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Figures

Tables

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Release	Jul 09

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1. OVERVIEW

The Demodulator series is a complete hardware based solution for demodulating satellite compressed transport streams. As more satellite providers are adding services, they need better modulation performance and, therefore, are moving their modulators to DVB-S2.

Controlled by the industry leading VistaLINK® PRO, this series offers signal providers the capability to demodulate two Transport Streams out of a DVB-S2 L-Band feed in one slot card making it the smallest footprint demodulator in the industry.

All demodulators are backward compatible with existing QPSK (DVB-S) modulators. In addition, each demodulator offers quality measurement of the RF signal.

Please note that the term *7780DM-LB series* in this manual refers to the following products: 7780DM2-LB, 7780DM2-LB-CA, 7780DM2-LB2, 7780DM2-LB2-CA, 7780DM4-LB and 7780DM4-LB4.

Features

- Demodulates both DVB-S & DVB-S2 signals
- 1 to 4 L-Band input with loop through
- 2 to 4 DVB-S2 Demodualtors
- 4 ASI Outputs
- Broadband operation – 925 to 2176MHz
- Monitoring of RF Input parameters
- Optional MPEG over IP output
- Optional BISS and BISS E Decryption
- Comprehensive signal and card status monitoring via card-edge display, or remotely through the Industry leading Evertz VistaLINK® PRO NMS system
- Fully hot swappable from front of frame

Summary of Card specific features and options:

	7780DM2-LB	7780DM2-LB-CA	7780DM2-LB2	7780DM2-LB2-CA	7780DM4-LB	7780DM4-LB4
CARD SLOTS	1	2	2	2	2	2
RF INPUTS	1	1	2	2	1	4
TUNER/DEMOD	2	2	2	2	4	4
MPEG OVER IP OUTPUT	--	--	+IP OPTION	+IP OPTION	+IP OPTION	+IP OPTION
DVB-CI MODULE	--	DUAL	--	DUAL	--	--

Table 1-1: Product Chart

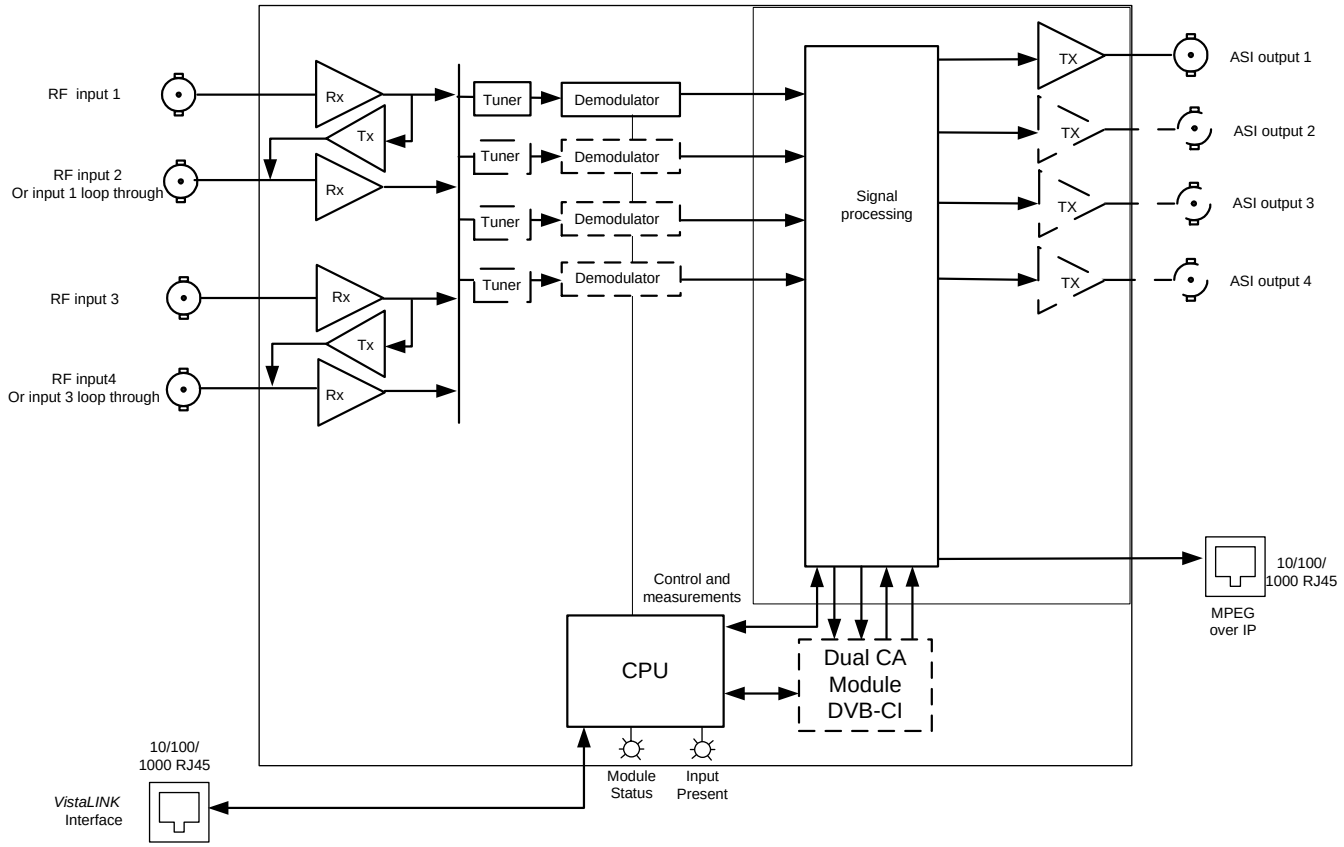


Figure 1-1: 7780DM-LB Series Block Diagram

2. INSTALLATION

2.1. REAR PLATE DESCRIPTION

Each of the modules in the 7780DM-LB series comes standard with companion +3RU rear plates. Figure 2-1 and Figure 2-2 provide an illustration of the 7780DM-LB Series rear plates. For information on mounting the rear plate and inserting the module into the frame, see section 3 of the 7700FR manual.

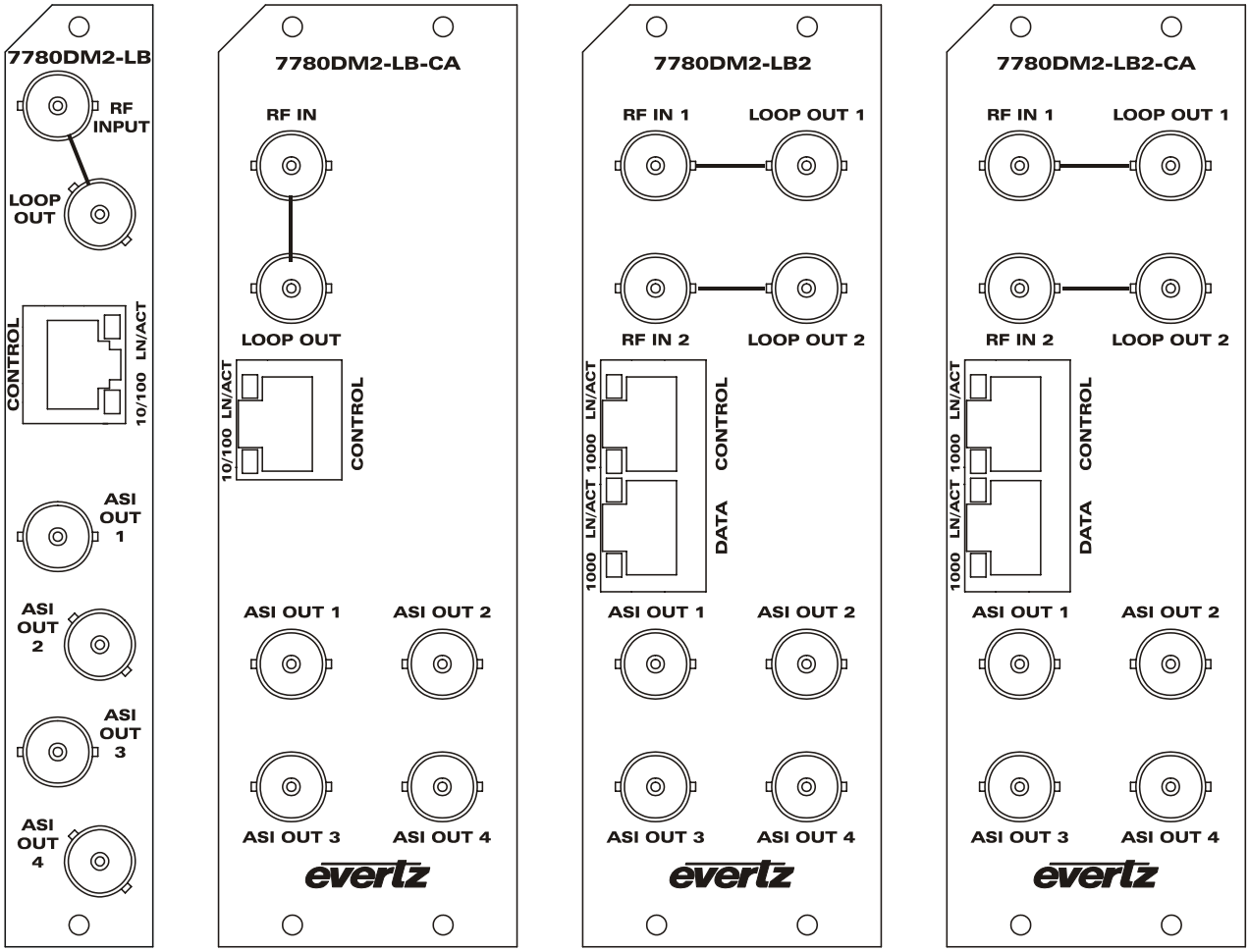


Figure 2-1: 7780DM2-LB, 7780DM2-LB-CA, 7780DM2-LB2 and 7780DM2-LB2-CA Rear Plates

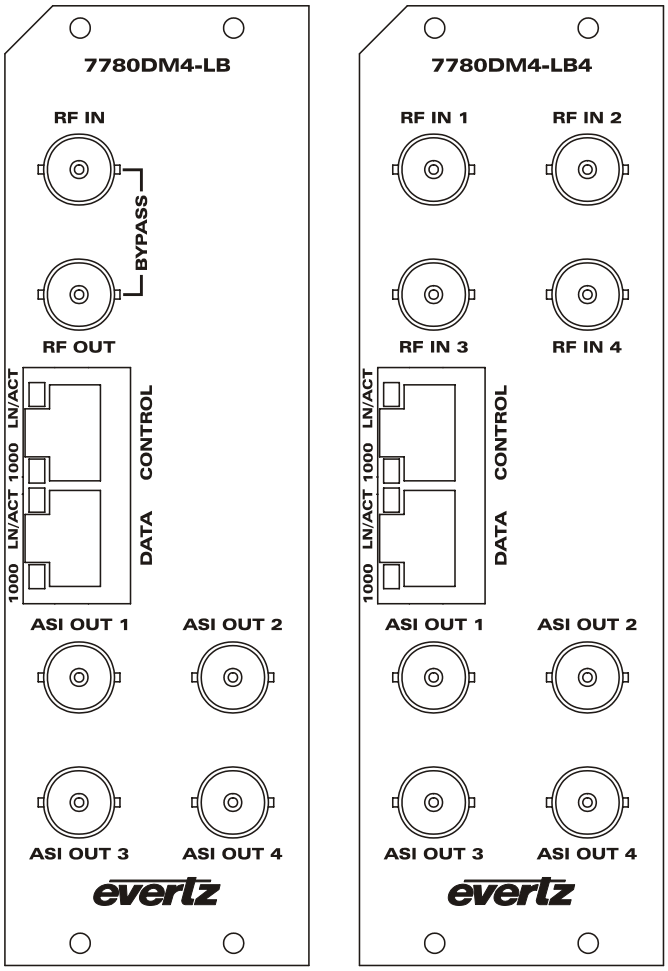


Figure 2-2: 7780DM4-LB and 7780DM4-LB4 Rear Plates

2.1.1. 7780DM-LB Connectors

RF IN: Input BNC connector for L-band output of a suitable LNB directly or via a suitable attenuator giving lighting and surge protection.

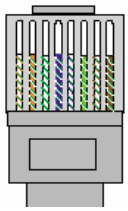
RF (MONITORING) OUT/ LOOP OUT: Monitoring output BNC is an L-Band RF output for monitoring of L-band satellites.

ASI OUT: Four BNC connectors used to output ASI Transport Streams.

2.1.2. Ethernet Connection

The 7780DM-LB Series uses 10Base-T (10 Mbps), 100Base-TX (100 Mbps) or Gigabit (1Gbps) twisted pair Ethernet cabling systems. When connecting for 10Base-T systems, category 3, 4, or 5 UTP cable as well as EIA/TIA – 568 100Ω STP cable may be used. When connecting for 100Base-TX systems, category 5 UTP cable is required. The cable must be "straight-through" with an RJ-45 connector at each end. Establish the network connection by plugging one end of the cable into the RJ-45 receptacle of the card and the other end into a port of the supporting hub.

The straight-through RJ-45 cable can be purchased or can be constructed using the pin-out information in Table 2-1. A colour coded wiring table is provided in Table 2-1 for the current RJ-45 standards (AT&T 258A or EIA/TIA 258B colour coding shown). Also refer to the notes following the table for additional wiring guide information.



Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
1	Transmit +	White/Green	White/Orange	X
2	Transmit –	Green/White or White	Orange/White or Orange	X
3	Receive +	White/Orange	White/Green	X
4	N/A	Blue/White or Blue	Blue/White or Blue	Not used (required)
5	N/A	White/Blue	White/Blue	Not used (required)
6	Receive –	Orange/White or Orange	Green/White or Green	X
7	N/A	White/Brown	White/Brown	Not used (required)
8	N/A	Brown/White or Brown	Brown/White or Brown	Not used (required)

Table 2-1: Standard RJ-45 Wiring Colour Codes

Note the following cabling information for this wiring guide:

- Only two pairs of wires are used in the 8-pin RJ-45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory that they be present in the cable.
- 10BaseT and 100BaseT use the same pins (a crossover cable made for one will also work with the other).
- Pairs may be solid colours and not have a stripe.
- Category 5 cable must use Category 5 rated connectors.

The maximum cable run between the router and the supporting hub is 300 ft (90 m). The maximum combined cable run between any two end points (i.e. router and PC/laptop via network hub) is 675 feet (205 m).

Devices on the Ethernet network continually monitor the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, the devices also send a link test signal to one another to verify link integrity. The rear panel is fitted with two LEDs to monitor the Ethernet connection.

1000: This Amber LED is ON when a 100Base-TX link is last detected. The LED is OFF when a 10Base-T link is last detected (the LINK LED is ON). Upon power-up the LED is OFF as the last detected rate is not known and therefore defaults to the 10Base-T state until rate detection is completed.

LN/ACT: This dual purpose Green LED indicates that the card has established a valid linkage to its hub, and whether the module is sending or receiving data. This LED will be ON when the module has established a good link to its supporting hub. This gives you a good indication that the segment is wired correctly. The LED will BLINK when the module is sending or receiving data. The LED will be OFF if there is no valid connection.

To successfully install any of the 7780DM-LB series modules you will need:

1. Unused IP address on the network or a DHCP server.
2. Evertz serial cable.
3. VLPro Server IP address.

The 7780DM-LB series modules may be controlled directly via a built on SNMP agent or they may be controlled via a 7700 Frame controller.

Control: Ethernet remote control port for SNMP control.

Data: RJ-45 high speed data (Transport Stream) over Ethernet output (option).

2.2. HARDWARE INSTALLATION

Before handling the card it is important to minimize the potential effects of static electricity. It is therefore recommended that an ESD strap be worn. Locate on a 7700 chassis 2 adjacent vacant slots. Unpack the 7780DM-LB and separate the rear panel from the main card. Locate on the rear of the rack the three slots and remove the blanking panels. Insert the rear panel into the back of the chassis and secure using the screws provided.

Before inserting the front card, connect the serial cable to the board using the serial cable provided. Now insert the 7780DM-LB Series card into the corresponding front slots ensuring the card lines up with the slot runners on the bottom and the top of the chassis. Push the card into the slot ensuring that when it mates with the rear card that is has been firmly pushed into a seated position. This can be confirmed when the connectivity lights for the Ethernet port are illuminated. Do not connect any cables to the rear card (failure to do this could cause unwanted network issues) until the initial configuration has been completed.

2.3. CONNECTING TO VLPRO

This chapter assumes that the VLPro server and VLPro client are already configured for your network and you have basic knowledge of the VLPro interface. It also assumes that the user or network administrator has already added the 7780DM-LB series jar file to the server and both the client and server applications have been restarted. If you are the network administrator refer to section 5.2 for information on updating the VLPro Server Jar File.

Open VLPro and click on the refresh tree icon. Expand the hardware tree by clicking on the "+" symbol. The 7780DM-LB should appear as a newly listed device with the IP address used to configure the card in Step 1 above or in the case where a Frame Controller is used it will appear under the FC IP address. It may take up to a minute to appear while the card and switch negotiate network settings (this can be verified directly on the switch if necessary).

Figure 2-3 identifies the parameters of the 7780DM-LB Series as it will appear if controlled via a Frame Controller:

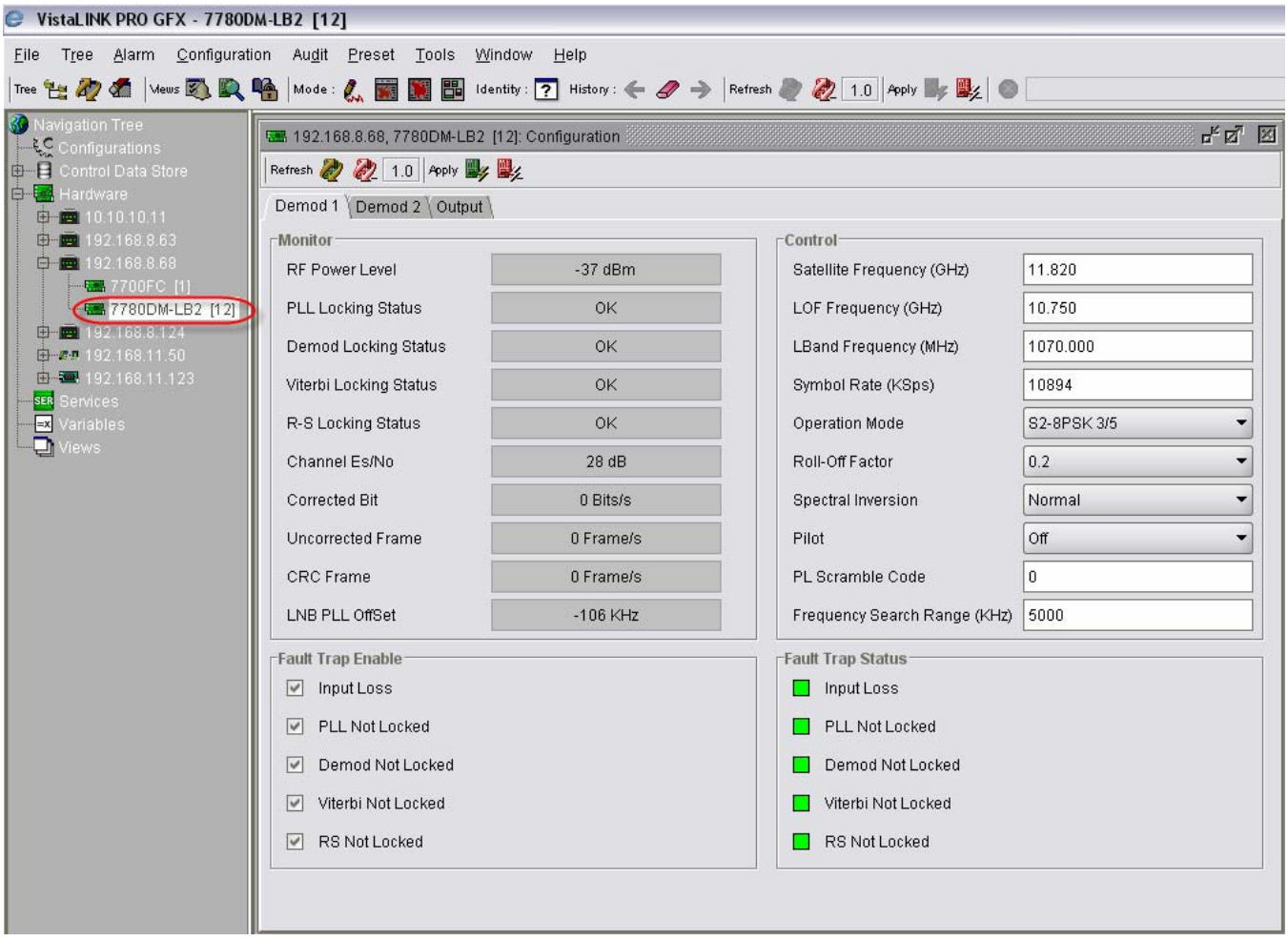


Figure 2-3: VistaLINK® PRO Hardware Configuration

Note: If after a couple of minutes the card has still not appeared, try selecting *Add Agent* from the *Tree> Add/Update Agent* menu. Enter the IP address used in the configuration stage earlier and select OK. The card should now be listed and will remain greyed out for a moment while VLPro finds the card and confirms its configuration.

Please consult your network administrator if you continue to have problems connecting the card with VLPro, alternatively contact Evertz Microsystems Ltd. or your authorized reseller for technical support.

3. TECHNICAL DESCRIPTION

3.1. SPECIFICATIONS

3.1.1. RF Inputs

RF Inputs: 1 to 4
Connector: 75Ω BNC (F-Type optional)
Channel Bandwidth: 27,33,36,54 and 72MHz
RF Input Range: 925 to 2176MHz
Symbol Rate:
DVB-S 2 to 45 MSps
DVB-S2 10 to 30 MSps
Input Power: -69 to -23dBm

3.1.2. Output Specifications

Standard Outputs: 4 ASI BNC outputs

MPEG over IP Output: (+IP Option):
MAC 802.3> IPV4> RTP> UDP> MPEG-2 TS
FEC PRO MPEG Forum Code of Practice #3, Rev 2
RJ45 10/100/1000 Connector

3.1.3. Control Specification

Connector: 1xRJ45 10/100 control port

3.1.4. Monitored Parameters

- Demodulator Sync indicator
- Viterbi or LDPC Sync indicator (Depending on mode)
- RS or BCH Sync Indicator (Depending on mode)
- RF Signal level
- Corrected bit rate
- Uncorrected frame rate
- ESNO count (SNR)

3.1.5. DVB-CI compatible CA Module with (when fitted)

- Alphacrypt
- Aston Crypts
- Conax
- Cryptoworks
- Irdeto
- Nagravision
- Viaccess

4. CARD CONFIGURATION

Right click the 7780DM-LB series card in the side bar navigation tree and select “View Configuration”. The configuration page will open; it is from these configuration tabs that the 7780DM-LB can be configured. Refer to the relevant section of this manual for an explanation of the features and functions.

4.1. DEMOD

The Demod selection tab is used to tune each individual demodulator as well as monitor the health and status of the input signal. The 7780DM-LB series cards can contain up to four different demodulators on each module.

Please note that the following sections 4.1.1 to 4.1.4 outline the features for the 7780DM2-LB2.

4.1.1. Monitor Window

The monitor section, as shown in Figure 4-1, displays the monitoring parameters for the selected demodulator.

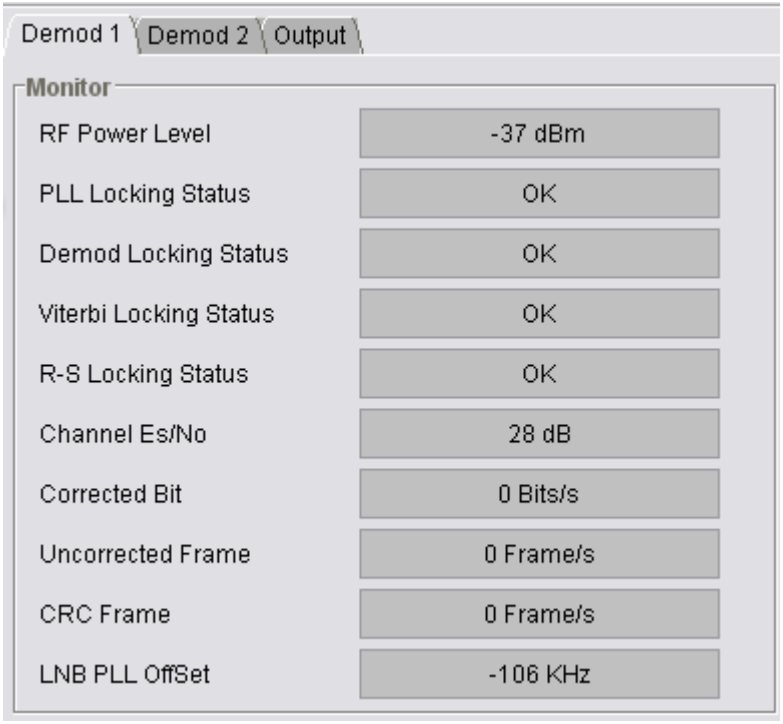


Figure 4-1: Monitor Window

- **RF Power Level:** Measures the input power level. The input power level is –82 dBm to –19dBm.
- **PLL Locking Status:** Allows the user to monitor the PLL locking status (Not Locked, OK).

- **Demod Locking Status:** Allows the user to monitor the demodulator lock status (Not Locked, OK).

- **Viterbi Locking Status:** Allows the user to Viterbi locking status. If the Viterbi decoder is able to lock correctly the Status field will display **OK**. If it is unable to lock, the status will display **Not Locked**.

- **R-S Locking Status:** Allows the user to monitor the Reed Solomon locking status. If the RS decoder is able to lock to RS the Status field will display **OK**. If it is unable to lock, the status field will display **Not Locked**.

- **Channel Es/No:** This field shows the ratio between the average energy per transmitted symbol and single sided noise power spectral density. For a summary of performance requirements at QEF over AWGN, please refer to Table 13 in ***ETSI EN 302 307 v1.1.1 (2005-03)***

- **Corrected Bit:** This field shows the count of the number of bits corrected by the Reed-Solomon decoder (DVB-S mode) or BCH decoder (DVB-S2 mode). This value is bit accurate only if all bit errors have been corrected.

- **Uncorrected Frame:** This field shows the count of the number of frames that still have uncorrected errors in them. Thus if this value is zero, the corrected Bit value is accurate.

- **CRC Frame:** This count is only relevant in DVB-S2 modes and is a count of the number of CRC frame errors.

- **LNB PLL OffSet:** This field shows the difference between the incoming frequency and the locked-to frequency.

NOTE: If the card is removed from the chassis, the ASI loop through will continue but the decoded output will no longer be available.

4.1.2. Control Window

The control section, as shown in Figure 4-2, displays the controlled parameters for the selected demodulator. The user can configure the demodulator by entering the desired information into the parameter fields.

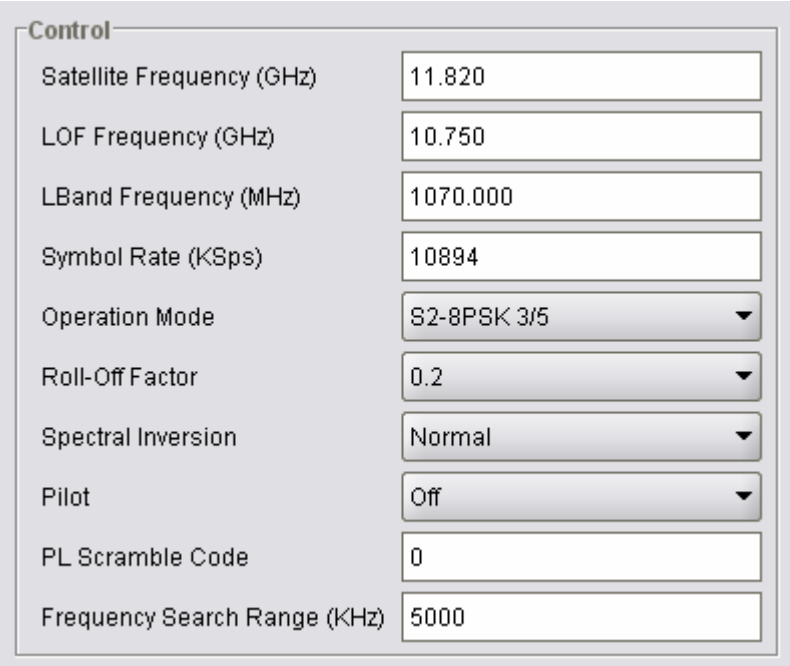


Figure 4-2: Control Window

- **Satellite Frequency (GHz):** This field enables the user to enter the Satellite Frequency (GHz) value.

- **LOF Frequency (GHz):** This field enables the user to enter the standardized Local Oscillator Frequency (LO) value.

- **Lband Frequency (MHz):** This field enables the user to enter the L-band frequency. The input ranges from 925 to 2176 MHz.

Note: *Lband Frequency = Satellite Frequncy - LOF Frequency*
Standardised LOF is 5150 for C-Band and 10750 for Ku-band.

- **Symbol Rate (KSps):** This field enables the user to enter a symbol rate in Ksymbols/s.

- **Operation Mode:** Using the drop down menu, select the Modulation technique (DBS, DVB, QPSK, 8PSK) and the FEC (½, 2/3, 4/5, 3/5, 8/9, 7/8, 6/7, ¾, 5/6) rates.

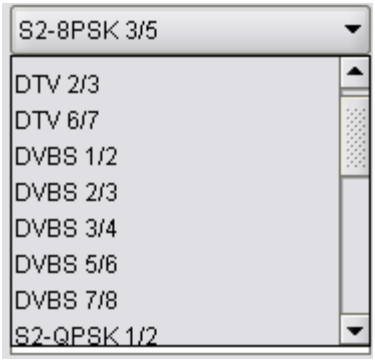


Figure 4-3: Operation Mode

- **Roll-Off Factor:** Use the drop down menu to select the transponder filter roll-off factors. The following options are available: 0.2, 0.25 and 0.35.

- **Spectral Inversion:** Use the drop down menu to select the Spectral Inversion. The following options are available: **Normal, Inverted** and **Auto.**

- **Normal:** Scan only the un-inverted side of the frequency spectrum.

- **Inverted:** Scan only the inverted side of the frequency spectrum.

- **Auto:** Scan both the inverted and un-inverted side of the frequency spectrum.

- **Pilot:** Use the drop down menu to enable or disable the pilot. The following options are available: **ON** or **OFF**. Select **ON** if pilot tone is present, otherwise this option should be set to **OFF**.

- **PL Scramble Code:** This field enables the user to set the physical layer scrambling code.

- **Frequency Search Range (KHz):** This field enables the user to set the maximum frequency offset which is covered by the carrier search (in KHz). The Frequency Search range is +/- 10MHz.

4.1.3. Fault Trap Enable

The *Fault Trap Enable* window allows the user to Enable (Check) or Disable (Uncheck) SNMP alarms from being sent from the module to the SNMP alarm server.

Figure 4-4: Fault Trap Enable

4.1.4. Fault Trap Status

All LEDs can be used in auto refresh mode or on a graphical view to provide an instantaneous feed which relays information about the status of the input signal.

The Input Loss LED is used to indicate the presence or loss of an input signal. The remaining 4 LEDs can be used to represent the lock status for each demod.

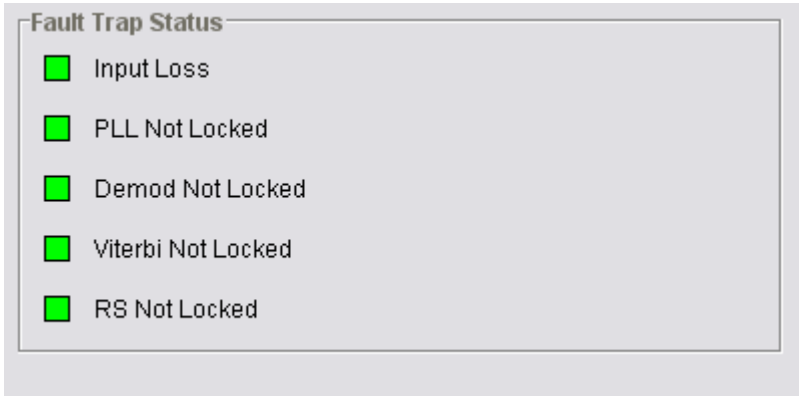


Figure 4-5: Fault Trap Status

5. TROUBLESHOOTING

5.1. VLPRO DOES NOT DISPLAY THE 7780DM-LB ALARMS

The user must connect directly to the board via the serial port. Once a connection has been established, check and/or configure the SNMP settings with the correct VLPro Server IP address and ensure the community strings are correctly set. Refer to the network administrator if you are in doubt as to what these should be set to.

5.2. UPDATING VLPRO SERVER JAR FILE

Products from Evertz are constantly evolving and new features are often added. It is therefore important to update the JAR files in use to provide access to all the latest features or enhancements. It will also be necessary to add JAR files for new products. If your new product has not appeared, even after waiting a few minutes for the Ethernet switch negotiation to complete, then it is possible that your JAR file may be old or missing.

To perform a JAR update, ensure that all VLPro clients are closed (those clients which are not closed will automatically be disconnected as soon as the VLPro Server is restarted). Maximize the VLPro Server window from the Windows task bar; select *Help> Apply Update> Product* from the menu.

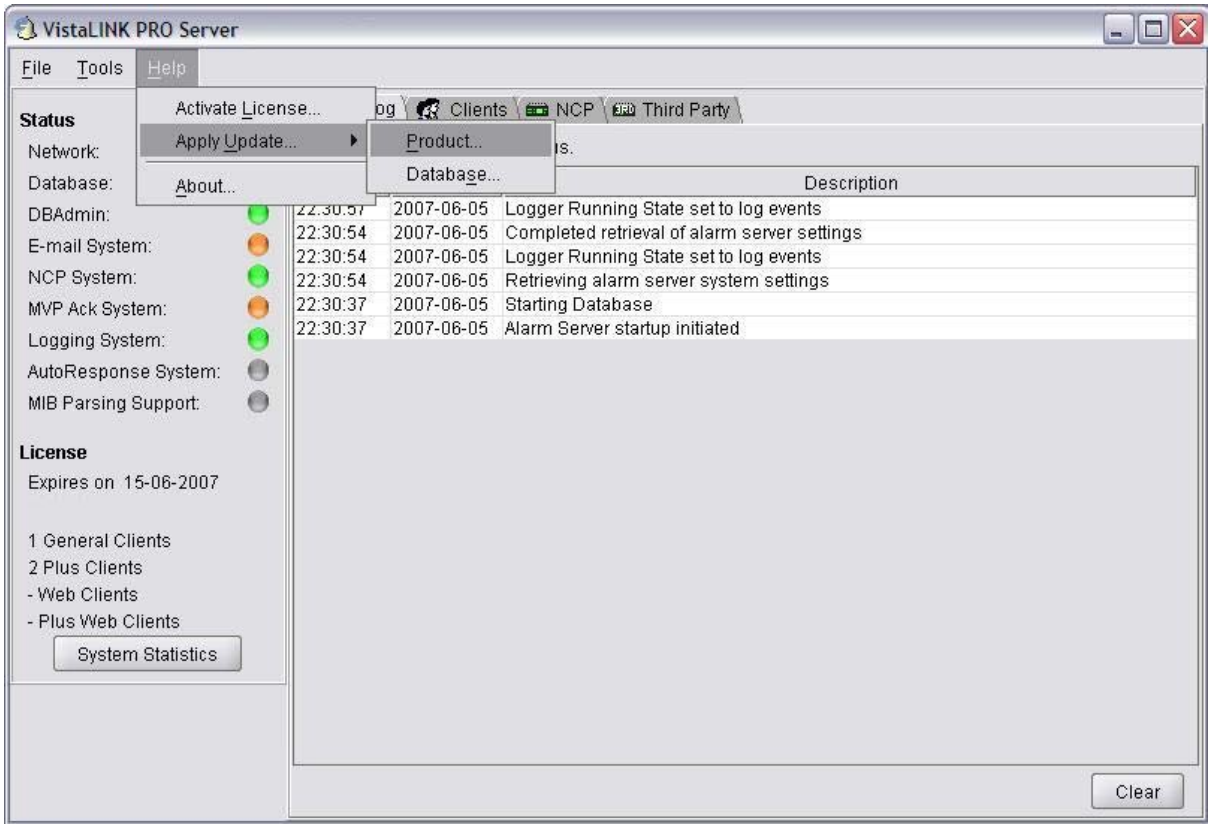


Figure 5-1: VistaLINK® PRO Server

A window will appear, as shown in Figure 5-2, simply navigate to the location of the new JAR file and double click to select the file. The window will automatically close and the update will be applied in the background.

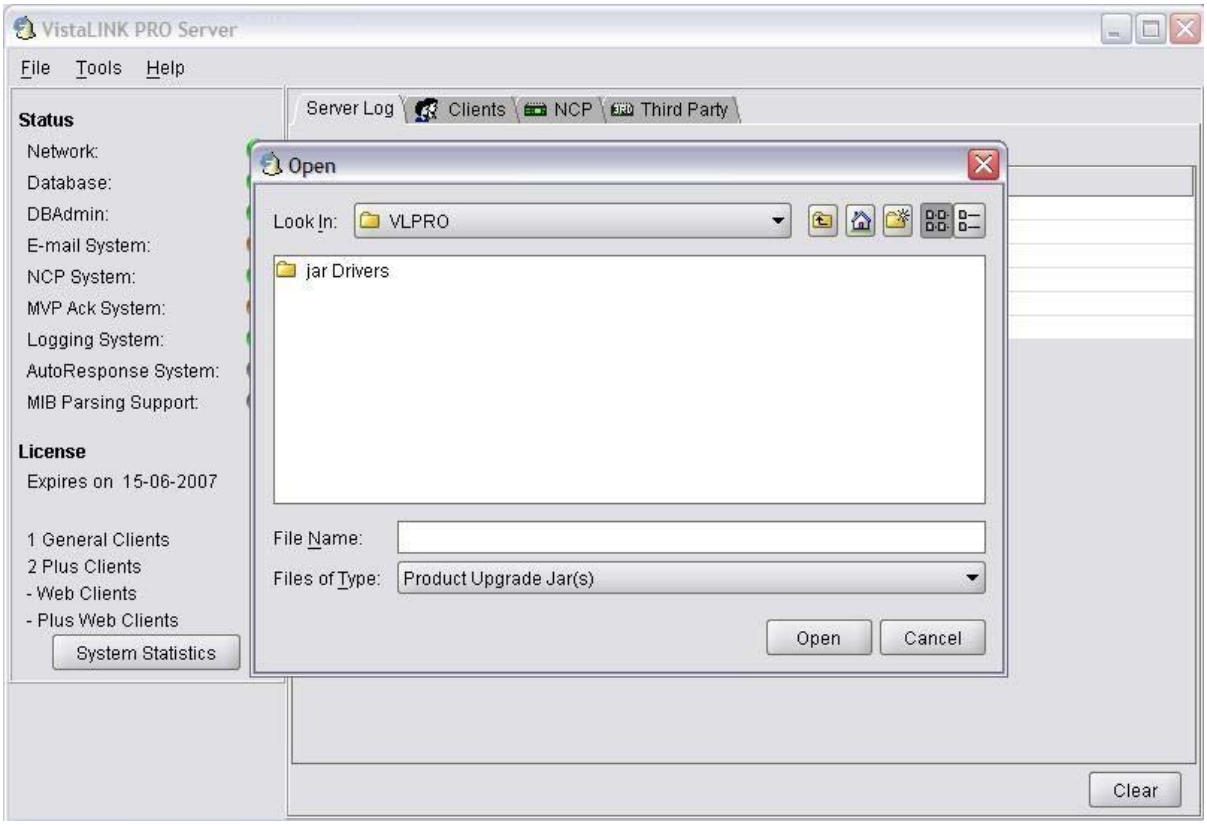


Figure 5-2: VistaLINK® PRO – Applying JAR Updates

You will be prompted to restart the server to enable the change to take effect. Apply as many JAR updates as required before restarting the server.

Figure 5-3: "Please Restart Your Alarm Server" Dialog Box

NOTE: You may confirm that all updates have been successfully applied by selecting from the menu *Tools>View>Show/Hide Product* update log.

Shutdown the server by selecting from the menu: *File>Shutdown Server*. Now re-open the server, it is normal for the startup to take marginally longer while each individual update is being applied. Once complete, you may restart the VLPro Clients. As the Client restarts you will experience a short delay while the update is applied. A prompt will appear confirming that the updates have been applied.

6. ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

BAT Bouquet Association Table
BER Bit Error Rate
BW Band Width
CA Conditional Access
CAT Conditional Access Table
CPE Common Phase Error
CRC Cyclic Redundancy Check
ETSI European Telecommunications Standards Institute
DC Direct Current
DVB Digital Video Broadcasting
DVB-C Digital Video Broadcasting baseline system for digital cable television (EN 300 429 [6])
DVB-CS Digital Video Broadcasting baseline system for SMATV distribution systems (EN 300 473 [13])
DVB-S Digital Video Broadcasting baseline system for digital satellite television (EN 300 421 [5])
DVB-T Digital Video Broadcasting baseline system for digital terrestrial television (EN 300 744 [9])
EIT Event Information Table
ETR ETSI Technical Report
ETS European Telecommunication Standard
FEC Forward Error Correction
GOP Group of Pictures
HEX Hexadecimal
ISO International Organization for Standardization
ITU International Telecommunication Union
MGT Master Guide Table
MPEG Moving Picture Experts Group
NIT Network Information Table
PAT Program Association Table
PCR Program Clock Reference
PID Packet Identifier
PMT Program Map Table
PSI MPEG-2 Program Specific Information (as defined in ISO/IEC 13818-1 [1])
PSIP Program and System Information Protocol
PTS Presentation Time Stamps
RS Reed-Solomon
RST Running Status Table (see EN 300 468 [7])
RTE Residual Target Error
SDT Service Description Table
SI Service Information
TDT Time and Date Table
TOT Time Offset Table
TS Transport Stream
UTC Universal Time Co-ordinated

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