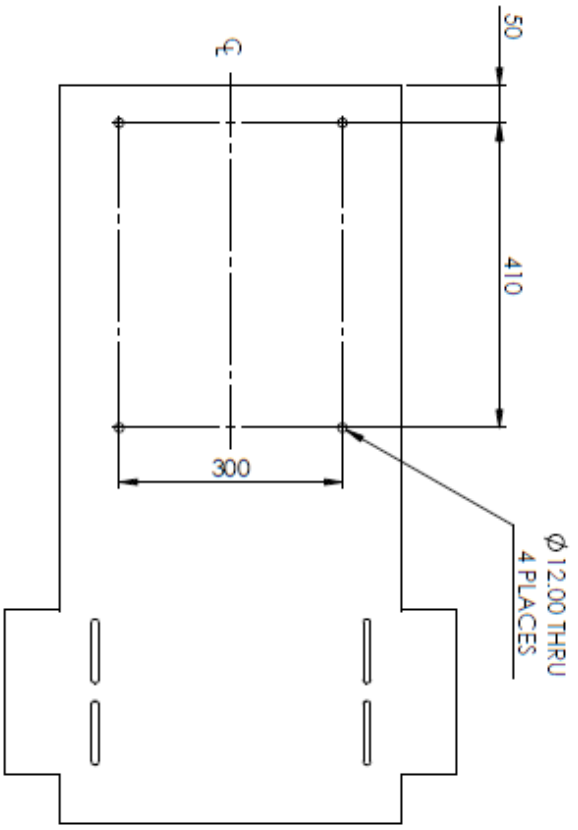


Figure 3: Wall mount bracket, bolt drilling hole alignment template - accessories insert.

4.3 Pole Mounting Procedure

NOTE!
For Wind Load Calculations the Effective Flat Plate Area of the Edge Repeater is 0.454 m².

4.3.1 The UC1 pole mounting brackets are designed to mount to poles with diameters from 20 mm to 75 mm.

4.3.2 Attach one of the Edge Repeater's mounting brackets to one of the UC1 pole-mount clamps using the clamp's components shown in Figure 4. Tighten the M12 bolts to a torque of 30 Nm;

4.3.3 Attach the mounting bracket and clamp assembly from 0 to the mounting pole as the top mounting bracket and clamp assembly, using the remaining components of the UC1 clamp assembly as shown in Figure 5 & Figure 6. Tighten the M12 bolts to a torque of 30 Nm;

4.3.4 Repeat 0 with the second Edge Repeater mounting bracket and second UC1 pole mount clamp;

4.3.5 Repeat 0 with the mounting bracket and clamp assembly from 0, this time positioning the assembly as the bottom mounting bracket and clamp assembly. Do not tighten the bolts at this stage in order to allow alignment adjustment of the bottom assembly with the Edge Repeater;

4.3.6 Lift and carefully place the repeater, with factory fitted M8 shoulder bolts, onto and in the M8 open slots of the top bracket. This is best done with 2 persons lifting the Edge Repeater and with the repeater slightly angled away from the pole at its base end;

4.3.7 Once the Edge Repeater is located on the top bracket, position the bottom mounting bracket and clamp assembly from 0 in order to align all the other M8 fixing holes with the mounting bracket fixing holes and fit the M8 securing bolts, including flat & spring washers, through the mounting bracket holes into the Edge Repeater, tightening to a torque of 17 Nm;

4.3.8 Tighten the bottom UC1 clamp assembly M12 bolts to a torque of 30 Nm after fastening all the M8 bolts in 0.

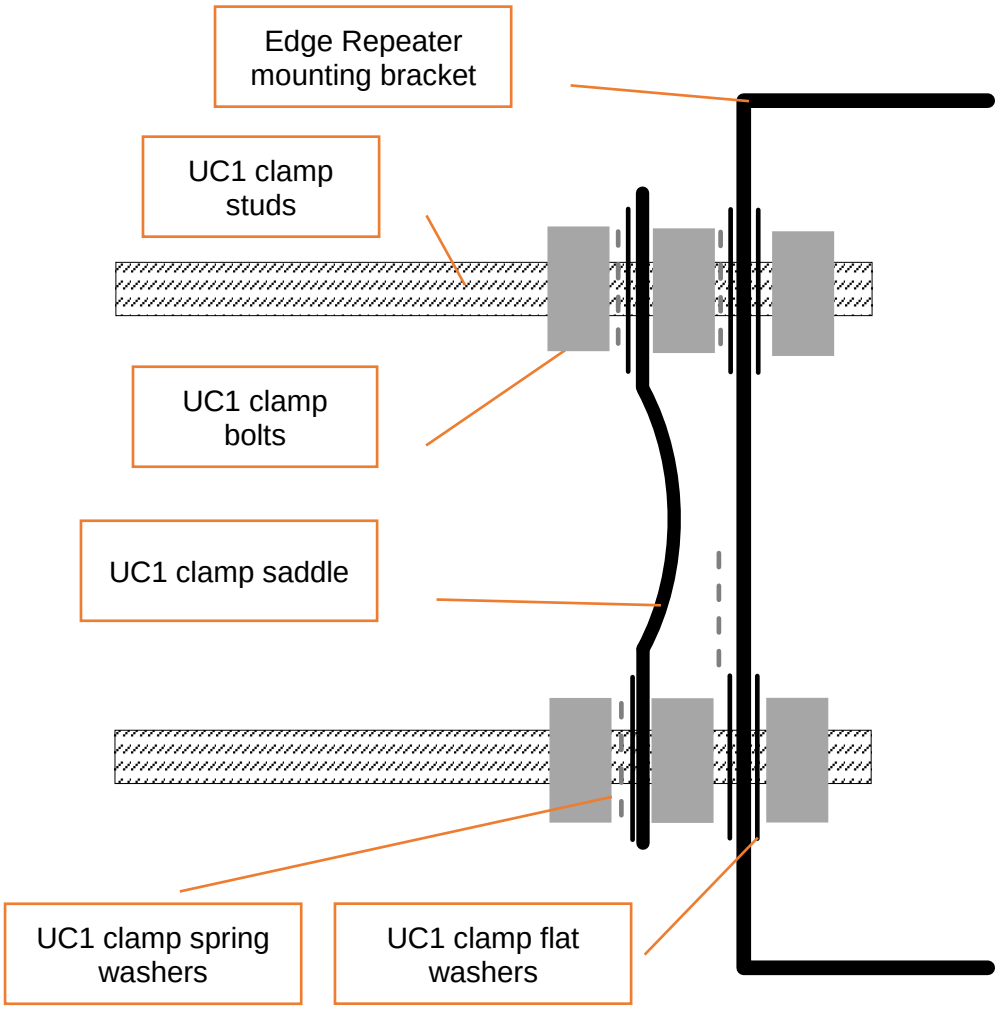


Figure 4: Plan view, Pole mount assembly step 0.

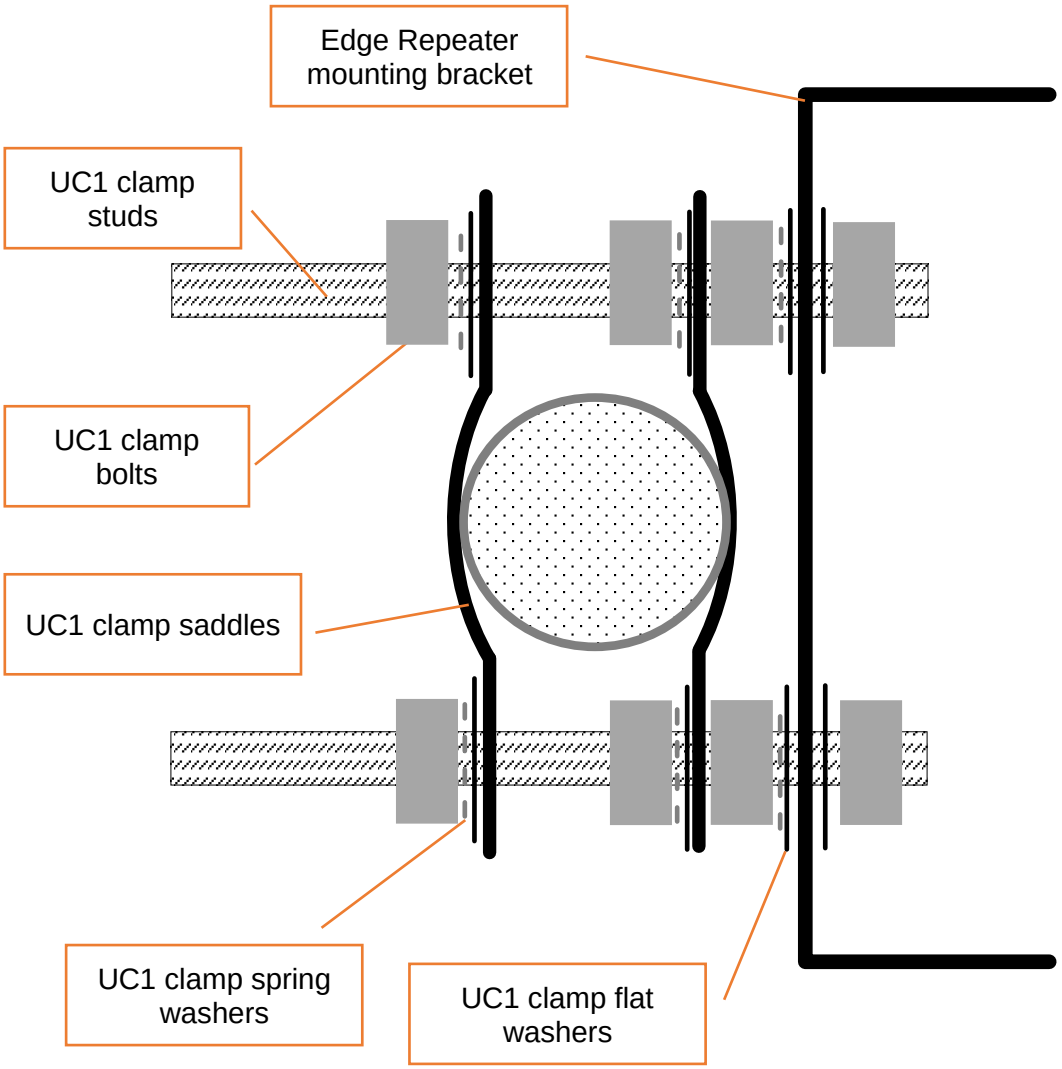


Figure 5: Plan view, Pole mount assembly step 0.

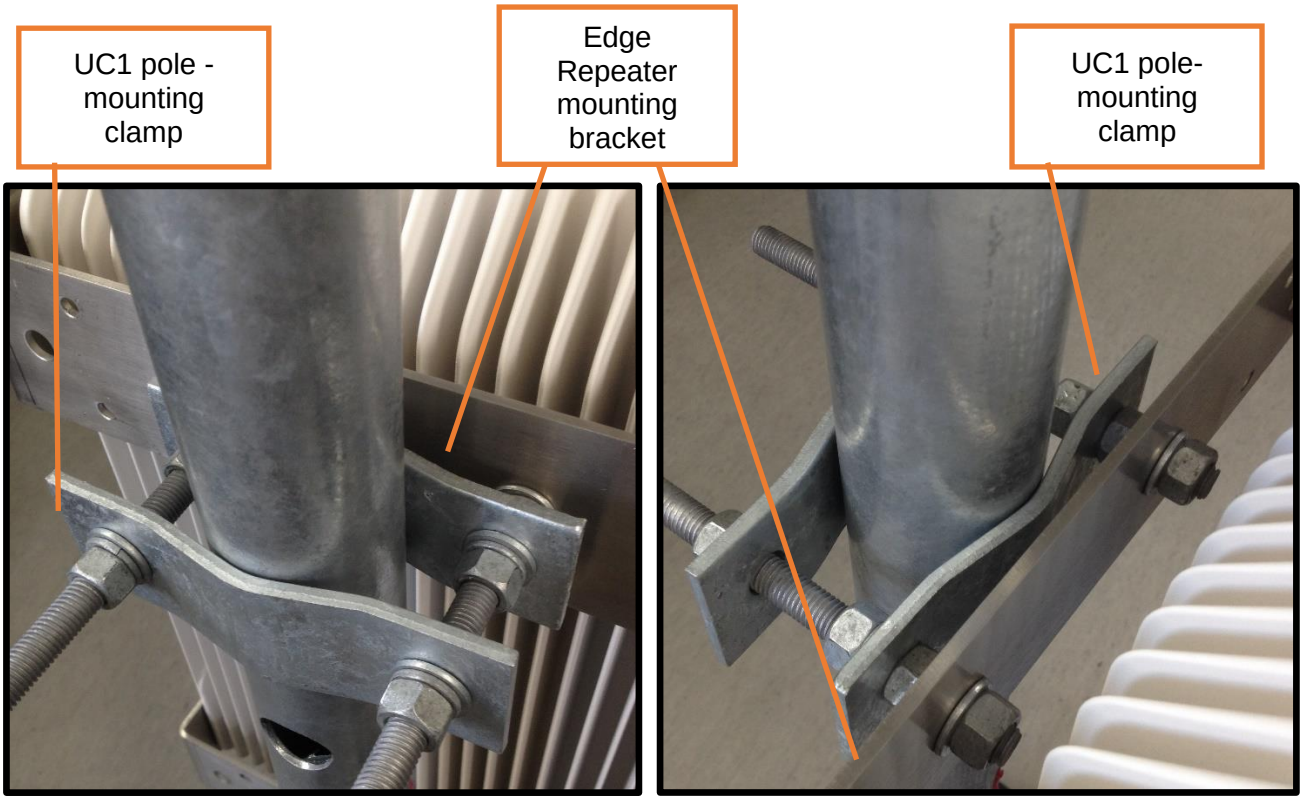


Figure 6: Pole mount bracket and clamp assembly.

5 INTERNAL RACK MOUNTING

The Edge Repeater is also suitable for indoor rack mounting installation. Due to the Edge Repeater's length a rack depth of 800 mm or greater is required to accommodate the Edge Repeater and associated cabling. The Edge Repeater should be bolted to a fixed heavy-duty (80 kg weight capability) flat rack shelf. Note that with the Edge Repeater located at the front of an 800 mm rack there is 200 mm of cabling room at the rear of the rack. For improved thermal performance it is recommended that a single wall mounting bracket be attached to the top of the Edge Repeater. Also note that the front door opening of the Edge Repeater can be restricted when it is mounted in a rack.

Figure 7: Edge Repeater rack mounted on a vented flat tray.

Figure 8: Raised end Edge Repeater rack mounted on a vented flat tray.

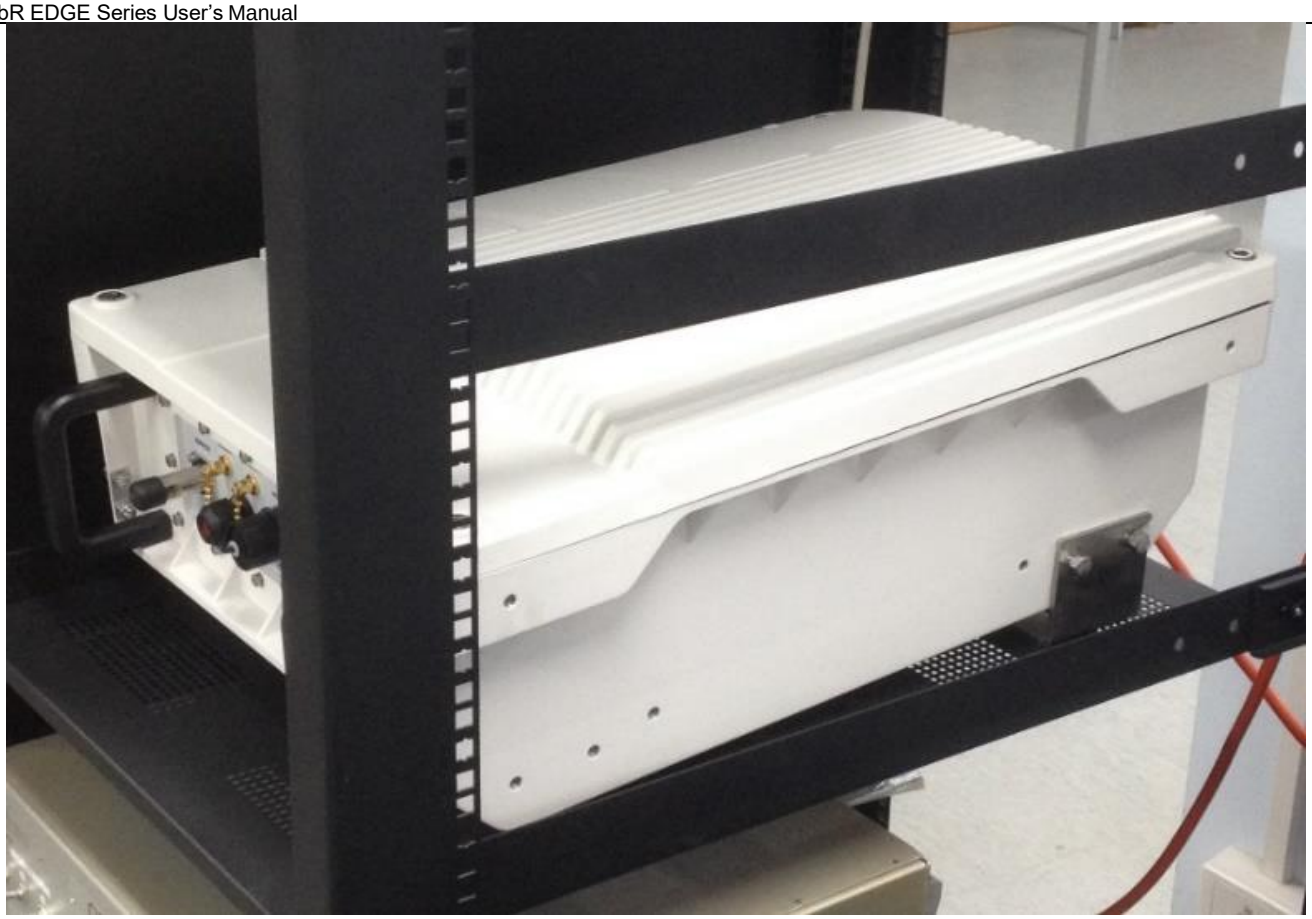


Figure 9: Raised end Edge Repeater rack mounted on a vented flat tray. Raised end using one wall mounting bracket for improved thermal convection air flow.

Appendix 1A - AC MAINS and DC POWER CONNECTOR CABLING ASSEMBLY INSTRUCTIONS

AC connector cabling

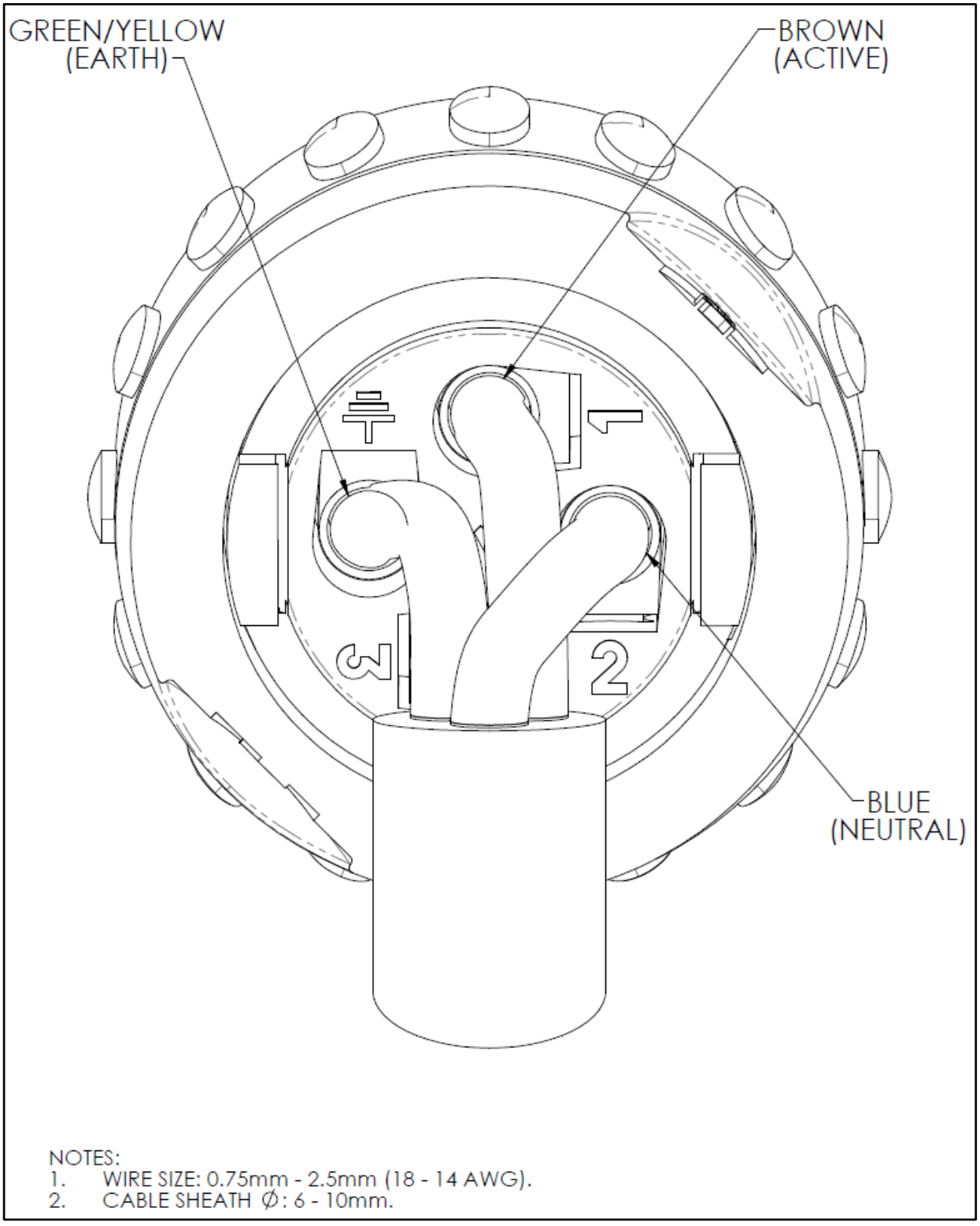


Figure 10: View from rear of connector.

DC connector cabling

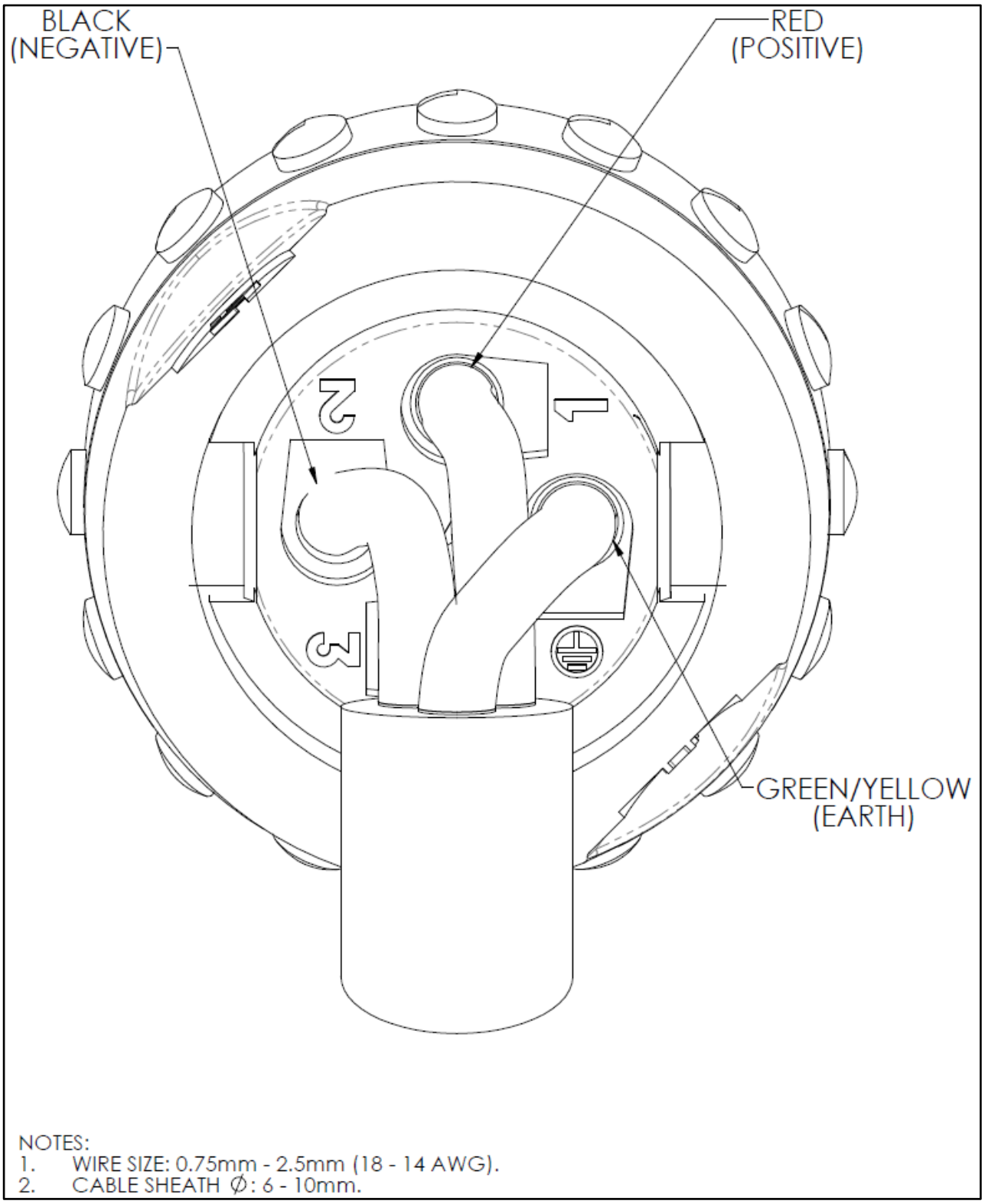


Figure 11: View from rear of connector.

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