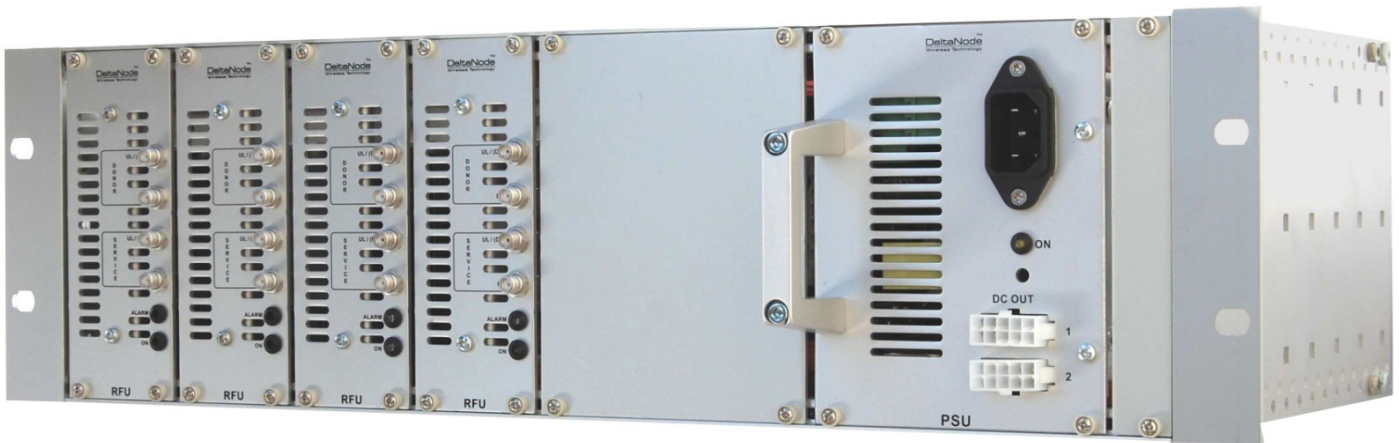


DeltaNode Solutions

DMR USER MANUAL



DeltaNodeTM
WIRELESS TECHNOLOGY
A Bird Technologies Company

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1 Introduction

This document contains quick guidelines on how to operate the DeltaNode DMR Repeater family and how to install, commission and maintain a Repeater unit.

The Rack Mount Repeater - DMR 400 Series is a medium power repeater for 19" rack mounting. It is developed for use in moving environments like trains and ships but can also be used in fixed multiband and multi operator indoor coverage solutions.

The DMR Repeater consists of a 19" Rack chassis, one or more Radio Frequency Unit (RFU)s, and a Power Supply Unit (PSU).

Standalone repeater applications can also be modified and used in the fiber DAS systems where base stations are not available for signal feeding to the system. In such cases DMR repeater is modified and equipped with a Fiber optical interface (FOI) inside the chassis.

2 DMR Operational Description

DeltaNode DMR 400 repeater series is a medium power radio repeater used in 19 inch rack mounted applications. The extremely light weight, convection fan cooled chassis secures the high quality performance in almost any environment.

DMR400 repeater can operate in the stand alone applications as well in the fiber fed DAS systems where the repeaters are used for off air feeding of the DAS network where Base stations are not available.

DMR400 Repeater unit series exists in a number of frequencies and system depended variants and rackmount chassis consists of following parts:

- Power supply Unit (PSU)
- Internal Duplex Filters (DPX) filtering Uplink and Downlink frequencies and necessary RF combiners depending on the Remote Unit configuration.
- Band selecting Repeater board.
- Optional- Remote Gateway unit (called RGW) used for remote access/configuration and alarm supervision

User has the possibility to set the following parameters in the Repeater unit via web based GUI application:

- Gain Values (UL & DL)
- Bandwidth (UL&DL)
- ALC threshold (UL & DL)
- Self-oscillation protection
- Gain Link symmetry-Gain trail (UL&DL)

3 DMR Specifications

GENERAL SPECIFICATIONS

Gain		50 - 80	dB in 1dB steps
Noise Figure		< 5	dB
Delay		< 6	µs
Power Supply (optional)	Mains	12 - 30	VDC
Power Supply	Mains	85 – 264	VAC or VDC
Power Consumption DC	12-28 V	< 35	W
Dimensions	WxDxH	10 TE x 220mm x 3U	
Weight (Module)		< 0,7	Kg
Weight (Frame)		2	Kg
Operating Temperature		-25 - +55	°C
Casing		IP42	
Environmental standard		50155	
Safety standard		IEC60950	
EMC standard		EN50121-3-2	
Vibration and shock standard		EN50155	EN61373

AVAILABLE PRODUCTS, AMERICAN CELLULAR

Product	System	UL Frequency MHz	DL Frequency MHz	Pout UL/DL, dBm	Standard
DMR404	700 UC	776 - 788	746 - 758	25	FCC
DMR405	700 LC	698 - 716	728 - 746	25	FCC
DMR407	iDEN	806 - 824	851 - 869	25	FCC
DMR408	Cellular	824 - 849	869 - 894	25	FCC
DMR419	PCS1900	1850 - 1915	1930 - 1995	25	FCC
DMR420	AWS	1710 - 1755	2110 - 2155	25	FCC

Note for Canada: DMR 404 700 UC Frequency is UL 777-787 MHz and DL 746-756 MHz

4 Installation guidelines

4.1 Health and Safety

DeltaNode Repeater system is an advanced system and should be handled by skilled staff. DeltaNode is offering training of installation service providers in the case where this is necessary.

Read all available documentation and warnings before handling the equipment! Equipment failures due to improper handling are normally not covered by the product warranty!

Respect all warning signs on the equipment and in the documentation. Make sure to only operate the equipment on frequencies allowed to use. **Do not modify the equipment!** The equipment may from case to case contain a Class 3B laser and the equipment is Class 1. **Never look into the Laser beam directly or indirectly, it is strong invisible light and may cause serious damage to human eyes!**



Always use protective hat on fiber (if used in the application) and connector end when fiber is removed from socket! Always clean socket and connector after a fiber has been removed before you re-attach it again!

WARNING

This is NOT a consumer device.

It is design 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. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

WARNING: This is NOT a CONSUMER device. It is designed for installation by an installer approved by an ISED licensee. You MUST have an ISED LICENCE or the express consent of an ISED licensee to operate this device.

AVERTISSEMENT : Ce produit N'EST PAS un appareil de CONSOMMATION. Il est conçu pour être installé par un installateur approuvé par un titulaire de licence d'ISDE. Pour utiliser cet appareil, vous DEVEZ détenir une LICENCE d'ISDE ou avoir obtenu le consentement exprès d'un titulaire de licence autorisé par ISDE.

Keep passwords and other operational information away from unauthorized personnel!

- DeltaNode Repeater system is an advanced technology system and should be handled by FCC Licensee or FCC approved staff.
- Read all documentation and warnings before handling the equipment.
- Obey all warning signs on the equipment and in documentation.
- The equipment may get hot during operation, do not operate outside permitted temperature range and keep away from heat sensitive material!
- The equipment contains ESD sensitive components. Open the equipment ONLY in a safe location designed for handling ESD products and use grounding devices! Opening the unit is not intended for field maintenance!
- The equipment contains ESD sensitive components. If not handled with care critical components may be damaged or destroyed. To avoid any damage due to ESD standard ESD precautions shall be used when handling the equipment.
- The product transmits RF signals keep away from Antennas and other radiating devices.
- Repeaters generate radio signals which are transmitted by the connected antennas. Installations should always be done so that the radiation exposure doesn't exceed the recommendation set up by local authorities.
- Consult a FCC licensee or other applicable regulation body for details on RF requirements and safety issues on RF!
- Electrical installation shall be done in accordance with local safety regulations and laws.
- Make sure to use the equipment only in its intended applications and on the allowed frequencies.
- Avoid overheating by avoiding sunlight exposure!

4.2 Installing the DMR Repeater Unit

The DMR Chassis is a medium power repeater designed for 19" rack mounting. The Chassis is secured to the rack by four screws.

The chassis of the repeater should be grounded to a potential bar or safety grounding bar when operated.

All electrical installations should be done by an FCC Licensee or/and a certified electrician only!

RF Exposure Warning/Avertissement d'exposition RF

The DMR404, DMR405, DMR408 DL antenna(s) shall be installed to provide a separation distance of at least 7.5 m from nearby persons and the maximum DL antenna gain is 37 dBi for DMR404, DMR405 and 34 dBi for DMR408.

The DMR404, DMR405, DMR408 UL antenna(s) shall be installed to provide a separation distance of at least 7.5 m from nearby persons and the maximum UL antenna gain is 37 dBi for DMR404, DMR405 and 34 dBi for DMR408.

The DMR419, DMR420 DL antenna(s) shall be installed to provide a separation distance of at least 5.5 m from nearby persons and the maximum DL antenna gain is 37 dBi.

The DMR419, DMR420 UL antenna(s) shall be installed to provide a separation distance of at least 0.2 m from nearby persons and the maximum UL antenna gain is 8 dBi for DMR419 and 5 dBi for DMR420.

L'antenne (s) DMR404, DMR405, DMR408 DL doit être installée pour fournir une distance de séparation d'au moins 7,5 m des personnes voisines et le gain d'antenne DL maximum est 37 dBi pour DMR404, DMR405 et 34 dBi pour DMR408. les antennes DMR404, DMR405, DMR408 UL doivent être installées pour fournir une distance de séparation d'au moins 7,5 m des personnes voisines et le gain d'antenne UL maximal est 37 dBi pour DMR404, DMR405 et 34 dBi pour DMR408. l'antenne (s) DMR419, DMR420 DL doit être installée pour fournir une distance de séparation d'au moins 5,5 m de n et le gain maximal de l'antenne DL est de 37 dBi. l'antenne (s) DMR419, DMR420 UL doit être installée pour fournir une distance de séparation d'au moins 0,2 m des personnes voisines et le gain d'antenne UL maximal est de 8 dBi pour DMR419 et 5 dBi pour DMR420.

The number of bands supported by the DMR Repeater unit will determine how many RFUs are installed in the chassis. The Chassis is mounted in the rack as shown in figure 1.

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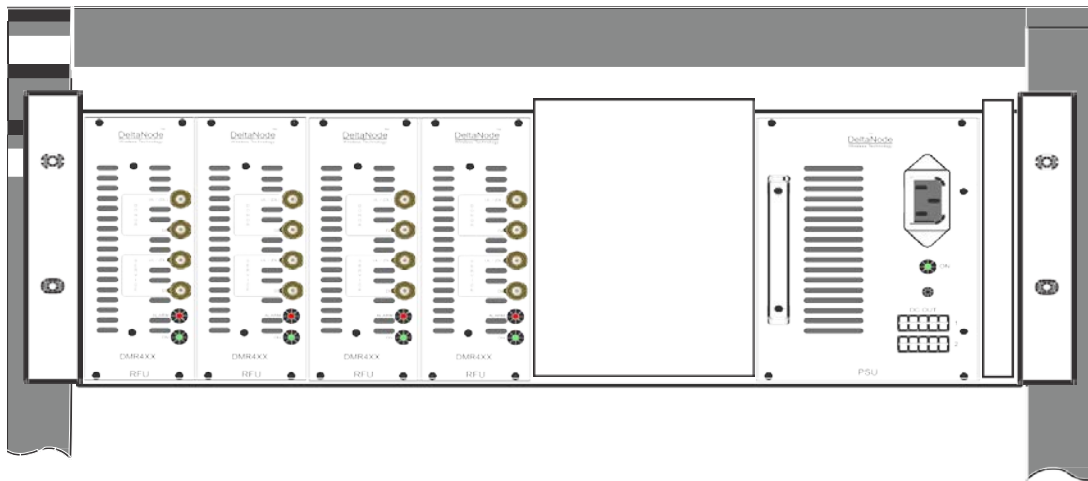


Figure 1. DMR Rack Mounted Chassis

4.2.1 Antenna Connections

Connectors and connections of the DMR RFU are shown in figure 2.

Service and Donor Antenna jumpers are connected to the SMA connectors on the RFU.

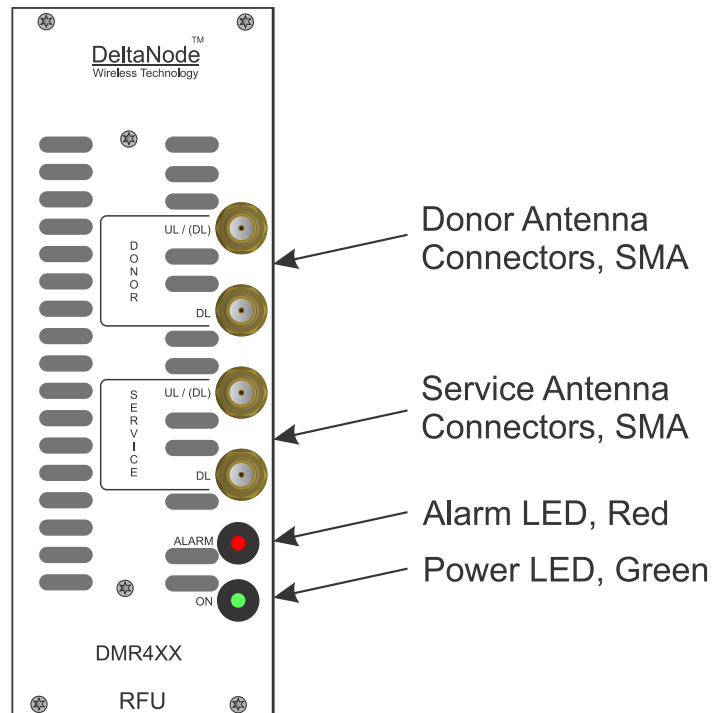


Figure 2. Connections on the RFU

If a DMR repeater unit is used for feeding the fiber optic DAS system where a base station is not provided, then the fibers should be connected to an optional Fiber-Optic Interface (FOI) Unit. The FOI would then be connected to the RFU with coax cable.

4.2.2 Power AC

All electrical installations should be done by an FCC Licensee or/and a certified electrician only!

WARNING

This is NOT a consumer device.

It is design 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. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

WARNING: This is NOT a CONSUMER device. It is designed for installation by an installer approved by an ISED licensee. You MUST have an ISED LICENCE or the express consent of an ISED licensee to operate this device.

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Connectors and connections of the DMR PSU are shown in figure 3.

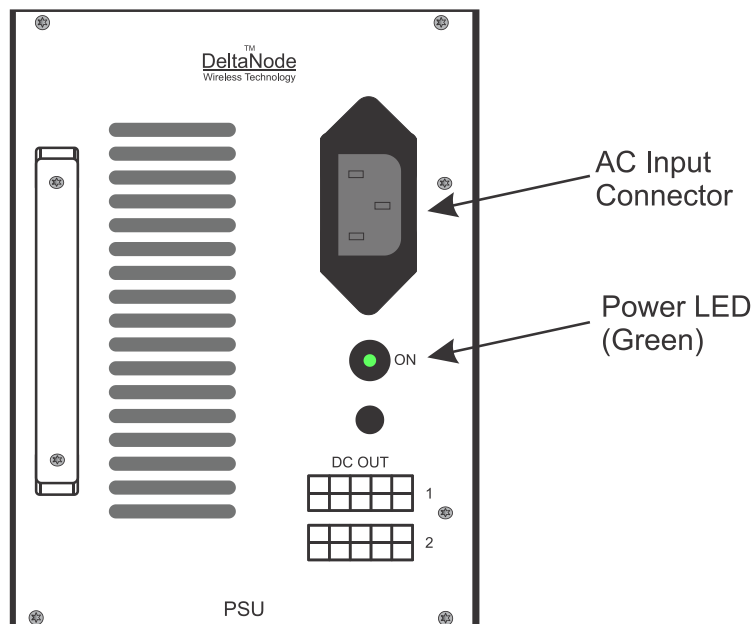


Figure 3. DMR Power Supply Unit

5 DMR Repeater Commissioning

After the successful mounting installation and powering of the DMR Repeater, user can now start commissioning the Repeater unit.

Accessing the DMR Repeater units is through the Remote Station Gateway (RGW).

Login and access information such as username and passwords are provided separately by DeltaNode application engineers.

5.1 Commissioning using Remote Gateway (RGW)

DeltaNode DMR Repeater units are equipped with an RGW. The RGW is basically a PC/server used for handling multiple units, alarm management, remote access, commissioning and configurations.

Follow the steps below to set up the repeater network. RGW uses a secure protocol and its IP is by factory default set to use 192.168.0.2 IP address.

After configuring the PC to use the static IP, open the Web browser and enter the following:

<https://192.168.0.2>

Log into the RGW with the username and password provided by DeltaNode application engineering.



When logged in, navigate to the **configuration menu** and put the managed repeater unit into the **DNS** of the **RGW**. See pictures below for reference.

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ACK	SEQ	HOST	A LEVEL	Date Time (MST)	AID	Cts	Inst	Anum	MESSAGE
✓	1588	rgw-000db93973a8	Critical	2015-11-19 04:52:26	65553	rgw	0	17	Node supervision not functional RGW-000DB93973A8
✓	1587	rgw-000db93973a8	Critical	2015-11-19 04:50:18	65537	rgw	0	1	RGW Started. 0
✓	1586	rgw-000db93973a8	Critical	2015-11-16 03:59:49	65553	rgw	0	17	Node supervision not functional RGW-000DB93973A8
✓	1585	spl-001a2600400a	Critical	2015-11-16 03:57:49	65552	rgw	0	16	Node lost SPI-001A2600400A.RGW.NET
✓	1584	spl-001a2600400a	Error	2015-11-16 03:49:28	33554758	spl	1	70	Output power low, Down, Handle:5, 52 dB
✓	1583	spl-001a2600400a	Critical	2015-11-16 03:43:53	33554758	spl	1	70	Output power low, Down, Handle:5, 52 dB
✓	1582	spl-001a2600400a	Error	2015-11-16 03:14:09	33554758	spl	1	70	Output power low, Down, Handle:5, 52 dB
✓	1581	spl-001a2600400a	Critical	2015-11-16 03:13:02	33554759	spl	1	71	Gain adjust or signal block, Down, Handle:5, 769 dB
✓	1580	spl-001a2600400a	Critical	2015-11-16 03:13:02	33554759	spl	1	71	Gain adjust or signal block, Down, Handle:4, 201 dB
✓	1579	rgw-000db93973a8	Critical	2015-11-16 02:56:36	65537	rgw	0	1	RGW Started. 0
✓	1578	spl-001a2600400a	Critical	2015-10-16 13:19:58	33554759	spl	1	71	Gain adjust or signal block, Down, Handle:4, 201 dB
✓	1577	spl-001a2600400a	Critical	2015-10-16 13:10:55	65554	rgw	0	18	Node not lost any more SPI-001A2600400A.RGW.NET
✓	1576	rgw-000db93973a8	Critical	2015-10-16 13:04:46	65537	rgw	0	1	RGW Started. 0
✓	1575	rgw-000db93973a8	Critical	2015-10-16 12:52:51	65537	rgw	0	1	RGW Started. 0
✓	1574	rgw-000db93973a8	Critical	2015-10-16 09:01:36	65553	rgw	0	17	Node supervision not functional RGW-000DB93973A8
✓	1573	spl-001a2600400a	Critical	2015-10-16 08:59:36	65552	rgw	0	16	Node lost SPI-001A2600400A.RGW.NET
✓	1572	spl-001a2600400a	Critical	2015-10-16 08:54:57	33554759	spl	1	71	Gain adjust or signal block, Down, Handle:6, 200 dB
✓	1571	spl-001a2600400a	Critical	2015-10-16 08:54:57	33554759	spl	1	71	Gain adjust or signal block, Down, Handle:5, 201 dB
✓	1570	spl-001a2600400a	Critical	2015-10-16 07:59:32	33554759	spl	1	71	Gain adjust or signal block, Down, Handle:4, 201 dB
✓	1569	spl-001a2600400a	Critical	2015-10-16 07:59:03	33554759	spl	1	71	Gain adjust or signal block, Down, Handle:4, 201 dB

Updated: Thursday 2015-11-19 04:56:31 (MST)

When in configuration menu, click on the **DLR/DMR/DHR- xxx** option. Move the managed **DLR/DMR/DHR** unit from **NOT USED** window to **DLR/DMR/DHR- xxx** in the **system** window and press **Submit**.

RGW-000DB93973A8 GateWay

Home Network views RF Units Alarms Status/Statistics Configuration

Manage DAS Nodes that should be in the system and All view

CCU BIU/DBI FOU/DOI FOR/RU Local FOR DTR-xxx DLR/DMR/DHR-xxx PIR-xxx

DLR/DMR/DHR-xxx - not used

SPI-001A2600400A.RGW.NET

DLR/DMR/DHR-xxx in system

>> << All >> All <<

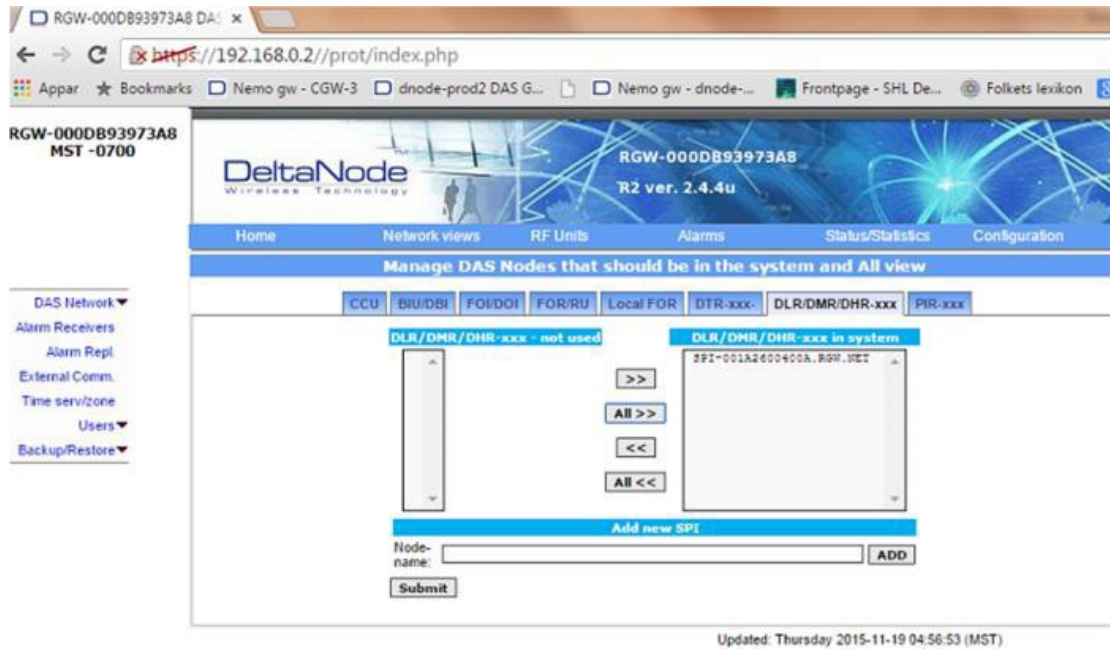
Add new SPI

Node name: ADD

Submit

Updated: Thursday 2015-11-19 04:56:53 (MST)

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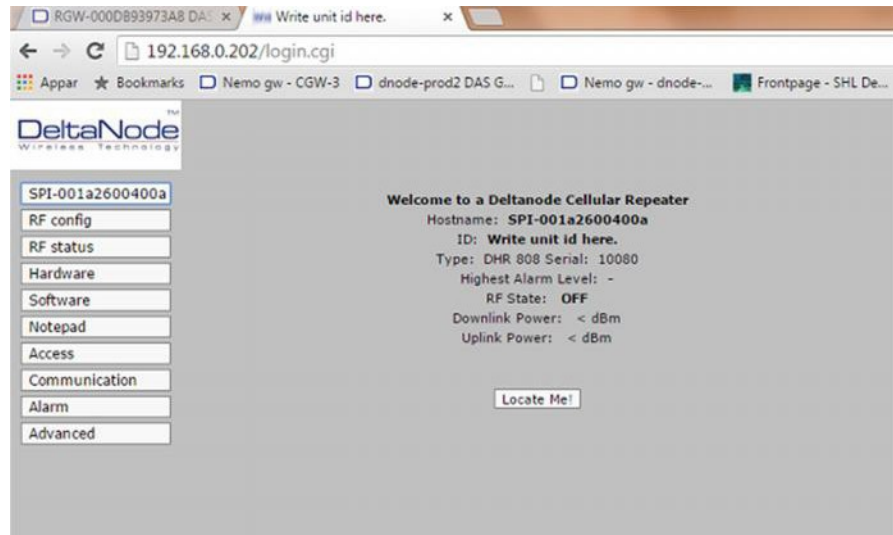
Now the managed Repeater unit has been added to the RGW DNS.

Navigate to the **Network views** menu and log into the managed repeater unit by clicking on it.

See picture below for reference.



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When logged into the managed repeater, the user can now begin with commissioning of the managed repeater unit.

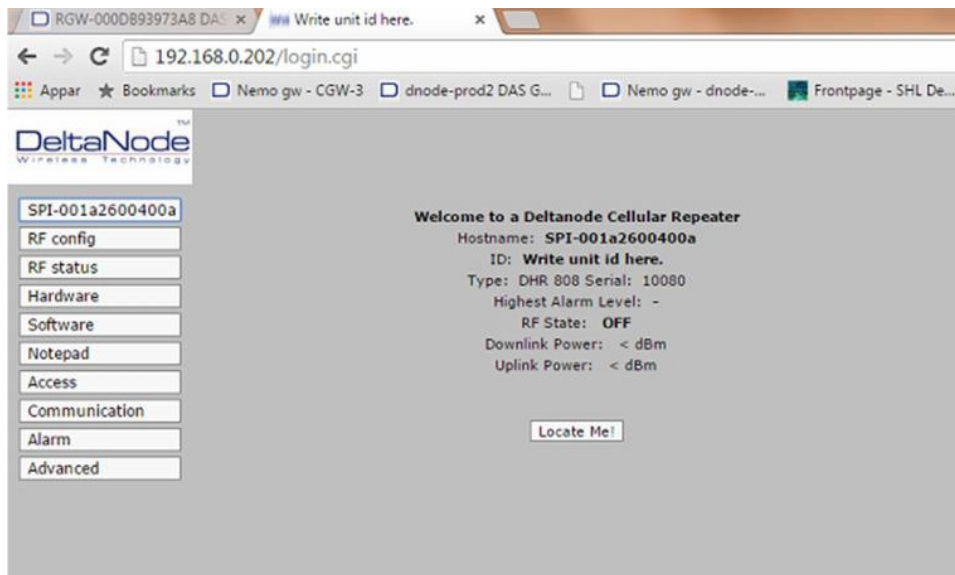
5.2 Repeater commissioning locally

5.2.1 Login

Log into the RGW with the username and password provided by DeltaNode application engineering.

5.2.2 Home page

When logged into the repeater, home page is displayed, showing the factory default name of the repeater, which is basically a unique MAC ID of the actual repeater, article and serial number, RF state (OFF/ON), and the current output power of the repeater. On the left hand side are the different configuration menu's.



5.2.3 RF Config

DeltaNode
Wireless Technology

SPI-001a2600400a

RF config

RF status

Hardware

Software

Notepad

Access

Communication

Alarm

Advanced

Downlink

Parameter	Current value:	New value:	Unit:
Gain	70.0		dB
Start frequency	870.000000		MHz
Stop frequency	885.000000		MHz
ALC level	30.0		dBm

Uplink

Parameter	Current value:	New value:	Unit:
Gain	70.0		dB
ALC level	25.0		dBm

Set RF on: ☐ or off: ☒

Submit

Get

Advanced

RF Config menu contains configuration fields for setting the **Gain, ALC level, frequency band** and the **bandwidth** of the actual DMR Repeater unit.

Gain and **ALC** level can be set for **Downlink** and **Uplink** separately. The resolution in setting is adjustable by the 0, 1 dB.

As mentioned the DMR Repeater unit has the **adjustable bandwidth**. User can set the Downlink start and stop frequency path. The uplink path uses a fix duplex distance.

The threshold for the **Automatic Level Control (ALC)** is set in dBm for downlink and uplink respectively. The ALC feature controls the gain of the repeater so that the output power never ends up in exceeding the actual set level of the output power.

When changing any parameters a submit button must be pressed in order to send the data to the repeater. Get button reads current set parameters.

If a different parameter (other than the specified validation range) is entered and submitted, an Error message will be displayed on the right hand side of the configuration fields. Error message will even show the valid range of the actual parameter.

5.2.4 Advanced RF Config

Advanced mode in **RF config** menu gives user a possibility to control and fine tune the **frequency band edges**, set up **link symmetry**, and **self-oscillation** protection.

The screenshot displays the DeltaNode Advanced RF Config web interface. The browser address bar shows the URL <https://192.168.0.2/prot/spi/SPI-001A2600400A/>. The interface includes a sidebar with navigation links: SPI-001a2600400a, RF config, RF status, Hardware, Software, Notepad, Access, Communication, Alarm, and Advanced. The main content area is divided into sections for Downlink and Uplink configuration.

Downlink Configuration:

Parameter	Current value:	New value:	Unit:
Low band edge adjust	0.000		kHz
High band edge adjust	0.000		kHz

Uplink Configuration:

Parameter	Current value:	New value:	Unit:
Low band edge adjust	0.000		kHz
High band edge adjust	0.000		kHz

Set link symmetry on: ☐ or off: ☐

Submit Get

Self Oscillation Detection Configuration:

Downlink:

Parameter	Current value:	New value:	Unit:
Stability margin	10.0		dB
Recovery time	30		secs
Recovery margin	10.0		dB

Set downlink oscillation protection on: ☐ or off: ☐

Uplink:

Parameter	Current value:	New value:	Unit:
Stability margin	10.0		dB
Recovery time	30		secs
Recovery margin	10.0		dB

Set uplink oscillation protection on: ☐ or off: ☐

Submit

Band edges control gives user a possibility to fine tune the set band width with **0-100 kHz** up or down of the actual set frequency band.

Link symmetry is a function that is mainly developed for usage in moving application setups, like in-train, boats for example. What it does basically is that UL gain is controlled by the DL gain. When this feature is activated, the repeater will reduce the gain in UL as in DL with the same symmetrical pattern. The UL gain is determined by the actual automatically controlled gain used in DL. The originally set gain difference between Uplink and Downlink is kept as originally set.

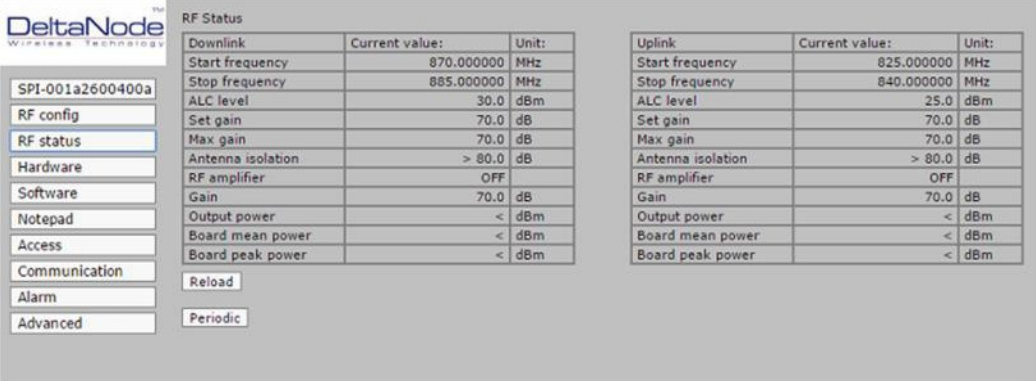
Link symmetry feature is used to minimize the amount of Noise level to the BTS and is developed mainly for moving applications as mentioned above such as trains, boats for example when/if the signal from the BTS fluctuates.

Self-oscillation protection is a function for detection of eventual issues/problems related to the **Antenna isolation** between **Service** and **Donor** Antenna's. In case of **low isolation** between the two antennas (**Service & Donor**) the repeater will begin to **self-oscillate** in the usual manner, but however self-oscillation protection in this case will immediately intervene and lower the gain to a safe level equal to the isolation minus the stability margin. There are separate settings for UL and DL respectively;

- **ON/OFF**
- **Stability margin.** The value set of how much lower the gain should be than the calculated isolation in case of issues with the isolation between the antennas. Range of this value is from 0.0 – 20 dB.
- **Recovery time.** This is the time limit before the repeater tries to reset the gain to the originally actual set gain in **RF config**. Range for the recovery time is between 30 – 86400 seconds.
- **Recovery margin.** Set value of gain level above the actual set gain (specified in RF config) that is used when the repeater recovers after the **Recovery time**. Range is between 0.0 – 20.0 dB.

5.2.5 RF Status

Generally this menu gives a current status overview for both of the links in the repeater.



The screenshot shows the DeltaNode RF Status menu. On the left is a sidebar with navigation options: SPI-001a2600400a, RF config, RF status (selected), Hardware, Software, Notepad, Access, Communication, Alarm, and Advanced. The main area is titled 'RF Status' and contains two tables for Downlink and Uplink parameters. Below the tables are 'Reload' and 'Periodic' buttons.

Downlink			Uplink		
	Current value:	Unit:		Current value:	Unit:
Start frequency	870.000000	MHz	Start frequency	825.000000	MHz
Stop frequency	885.000000	MHz	Stop frequency	840.000000	MHz
ALC level	30.0	dBm	ALC level	25.0	dBm
Set gain	70.0	dB	Set gain	70.0	dB
Max gain	70.0	dB	Max gain	70.0	dB
Antenna isolation	> 80.0	dB	Antenna isolation	> 80.0	dB
RF amplifier	OFF		RF amplifier	OFF	
Gain	70.0	dB	Gain	70.0	dB
Output power	<	dBm	Output power	<	dBm
Board mean power	<	dBm	Board mean power	<	dBm
Board peak power	<	dBm	Board peak power	<	dBm

Start and stop frequency of both UL and DL are displayed in the first field as seen in the above screenshot.

Set gain is the gain value defined and set by the user. **Max gain** is the parameter that ALC and other algorithms, such as the link symmetry feature and antenna oscillation detection, define/set. It is the current maximum gain of the repeater.

For example, if the antenna oscillation detection algorithm detects antenna isolation issues, Max gain will be automatically reduced to a new calculated value. The operation is performed as Antenna isolation minus set stability margin, which in that case is lower than the set gain. **Gain** field reflects the actual gain value set by the user.

If by any chance antenna isolation is an issue while commissioning for example, the field for antenna isolation will display a certain value measured in dB, and the alarm will be generated. Gain will be automatically reduced with a certain margin in respect to the Antenna isolation.

For example, if the displayed Antenna isolation value is >90dB, then there should be no problem.

Automatic Level Control (ALC) threshold are also displayed and shown in tenths of a dBm. If the set gain differs from the Max gain for example, this a sign that the ALC is active.

Output power field is displaying RMS power of the repeater measured at the antenna port. Different modulation waveforms might have a slight impact on the measured value at the antenna port.

User has a possibility also to set up a **periodic mode**. The window will collect and update the data displayed every two seconds.

5.2.6 Software

Software menu displays the actual application **SW version**, **fallback application**, **boot loader version**, **serial and article numbers**, **dates of manufacturing** of the unit and its board units used in the actual repeater product.

The screenshot shows the DeltaNode web interface with the 'Software' menu selected. The interface is divided into several sections:

- Left Sidebar:** Contains navigation links: SPI-001a2600400a, RF config, RF status, Hardware, **Software** (highlighted), Notepad, Access, Communication, Alarm, and Advanced.
- Software versions:** A table showing the following data:

Software:	Version:
Current application:	AF001001 Rev: 2.7.3p 2015-01-20 17:29:01
Primary application:	AF001001 Rev: 2.7.3p 2015-01-20 17:29:01
Fallback application:	AF001001 Rev: 2.6.13 2013-09-12 10:08:19
Boot loader:	BF001001 version 1.3.3
- Buttons:** 'Start download of this file:', 'Valj fil' (disabled), and 'Ingen fil har valts' (disabled).
- Choose primary application:** Two radio buttons are shown. The first is selected and labeled 'AF001001 Rev: 2.7.3p 2015-01-20 17:29:01'. The second is labeled '(Fallback application)' and is associated with 'AF001001 Rev: 2.6.13 2013-09-12 10:08:19'. Below these are 'Set' and 'Reboot' buttons.
- Hardware versions:** A table showing the following data:

Unit:	Version:	Serial number:
Complete unit:	DHR 808	10080
Main board:	KS31.4 R1A	LH00117 2014w48
Connection board:	KS21.1 R4A	LH00587 2014w48
- Subunits:** A table showing the following data:

Downlink PA:	Version:
Software:	Version:
Current application:	AF002003 0.3.0 PA-GaAs 2014-03-12 12:38:50
Loaded in eeprom:	AF002003 0.3.0 PA-GaAs 2014-03-12 12:38:50
Boot loader:	BF002003 0.0.1 Boot PA-GaAs 2008-02-20 15:12:39
Hardware:	Version:
HW Version:	KS28.8 R1D 2014W46 DH00168
HW Version digital:	02/01 rev 0.003 2014W46 0002:00168

When logged in **Extended** user mode, there are allowed possibilities for Software upgrades, changing of current application versions, and Reboot option. All actions such as SW upgrades and application version swap require a command **Set** which must be followed by a **reboot** of the repeater in order for the changes to properly apply.

5.2.7 Notepad

Notepad menu is basically a small scratch pad for text. It is stored in a non-volatile memory. It is meant to be used as a feature to enter notes about the installation, repeater unit, commissioning etc. Maximum allowed character number is 255.

5.2.8 Access

In Access menu, user has the possibility to define other passwords for the 2 different level accesses, **Extended** and **Normal**.

When using the **Extended** level access, there a number of extra parameters and features displayed and allowance for change. **Extended** level can be explained as administrator access level, while the **Normal** access level can be defined as a light version access level.

5.2.9 Communication

Communication menu contains a number of settings the user has a possibility to define the communication with the repeater. Ethernet IP addresses, MAC ID are displayed.

User has three options for the IP configuration settings.

- Static- IP address that is manually defined by the user.
- Default- IP address is set to the factory default address, 192.168.0.202
- Automatic. IP address is provided by a DHCP server. This option is used only when the Remote Gateway (RGW) is optionally used in the actual repeater.

User has a possibility to change the hostname and the Unit ID of the repeater. Unit ID is the name of the repeater seen in the web interface.

This change must be manually set which follows by a reboot command in order for the change to take place.

The screenshot displays the 'Communication parameters' web page for a DeltaNode device. On the left is a sidebar menu with options: SPI-001a2600400a, RF config, RF status, Hardware, Software, Notepad, Access, Communication (highlighted), Alarm, and Advanced. The main content area is titled 'Communication parameters' and contains several configuration sections:

- Ethernet address:** 00:1a:26:00:40:0a
- IP address:** 192.168.13.66
- IP address config table:**

Parameter:	Current value:	New value:	Info:
IP address config			
☐ static:	192.168.0.202		
☐ default:	192.168.0.202		
☐ automatic:			
Gateway:	0.0.0.0		
Network mask:	255.255.255.0		
- Hostname:** SPI-001a2600400a
- New hostname:** [Text input field]
- Buttons:** Set parameters, Reboot
- Unit id:** Write unit id here.
- New id:** [Text input field]
- Save new unit id** button
- Automatic configuration by DHCP server:**

Host IP address	192.168.13.66
RIP (Gateway)	192.168.13.1
Network mask	255.255.255.0
DNS	192.168.13.1
NIS	192.168.13.1
NTP	192.168.13.1
Syslog / Alarm receiver	192.168.13.1
Lease time:	86400 s
T1:	43200 s
T2:	75600 s

5.2.10 Alarms

Alarm log clearly displays all alarm events in the repeater. The log itself is located in volatile memory and is cleared every time the repeater is restarted/ rebooted.

There are three levels of severity defined in the repeater.

- Warning
- Error
- Critical

All alarms can be forwarded to external alarm receiver. In order to forward the alarms from the repeater, **syslog UDP port 514** must be used and the correct IP address of external receiver must be defined. This change as every other mentioned in previous chapters must be manually **Set** and the repeater must be rebooted in order for the changes to apply.

The receiver IP address might be changed automatically by the DHCP server if a Remote Gateway (RGW) is used.

DeltaNode Wireless Technology

SPI-001a2600400a

RF config

RF status

Hardware

Software

Notepad

Access

Communication

Alarm

Advanced

Alarm register:

Nbr:	Alarm text:	Handle:	Select:
1	-	-	☐
2	-	-	☐
3	-	-	☐
4	-	-	☐
5	-	-	☐
6	-	-	☐
7	-	-	☐
8	-	-	☐

Reload View previous Ack Delete

Alarm reset

Clear all

Current time, UTC:	Thu Nov 19 12:18:14 2015
Uptime:	0 days 0 hours 15 minutes 43 seconds
Current Alarm level:	-
Alarm counter for critical level:	0
Alarm counter for error level:	0
Alarm counter for warning level:	0

Alarm receiver: 192.168.0.1

The DHCP may automatically override this setting. See Communications page

Set

Advanced alarm config

In the alarm menu is also a feature called **advanced alarm config**, where user has the possibility define the alarm power levels of UL and DL respectively, and the time out function for these. Further on the user has possibility to define the ALC gain reduction thresholds.

In case of where external alarm relay is used in combination with the repeater the user has the possibility to define own descriptions of External alarms generated by the repeater.

User can even generate the **Test Alarm** in order to test either **External Alarm** functionality or alarm forwarding feature.

There are even some cosmetic possibilities like **LED intensity** and **LED style** available for user to change if required.

DELTANODE DMR USER MANUAL

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Wireless Technology

SPI-001a2600400a

RF config

RF status

Hardware

Software

Notepad

Access

Communication

Alarm

Advanced

Downlink tx supervision

Parameter	Current value:	New value:	Unit:	
Tx power threshold	15.0		dBm	
Tx power timeout	60		secs.	

Set downlink output power supervision on: ☒ or off: ☐

Uplink tx supervision

Parameter	Current value:	New value:	Unit:	
Tx power threshold	0.0		dBm	
Tx power timeout	60		secs.	

Set uplink output power supervision on: ☐ or off: ☒

Config tx supervision

Downlink ALC alarm configuration

Parameter	Current value:	New value:	Unit:	
ALC gain reduction threshold	20.0		dB	

Uplink ALC alarm configuration

Parameter	Current value:	New value:	Unit:	
ALC gain reduction threshold	20.0		dB	

Config ALC alarm

External alarm port configuration

Parameter	Current value:	New value:	
Alarm level External 1	-1		
Alarm text External 1			
Alarm level External 2	-1		
Alarm text External 2			
Alarm level External 3	-1		
Alarm text External 3			
Alarm level External 4	-1		
Alarm text External 4			

Config external alarms

Select Alarm LED Style: DAS ☐ or DxR ☒

LED Intensity: (100) %

Config LED Style

Generate test alarm

Submit

Test alarm cease

Cease

Activate periodic keep alive message (Deactivated)

Activate

Deactivate

5.2.11 Hardware

Hardware menu contains internal hardware test points like different driver and synth voltages, temperatures, etc. This menu is mainly helpful for the advanced users when troubleshooting for example.

 RF config RF status Hardware Software Notepad Access Communication Alarm Advanced	Board testpoints		
	Test point id:	Current value:	Unit:
	1 V1	5.096	V
	2 I1	3.242	A
	3 PSU VOLT M	15.050	V
	4 TEMP	61	C
	5 RFON	ON	
	6 REF LEVEL	185	mV
	7 V RF D	5.019	V
	8 V RF U	5.040	V
	9 LOCK D1	Locked	
	10 LOCK D2	Locked	
	11 LOCK U1	Locked	
	12 LOCK U2	Locked	
	13 WCO U1	1.768	V
	13 WCO U2	1.515	V
	13 WCO D1	2.565	V
	13 WCO D2	2.001	V

5.2.12 Advanced

The Advanced menu displays DAC (Bit) hardware values. It is not of much interest for the normal use. As Hardware menu described above, this is mainly used for the troubleshooting and reference for the advanced users developers and RMA personnel.

