

7800R4x4-FR Switch Series

USER MANUAL



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IMPORTANT SAFETY INSTRUCTIONS

	<p>The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.</p>
	<p>The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.</p>

- Read these instructions
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
-

WARNING
 TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE

WARNING
 DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT

WARNING
 TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE

WARNING
 THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

INFORMATION TO USERS IN EUROPE

NOTE

CISPR 22 CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. 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 the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

	EN60065	Safety
	EN55103-1: 1996	Emission
	EN55103-2: 1996	Immunity
	EN504192 2005 Waste electrical products should not be disposed of with household waste. Contact your Local Authority for recycling advice	

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

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 the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

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REVISION HISTORY

<u>REVISION</u>	<u>DESCRIPTION</u>	<u>DATE</u>
1.0	First Release	Jun 2017

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Although every attempt has been made to accurately describe the features, installation and operation of this product in this manual, no warranty is granted nor liability assumed in relation to any errors or omissions unless specifically undertaken in the Evertz sales contract or order confirmation. Information contained in this manual is periodically updated and changes will be incorporated into subsequent editions. If you encounter an error, please notify Evertz Customer Service department. Evertz reserves the right, without notice or liability, to make changes in equipment design or specifications.

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1. OVERVIEW

The 7800R4x4-RF is a modular RF signal switch for routing and monitoring L-band, IF and DTV as well as other signals within a satellite communications facility. Starting from a base 4x4 configuration, the switch can be expanded to support additional inputs and outputs using license keys. Advanced features such as slope compensation, automatic gain control, monitoring and alarm reporting of critical signal parameters such as input signal presence and signal level provide flexible RF signal management. Optical per port selection of 13/18V DC LNB power with active overload and short circuit protection is available. Direct optical input is also supported using 2307LR miniature fiber receiver.

In addition, this flexible routing switch can be controlled, configured and monitored via Web GUI and/or SNMP control over Ethernet using Evertz® VistaLINK® or other monitoring and control software. This platform can be housed in Evertz 7800FR 3RU or 7801FR 1RU multiframe.

Features & Benefits

- Modular switch with hot swappable design
- Future proof with 40 – 2400MHz operation
- Industry's best overall signal performance and preserving signal quality from input to output. Supports the strict performance requirements of advanced modulation formats needed for optimal transponder usage and ROI over time
- 70/140MHz IF, L-Band, stacked L-Band and off-air DTV all in one platform
- Passes all modulation formats
- Modular design, front-loading and hot-swappable
- Up to eight programmable salvos
- System expansion capability up to 8x16
- Non-blocking, fan-out configuration
- Optional 13/18V DC LNB power with active overload and short circuit protection
- Solid State matrix switching system reduces complexity, improves reliability and increases flexibility over manual patch bays
- Automatic or manual gain control on input channels
- RF power monitoring on all input channels
- Adjustable output level in AGC mode
- Matrix crosspoint control using web GUI, CP-22xx series, CP-9000 remote control panels, VistaLINK® or third party control software
- System configuration, alarm monitoring, event logging and e-mail notification available through VistaLINK® or third party control software

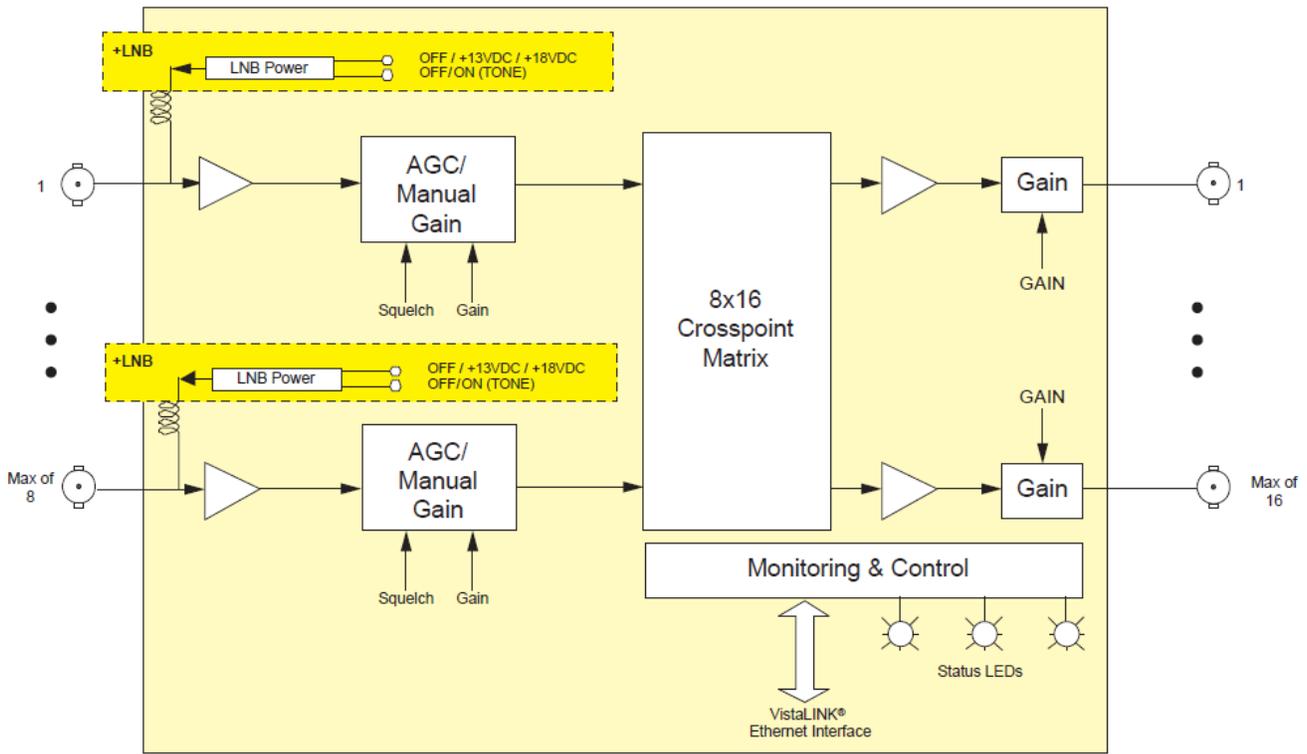


Figure 1-1 : 7800R4x4-RF Block Diagram

The 7800R4x4-RF platform is a wideband RF router for signals from 40MHz to 2400MHz including L-Band and other applications. Housed in a compact 3RU and available in 8x16 matrix size, the 7800R4x4-RF is a full-featured routing matrix with automatic or manual gain control and RF power meters on each input channel, as well as optional LNB power supplies. While housed in a compact 7800 Frame, the 7800R4x4-RF makes no compromises on features, performance and most importantly, reliability.

2. INSTALLATION

2.1. REAR PANEL

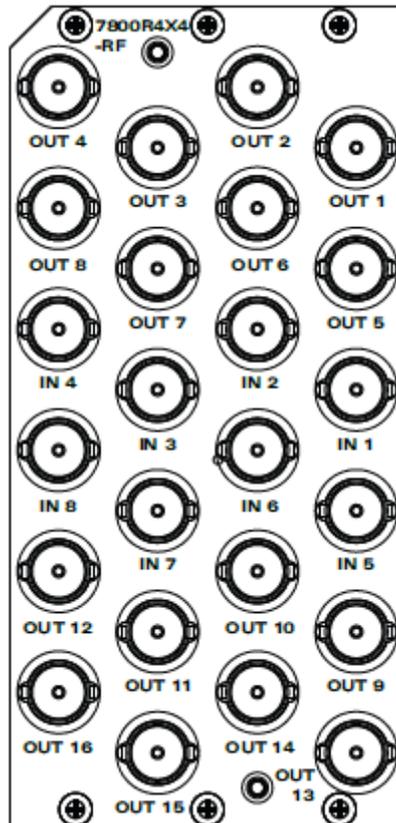


Figure 2-1 : 7800R4x4-RF Rear Panel

IN 1-8: The 7800R4X4-RF provides 8 BNC connections for inputs.

OUT 1-16: The 7800R4X4-RF provides 16 BNC connections for outputs.

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3. SPECIFICATIONS

3.1. SYSTEM

Switch Sizes	4x4, 4x8, 4x12, 4x16, 8x4, 8x8
Input/Output Expansion	Increments of 4
Impedance	75 ohm (50 ohm optical)
Connector Type	BNC per IEC 61169-8 Annex A (SMA, F-Type optional)
Input Gain Range	-20 to +20dB in 1dB steps (manual gain mode)
Output AGC Level	-20 to -50 dBm
Bandwidth	40 to 2400MHz

3.2. RF SPECIFICATIONS

Frequency Response

850-2150MHz	±1.5dB over bandwidth, ±0.5dB over any 36MHz channel
70-1000MHz	±0.5dB
70-1000MHz	±4.5dB

Isolation

- >60dB input to output
- >70dB output to output
- >70dB input to output

RF Input Power	0dBm to -60dBm
Max RF Output Power	-10dBm
Input Return loss	18dB
Output Return loss	
70-2450MHz	12dB
850-2150MHz	14dB
Input P1dB	+5dBm (1500MHz) typical
OIP3	+20dBm at -5dBm input
Noise Figure	25dB @ 0dB gain 14dB @ 20dB gain

3.3. LNB POWER (OPTICAL WITH –LNB VERSION)

Voltage	13/18V DC, off (selectable)
Max Current	400 mA
Protection	Short circuit, overload

3.4. COMMUNICATION & CONTROL

Ethernet	SNMP over IEEE 802.3/U (10/100 BaseTx) RJ45 connector for Mini agent or SNMP via 7800FC
Control	Web GUI, VLPro, Front Panel, Quartz Protocol and CP-9000 panel push

3.5. ELECTRICAL

Voltage	+12V DC
Power	24 Watts (not including LNB power)
Safety	CSA Listed to CSA C22.2 No 60065-03, UL 60065-03 IEC 60065-(2001-12) 7 th Edition Complies with CE low voltage Directive
EMC	Complies with FCC part 15, Class A complies with EU EMC directive

3.6. PHYSICAL

For max of 8x16 connections

8x16-B75	BNC 8x16 connections, 75ohm, 3 slots
8x16-B50	BNC 8x16 connections, 50ohm, 3 slots
8x16-F75	F-Type 8x16 connections, 75ohm, 3 slots
8x16-M75	Mini BNC 8x16 connections, 75ohm, 2 slots
8x16-D75	Din 8x16 connections, 75 ohm, 2 slots
8x16-S50	SMA 8x16 connections, 50 ohm, 2 slots

For max of 8x8 connections

8x8-B75	BNC 8x8 connections, 75ohm, 2 slots
8x8-F75	F-Type 8x8 connections, 75ohm, 2 slots
8x8-B50	BNC 8x8 connections, 50ohm, 2 slots
8x8-S50	SMA 8x8 connections, 50 ohm, 2 slots

For max of 4x12 connections

4x12-B75	BNC 4x12 connections, 75ohm, 2 slots
4x12-F75	F-Type 4x12 connections, 75ohm, 2 slots
4x12-B50	BNC 4x12 connections, 50ohm, 2 slots
4x12-S50	SMA 4x12 connections, 50 ohm, 2 slots

4. WEB INTERFACE

After 7800R4x4-RF has been installed in the 7800FC frame and configured with the required network addresses for the control port, it can be completely configured using the web interface. To do this, simply type the main IP address of 7800FC in the web browser (Chrome preferred).

Note: Computer must be on the same subnet in order to have communication with module.

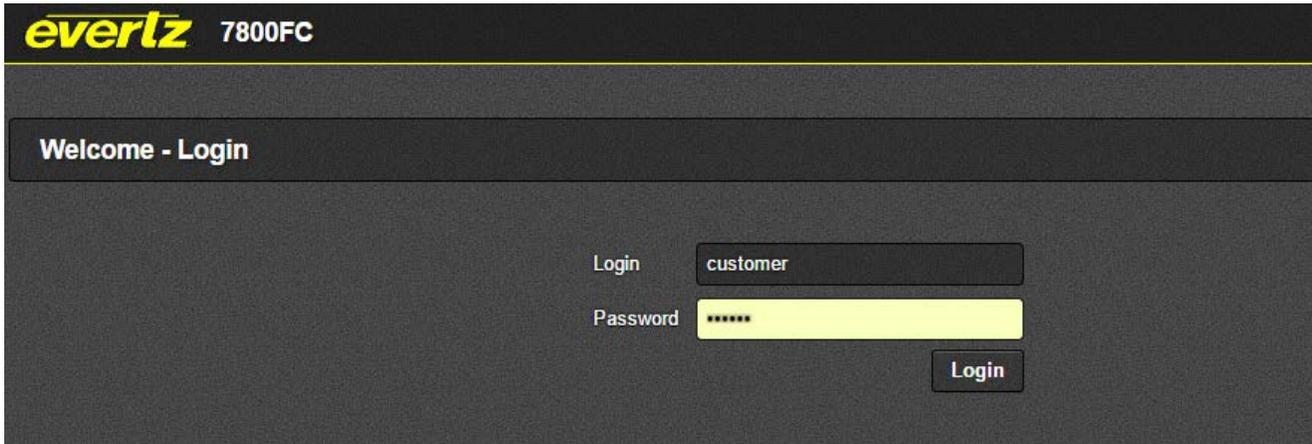


Figure 4-1 : WebEASY® – Login Menu

“Login” and “Password” is customer.

The user can access all the cards from the frame tab under menu on the left of the page. (Figure 4-2)

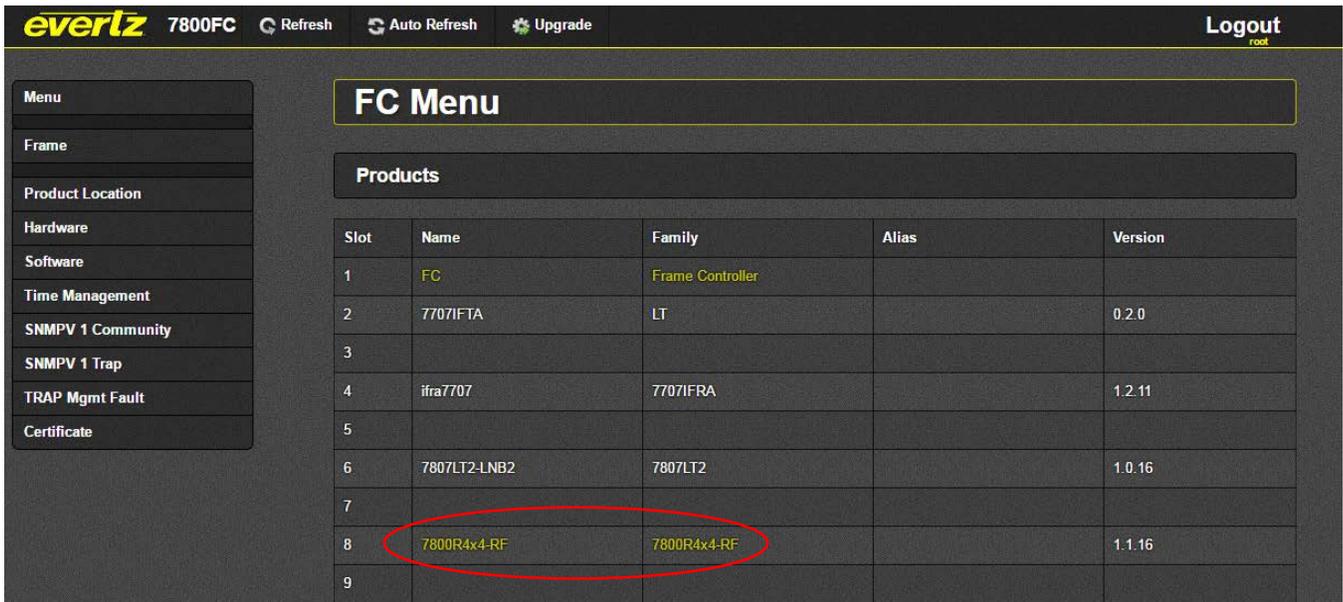


Figure 4-2 : WebEASY® – FC Menu

Select the 7800R4x4-RF from FC menu.

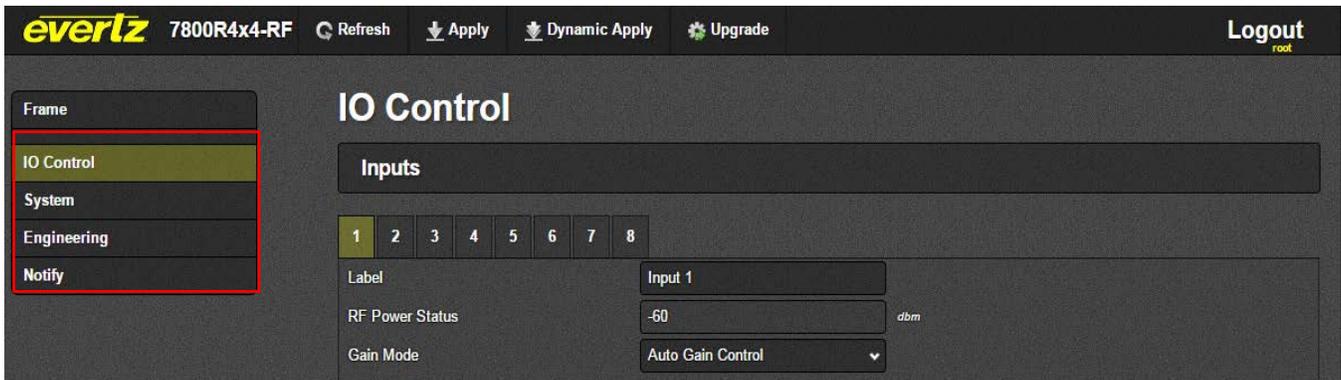


Figure 4-3 : WebEASY® – 7800R4x4-RF Menu

The 7800R4x4-RF web page has four sections on the left side of the page as is shown in Figure 4-3.

4.1. IO CONTROL

IO Control

Inputs

1
2
3
4
5
6
7
8

Label	Input 1	
RF Power Status	-60	dbm
Gain Mode	Auto Gain Control	▼
AGC Power	<input style="width: 100%; height: 15px;" type="range"/>	-10 dbm
Input LNB	Off	▼
Tone	Off	▼
Slope	Off	▼

Outputs

	Label	Route Input	Manual Gain <small>dbm</small>
1	Output 1	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
2	Output 2	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
3	Output 3	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
4	Output 4	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
5	Output 5	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
6	Output 6	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
7	Output 7	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
8	Output 8	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
9	Output 9	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
10	Output 10	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
11	Output 11	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
12	Output 12	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
13	Output 13	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
14	Output 14	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
15	Output 15	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0
16	Output 16	No Route ▼	<input style="width: 100%; height: 15px;" type="range"/> 0

Figure 4-4 : WebEASY® - IO Control Section

4.1.1. Inputs

The RF Input control is used to monitor and edit transfer specifications of each individual input.

RF Input Control and Status

Label: This field gets the name label of the corresponding input of XPRF.

RF Power Status: This field gets the input optical power. It displays “Off” when value is -126 and displays “Over” when value is 127.

Gain Mode: This drop down allows the user to set the mode of gain control for XPRF input. Possible options are Manual or AGC. This slide bar (Figure 4-5) allows the user to apply a fixed amount of gain to the selected input. Available range is incremented or decremented in 1dB steps.

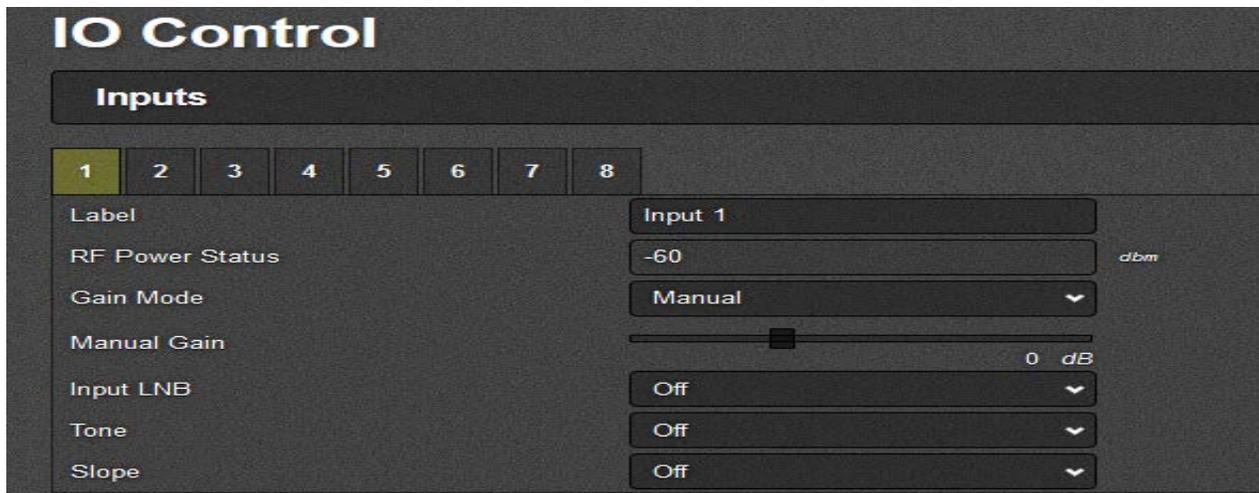


Figure 4-5 : WebEASY® - IO Control \ Manual Gain

Manual Gain: In manual gain mode, the gain through the router for all outputs connected to a particular input is fixed. The default value for all inputs is 0dB, with an adjustable gain range of -10 to +20 dB.

If a high level input signal (i.e. -10 dBm) is set to full gain of +20 dB, the output level on any connected inputs will be exceeding design limits. Significant distortion to the RF signal may occur under these circumstances.

AGC Power: AGC (Automatic Gain Control) the input through the system on a particular input is fixed, to a user selected target output level (-20dBm is the default), with an adjustable range of -40 to -10 dBm. The AGC maintains the output level if the input level is within the range determined by the AGC output level and the available gain in AGC mode. Customer needs to buy a license to enable the AGC mode.

Input LNB: This field allows the user to set the LNB power to 13v, 18v or turn it Off.

Tone: This field allows the user to enable or disable the 22KHz tone.

Slope: This field allows the user to set the RF slope correction level.

4.1.2. OUTPUTS

This selection allows the user to set the label, gain and the active source of the output. In the status, it shows the active source

RF Output Control And Status

Label: This field allows the user to define a label for output.

Route Input: This field allows the user to make routes by selecting the input destination corresponding to its output from the drop down list.

Manual Gain: This slide bar allows the user to apply a fixed amount of gain to the selected output. Available range is -15 to +15 in 1dBm steps. Note that the Gain Mode settings must be in Manual mode for this control to be available.

4.2. SYSTEM

Figure 4-6 : WebEASY® - System Section

4.2.1. Controller

Name Alias: This field allows the user to edit the identity of the frame.

Health: This field indicates if there is any fault in the system. The status will be “Ok” or “Attention Required”.

Software version: This field shows the software version of current FC.

Reset: This control allows the user to reset the Frame Controller.

4.2.2. License

License String: This field allows the user to upload the License for products that are saved on PC. This license key is used for router’s IO expansion.

4.2.3. Product Features Supported

This tab shows which type of license support is enabled. The following are the license keys:

License	Functionality
FK-AGC	Automatic Gain Control
FK-SM	Smart Monitoring
FK-LNB	LNB-DC Power
4CK-IN	Channel Key: Inputs 5 to 8
4CK-OP-1	Channel Key: Outputs 5 to 8
4CK-OP-2	Channel Key: Outputs 5 to 12
4CK-OP-3	Channel Key: Outputs 5 to 16

Table 4-1 : Licenses

How to apply a license

- Obtain order/customer specific license by sending the serial number of the module as seen in webpage under engineering menu (Figure 4-9).
- Right click on the key and go to “Edit it with notepad”.
- Copy the string between “----”
- Go to webpage and paste this string under System -> License and hit apply (Figure 4-7).

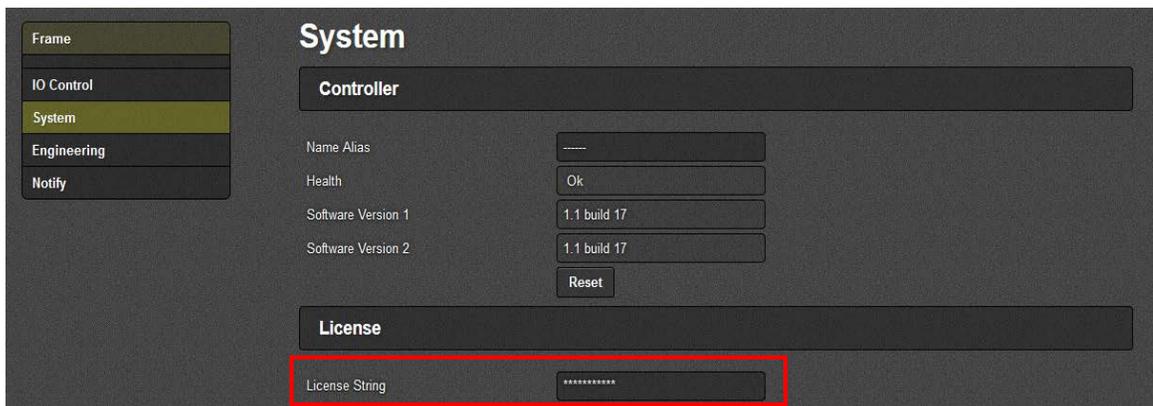


Figure 4-7 : WebEASY® - System\ License String

- Refresh the page.
- Ensure that the Support Status under Product Feature Supported changes to ‘Enabled’ for all the features requested (Figure 4-8).



Figure 4-8 : WebEASY® - System\Product Features Supported

- Verify that the enabled features work.

4.3. ENGINEERING

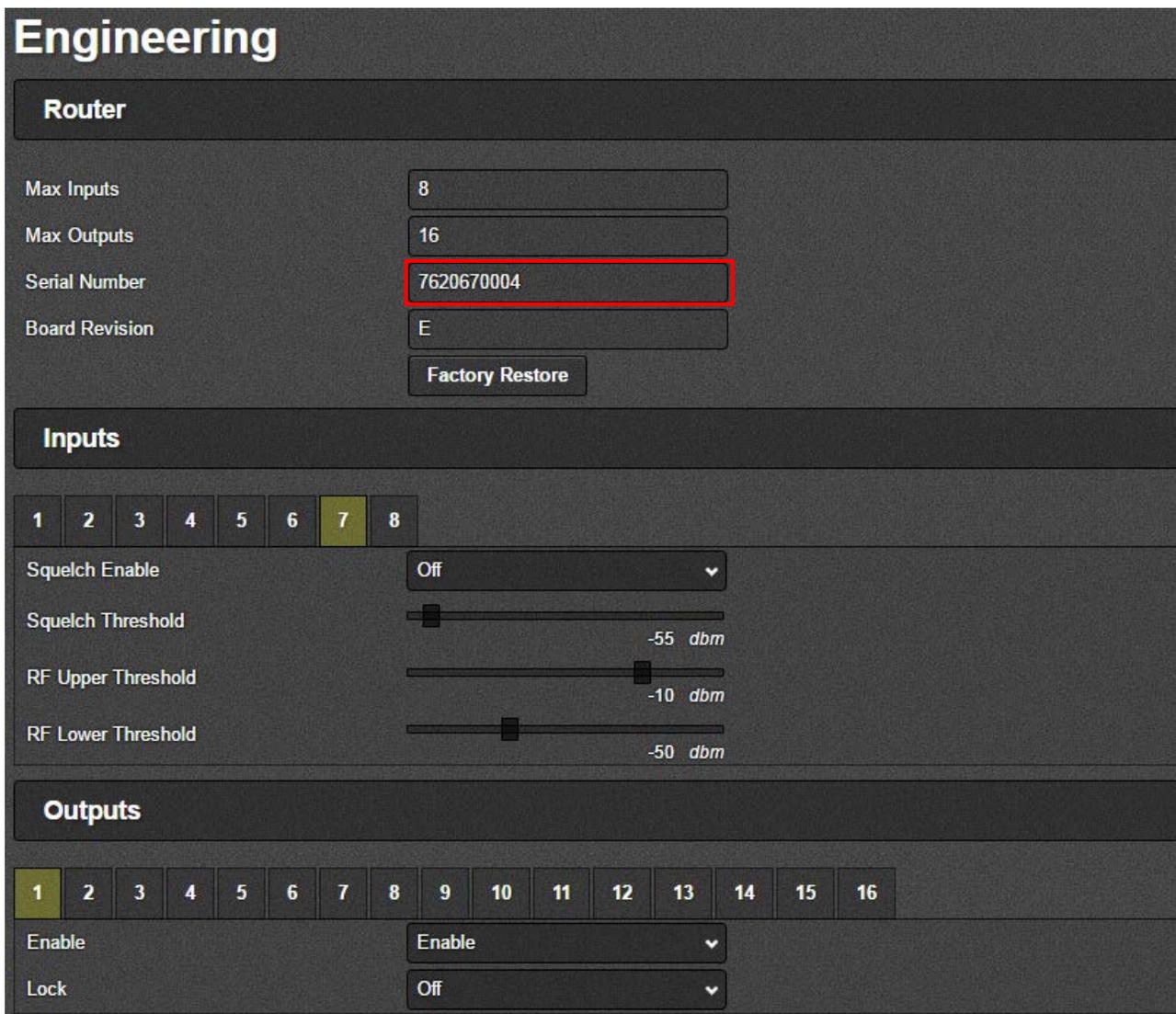


Figure 4-9 : WebEASY® - Engineering Section

4.3.1. Router

Max Inputs: This field shows the maximum number of available inputs supported by the current configuration. Configuration is based on the cross point card type currently inserted in the frame.

Max Outputs: This field shows the maximum number of available outputs supported by the current configuration. Configuration is based on the cross point card type currently inserted in the frame.

Serial number: This field shows the serial number of router board 7800R4x4-RF.

Board revision: This field shows the board revision of router board 7800R4x4-RF.

Factory Restore: This field allows the user to revert back to factory settings.

4.3.2. Inputs

Squelch Enable: Set to enable turning off input when power level after gain falls below the squelch threshold.

Squelch Threshold: If the input level falls below the Squelch Threshold set point, the input will be turned off or squelched.

RF Upper Threshold: This slide bar is the upper RF input power level thresholds for SNMP alarms. The router will send an SNMP trap if the input level is above the upper set threshold.

RF Lower Threshold: This slide bar is the lower RF input power level thresholds for SNMP alarms. The router will send an SNMP trap if the input level drops below the set lower threshold.

4.3.3. Outputs

Enable: Set output to be disable or enable for routing. Locked output port will not be rerouted.

Lock: Set output port to be locked. Locked port can no longer change source configuration.

4.4. NOTIFY

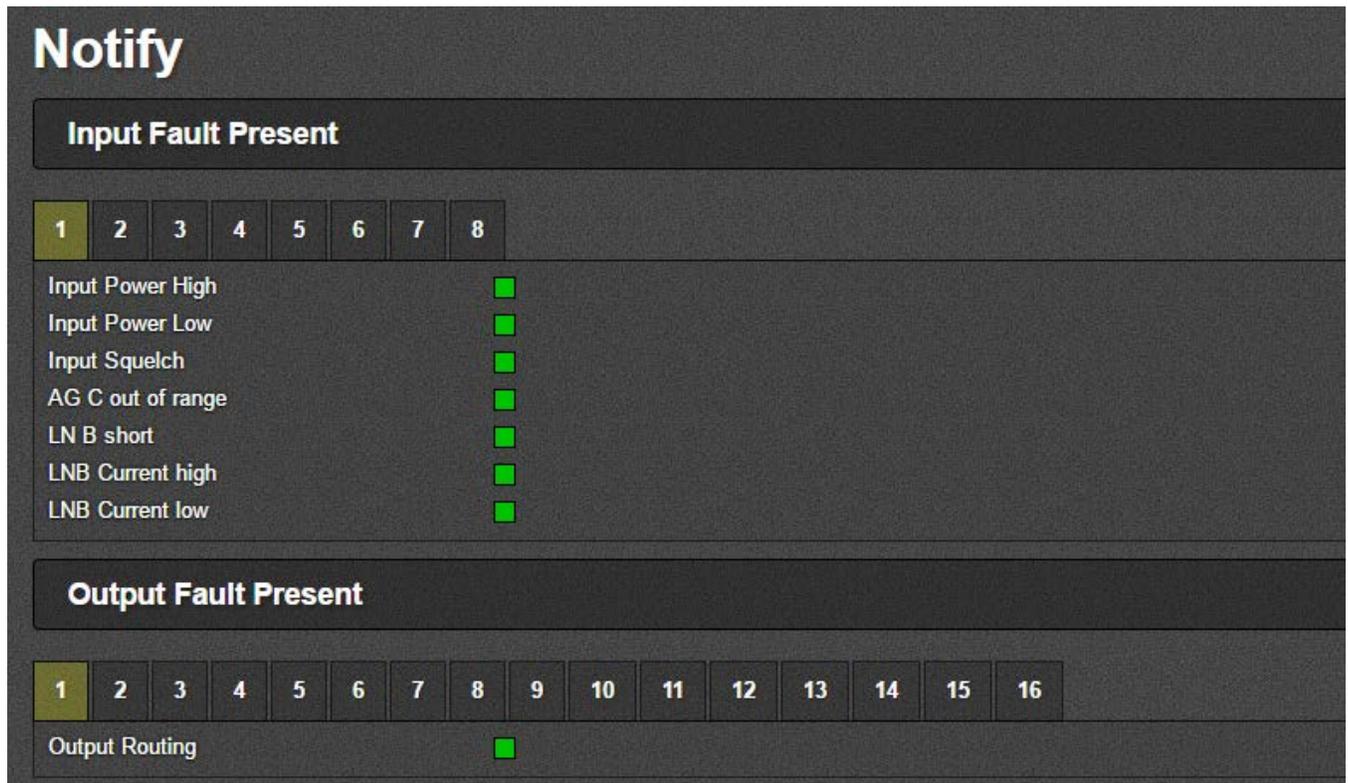


Figure 4-10 : WebEASY® - Notify Section

The Notify tab contains all the alarm status present or not present identified by Red or Green indicators.

4.4.1. Input Fault Present

Input Power High: This indicator shows red if the input power is beyond threshold limit.

Input Power Low: This indicator shows red if the input power is below threshold limit.

Input Squelch: This indicator shows red if squelch is enabled.

AGC out of range: This indicator shows red if AGC power is beyond the limit.

LNB short: This indicator shows red if there is short on the LNB input.

LNB Current high: A range of values indicating the maximum LNB current.

LNB Current low: A range of values indicating the minimum LNB current.

4.4.2. Output Fault Present

Output Routing: This field indicates red if routing fails for some reason.

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5. VISTALINK[®] PRO INTERFACE

This chapter assumes that VLPro server and VLPro client are already configured for the network and the user has basic knowledge of the VLPro interface. It also assumes that the user or network administrator has already added the 7800R4x4-RF Jar file to the server and both the client and server applications have been restarted. See section 6.1 for information on updating the VLPro server Jar file.

The IP address of the 7800 FC should automatically appear in VistaLINK[®] PRO Client window, along the left column under **hardware**. Should it not appear, open the VistaLINK[®] PRO Sever window and click the **Discovery** tab. This will allow the user to search for the IP address of the device of choice. Under the **Range Discovery** tab, enter the range of the IP address of the 7800 FC and then push the Start button. This should contact the 7800R4x4-RF and allow communication with it through VistaLINK[®] PRO.

5.1. 7800R4X4-RF CONFIGURATION

- Open the General Configuration view of the 7800 FC by right clicking on the IP address of the frame controller.
- Choose **View Configuration**

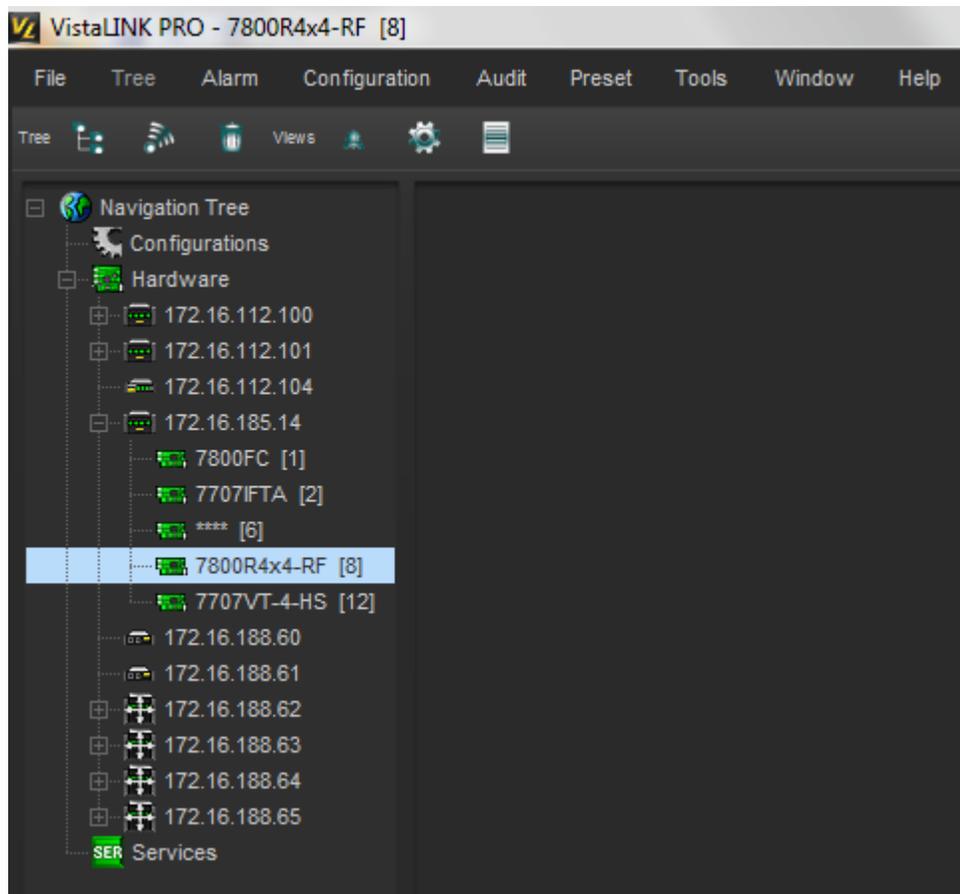


Figure 5-1 : VistaLINK[®] - 7800R4x4-RF Hardware Tree

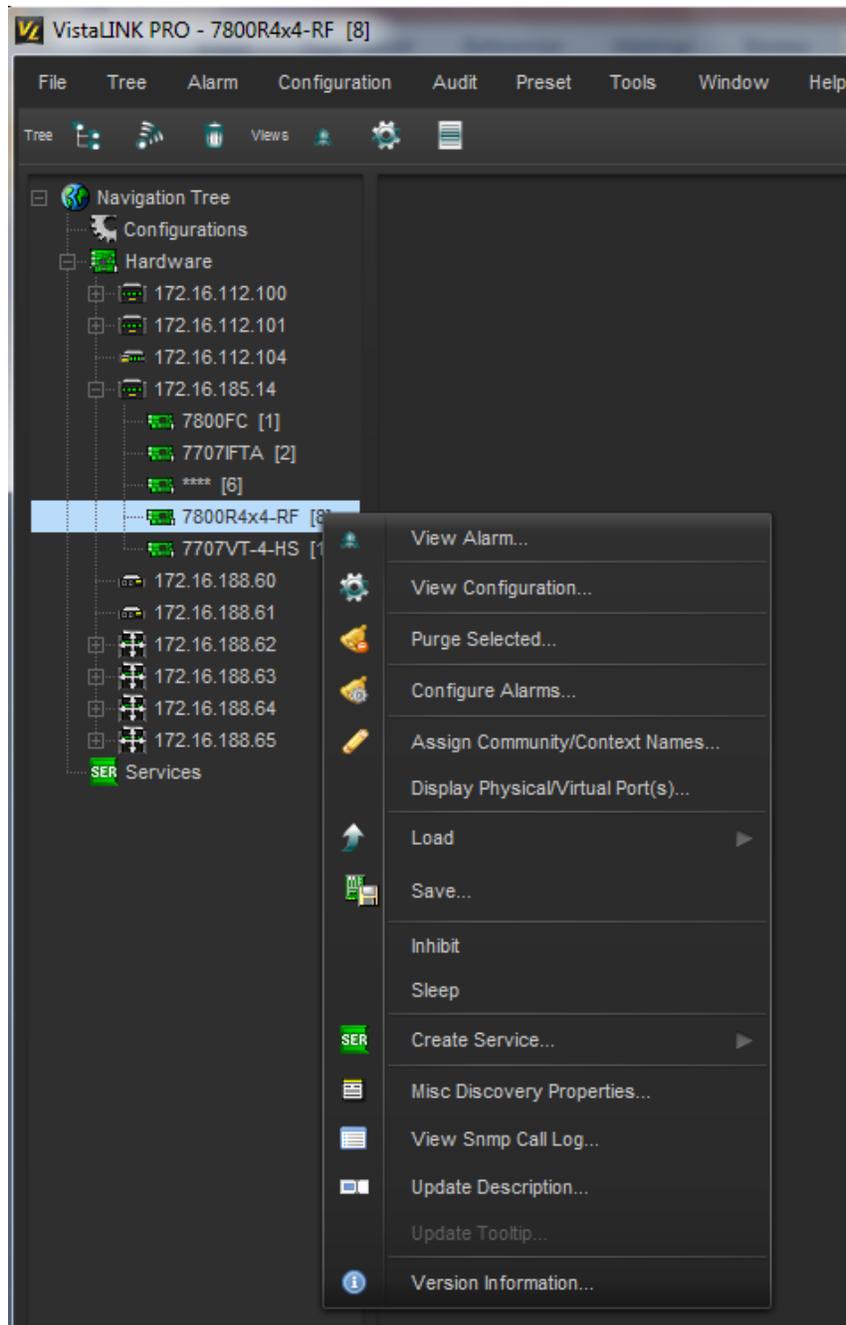


Figure 5-2 : VistaLINK® - Choosing View Configuration

By selecting view configuration (Figure 5-2), the Configuration page will appear which has four tabs (Figure 5-3).

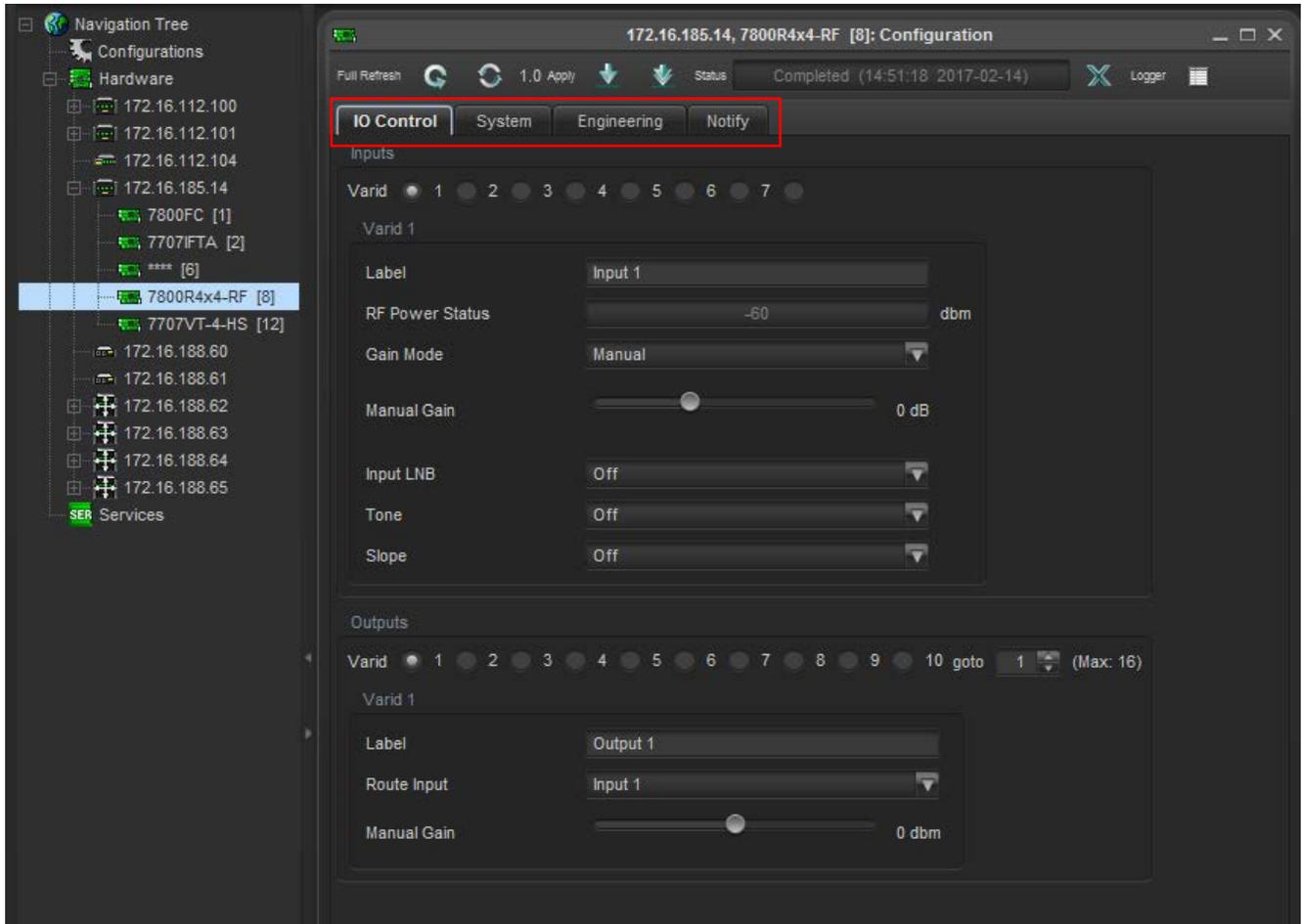


Figure 5-3 : VistaLINK® - Configuration Sections

These tabs hold the same content and features as the web page and making any changes through vista link will automatically update the web page.

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6. UPGRADE PROCEDURES

6.1. UPDATE VLPRO SERVER JAR FILE

Jar file is needed for new products and also it is recommended to update the in use Jar files in order to have access to the latest features of the module.

For updating a Jar file, new version of Jar file supplied by Evertz is needed. Follow the below steps to update a jar file.

- Ensure that all VLPro clients are closed. (If the clients are not closed, they will be automatically disconnected after restarting VLPro server.)
- On the main page of VLPro Server, select **Help** on task bar then choose **Apply Update** and **Product**.(Figure 6-1)

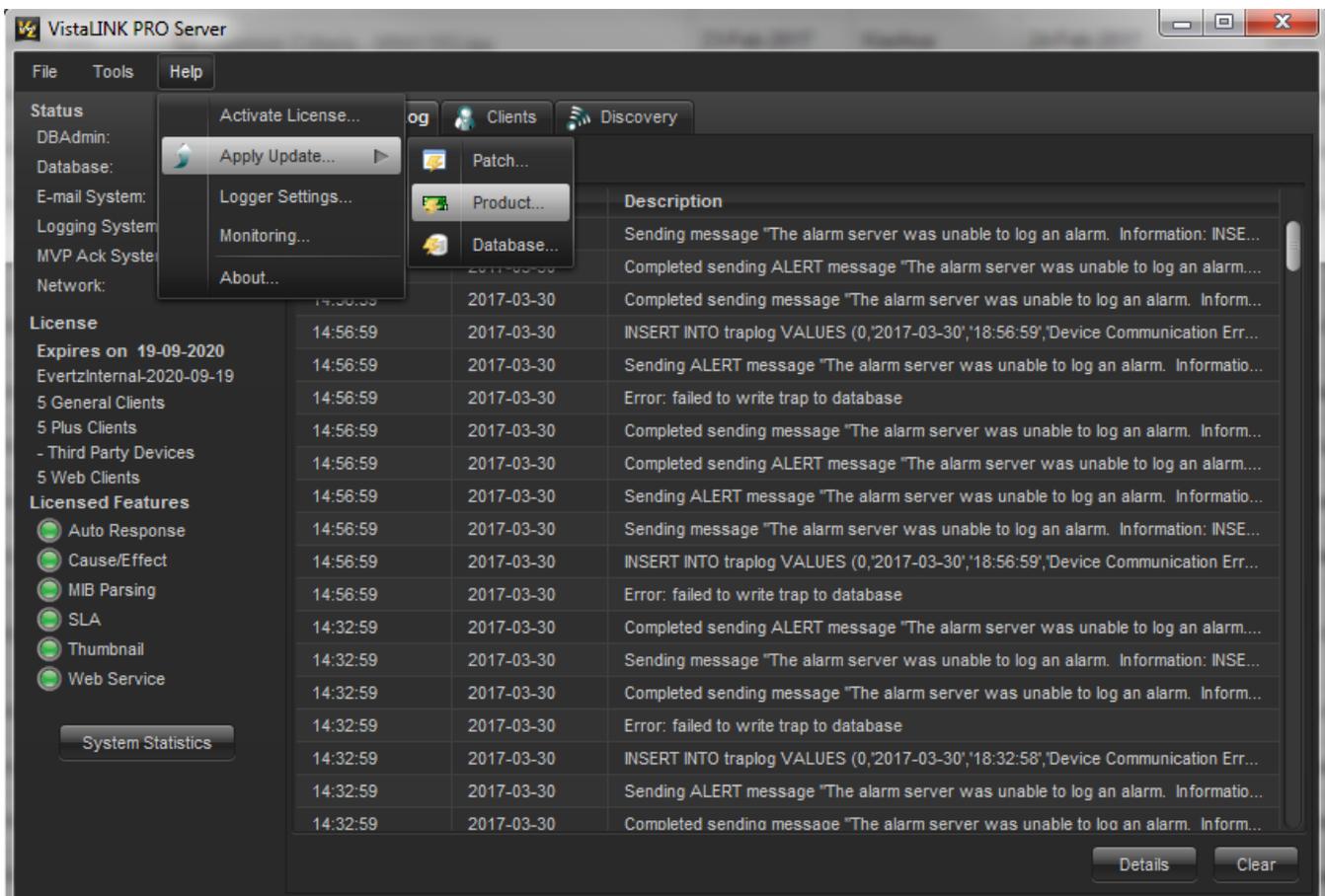


Figure 6-1 : VistaLINK® - Updating Jar file

- In the new appeared window, navigate to the proper Jar file and double click on it to select the Jar file. The window will be automatically closed and the update will be applied.
- A message will be prompted and ask to restart the server. Apply as many Jar updates as required and restart the server.

6.2. FIRMWARE UPGRADE

There are two recommended ways to upgrade the firmware for the 7800R4x4-RF.

1. WebEASY®
2. VistaLINK®

Using the WebEASY® on a web interface is the fastest and recommended procedure to load the firmware onto the 7800R4x4-RF.

6.2.1. Firmware Upgrade Using WebEASY®

When first visiting the 7800R4x4-RF web interface, the user will be asked to enter a Login and Password. Enter “*customer*” for Login and “*customer*” for Password.

On the top of the web page for the 7800R4x4-RF, there is a tab labeled **Upgrade**. The **Upgrade** tab is used to check current firmware version and upload the latest firmware.

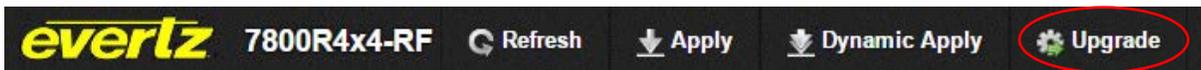


Figure 6-2 : WebEASY® - Upgrade Button on Top Menu Bar

Selecting the Upgrade tab, will take the user to Figure 6-3 where the current firmware version is shown. Should the firmware version be outdated, it is needed to download the firmware image file.



NOTE: Contact Evertz to get the latest firmware file.

Firmware Upgrade

Upgrade

Slot	Upgrade	Name	Alias	Current Version	Progress	
1	Upgrade	Frame Controller				
2	<input type="checkbox"/>	7707IFTA		0.2.0	<input type="text"/>	
3		Not Available		0.0.0	<input type="text"/>	
4	<input type="checkbox"/>	ifra7707		1.2.11	<input type="text"/>	
5		Not Available		0.0.0	<input type="text"/>	
6	<input type="checkbox"/>	7807LT2-LNB2		1.0.16	<input type="text"/>	
7		Not Available		0.0.0	<input type="text"/>	
8	<input checked="" type="checkbox"/>	7800R4x4-RF		1.1.16	<input type="text"/>	
9		Not Available		0.0.0	<input type="text"/>	
10		Not Available		0.0.0	<input type="text"/>	
11		Not Available		0.0.0	<input type="text"/>	
12	<input type="checkbox"/>	7707VT-4-HS		0.3.42	<input type="text"/>	
13		Not Available		0.0.0	<input type="text"/>	
14		Not Available		0.0.0	<input type="text"/>	
15		Not Available		0.0.0	<input type="text"/>	

Firmware No file chosen

Figure 6-3 : WebEASY® - Firmware Upgrade Menu

Click Choose File and browse to locate image file. Once selected, click open to advance to next step. Click upgrade and watch the progress bar for status. Once completed, the device will automatically restart.

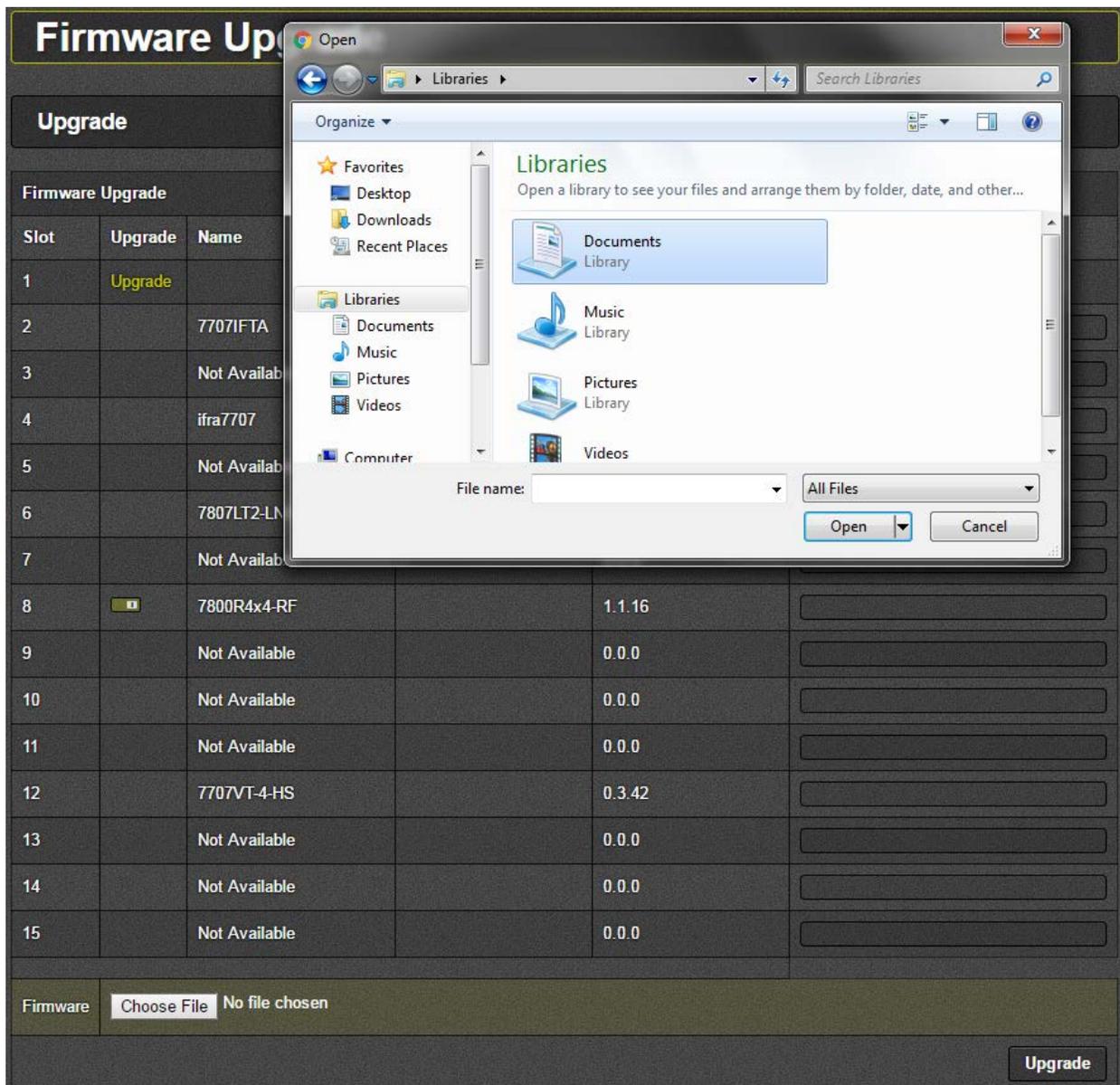


Figure 6-4 : WebEASY® - Firmware Upgrade Menu

6.2.2. Firmware Upgrade Using VistaLINK®

Ensure that the 7800R4x4-RF is running the latest firmware, to check this simply right click on the cards address in VLPro Client and select *Version Information* as shown in Figure 6-5.

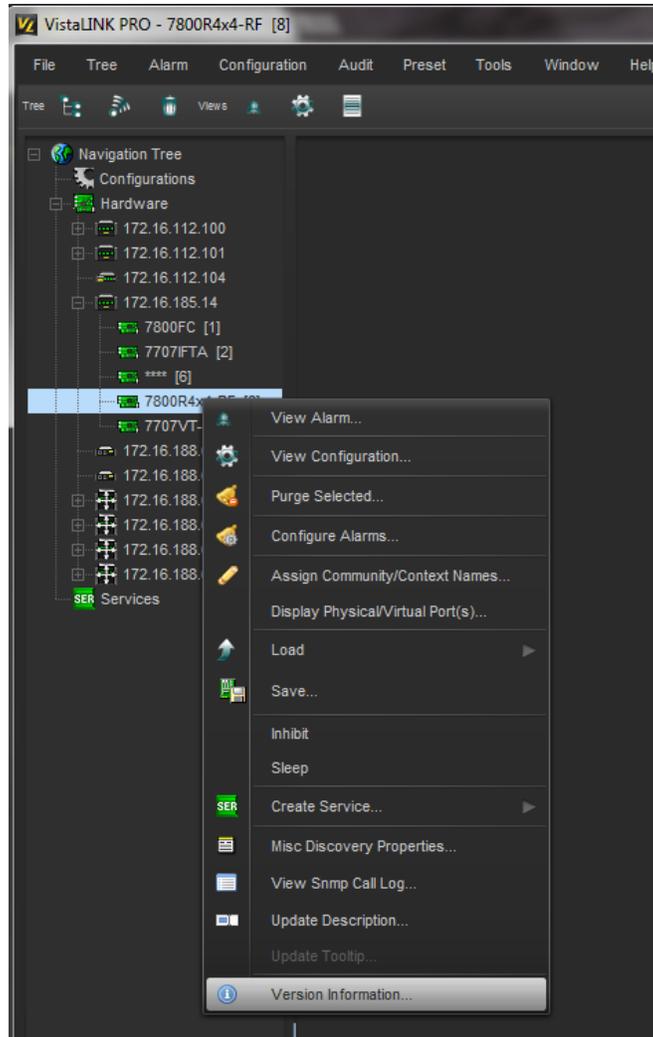


Figure 6-5 : VistaLINK[®] - Selecting Version Information

Once Version Information is selected, Figure 6-6 will appear and the module will be able to be selected for upgrade.

- Open hardware tree and select card to be upgraded.
- Put the check mark in the square beside the card to select it for upgrade.

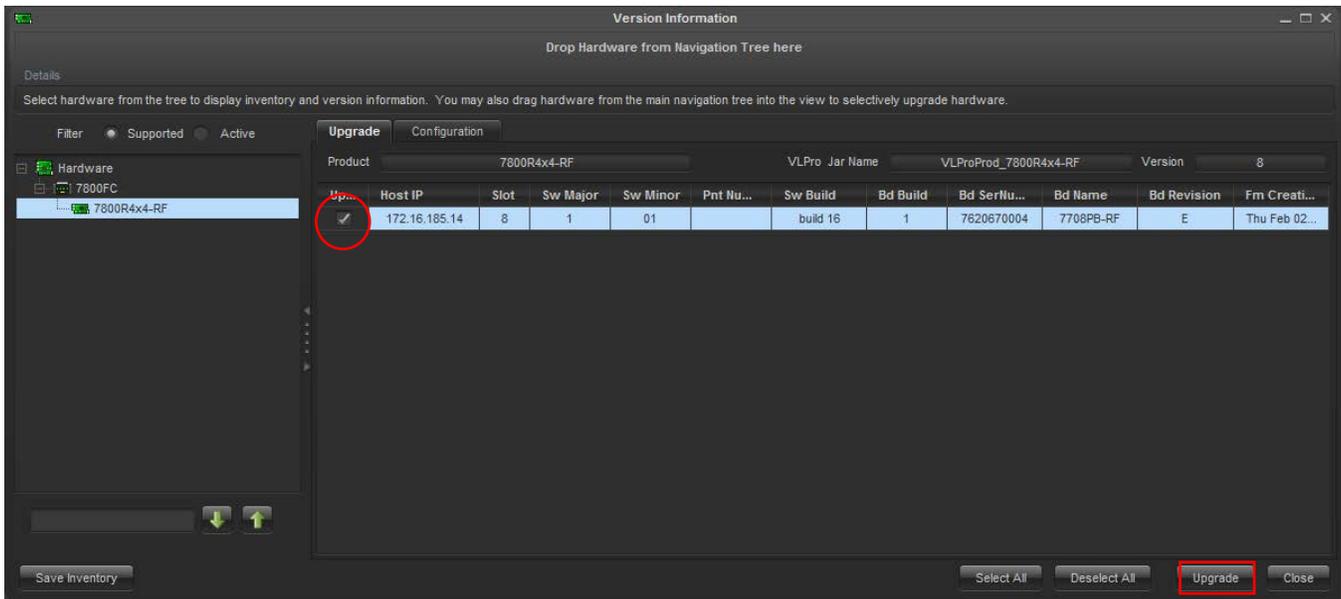


Figure 6-6 : VistaLINK® - Selecting Card for Upgrade

- Click the Upgrade button on bottom right corner.
- Click the Browse button to select the XPRF image file.
- Click the Upgrade button and wait for the upload to complete. This will take approximately 5 to 10 minutes depending on network traffic. The progress bar to the right will provide feedback on the status of the upgrade.

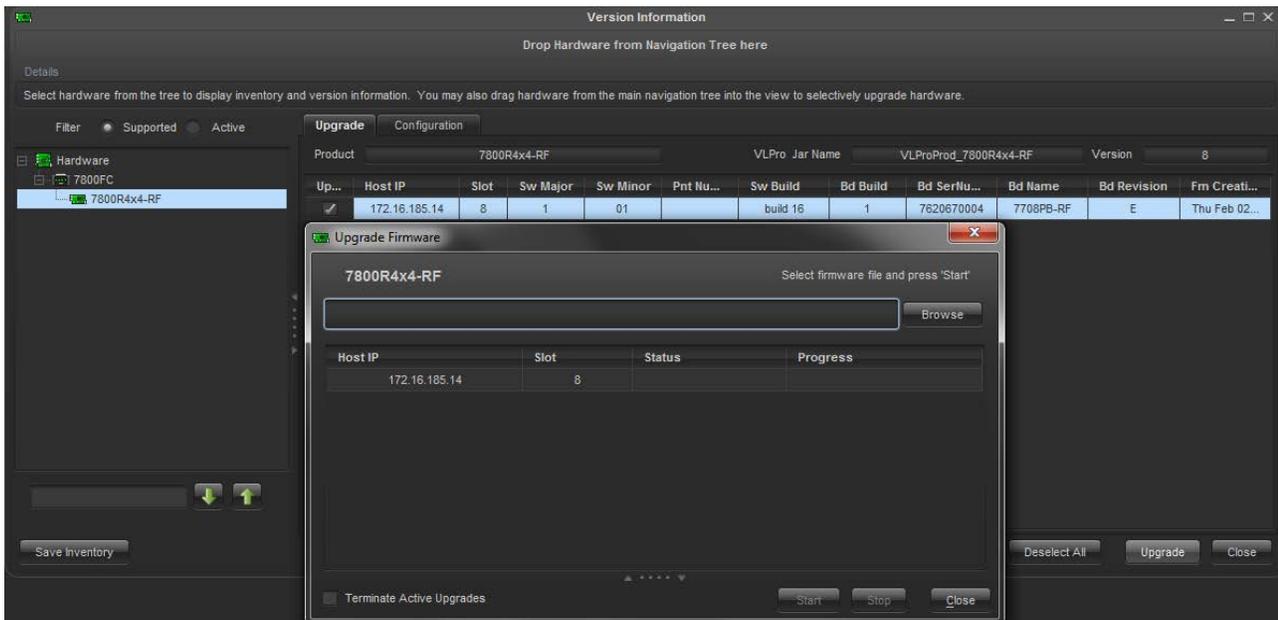


Figure 6-7 : VistaLINK® - Selecting File for Firmware Upgrade

- Upon completion, the 7800R4x4-RF will reboot automatically and return online in normal “Run” mode.