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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Release	Jul 07
1.1	Added Template Check section 3.6 and GOP Repeat Mode tables. Added Switch faults section 2.5. Minor Corrections.	Nov 07
1.2	Updated VistaLINK screenshots, section 5&6. Added in VistaLINK description. General cleanup.	Dec 08
1.3	Modified “Card Type” definition in section 5.1	May 09
1.4	New menu added in switch control section	Nov 09

1. OVERVIEW

The 7780R2x1-ASI-CS-2 is a complete hardware base solution for MPEG-2 feed redundancy switching. By providing automatic smart switching of the main signal to a back up signal, the 7780R2x1-ASI-CS-2 offers protection to digital compressed signals.

Controlled by the industry leading VistaLINK® PRO, the 7780R2x1-ASI-CS-2 offers signal providers the capability to design automatic redundancy into their system and alarm the operator the second a problem arises. By constantly monitoring the incoming signals, the 7780R2x1-ASI-CS-2 is capable of knowing when the signals reach a point where they are no longer suitable for broadcast and automatically switches to a backup feed. The user can customize all monitored and switching rules to meet Broadcast, Cable, Satellite and IPTV needs.

Features

- Two automatic smart switches, each having 2 ASI inputs and 2 ASI outputs
- Fully integrated with the Industry leading VistaLINK® PRO NMS system
- TR101290 monitoring bitrate measurement and component matching test on all inputs
- Smart configuration of error threshold and switching rules to avoid false switching
- Delay of stream up to 3 seconds for perfect synchronization of incoming streams from different paths
- Complete TS data rate measurement from 100Kb/s to 100Mb/s with user settable measurement window
- Bitrate measurement on each PID
- Display of Transport Stream tree
- Matching of PID assignment, with predefined PID list and TSID
- Complete customization of status view and error report in VistaLINK® PRO
- Fits in 7700 Chassis

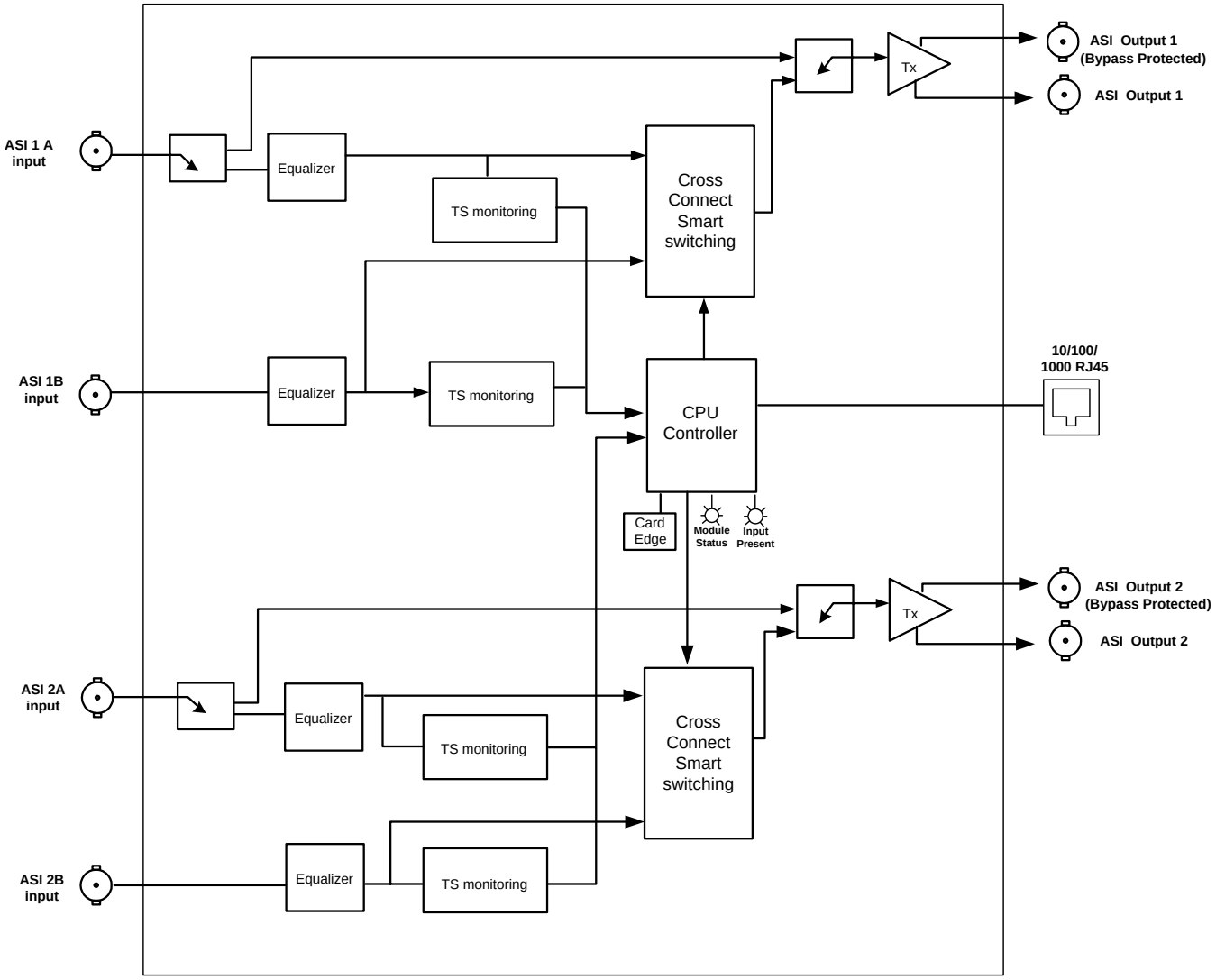


Figure 1-1: 7780R2x1-ASI-CS-2 Block Diagram

2. INSTALLATION OF 7780R2X1-ASI-CS-2

2.1. REAR PLATE DESCRIPTION

The 7780R2x1-ASI-CS-2 comes standard with a companion +3RU rear plate. Figure 2-1 provides an illustration of the 7780R2x1-ACI-CS-2 rear plate. For information on mounting the rear plate and inserting the module into the frame, see section 3 of the 7700FR manual.

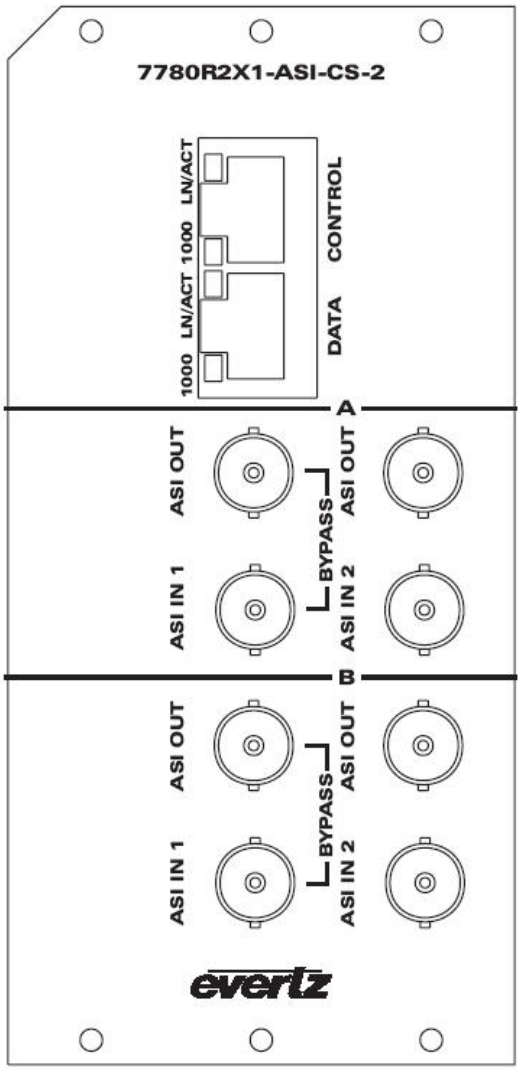


Figure 2-1: 7780R2x1-ASI-CS-2 Rear Plate

2.1.1. ASI Connectors

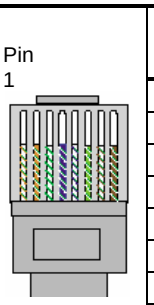
ASI IN 1A/ ASI IN 1B/ ASI IN 2A/ ASI IN 2B: There are four BNC connectors with serial digital video inputs, compatible with the SMTPE 259M (270 Mb/s) and SMPTE 292M (1.5 Gb/s) standards. ASI IN 1A and ASI IN 2A are bypass relay protected.

ASI OUT 1 and ASI OUT 2: There are four BNC connectors with serial digital video outputs. The ASI OUT 1 to the ASI IN 1A and the ASI OUT 2 to the ASI IN 1B are bypass relay protected.

2.1.2. Ethernet Connections

The 7780R2x1-ASI-CS-2 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 a RJ-45 connector at each end. Establish the network connection by plugging one end of the cable into the RJ-45 receptacle of the EQT 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 Color 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 EQT 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 EQT 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.

2.2. HARDWARE INSTALLATION

The following materials are required to successfully install the 7780R2x1-ASI-CS-2:

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

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 three adjacent vacant slots. Unpack the 7780R2x1-ASI-CS-2 and separate the rear card from the main card. Locate on the rear of the rack the three slots and remove the blanking panels. Insert the rear card into the back of the chassis and secure using the four screws provided.

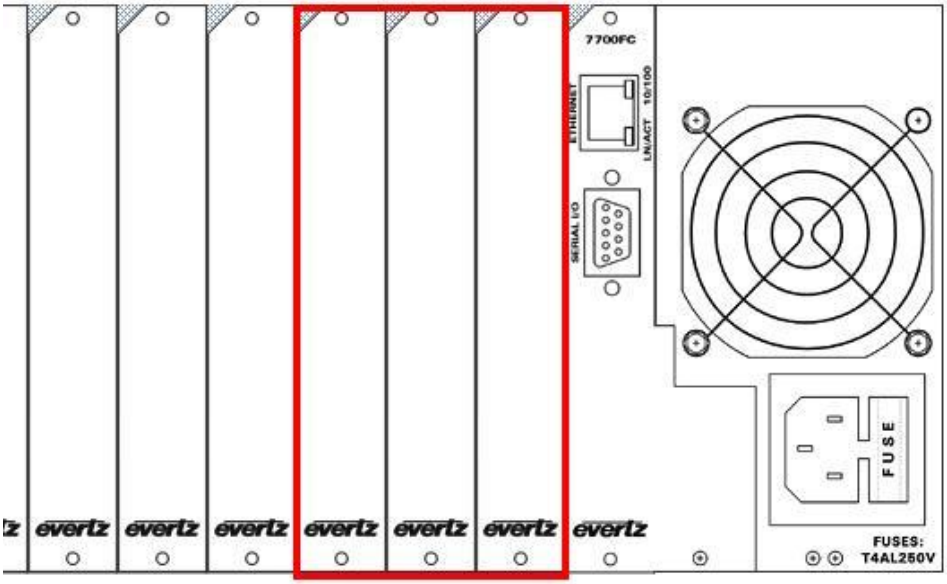


Figure 2-2: 7700 Chassis

Before inserting the front card, connect the serial cable to the board using the rainbow coloured serial cable, provided. Now insert the 7780R2x1-ASI-CS-2 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.

Connect the 9-pin d-type end of the serial cable to the serial port of your computer. Open a Terminal session and configure the port for the following configuration:

Bits per second	**115200**
Data Bits	**8**
Parity	**None**
Stop Bits	**2**
Flow Control	**None**

Click OK to apply these settings and press return. The session should respond with the R2x1-CS-2 Main Menu as shown in Figure 2-4:

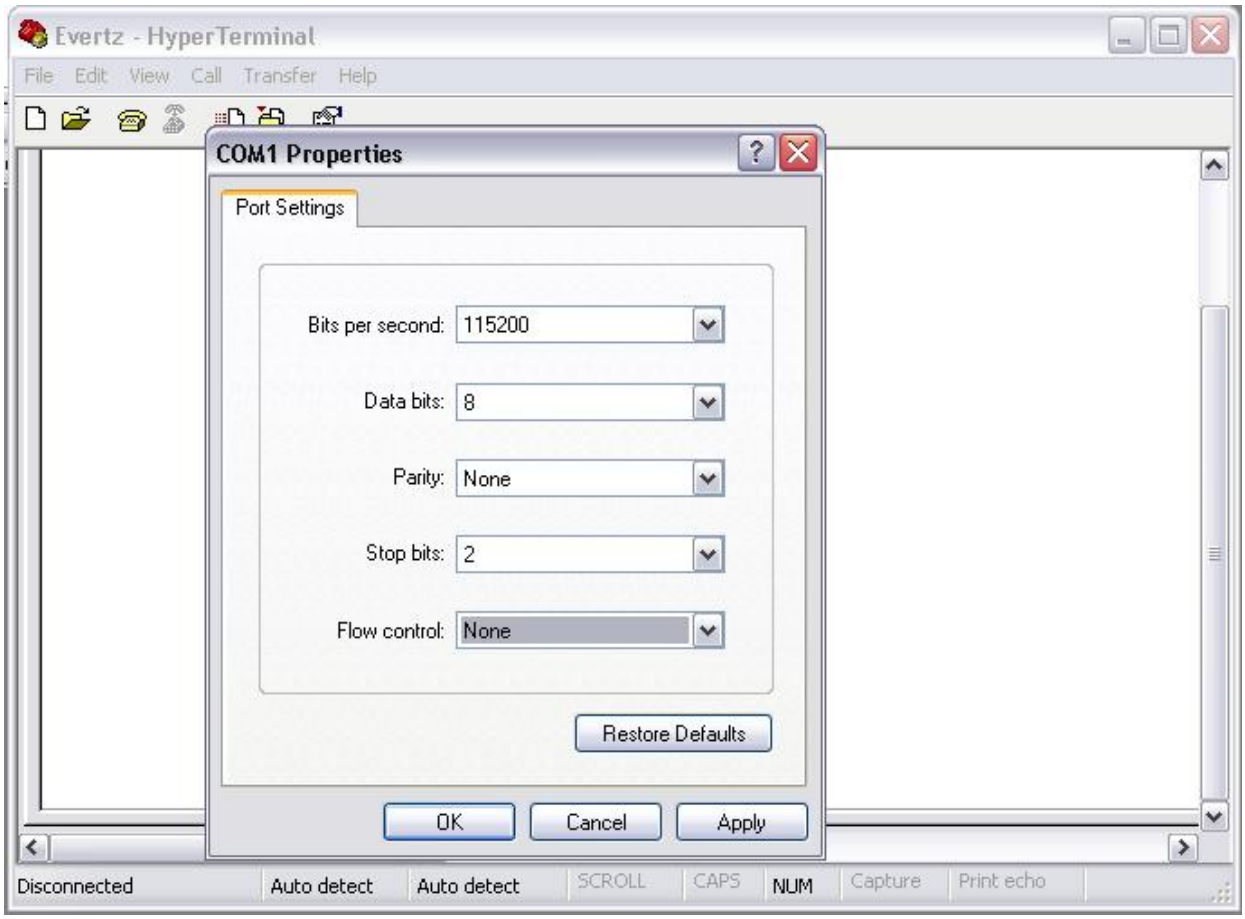


Figure 2-3: COM Port Properties Window

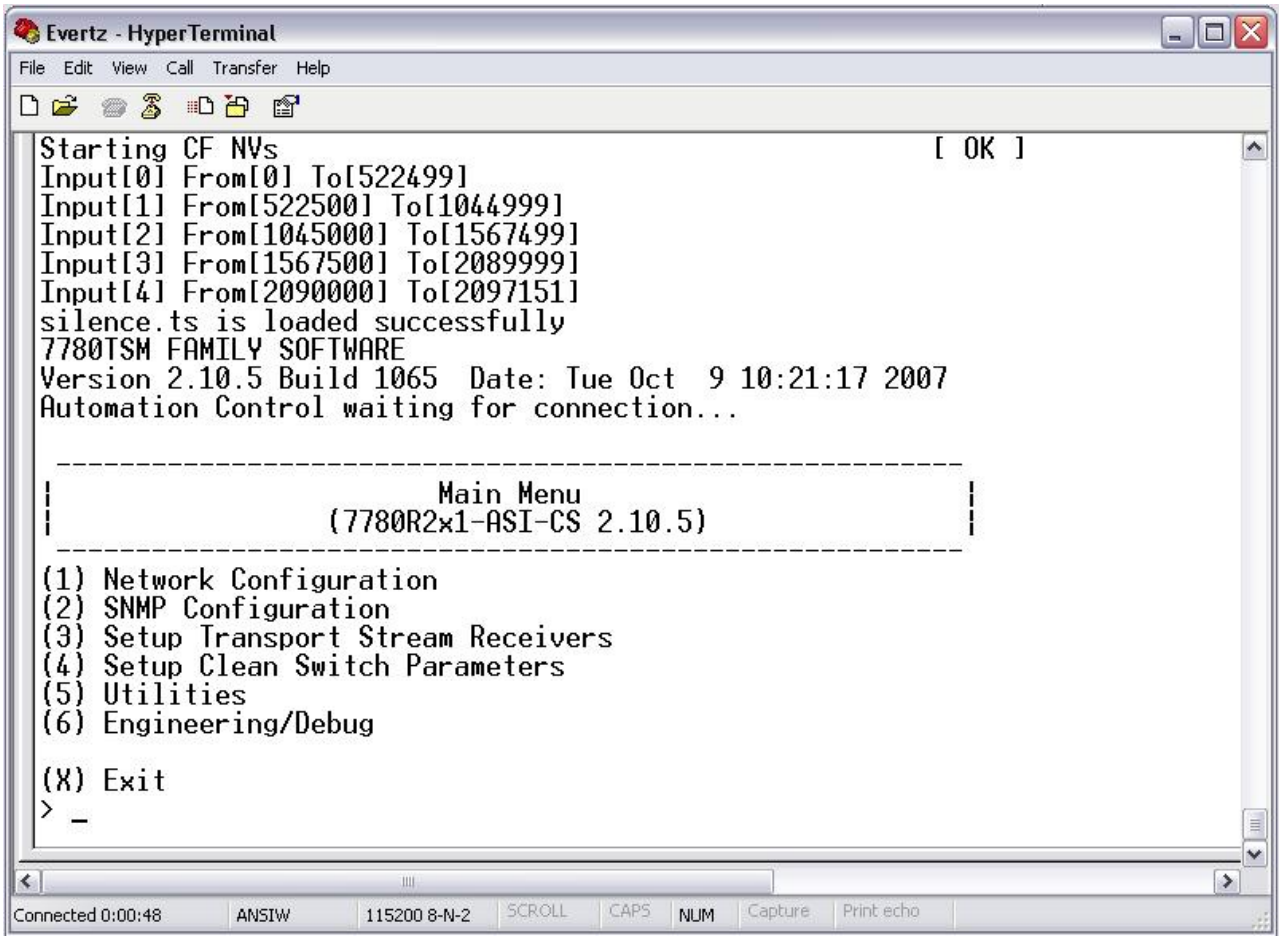


Figure 2-4: HyperTerminal Main Menu

(1) Network Configuration
This sub-menu enables the user to configure the network settings for the card.

(2) SNMP Configuration
This sub-menu enables the user to configure the Simple Network Management Protocol settings. In this menu you can set or remove the SNMP trap IP address and the SNMP Read and Set community strings.

(3) Setup Transport Stream Receivers
This sub-menu is used to configure the Transport Stream Receivers. As this configuration can also be performed via VLPro the sub-menu for this item will not be covered in this section.

(4) Setup Clean Switch Parameters
This sub-menu can be used to configure the clean switch settings such as switching mode, PCR tolerance, output mode and enable or disable the different features. As this configuration can also be performed via VLPro the sub-menu for this item will not be covered in this section.

(5) Utilities
This sub-menu contains two utilities. One command is for clearing the memory, and the other for clearing the flash. In normal operation it should not be necessary to use either of these options.

(6) Engineering/Debug
This menu is for Evertz personnel only. You may be requested to access and execute options within this menu when seeking technical support from Evertz. Guidance will be given should this be required.

Before is it possible to configure the card via VLPro it is first necessary to configure the initial basic network settings via the serial cable, this is covered in the next section.

2.3. CONFIGURING THE BASIC NETWORK SETTINGS

Using a terminal program, select option (1) *Network Configuration*, the Network Configuration menu will be displayed as shown in Figure 2-5. If you prefer to use DHCP then you may select option (5) *Use DHCP*, and then continue from step 4:

1. Select option (1) *Set IP Address* and configure the IP address for the 7780R2x1-ASI-CS-2 ensuring that the IP address is not already in use on the network.

2. Now select option (2) *Set Netmask* from the Network Configuration menu and configure the correct subnet mask for your network.

3. If required also configure option (3) *Set Gateway*.

4. Exit from the Network Configuration menu using (s) *Save and Exit*, NOT (x) *Exit*.

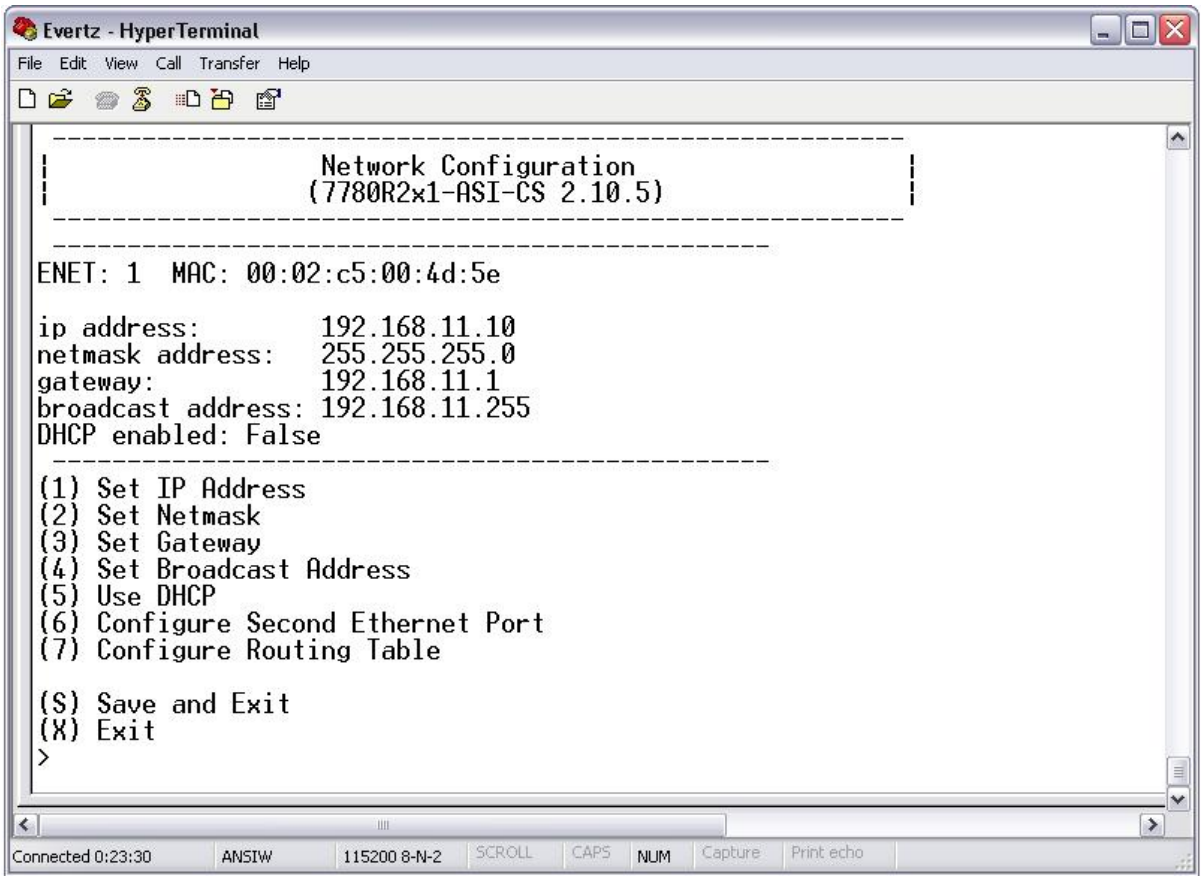


Figure 2-5: Network Configuration Sub-Menu

From the Main Menu select option (2) *SNMP Configuration*. Normally it is only necessary to configure here, under option (1) *Set Trap IP Address*, enter here the IP address of your VLPro Server. Exit using option (s) *Save and Exit*, now extract the card from the rack, remove the serial cable and re-insert it.

You have now completed the necessary minimum configuration and can connect the cables to the rear card when ready.

Note: The firmware version number is displayed in the menu title.

3. TECHNICAL DESCRIPTION

3.1. SPECIFICATIONS

The 7780R2x1-ASI-CS-2 Dual ASI clean switch is designed for seamless switching between two identical ASI streams.

3.1.1. General

- PCR re-stamping of the output
- Second buffer, per clean switch up to 213M/bs
- x RJ45 10/100/1000 Mb/s Ethernet port

3.1.2. Inputs and Outputs per switch

2 x ASI Inputs

Min ASI TS Input bitrate – 100Kb/s
Max ASI TS Input bitrate – 100Mb/s

2 x ASI Outputs

Min ASI TS output bitrate – 100Kb/s
Max ASI TS output bitrate – 100M/bs

3.1.3. Monitored Parameters TR 101 290

1.1 TS_sync_loss
1.2 Sync_byte_error
1.3 Pat_error
1.4 Continuity_count_error
1.5 PMT_error
1.6 PID_error

2.1 Transport_error
2.2 CRC_error
2.3a PCR_repetition_error
2.4b PCR_error
2.4 PCR_accuracy error
2.5 PTS_error
2.6 CAT_error

3.1.4. Tables and Repetition

DVB SI repetition error (NIT, SDT, EIT, RST, TDT)
ATSC PSIP tables repetition error (MGT, TVCT, CVCT, EIT, RRT, STT)

Note: The switch is capable of handling dynamic changes in the bitrate of 5 mb/s only. If the max bitrate should dynamically change by a larger amount the switch will perform an automatic reset.

3.1.5. PID Template

- TSID
- PID List
- Bitrate Limits

3.1.6. Electrical

Power: 41W

3.1.7. Physical

Number of Slots: 3

4. VISTALINK® REMOTE MONITORING/CONTROL

4.1. WHAT IS VISTALINK®?

VistaLINK® is Evertz' remote monitoring and configuration platform which operates over an Ethernet network using Simple Network Management Protocol (SNMP). SNMP is a standard computer network protocol that enables different devices sharing the same network to communicate with each other. VistaLINK® provides centralized alarm management, which monitors, reports, and logs all incoming alarm events and dispatches alerts to all the VLPro Clients connected to the server. Card configuration through VistaLINK® PRO can be performed on an individual or multi-card basis using simple copy and paste routines, which reduces the time to configure each module separately. Finally, VistaLINK® enables the user to configure devices in the network from a central station and receive feedback that the configuration has been carried out.

There are 3 components of SNMP:

1. An SNMP manager, also known as a Network Management System (NMS), is a computer running special software that communicates with the devices in the network. Evertz VistaLINK®-C Configuration Utility graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz VistaLINK® enabled products.

2. Managed devices, each with a unique address (OID), communicate with the NMS through an SNMP Agent. The 7780R2x1-ASI-CS-2 communicates directly with the manager using its internal Agent.

3. A virtual database, known as the Management information Base (MIB), lists all the variables being monitored, which both the Manager and Agent understand. Please contact Evertz for further information about obtaining a copy of the MIB for interfacing to a third party Manager/NMS.

4.2. 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 7780R2x1-ASI-CS-2 jar file to the server and both the client and server applications have been restarted. If you are the network administrator refer to section 7.2 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 "+" sign. Your 7780R2x1-ASI-CS-2 should appear as a newly listed device with the IP address used to configure the card in Step 1 above. 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).

As illustrated in Figure 4-1, the 7780R2x1-ASI-CS-2 will be displayed as four inputs numbered one through four. Inputs 1 and 2 relate to the first clean switch (A on the rear panel) while inputs three and four relate to clean switch two (B on the read panel).

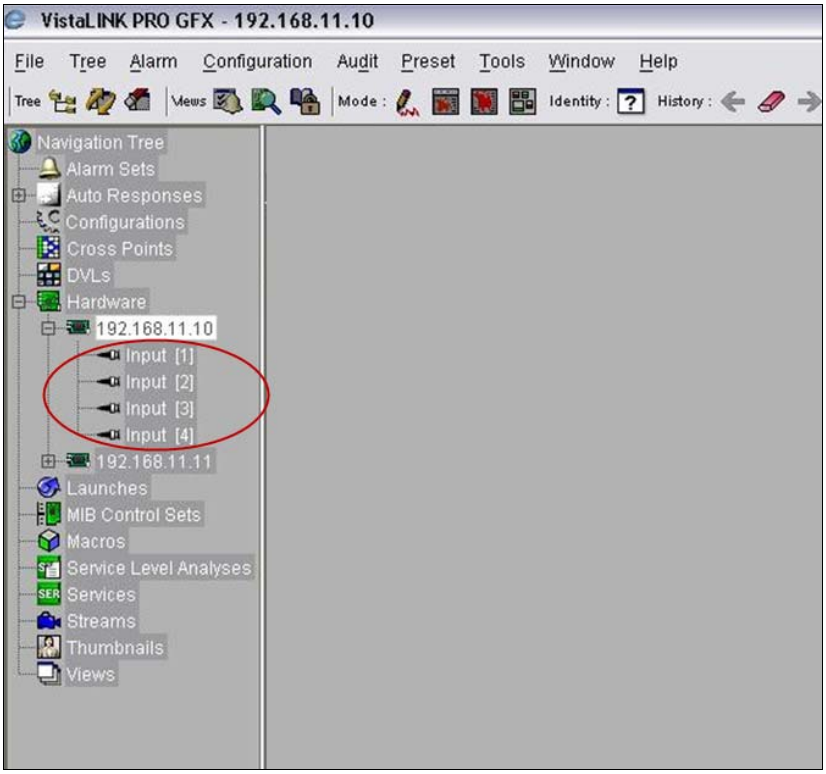


Figure 4-1: VistaLINK® PRO Hardware Configuration

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 but will remain greyed out for a moment while VLPro communicates with 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.

5. CARD CONFIGURATION

5.1. INPUT STATUS

Right-click the IP address of the 7780R2x1-ASI-CS-2 in the sub-menu and select *View Configuration*. The right window will display the 7780R2x1-ASI-CS-2 Configuration menus as shown in Figure 5-1.

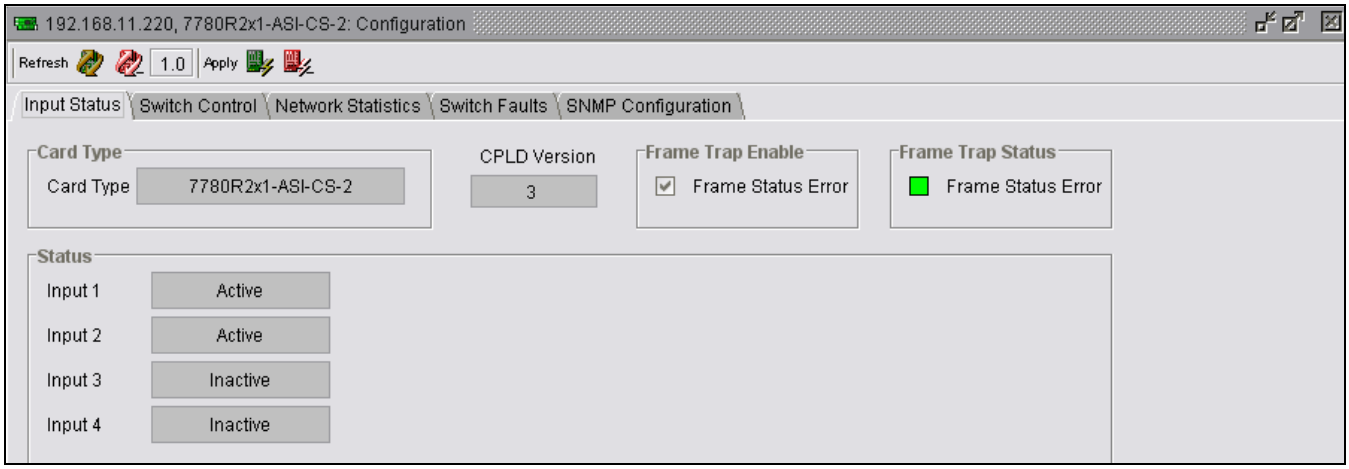


Figure 5-1: VistaLINK® PRO Input Status Tab

Here we can confirm that the correct board has been selected from the tree, notice that the IP address of the card forms part of the window header, and that the board is loaded with the correct firmware in the Card Type box. Below the card type, is the Status window that shows the status of the four inputs. The status of the inputs will not change unless a valid ASI feed is connected to the rear plate of the card and the status is refreshed using the *refresh* button located at the top of the configuration window. Using the continuous refresh button can aid troubleshooting connectivity issues, but does however prevent any configuration changes.

- **Card Type:** Displays the product name.
- **CPLD Version:** Used for engineering troubleshooting.
- **Frame Trap Enable:** Enables a trap to be sent out when a fault is detected in the frame (i.e. power)
  - It indicates a supply failure or when certain failures are detected on any of the cards within the frame (i.e. loss of input to certain cards).
- **Frame Trap Status:** This indicator will turn red when a fault is detected and will otherwise be green.
- **Status:** Indicates the status of the four inputs.

Note: There are no user configurable items on this page; it is for information purposes only.

5.2. SWITCH CONTROL

The **Switch Control** tab is for configuring the mode and method for both A and B clean switches. The controls are identical and independent for each. Both switches are identical in operation and configuration so for ease of illustration and explanation we will only consider switch A in this manual.

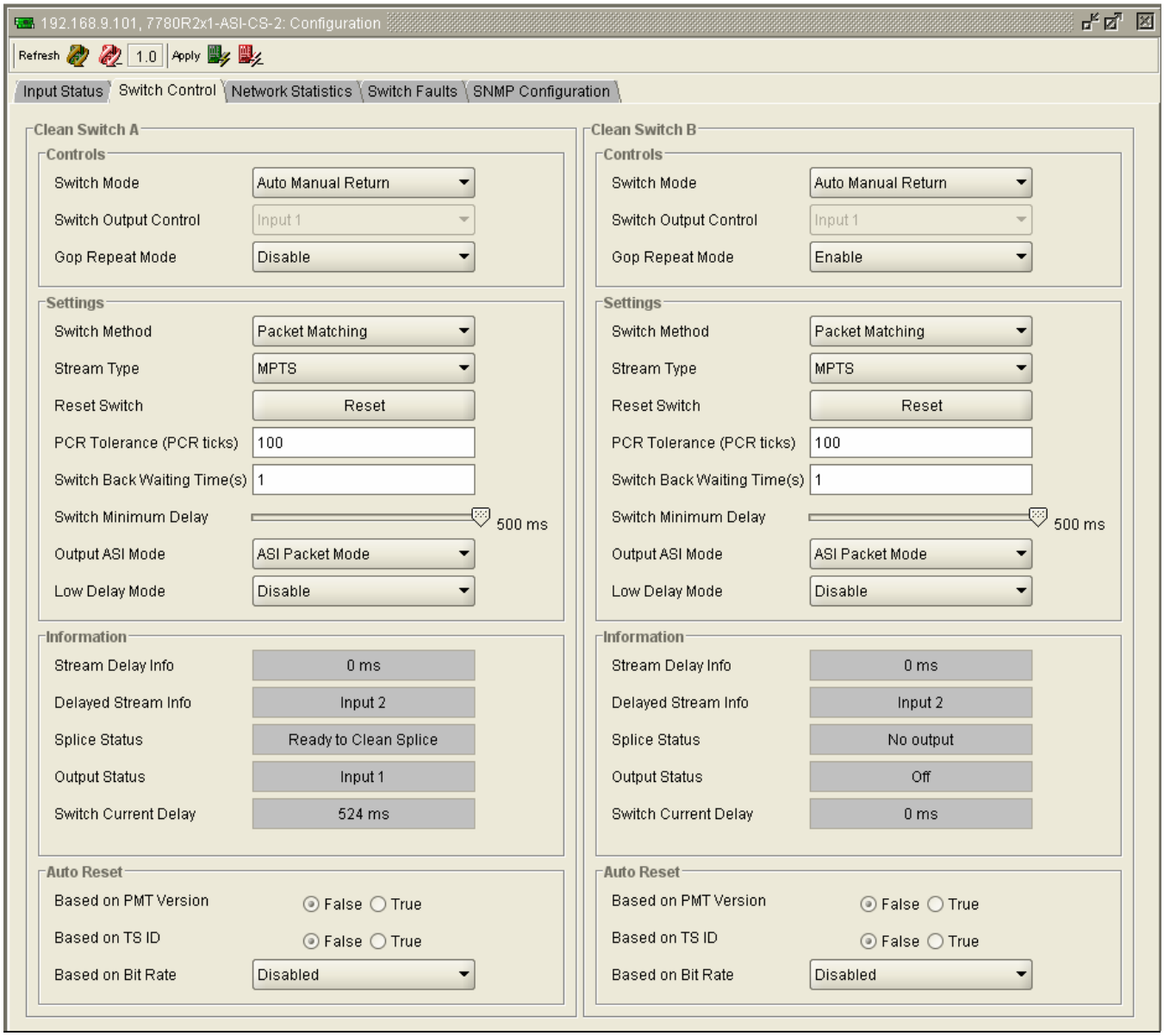


Figure 5-2: VistaLINK® PRO Switch Control Tab

5.2.1. Clean Switch A Controls

5.2.1.1. Switch Mode

Switch Mode options are “Manual”, “Auto-Manual Return” and “Auto Switch”. Normal operating modes are “Auto Switch” or “Auto-Manual Return;” however, “Manual” can be used during engineering work for example to prevent switching.

- **Auto:** The switch is in full control and will automatically switch from input 1 to input 2 and vice-versa. When possible, and when no errors are present, the switch will automatically clean switch to input 1, its preferred input. It is **not** possible to make any manual switch changes while in this mode.

- **Auto-Manual Return:** The switch is in semi-automatic control and will automatically switch from input 1 to input 2; however, manual intervention is required to switch back to input 1. It is necessary to select the manual mode first, before initiating the switch back to input 1.

- **Manual:** The switch is now in the users’ control. The switch will **not** perform any automatic switching on any errors. It is necessary to select this mode to initiate manual switching of the inputs. This mode is also useful during engineering works to prevent switching to an input known to be undergoing engineering work.

5.2.1.2. Switch Output Control

This button is used to manually control the switched output; Options are “Input 1” and “Input 2”. The operation of this button is dependant upon the Switch Mode.

- **Auto:** This control is greyed out and cannot be used.

- **Auto-Manual Return:** This control is greyed out and cannot be used.

- **Manual:** This control can be used to switch back and forth, manually, between inputs 1 and input 2. It may be necessary to select an alternative switching method to force the change if no switch point is available.

5.2.1.3. GOP Repeat Mode

The GOP repeat mode will repeat the last two valid GOP’s received in a number of different scenarios, please refer to the reference chart in section 7.3. The purpose of this mode is to provide a visual output in the event both inputs have been lost. It also disguises the switch point in a number of different scenarios to avoid black or frozen outputs.

Note: Disabling of the GOP Repeat Mode will, in a number of situations, cause an automatic reset to happen, as the input returns. This is necessary to maintain clean switching capability.

5.2.2. Clean Switch A Settings

5.2.2.1. Switch Method

Options are “Packet Matching”, “GOP boundary” and “Packet Switch”. Here we select how the switch finds its switch points. The operation of these three modes has different effects on the output and the selection of which depends upon the inputs. All can be used with delayed streams (up to a max of 4 seconds).

- **Packet Matching:** Can be used for MPTS or SPTS and should be selected where both input sources are identical, perhaps from a DA source or from the same MUX. The switched output in this mode will be totally seamless for all programs within the stream. Streams must contain a PCR and video streams.

- **GOP Boundary:** Ideally for SPTS streams where both sources are identical or near-identical streams (Hot/Redundant Muxes). The switched output will be seamless or near seamless. Streams must contain a PCR and video streams.

- **Packet Switch:** This mode is for switching of non-identical streams or streams containing audio or data only. The switched output will **not** be seamless and will result in black and/or frozen frames.

5.2.2.2. Stream Type

Table 5-1 provides information for each Stream Type.

ASI Stream Types	Same PID Structure/Bitrate	7780R2x1-ASI-CS Mode	Switched Output	
			MPEG-2 Syntax	Display
Identical SPTS	Yes	Packet Match	No Errors	Perfect
Identical MPTS	Yes	Packet Match	No Errors	Perfect
Non Identical Synchronized sources SPTS	Yes	Packet Match + PCR Tolerance	No Errors	Perfect
Non Identical Synchronized sources MPTS	Yes	Packet Match + PCR Tolerance	No Errors	Perfect
Non Identical Non Synchronized sources SPTS	Yes	GOP Boundary	No Errors	Close to Perfect
Non Identical Non Synchronized sources MPTS	Yes	Packet Switch	Multiple Errors	Freeze/Black
Different Streams	No	Packet Switch	Multiple Errors	Freeze/Black

Table 5-1: ASI Stream Types

Note: It is important to select the correct mode for the stream configuration in use.

- **MPTS - SPTS:** Options are SPTS or MPTS. In SPTS mode the PCR will be re-stamped on the output and should ideally be used in GOP Boundary mode. Make sure the correct type of stream is selected here.

5.2.2.3. Reset Switch

Select “Reset”, and then apply the change. This will perform a soft reset of the switch; it has no effect on the other switch. This should be performed every time a different stream is applied. Where a reset is required to switch between modes of operation, a reset will be automatically applied.

Note: The switch output will be temporarily interrupted during the reset.

5.2.2.4. PCR Tolerance

A value should be entered for switching of streams that are identical in every aspect except for their PCR values. For these kinds of streams we can switch in the "Packet Matching" switching mode if the corresponding PCR values are different by less than 50,000 PCR ticks. It is recommended that the PCR Tolerance will be set to the maximum difference in PCR values plus a minimal tolerance, as it may cause the false matching of the PCR packets that are close but not identical.

5.2.2.5. Switch Back Waiting Time

The waiting time is used to avoid constant toggling between Input 1 and Input 2. It is used in combination with Auto Switch mode as follows: when Input 1 fails the switch will automatically switch from input 1 to input 2. The switch will then continue to monitor the health of Input 1, if Input 1 health becomes good a count down timer equal to the waiting time will be started, if the counter reaches zero and Input 1 is still good, then the switch will switch back to Input 1, otherwise the counter will be reset and the same procedure mentioned above will be re-executed.

In Auto Switch mode if the value in the waiting time field is set to zero the following will occur if an error is detected on Input 1 the Clean Switch will switch to Input 2 and remain on Input 2 until an error occurs on Input 2 that would cause the Clean Switch to switch back to Input 1.

Note: A zero waiting time is not recommended as input 1 should always be used as primary when in error free working mode. Input 1 is bypassed protected but input 2 is not. When using input 2 as the permanent selected output, a card failure or a power supply failure will result in output interruption.

5.2.2.6. Switch minimum delay

The standard time a signal spends in clean switch (Input to output delay) depends on multiple parameters such as input 1 to input 2 time difference, Bitrate, switching mode and how much time the streams spend in buffer. The default buffering time is 500ms. The 7780R2x1-ASI-CS offers the capability to lower the default buffering time to 100ms. This is the minimum value that can guarantee clean switching. The Switch minimum delay setting allows the user to change the buffering time.

Note by lowering the buffering time, the input to output delay will be reduced but there is also more chances that an input error will be propagated to the output prior to switching. The recommended value is 500ms.

5.2.2.7. Output ASI mode

There are two modes that can be set for the output of the clean switch: ASI Packet mode and ASI byte mode. These two modes follow the DVB ASI standard and allow the user to choose the TS packet distribution on the ASI physical layer. The ASI packet mode will burst 1 MPEG-2 packet at a time when the ASI byte mode will spread all bytes equally. Depending on the downstream equipment compatibility the byte mode or the packet mode is required. The wrong mode will often result in the packet dropping at the input of the downstream equipment.

5.2.2.8. Low latency mode

The clean switch 7780R2x1-ASI-CS-2 offers a low latency mode when latency is more important than clean switching. When the low latency mode is enabled the switching mode will be by default set to packet matching. This mode presents very low latency through the 7780R2x1-ASI-CS-2 but does not offer any clean switching.

When enabled this mode will grey out most of the clean switch controls. In this low latency mode, the total delay through the switch is less than 10 milliseconds.

5.2.3. Clean Switch A Information

5.2.3.1. Stream Delay Info

The information displayed here is the current delay of the stream in ms. If both streams are perfectly in sync then this will read 0. If there is any delay then a decimal value, in ms, will be displayed.

Note: This window is only visible when the Switch Method is set to Packet Matching.

5.2.3.2. Delayed Stream Info

This information window only appears when a delayed stream is detected. It will show which stream is actually delayed. This will not appear in Packet Matching mode.

5.2.3.3. Splice Status

The status window is very important as it displays, when in auto-refresh mode, the near real-time status of the switch. If you are having problems, the display reads “Not ready to clean splice”, “Switch request pending” or “Splice request pending”. It is possible that for some reason the switch has been unable to identify a switching point. This can be caused by similar or dissimilar failures on either or both inputs. The clean switching points are a continuously moving target and, therefore not a constant, thus it is not possible to clean switch 100% of the time.

- **Packet Match:** Under normal operation this should read “Ready to Splice”, however, if it reads “Not ready to Clean Splice” then please check the settings above and confirm the inputs are both valid.

- **GOP Boundary and Packet Switch:** As packet switching is not relying upon a PCR match it is always ready to switch and will read “Ready to Switch”. All switch requests whether manual or automatic will be immediate.

5.2.3.4. Output Status

This information displayed here is the current output status. There are five possible states; these are Input1, Input2, Input GOP Repeat, Input 2 GOP Repeat or OFF. The front LED display will also mimic this output using 1, 2, G or 0 respectively.

5.2.3.5. Switch Current delay

The information displayed here is the current delay between the input and the output of the selected streams. This includes processing time, standard buffer time and any extra buffer time due to timing delay between the inputs.

5.2.4. Auto Reset

The clean switch typically needs to be reset manually when major configuration changes occur. This needs to happen when new streams are applied, or the PID structure is changed, etc.

The Auto reset menus allow the clean switch to auto reset on specific parameters such as the PMT version change, TS ID change, and Large Bitrate change, etc. This mode is useful when the clean switch is used for occasional feeds and setting change on a regular basis.

Note: The output of the clean switch will turn off momentarily when the clean switch is reset.

5.2.4.1. Based On PMT version

When this is enabled the clean switch will reset when a new PMT version is detected.

5.2.4.2. Based On TSID

When this is enabled the clean switch will reset when a new TSID is detected.

5.2.4.3. Based On Bitrate

When this is enabled the clean switch will reset when a large input Bitrate is detected. The user can decide on a 20, 40, 60, 80% Bitrate change before applying the reset.

5.3. NETWORK STATISTICS

The **Network Statistics** tab displays the network statistics for the gigabit Ethernet interface on the back plate. The upper port, as viewed from the back of the chassis, is the Management Port (Control) and the other is the data port. The data port, in the context of the 7780R2x1-ASI-CS-2, is not used and does not require any configuration or connection.

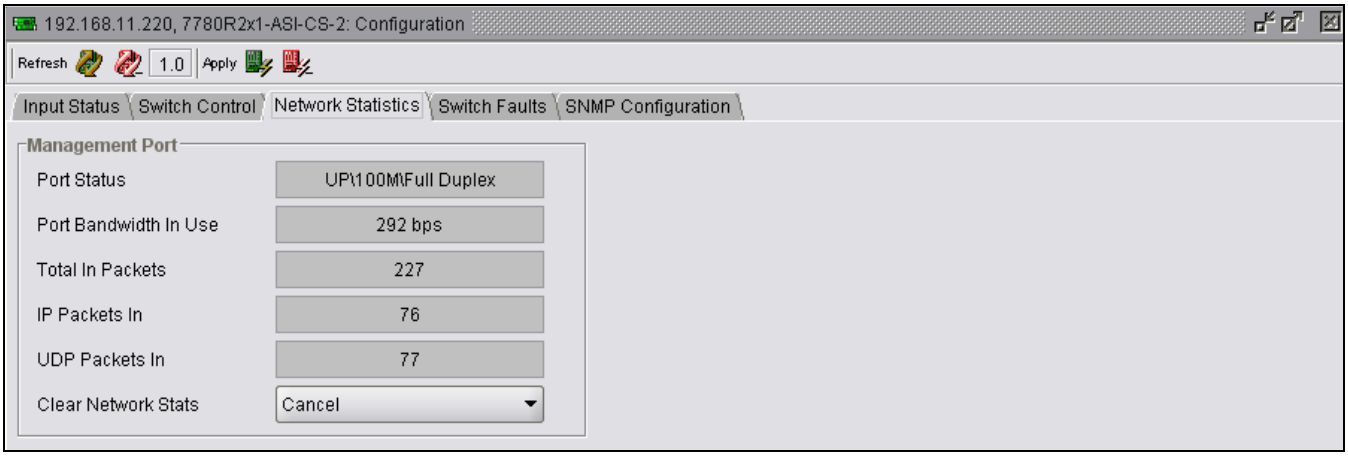


Figure 5-3: VistaLINK® PRO Network Statistics Tab

The network statistics can be reset at any time by navigating to the “Clear Network Stats” drop down box as shown below, and selecting the “Clear” option. Once the setting is applied, using the *apply* button, the statistics will be reset and begin to count from zero again.

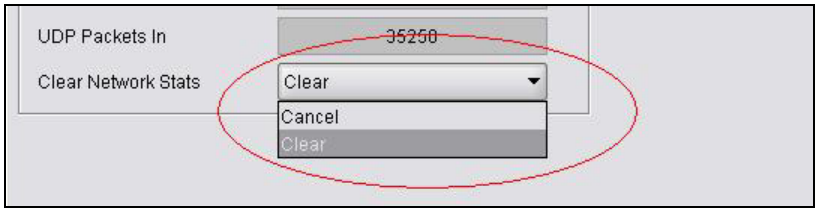


Figure 5-4: Clear Network Stats Menu Item

5.4. SWITCH FAULTS

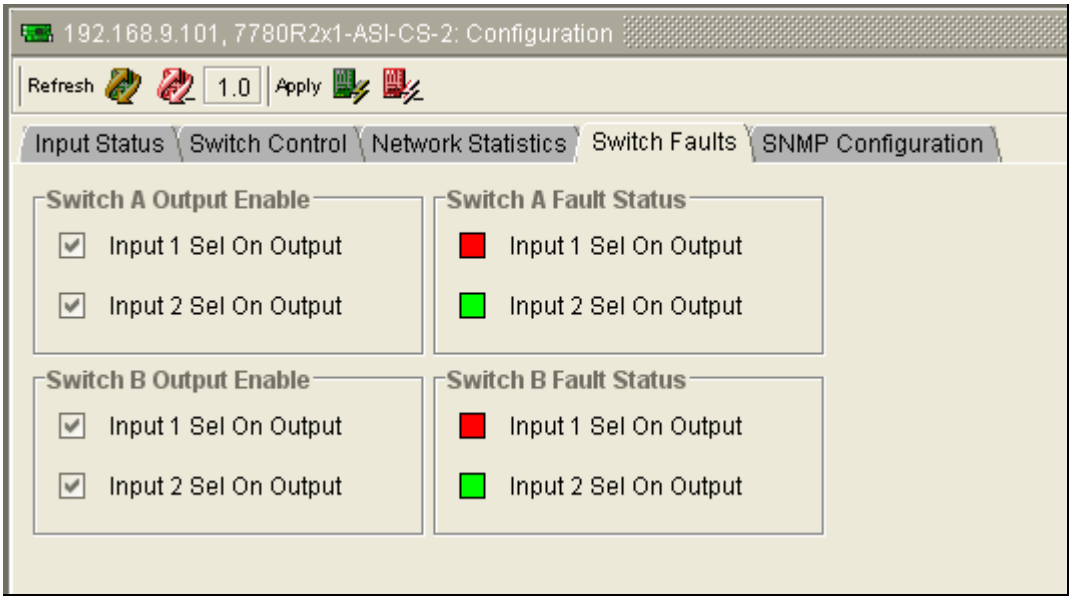


Figure 5-5: VistaLINK® PRO Switch Faults

5.4.1. Switch A Output Status

- **Input 1 Sel On Output:** Selecting this check box will cause VLPro to be notified, via an SNMP trap, that Input 1 has been selected as the output.

- **Input 2 Sel On Output:** Selecting this check box will cause VLPro to be notified, via an SNMP trap, that Input 2 has been selected as the output.

5.4.2. Switch B Fault Status

- **Input 1 Sel On Output:** This indicator will turn red if Input 1 is currently being used as an output for the switch.

- **Input 2 Sel On Output:** This indicator will turn red if Input 2 is currently being used as an output for the switch.

Note: Selecting both check boxes will raise two traps as the input is switched. This is useful for confirmation that the correct input has been selected and thus a switch has taken place.

5.5. SNMP CONFIGURATION

The **SNMP Configuration** tab is used to add or remove existing trap destinations. To add a trap destination simply enter the trap destination in the Destination IP Address field, then select the *Apply* button. To remove a destination, place a checkmark in the box beside the Trap Destination IP address that you wish to remove, and then select the *Apply* button.

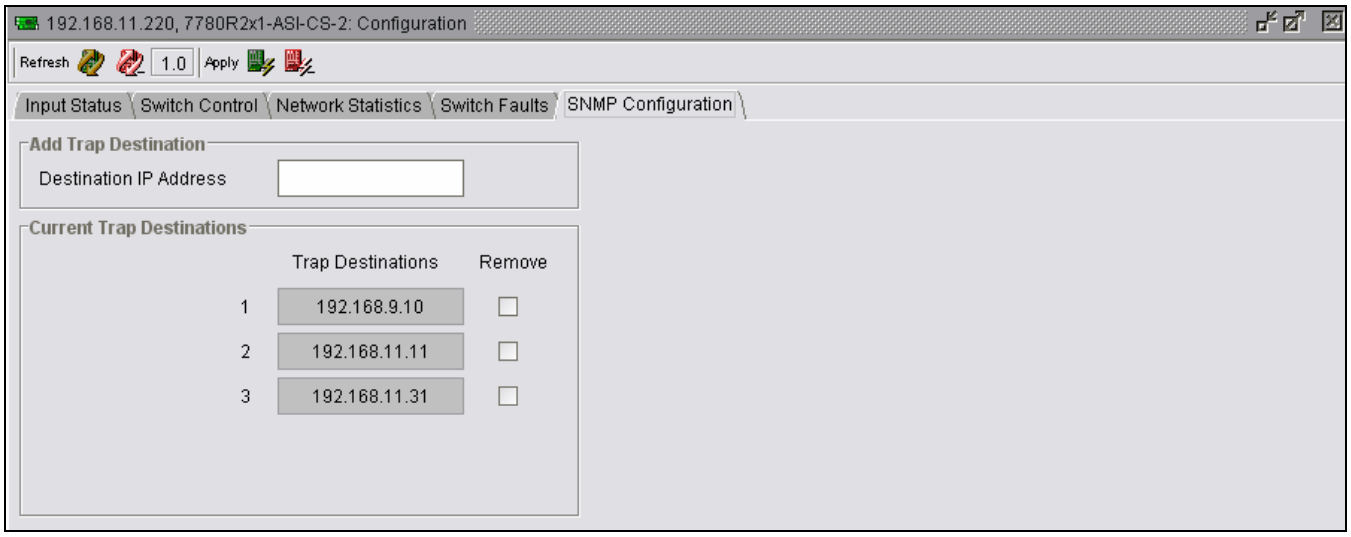


Figure 5-6: VistaLINK® PRO SNMP Configuration Tab

6. CONFIGURING INPUTS

With the 7780R2x1-ASI-CS-2 hardware tree expanded, it is possible to see the sub components, in this case Input 1, Input 2, Input 3 and Input 4. By right clicking and selecting *configure* it is possible to configure each of the inputs completely independent of one another. Section 6.1 to 6.9 describes the function of each of the tabs and any user configurable entries.

6.1. BITRATE VIEW TAB

The Bitrate View tab is where VLPro displays the standard Transport Stream parameters. As shown in Figure 6-1, it is possible to see all the packets within the TS stream. They are organized in ascending order by Service ID but can also be re-ordered by Prog #. This can be done by double clicking the column header. Make sure you are not in the auto refresh mode when doing this.

For each individual PID it is possible to view the minimum and maximum Bitrate since the last reset (Clear Monitoring Reset). The columns Min and Max Thresholds can be user configured to provide a triggered alarm for under or over bitrate conditions per PID, by default these are set to 0 and 100Mb/s respectively.

192.168.11.220, Input [1]: Configuration

Refresh 1.0 Apply

Bitrate View | Input Configuration | Input Monitor | TS Syntax Errors - P1 & P2 | TS Syntax Errors - P3 | Template Check | Fault Control | Trigger Faults

Prog. #	Prog. Name	PID #	PID Type	Table ver.	Info	Bar Graph	Bitrate(Mbps)	Min Bitrate(...	Min Thresh...	Max Bitrate(...	Max Thresh...	Bitrate Limit
		0	PAT	10	PAT		0.031	0.028	0.000	0.031	100.000	IN LIMIT
		17	SDT	1	SDT		0.027	0.024	0.000	0.027	100.000	IN LIMIT
		8191	NULL Packet	N/A	NULL Packet		46.962	44.891	0.000	95.086	100.000	IN LIMIT
3	JSTV	4642	MPEG-2 Vid...	N/A	MPEG2 Vid...		3.488	2.462	0.000	5.195	100.000	IN LIMIT
3	JSTV	4643	MPEG-2 Au...	N/A	Layer II | 48 ...		0.199	0.196	0.000	0.200	100.000	IN LIMIT
4	WOWTV	4898	MPEG-2 Vid...	N/A	MPEG2 Vid...		3.026	2.836	0.000	3.511	100.000	IN LIMIT
4	WOWTV	4899	MPEG-2 Au...	N/A	Layer II | 48 ...		0.400	0.392	0.000	0.409	100.000	IN LIMIT
5	AAJTK	5154	MPEG-2 Vid...	N/A	MPEG2 Vid...		2.108	0.269	0.000	2.826	100.000	IN LIMIT
5	AAJTK	5155	MPEG-2 Au...	N/A	Layer II | 48 ...		0.204	0.197	0.000	0.204	100.000	IN LIMIT
6	BTN	5410	MPEG-2 Vid...	N/A	MPEG2 Vid...		3.138	2.954	0.000	3.503	100.000	IN LIMIT
6	BTN	5411	MPEG-2 Au...	N/A	Layer II | 48 ...		0.401	0.391	0.000	0.410	100.000	IN LIMIT
7	HT	5666	MPEG-2 Vid...	N/A	MPEG2 Vid...		2.172	1.535	0.000	2.651	100.000	IN LIMIT
7	HT	5667	MPEG-2 Au...	N/A	Layer II | 48 ...		0.201	0.196	0.000	0.205	100.000	IN LIMIT
8	ONGME	1006	MPEG-2 Vid...	N/A	MPEG2 Vid...		3.075	2.594	0.000	3.610	100.000	IN LIMIT
8	ONGME	1007	MPEG-2 Au...	N/A	Layer II | 48 ...		0.400	0.392	0.000	0.409	100.000	IN LIMIT
9	TVN24	6178	MPEG-2 Vid...	N/A	MPEG2 Vid...		2.044	2.041	0.000	3.733	100.000	IN LIMIT
9	TVN24	6179	MPEG-2 Au...	N/A	Layer II | 48 ...		0.198	0.194	0.000	0.198	100.000	IN LIMIT
10	TRACE	6434	MPEG-2 Vid...	N/A	MPEG2 Vid...		2.416	1.634	0.000	3.287	100.000	IN LIMIT
10	TRACE	6435	MPEG-2 Au...	N/A	Layer II | 48 ...		0.198	0.197	0.000	0.200	100.000	IN LIMIT
11	PLSAT	6690	MPEG-2 Vid...	N/A	MPEG2 Vid...		5.710	2.678	0.000	6.147	100.000	IN LIMIT
11	PLSAT	6691	MPEG-2 Au...	N/A	Layer II | 48 ...		0.260	0.260	0.000	0.264	100.000	IN LIMIT
12	NBN	6946	MPEG-2 Vid...	N/A	MPEG2 Vid...		3.600	3.591	0.000	3.604	100.000	IN LIMIT
12	NBN	6947	MPEG-2 Au...	N/A	Layer II | 48 ...		0.202	0.199	0.000	0.204	100.000	IN LIMIT
13	NEWTV	5922	MPEG-2 Vid...	N/A	MPEG2 Vid...		2.524	2.519	0.000	2.533	100.000	IN LIMIT
13	NEWTV	5923	MPEG-2 Au...	N/A	Layer II | 48 ...		0.204	0.202	0.000	0.205	100.000	IN LIMIT
14	IQRAA	7458	MPEG-2 Vid...	N/A	MPEG2 Vid...		1.940	1.938	0.000	1.943	100.000	IN LIMIT
14	IQRAA	7459	MPEG-2 Au...	N/A	Unknown		0.132	0.130	0.000	0.134	100.000	IN LIMIT
15	B4U	7714	MPEG-2 Vid...	N/A	MPEG2 Vid...		6.548	6.543	0.000	6.554	100.000	IN LIMIT
15	B4U	7715	MPEG-2 Au...	N/A	Layer II | 48 ...		0.198	0.195	0.000	0.198	100.000	IN LIMIT
16	FUTUR	33	PMT :PGM3	1	PMT :PGM3		0.042	0.021	0.000	0.042	100.000	IN LIMIT
16	FUTUR	7970	MPEG-2 Vid...	N/A	MPEG2 Vid...		3.406	3.403	0.000	3.408	100.000	IN LIMIT
16	FUTUR	7971	MPEG-2 Au...	N/A	Layer II | 48 ...		0.196	0.194	0.000	0.198	100.000	IN LIMIT

Figure 6-1: VistaLINK® PRO Bitrate View Tab

Note: The Bitrate View is a dynamic view; by clicking the auto refresh button it is possible to see nearly instantaneous values for the stream.

6.2. INPUT CONFIGURATION TAB

The **Input Configuration** tab is used to select the stream type being monitored. The *Input Configuration* tab also configures the PID and TS display options.

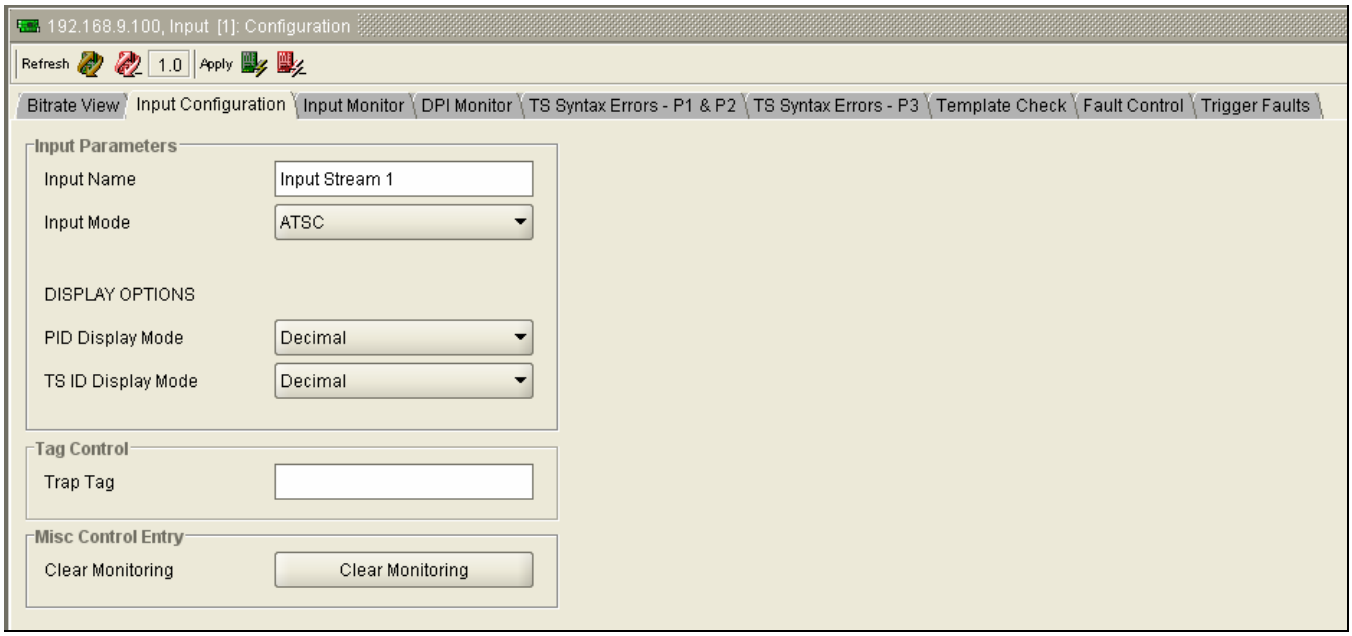


Figure 6-2: VistaLINK® PRO Input Configuration Tab

6.2.1. Input Parameters

- **Input Name:** This field enables the user to give the stream a more easily identifiable name.
- **Input Mode:** The Input Mode options available are ATSC, DVB and MPEG.

It is important to select the standard to which the stream is being coded as this affects the context of the alarms for ETSI TR 101 290 priority 3 and the handling of AC3 Audio.

- **PID Display Mode:** This control sets the PID display mode. The options available are Decimal or Hex.
- **TS ID Display Mode:** This control sets the TS ID display mode. The options available are Decimal or Hex

6.2.2. Misc Control Entry

- **Clear Monitoring:** Selecting the clear option and applying it will clear the recorded statistics for the Maximum and Minimum bitrates, as well as reset the error counts for all Priority 1, 2 and 3 Syntax Errors.

6.3. INPUT MONITOR TAB

The **Input Monitor** tab provides the user with an overview of the input status.

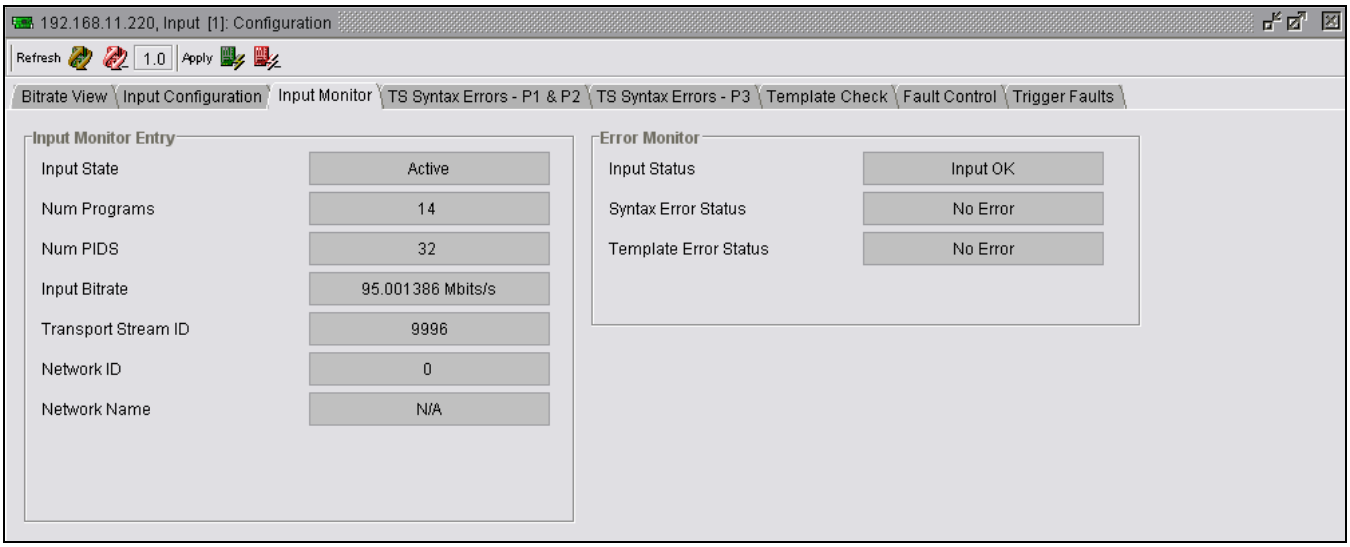


Figure 6-3: VistaLINK® PRO Input Monitor Tab

6.3.1. Input Monitor Entry

- **Input State:** This field will display the input state of the input monitor. The options will be *Active* or *Inactive*.
- **Num Programs:** This field will display the number of compliant programs found in the input stream.
- **Num PIDS:** This field will display the total number of individual PIDs found in the stream. It also includes all ghost PIDs and Null packets.
- **Input Bitrate:** This field display the current bitrate of the input ASI stream.
- **Transport Stream ID:** This field displays the decimal value for the input stream.

Corresponds to one satellite transponder.

- **Network ID:** This field displays the decimal value for Transport Stream Network ID.

Corresponds to an entire satellite of transponders.

- **Network Name:** If available, the network name will be displayed in this field.

6.3.2. Error Monitor

- **Input Status:** This field displays a system message to notify the user if the input is receiving a valid ASI source.

- **Syntax Error Status:** This field displays s system message to notify the user if any of the ETSI TR 101 290 P1/P2/P3 monitoring tests are currently in an alarm condition. The tests, which have the Fault Monitor checked, are displayed here. The determination of the severity can be selected on the syntax tabs. The most severe condition will be displayed.

- **Template Error Status:** This field displays a system message to notify the user if the TS input does not comply with the template parameters entered on the *Template Check* tab.

6.4. SYNTAX ERRORS – P1 & P2

The **Syntax Errors – P1 & P2** tab displays a general health check for the most important elements of the TS. The tests are not exhaustive and are outlined in detail in the document *Digital Video Broadcasting (DVB); Measurement guidelines for DVB systems ETSI TR 101 290*. It should be noted that the P3 errors are context sensitive to the type of input stream selected (under Input Configuration).

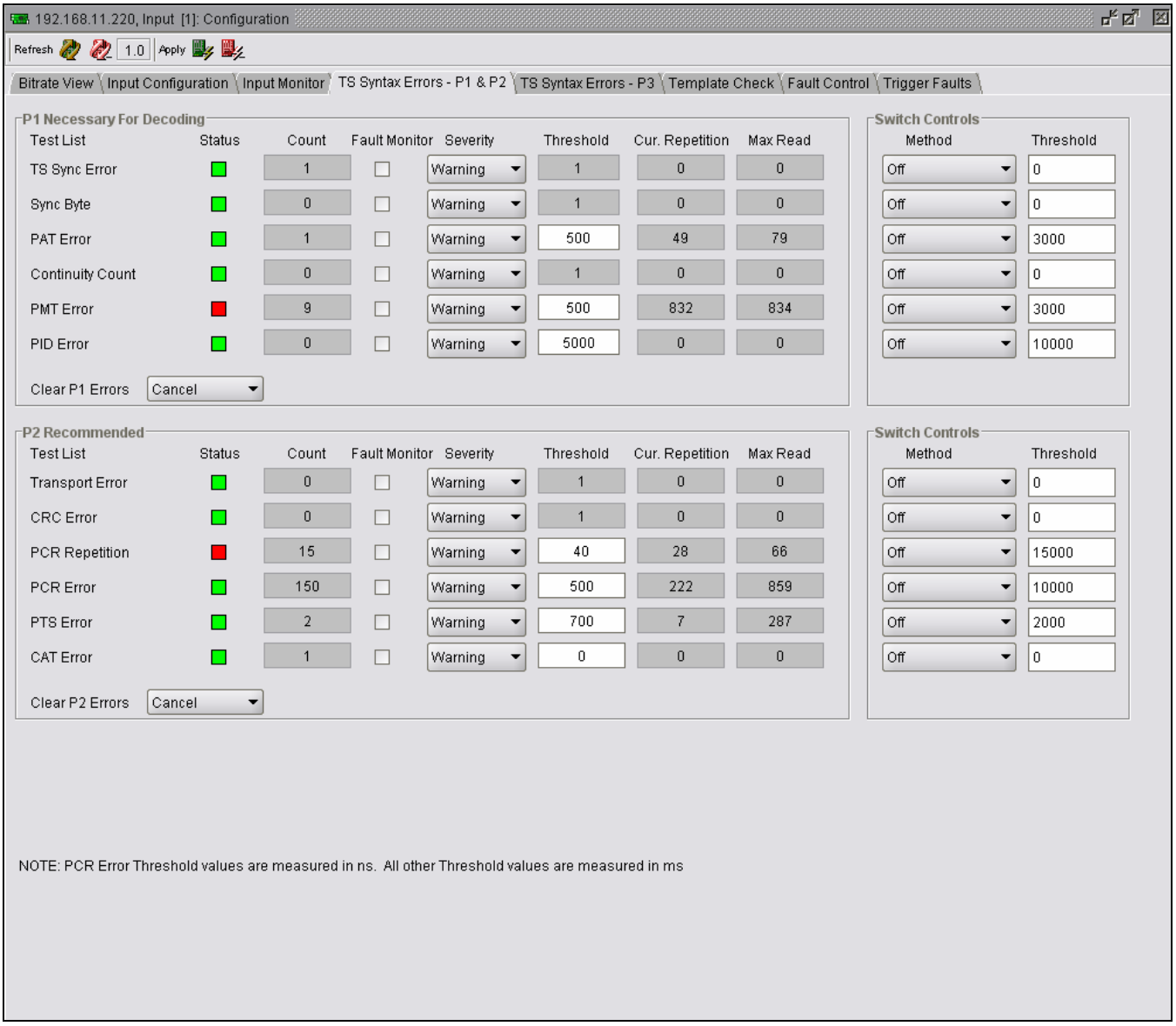


Figure 6-4: VistaLINK® PRO TS Syntax Errors – P1 & P2 Tab

The following chart provides a list of controls that apply to both Priority 1 and Priority 2 tables:

Status	Indicates the status of each test. Green indicates that no faults are found and red indicates that a fault is found.
Count	Displays the number of times a fault is detected.
Fault Monitor	When selected, updates the *Input Monitor* tab – Syntax Error status.
Severity	Enables the user to select the severity level of an alarm.
Threshold	Enables the user to enter a threshold value for each test. Greyed out threshold fields are based on Standard TR 101 290.
Cur. Repetition	Displays the current repetition value of each test.
Max Read	Displays the maximum read value of each test.

For each test there is a “Fault Monitor” check box. Selecting this check box will update the *Input Monitor* tab - Syntax Error status. The highest alarm severity will prevail. When selecting the check box be sure to select, from the drop down box, the corresponding severity that should be associated with this alarm.

In addition to the user configurable threshold for each of the Priority 1, 2 and 3 tests, it is also possible to set another, totally independent, threshold for switching. Here it is possible to select any value independently of the TR 101 290 tests themselves. This second threshold, usually beyond that of the alarm, is used to determine when to initiate a switch before the signal goes beyond a sensible user configured minimum for decoding thus preventing serious service interruption.

6.4.1. P1 Necessary for Decoding

- **TS Sync Error:** The most important function for the evaluation of data from the MPEG-2 TS is the sync acquisition. The actual synchronization of the TS depends on the number of correct sync bytes necessary for the device to synchronize; two or more consecutive corrupted sync bytes indicate sync loss. After synchronization has been achieved the evaluation of the other parameters is carried out.

- **Sync Byte:** The indicator "Sync Byte" is set as soon as the correct sync byte (0x47) does not appear after 188 or 204 bytes. This is fundamental because this structure is used throughout the channel encoder and decoder chains for synchronization. It is also important that every sync byte is checked for correctness since encoders do not necessarily check the sync byte.

- **PAT Error:** The Program Association Table (PAT), which only appears in PID 0x0000 packets, tells the decoder what programs are in the TS and points to the Program Map Tables (PMT) which in turn point to the component video, audio and data streams that make up the program. If the PAT is missing then the decoder can do nothing, no program is decodable. Nothing other than a PAT should be contained in a PID 0x0000.

- **Continuity Count:** For this indicator three checks are combined. The preconditions "Incorrect packet order" and "Lost packet" could cause problems for receivers that are not equipped with additional buffer storage and intelligence. It is not necessary for the test equipment to distinguish between these two preconditions as they are logically OR-ed, together with the third precondition, "a packet occurs more than twice" into one indicator.

- **PMT Error:** The Program Association Table (PAT) tells the decoder how many programs there are in the stream and points to the PMTs that contain the information where the parts for any given event can be found. Parts in this context are the video stream (normally one), the audio streams and the data stream (i.e. Teletext). Without a PMT the corresponding program is not decodable.

- **PID Error:** It is checked whether there exists a data stream for each PID that occurs. This error often occurs where TS are multiplexed, or demultiplexed and again remultiplexed.

6.4.1.1. Clear P1 Errors

Priority 1 Errors can be reset at any time by selecting the “Clear P1 Errors” drop down box and selecting the “Clear” option. Once the setting is applied, using the *apply* button, all error displays will be reset.

6.4.2. P2 Recommended

- **Transport Error:** The primary Transport error indicator is Boolean which counts the erroneous TS packets. This counter is intended for statistical evaluation of the errors. If an error occurs, no further error indication should be derived from the erroneous packet.

- **CRC Error:** The CRC check for the CAT, PAT, PMT, NIT, EIT, BAT, SDT and TOT indicates whether the content of the corresponding table is corrupted. In this case no further error indication should be derived from the content of the corresponding table.

- **PCR Error:** The PCRs are used to re-generate the local 27 MHz system clock. If the PCR does not arrive with sufficient regularity then this clock may jitter or drift. PCR discontinuity of more than 100 ms occurring without specific indication or the time interval between two consecutive PCR values is more than 40 ms.

- **PCR Repetition:** The PCRs are used to re-generate the local 27 MHz system clock. If the PCR do not arrive with sufficient regularity then this clock may jitter or drift. The receiver/decoder may even go out of lock. This error indicates that the time interval between two consecutive PCR values is more than 40 ms.

- **PCR Error:** The accuracy of ±500 ns is intended to be sufficient for the colour subcarrier to be synthesized from the system clock. This test should only be performed on a constant bitrate TS as defined in ISO/IEC 13818-1.

- **PTS Error:** The Presentation Time Stamps (PTS) should occur at least every 700 ms. The PTS is only accessible if the TS is not scrambled.

- **CAT Error:** The CAT is the pointer to enable the receiver to find the EMMs associated with the CA system(s) that it uses. If the CAT is not present, the receiver is not able to receive management messages.

6.4.2.1. Clear P2 Errors

Priority 2 Errors can be reset at any time by selecting the “Clear P2 Errors” drop down menu and selecting the “Clear” option. Once the setting is applied, using the *apply* button, all error displays will be reset.

6.4.3. Switch Controls

Switch Controls apply to both P1 and P2 tables in this section. Enabling a parameter or number of parameters is very simple. Add a threshold value (see Figure 6-5) next to the test in the threshold box located to the very right of the page. Now, enable the switch by changing the default "Off" value to either "Splice" or "Forced Switch" (using the *Method* drop down box). Be sure to apply all of the changes.

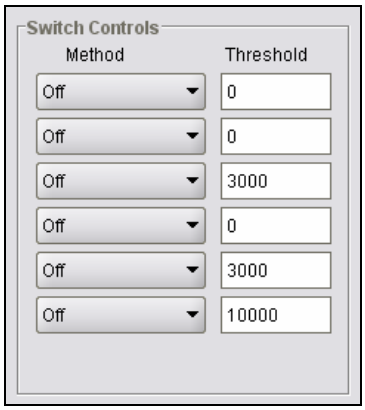


Figure 6-5: VistaLINK® PRO Switch Thresholds

Note: It is also possible to configure different thresholds for Input 1 and Input 2, totally independent of each other. This permits the user to configure the backup to have more tolerance to avoid unnecessary switches occurring if both feeds are having similar or identical issues.

- **Method:** The options are "Off", "Splice" or "Forced Switch".
    - **Off:** Disables the test from being able to initiate a switch request when exceeding the set threshold.
    - **Splice:** When the error condition occurs the switch will only occur where a clean switch point is available. If no switch point is currently available then the switch will cancel the request to preserve service quality (Ideally this should be used where the impact of the error is minor). If the alternative input is having the same error at the same time then the switch request will be cancelled.

Note: When the switch is set in the Packet Switch mode there are no clean switch points.

    - **Forced Switch:** When this condition is selected the switch will always switch when the error occurs regardless of a clean switch point being available. It will switch cleanly if possible (in Packet Matching and GOP Boundary modes). The switch request will only be cancelled if the second input is making the same switch request at the same time.

Note: Forced switching in some conditions, with GOP repeat disabled, will require a soft reset to restore the switches capability to clean switch between sources.

- **Threshold:** This field enables the user to enter a threshold value.

6.5. TS SYNTAX ERRORS - P3

Please note that the Priority 3 errors are context sensitive to the type of input standard (DVB versus ATSC) selected (under Input Configuration).

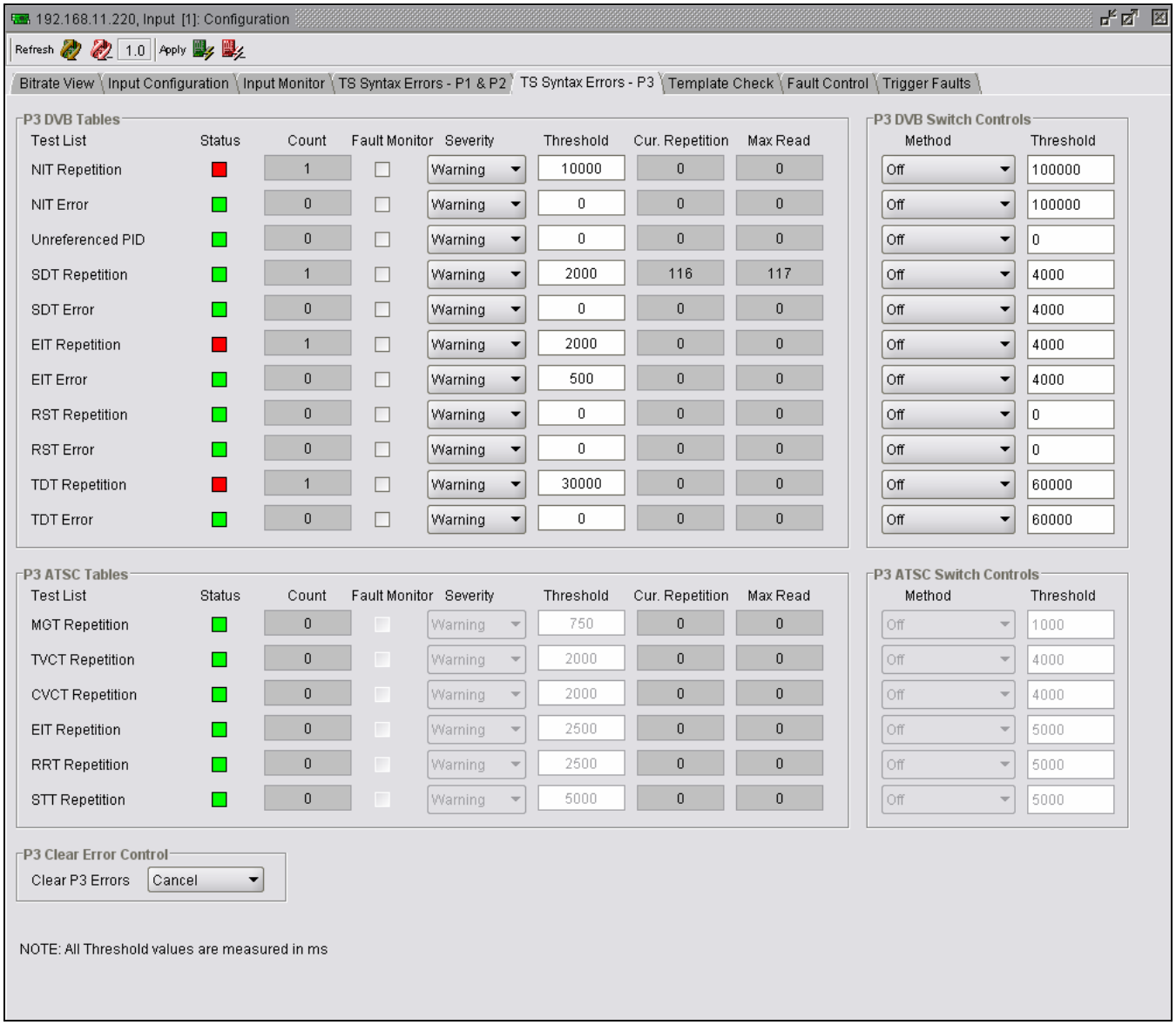


Figure 6-6: VistaLINK® PRO TS Syntax Errors - P3

The following chart provides a list of controls that apply to both Priority 3 DVB Tables and Priority 3 ATSC Tables:

Status	Indicates the status of each test. Green indicates that no faults are found and red indicates that a fault is found.
Count	Displays the number of times a fault is detected.
Fault Monitor	When selected, updates the *Input Monitor* tab – Syntax Error status.
Severity	Enables the user to select the severity level of an alarm.
Threshold	Enables the user to enter a threshold value for each test. Greyed out threshold fields are based on Standard TR 101 290.
Cur. Repetition	Displays the current repetition value of each test.
Max Read	Displays the maximum read value of each test.

6.5.1. P3 DVB Tables

- **NIT Repetition:** This test checks that any two sections with table_id = 0x40 (NIT_actual) occur on PID 0x0010 within a 25 ms.

- **NIT Error:** Network Information Tables (NITs) as defined by DVB contain information on frequency, code rates, modulation, and polarization etc. of various programs that the decoder can use. It is checked whether NITs are present in the TS and whether they have the correct PID. The test checks that sections with table_id 0x40 or 0x41 in PID value 0x0010 occur at least every 10 seconds.

- **Unreferenced PID:** Each non-private program data stream should have its PID listed in the PMTs. This test detects the presence of a PID (other than PAT, CAT, CAT_PIDs, PMT_PIDs, NIT_PID, SDT_PID, TDT_PID, EIT_PID, RST_PID, reserved_for_future_use PIDs, or PIDs user defined as private data streams) not referred to by a PMT within 0.5 s

- **SDT Repetition:** This test checks that the SDT information which describes the services contained in a particular Transport Stream is transmitted at least every 2 seconds on PID 0x0011.

- **SDT Error:** The SDT describes the services available to the viewer. It is split into sub-tables containing details of the contents of the current TS (mandatory) and other TS (optional). Without the SDT, the IRD is unable to give the viewer a list of what services are available. It is also possible to transmit a BAT on the same PID, which groups services into "bouquets".

- **EIT Repetition:** This test checks the EIT information that describes what is currently on and what will be on next on each service in a particular Transport Stream. By default it is transmitted at least every 2 seconds.

- **EIT Error:** The EIT (Event Information Table) describes what is on now and next on each service, and optionally details the complete programming schedule. The EIT is divided into several sub-tables, with only the "present and following" information for the current TS being mandatory. The EIT schedule information is only accessible if the TS is not scrambled.

- **RST Repetition:** This test checks that any two sections with table_id = 0x71 (RST) occur on PID 0x0013 within 25 ms (or lower).

- **RST Error:** The RST is a quick updating mechanism for the status information carried in the EIT.

- **TDT Repetition:** This test checks that any two sections with table_id = 0x70 (TDT) occur on PID 0x0014 within 25 ms.

- **TDT Error:** Sections with table_id = 0x70 (TDT) not present on PID 0x0014 for more than 30 seconds. The TDT carries the current UTC time and date information.

More information can be found at: http://www.etsi.org/

6.5.2. P3 ATSC Tables

- **MGT Repetition:** Master Guide Table. For each type of PSIP tables, the MGT provides the location in the Transport stream, the current version of the table and the length in bytes. This test checks that the Master Guide Table repetition rates do not exceed 150ms.

- **TVCT Repetition:** Terrestrial Virtual Channel Table. Consists of virtual channel definitions where each channel is characterized by the two-part channel number that the user will use to access the service, its text name, how the service is physically delivered, its MPEG-2 program_number, its "source ID" and the type of service. This test checks that the Terrestrial Virtual Channel Table repetition rates do not exceed 400ms.

- **CVCT Repetition:** Cable Virtual Channel Table. Consists of virtual channel definitions where each channel is characterized by the two-part channel number that the user will use to access the service, its text name, how the service is physically delivered, its MPEG-2 program_number, its "source ID" and the type of service. This test checks that the Cable Virtual Channel Table repetition rates do not exceed 400ms.

- **EIT Repetition:** The PSIP table that carries program schedule information for each virtual channel, this test checks the following is true:

    - EIT-0 Once every 0.5 seconds
    - EIT-1 Once every three seconds
    - EIT-2 and EIT-3 Once every minute

- **RRT Repetition:** Rating Region Table. Defines a rating system for a given region characterized by a number of rating dimensions, each of which is composed of two or more rating levels. This test checks that the Rating Region Table repetition rates do not exceed 60,000ms.

- **STT Repetition:** System Time Table. Provides a reference for the time-of-day to receivers. This test checks that the System Time Table repetition rates do not exceed 1000ms.

More information can be found at: http://www.atsc.org

6.5.3. Switch Controls

Switch Controls apply to both P3 DVB and P3 ATSC tables in this section. Enabling a parameter or number of parameters is very simple. Add a threshold value (see Figure 6-7) next to the test in the threshold box located to the very right of the page. Now, enable the switch by changing the default "Off" value to either "Splice" or "Forced Switch" (using the *Method* drop down box). Be sure to apply all of the changes.

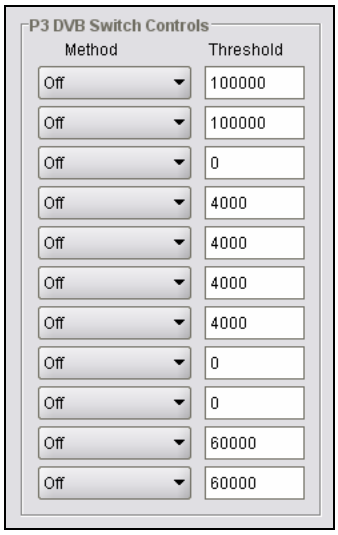


Figure 6-7: VistaLINK® PRO P3 DVB Switch Thresholds

- **Method:** The options are "Off", "Splice" or "Forced Switch".

  - **Off:** Disables the test from being able to initiate a switch request when exceeding the set threshold.

  - **Splice:** When the error condition occurs the switch will only occur where a clean switch point is available. If no switch point is currently available then the switch will cancel the request to preserve service quality (Ideally this should be used where the impact of the error is minor). If the alternative input is having the same error at the same time then the switch request will be cancelled.

Note: When the switch is set in the Packet Switch mode there are no clean switch points.

  - **Forced Switch:** When this condition is selected the switch will always switch when the error occurs regardless of a clean switch point being available. It will switch cleanly if possible (in Packet Matching and GOP Boundary modes). The switch request will only be cancelled if the second input is making the same switch request at the same time.

Note: Forced switching in some conditions, with GOP repeat disabled, will require a soft reset to restore the switches capability to clean switch between sources.

- **Threshold:** This field enables the user to enter a threshold value.

6.5.4. P3 Clear Error Control

Priority 3 Errors can be reset at any time by selecting the "Clear P3 Errors" drop down box and selecting the "Clear" option. Once the setting is applied, using the *apply* button, all error displays will be reset.

6.5.5. ETSI TR 101 290 Test Conditions

The status LED located to the right of each test will highlight, when in Auto-Refresh, the dynamic status of the stream.

For the majority of the ETSI TR 101 290 test it is possible to configure custom configurations to ensure that particular alarms and conditions are fed back to the operator. It is important to select the Fault Monitor check box (to enable custom monitoring parameters to be invoked), select the desired alarm Severity and then configure the test Threshold.

NOTE: Syntax Errors P1, P2 & P3 are measured in ms. PCR Errors are measured in ns.

6.6. TR 101 290 DVB REFERENCE VALUES

Test	DVB	
TS_sync_loss		
Sync_byte_error		
PAT_error	500ms	
Continuity_count_error		
PMT_error	500ms	
PID_error	500ms	
Transport_error		
CRC_error		
PCR_repetition_error	40ms	
PCR_error	500ns	
PTS_error	700ms	
CAT_error		

Table 6-1: TR 101 290 DVB Reference Values

6.7. TEMPLATE CHECK

The *Template Check* tab offers full customization of the switch to individual streams. Careful consideration is needed to correctly configure the switch to avoid unnecessary switching.

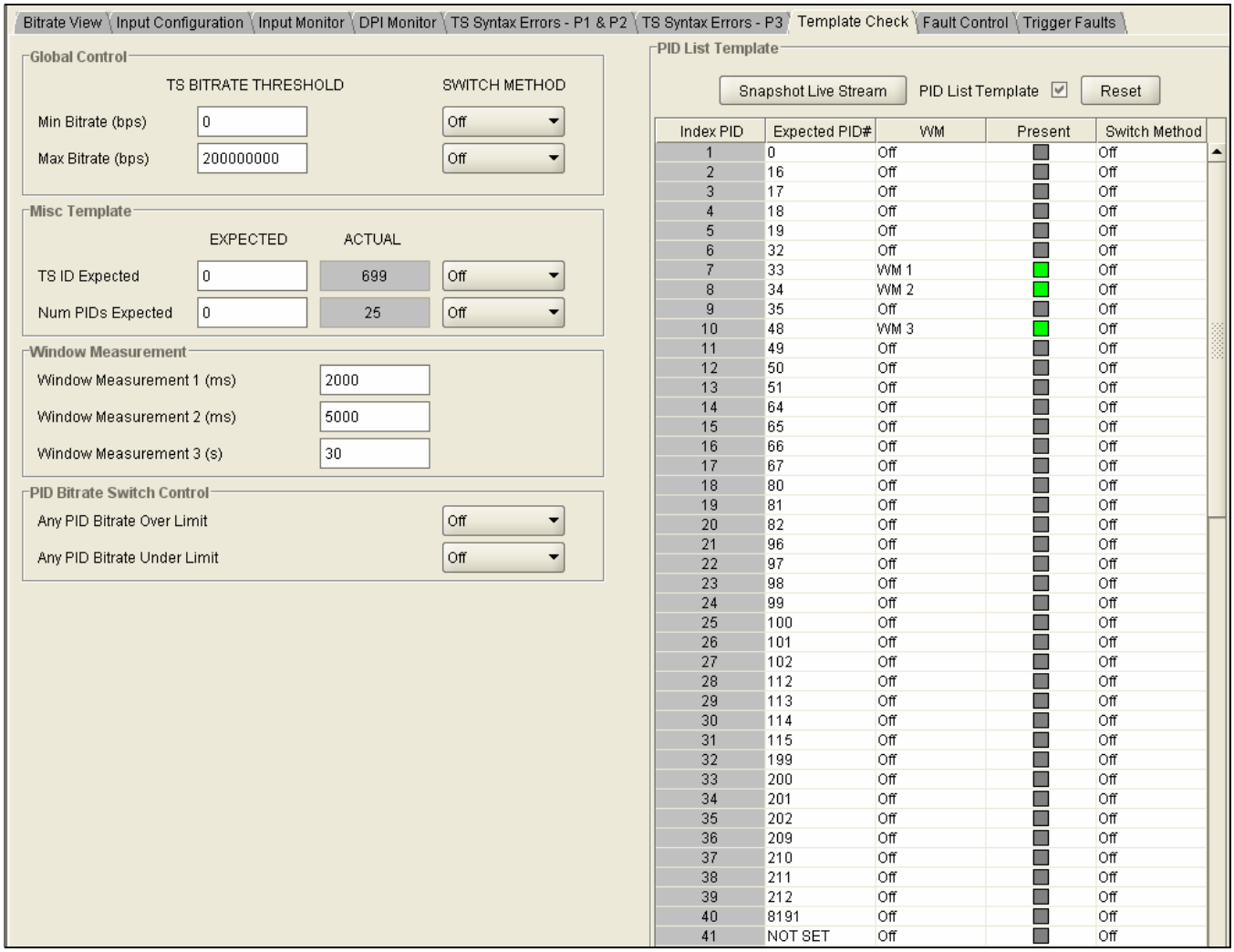


Figure 6-8: VistaLINK® PRO Template Check Tab

6.7.1. Template Checks Switch Methods

For all template checks the *Switch Methods* can be set as follows:

- **Switch Method:** The options are “Off”, “Splice” or “Forced Switch”.
    - **Off:** Disables the template check from being able to initiate a switch request when exceeding the set threshold.

- **Splice:** When the error condition occurs the switch will only occur where a clean switch point is available. If no switch point is currently available then the switch will cancel the request to preserve service quality (Ideally this should be used where the impact of the error is minor). If the alternative input is having the same error at the same time then the switch request will be cancelled.

Note: When the switch is set in Packet Switch mode there are no clean switch points.

- **Forced Switch:** When this condition is selected the switch will always switch when the error occurs regardless of a clean switch point being available. It will switch cleanly if possible (in Packet Matching and GOP Boundary modes). The switch request will only be cancelled if the second input is making the same switch request at the same time.

Note: Forced switching in some conditions, with GOP repeat disabled, will require a soft reset to restore the switches capability to cleanly switch between sources.

6.7.2. Global Control

- **Min Bitrate:** Enter the minimum transport stream bitrate (bps). Be sure to allow some overhead for natural stream variance.

- **Max Bitrate:** Enter the maximum transport stream bitrate (bps). Be sure to allow some overhead for natural stream variance.

6.7.3. PID Bitrate Switch Control

- **Any PID Bitrate Over Limit:** If the *Max Threshold* value (On Bitrate View tab) is exceeded for any PID then a switch request is initiated if the switch method condition has been set.

- **Any PID Bitrate Under Limit:** If the *Min Threshold* value (On Bitrate View tab) is exceeded for any PID then a switch request is initiated if the switch method condition has been set.

6.7.4. Misc. Template

- **TS ID Expected:** Enter the value for the Transport Stream ID expected, enter zero to disable the test.

Note: It is not possible to enter the TS ID as a Hex value.

- **Num PIDs Expected:** Enter here the number of PIDs expected in the stream (including the null packets if any), enter zero to disable the test.

6.7.5. Windows Measurement

The window measurement values determine at what interval each PID (within the PID List Template) should be expected before an alarm condition is met.

- **Windows Measurement 1 (ms):** Enter a decimal value, measurement is in milliseconds.
- **Windows Measurement 2 (ms):** Enter a decimal value, measurement is in milliseconds.
- **Windows Measurement 1 (s):** Enter a decimal value, measurement is in seconds.

6.7.6. PID List Template

The *PID List Template* provides a stream conformance or validation check with the capability of configuring the switch to react differently to each individual PID in the stream. Here we can check the presence of each PID using one of the Window Measurements as detailed above. Depending upon the importance of the PID we can selectively decide how the switch should react if a PID is missing beyond the measurement window selected.

- **Snapshot Live Stream:** This button is used to populate the PID List window with the PIDs currently found in the stream. Use of this button is slightly different to most normal operations within VLPro.
    - Simply click the *Snapshot Live Stream* button and then the *Refresh Configuration View* button; the *Snapshot* button is automatically applied. Should you click the *Apply* button afterwards the Snapshot request will be cancelled.
    - On an operational system ensure you de-select the *PID List Template* check box before making a new snapshot, this will avoid alarm conditions being raised as the PID List changes.

Note: Clicking the *Apply* button after clicking the *Snapshot Live Stream* button will cancel the request. Simply click the *Snapshot Live Stream* button and then click the refresh button. Select the *Refresh Configuration View* to see the new values.

- **PID List Template:** Once the *PID List Template* has been populated and fully configured, this check box must be checked to activate the PID List checking. It is important to ensure this check box is unchecked when making changes to avoid unexpected switching as changes are applied. Be sure to check the box once all configuration changes have been made.

Note: Refer to section 7.3 for further information on switch logic and special cases.

- **Reset PID Template:** This button can be used to reset the PID List. All entries will be set to "NOT SET", all *Windows Measurements* (WM) set to "Off" and the *Switch Method* will also be set to "Off". This is useful when changing the switch from one stream to another stream and the setting will be completely different. Make sure the *PID List Template* check box is not checked before resetting to avoid unexpected switching.

6.8. FAULT CONTROL

The *Fault Control* tab is a user configurable tab for enabling or disabling the fault conditions that can be triggered by the standard ETSI TR 101 290 checks discussed in the previous chapter.

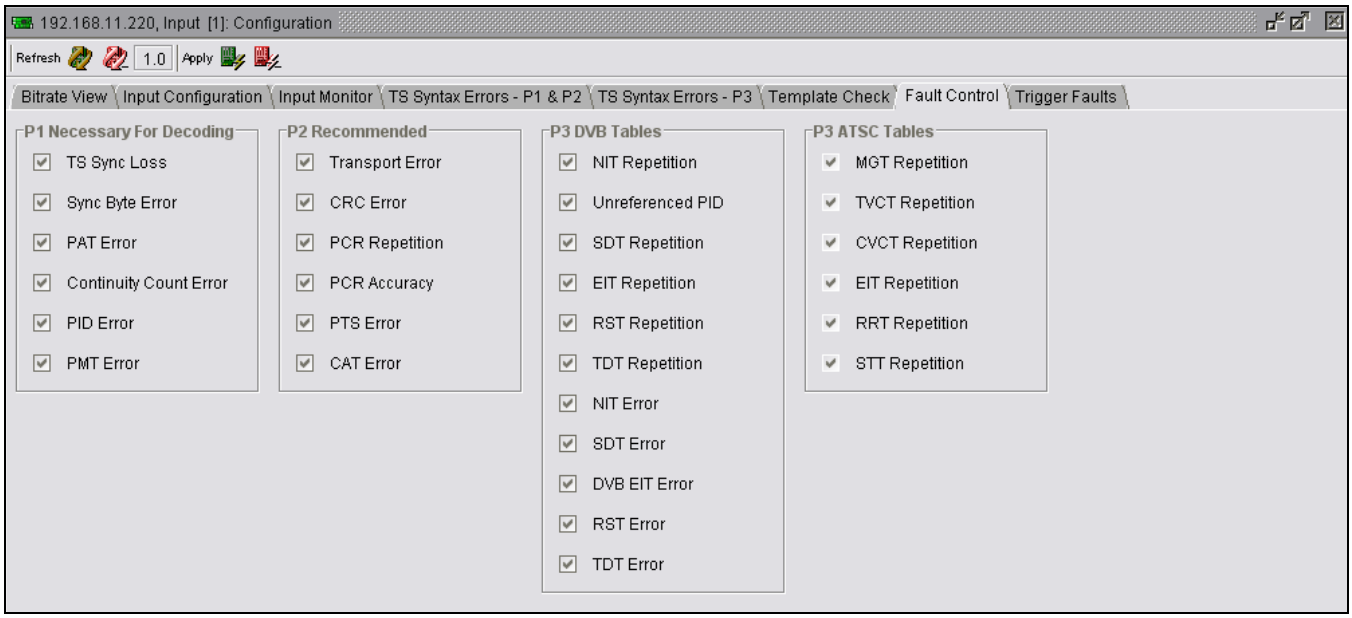


Figure 6-9: VistaLINK® PRO Fault Control Tab

The four window sub-sections allows users to custom configure which ETSI TR 101 290 test conditions can trigger an alarm:

Within this tab it is possible to individually de-select (all are selected by default) or re-select which tests can produce an alarm condition. The following subsections correspond with the previous two tabs:

- P1 Necessary for Decoding
- P2 Recommended
- P3 DVB Tables
- P3 ATSC Tables

It is important to ensure new settings are applied using the *apply* button on the menu.

DVB/ATSC tests may be greyed out depending on which mode has been selected under the Input Configuration Tab (DVB/ATSC or MPEG). ATSC mode will disable DVB; DVB mode will disable ATSC and MPEG will disable both ATSC and DVB.

6.9. TRIGGER FAULTS TAB

The *Trigger Control* tab provides a user configurable custom configuration for the top-level alarm statuses. This can be used to provide quick visual overviews of the ETSI TR 101 290 test status. An operator would need to refer either to the TS Syntax Error Tabs and review the status LED's, or to the alarm log to identify the test condition(s), which have triggered the alarm (status red).

Figure 6-10: VistaLINK® PRO Trigger Faults Tab

All levels are enabled, or checked, by default. On the previous tab, *Fault Control*, it is possible to disable P1, P2 and P3 alarms individually, here it is possible to disable each category with a single click. The SNMP traps, which provide the statuses for these alarms, are very useful to provide operators a single overview of the stream status. In addition to the TR 101 290 alarm controls it is possible to disable the alarming for the PID Template controls as well as the overall TS Bitrate Status and PID Bitrate Error.

7. TROUBLESHOOTING

7.1. VLPRO DOES NOT DISPLAY THE 7780R2X1-ASI-CS-2 ALARMS

Refer to section 1 to 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.

7.2. 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.

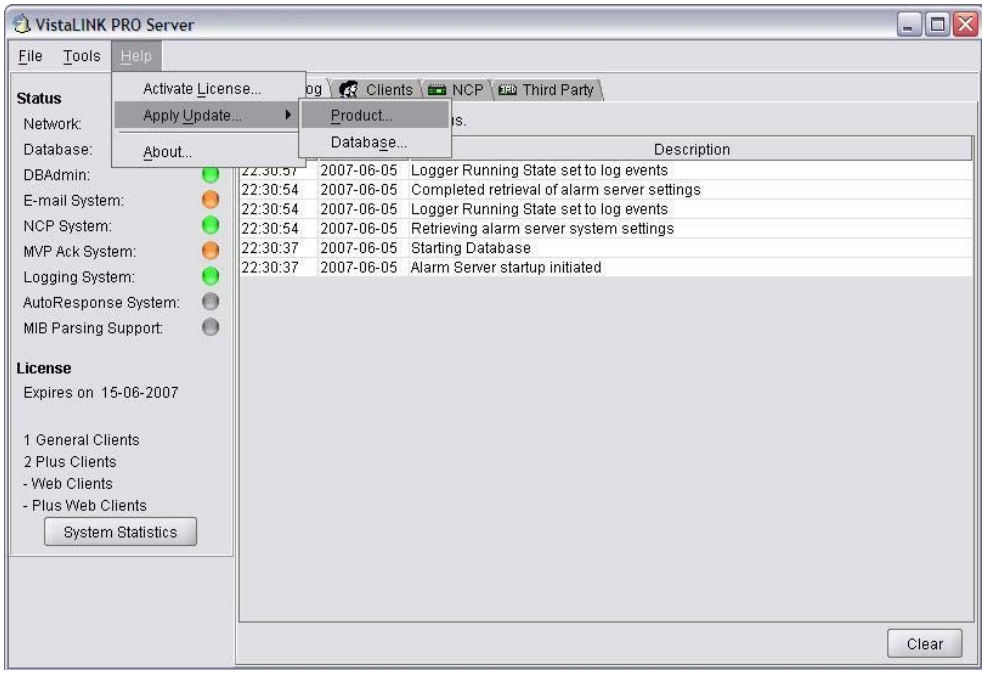


Figure 7-1: VistaLINK® PRO Server

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

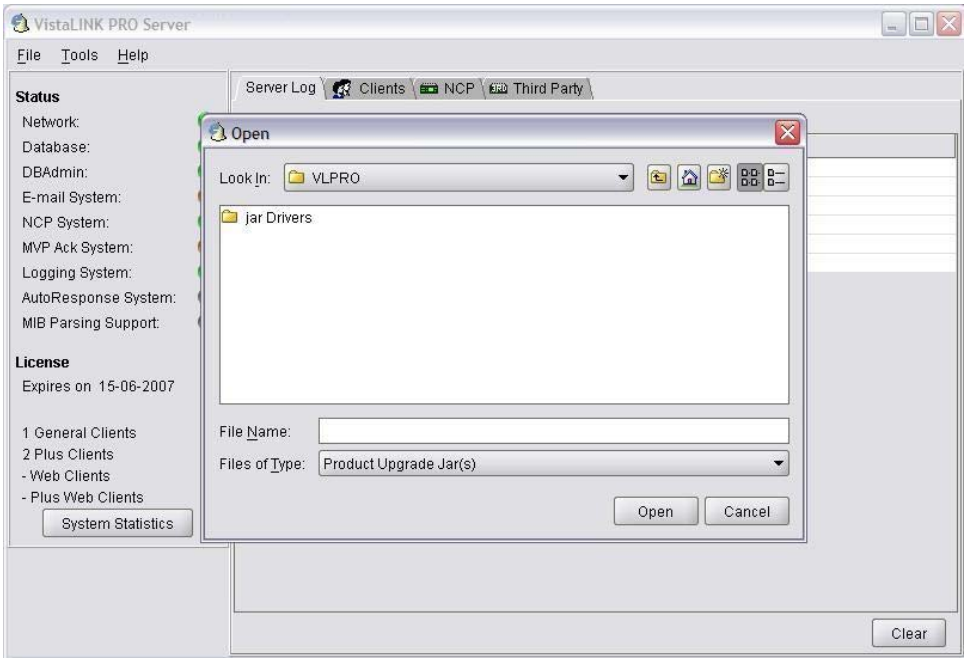


Figure 7-2: VistaLINK® PRO Applying JAR Updates

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 7-3: Restart Alarm Server Window

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 start-up 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.

7.3. SWITCHING LOGIC

7.3.1. Special Cases

- **Packet Matching:** By definition the Packet Matching mode requires two identical streams within which it finds matching points for cleanly switching inputs. From start-up the card therefore requires two valid matching streams.

    - If the switch starts with only one stream, the switch will continue to work until the second stream plugs in, then if it does not find any matching packet for 20 seconds it will reset itself.

- **MPTS or Scrambled:** The Method will either be Packet Switch or Packet Matching, and the GOP Repeat will be off. These constraints are enforced by the card, and cannot be changed.

- **TR 101 290 Triggers:** The setting of the triggers needs to be carefully planned. If, for example, we are to rely upon a PAT trigger to switch the stream after 3 seconds then we must consider the fact that the buffer would have already emptied before this 3 second timeout, it is therefore impossible to switch cleanly and thus a clean switch request would be rejected. The solution is therefore to either shorten the time or select *forced* as the switch method.

7.3.2. GOP Repeat Mode – Disabled

		Error	Current Output	Switch Action	Current Output	Switch Action		
Auto Mode PM/GB	Switch point	Total Loss	INP1	0	INP2	0		
		Loss of INP1	INP1	INP2	INP2	0	Clean Switch	
		Loss of INP2	INP1	0	INP2	INP1	Clean Switch	
		Syntax Switch Request Clean	INP1	INP2	INP2	INP1	Clean Switch	
		Syntax Switch Request PS	INP1	INP2	INP2	INP1	Packet Switch	Requires reset to CS
		Syntax Switch Request Both	INP1	0	INP2	0	No switching	
		User Switch	INP1	0	INP2	0	Not allowed	
Auto Mode PM/GB	No switch point	Total Loss	INP1	0	INP2	0		
		Loss of INP1	INP1	INP2	INP2	0	Packet switch	Requires reset to CS
		Loss of INP2	INP1	0	INP2	INP1	Packet switch	Requires reset to CS
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching	
		Syntax Switch Request PS	INP1	INP2	INP2	INP1	Packet Switch	Requires reset to CS
		Syntax Switch Request Both	INP1	0	INP2	0	No switching	
		User Switch	INP1	0	INP2	0	Not allowed	
Auto Mode PS	Switch point	Total Loss	INP1	0	INP2	0		
		Loss of INP1	INP1	INP2	INP2	0	Packet Switch	
		Loss of INP2	INP1	0	INP2	INP1	Packet Switch	
		Syntax Switch Request Clean	INP1	INP2	INP2	INP1	Packet Switch	
		Syntax Switch Request PS	INP1	INP2	INP2	INP1	Packet Switch	
		Syntax Switch Request Both	INP1	0	INP2	0	No switching	
		User Switch	INP1	0	INP2	0	Not allowed	
Semi-Auto Mode PM/GB	Switch point	Total Loss	INP1	0	INP2	0		
		Loss of INP1	INP1	INP2	INP2	0		
		Loss of INP2	INP1	0	INP2	0		
		Syntax Switch Request Clean	INP1	INP2	INP2	0		
		Syntax Switch Request PS	INP1	INP2	INP2	0		
		Syntax Switch Request Both	INP1	0	INP2	0	No switching	
		User Switch	INP1	0	INP2	0	Not allowed	
Semi-Auto Mode PM/GB	No switch point	Total Loss	INP1	0	INP2	0		
		Loss of INP1	INP1	INP2	INP2	0	Packet switch	
		Loss of INP2	INP1	0	INP2	0		
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching	
		Syntax Switch Request PS	INP1	INP2	INP2	0	Packet Switch	
		Syntax Switch Request Both	INP1	0	INP2	0	No switching	
		User Switch	INP1	0	INP2	0	Not allowed	
Semi-Auto Mode PS	Switch point	Total Loss	INP1	0	INP2	0		
		Loss of INP1	INP1	INP2	INP2	0		
		Loss of INP2	INP1	0	INP2	0		
		Syntax Switch Request Clean	INP1	INP2	INP2	0		
		Syntax Switch Request PS	INP1	INP2	INP2	0	Packet Switch	
		Syntax Switch Request Both	INP1	0	INP2	0	No switching	
		User Switch	INP1	0	INP2	0	Not allowed	
Manual Mode PM/GB	Switch Point	Total Loss	INP1	0	INP2	0	No switching	
		Loss of INP1	INP1	0	INP2	0	No switching	
		Loss of INP2	INP1	0	INP2	0	No switching	
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching	
		Syntax Switch Request PS	INP1	0	INP2	0	No switching	
		Syntax Switch Request Both	INP1	0	INP2	0	No switching	
		User Switch	INP1	INP2	INP2	INP1	Clean	
Manual Mode PM/GB	No switch point	Total Loss	INP1	0	INP2	0	No switching	
		Loss of INP1	INP1	0	INP2	0	No switching	
		Loss of INP2	INP1	0	INP2	0	No switching	
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching	
		Syntax Switch Request PS	INP1	0	INP2	0	No switching	
		Syntax Switch Request Both	INP1	0	INP2	0	No switching	
		User Switch	INP1	0	INP2	0	Not allowed as no switch point	

Manual Mode PS	Switch point	Total Loss	INP1	0	INP2	0	No switching	
		Loss of INP1	INP1	0	INP2	0	No switching	
		Loss of INP2	INP1	0	INP2	0	No switching	
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching	
		Syntax Switch Request PS	INP1	0	INP2	0	No switching	
		Syntax Switch Request Both	INP1	0	INP2	0	No switching	
		User Switch	INP1	INP2	INP2	INP1	Packet Switch	

Table 7-1: GOP Repeat Mode – Disabled

7.3.3. GOP Repeat Mode – Enabled

		Error	Current Output	Switch Action	Current Output	Switch Action	
Auto Mode PM/GB	Switch point	Total Loss	INP1	0	INP2	0	GOP Repeat
		Loss of INP1	INP1	INP2	INP2	0	Clean Switch
		Loss of INP2	INP1	0	INP2	INP1	Clean Switch
		Syntax Switch Request Clean	INP1	INP2	INP2	INP1	Clean Switch
		Syntax Switch Request PS	INP1	INP2	INP2	INP1	GOP Repeat / Packet Switch
		Syntax Switch Request Both	INP1	0	INP2	0	No switching
		User Switch	INP1	0	INP2	0	Not allowed
Auto Mode PM/GB	No switch point	Total Loss	INP1	0	INP2	0	GOP Repeat
		Loss of INP1	INP1	INP2	INP2	0	GOP Repeat / Packet Switch
		Loss of INP2	INP1	0	INP2	INP1	GOP Repeat / Packet Switch
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching
		Syntax Switch Request PS	INP1	INP2	INP2	INP1	GOP Repeat / Packet Switch
		Syntax Switch Request Both	INP1	0	INP2	0	No switching
		User Switch	INP1	0	INP2	0	Not allowed
Auto Mode PS	Switch point	Total Loss	INP1	0	INP2	0	GOP Repeat
		Loss of INP1	INP1	INP2	INP2	0	Packet Switch
		Loss of INP2	INP1	0	INP2	INP1	Packet Switch
		Syntax Switch Request Clean	INP1	INP2	INP2	INP1	Packet Switch
		Syntax Switch Request PS	INP1	INP2	INP2	INP1	Packet Switch
		Syntax Switch Request Both	INP1	0	INP2	0	No switching
		User Switch	INP1	0	INP2	0	Not allowed
Semi-Auto Mode PM/GB	Switch point	Total Loss	INP1	0	INP2	0	GOP Repeat
		Loss of INP1	INP1	INP2	INP2	0	
		Loss of INP2	INP1	0	INP2	0	GOP Repeat
		Syntax Switch Request Clean	INP1	INP2	INP2	0	GOP Repeat
		Syntax Switch Request PS	INP1	INP2	INP2	0	GOP Repeat
		Syntax Switch Request Both	INP1	0	INP2	0	No switching
		User Switch	INP1	0	INP2	0	Not allowed
Semi-Auto Mode PM/GB	No switch point	Total Loss	INP1	0	INP2	0	
		Loss of INP1	INP1	INP2	INP2	0	Packet switch
		Loss of INP2	INP1	0	INP2	0	
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching
		Syntax Switch Request PS	INP1	INP2	INP2	0	Packet Switch
		Syntax Switch Request Both	INP1	0	INP2	0	No switching
		User Switch	INP1	0	INP2	0	Not allowed
Semi-Auto Mode PS	Switch point	Total Loss	INP1	0	INP2	0	
		Loss of INP1	INP1	INP2	INP2	0	
		Loss of INP2	INP1	0	INP2	0	
		Syntax Switch Request Clean	INP1	INP2	INP2	0	
		Syntax Switch Request PS	INP1	INP2	INP2	0	Packet Switch
		Syntax Switch Request Both	INP1	0	INP2	0	No switching
		User Switch	INP1	0	INP2	0	Not allowed
Manual Mode PM/GB	Switch Point	Total Loss	INP1	0	INP2	0	No switching
		Loss of INP1	INP1	0	INP2	0	No switching
		Loss of INP2	INP1	0	INP2	0	No switching
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching
		Syntax Switch Request PS	INP1	0	INP2	0	No switching
		Syntax Switch Request Both	INP1	0	INP2	0	No switching
		User Switch	INP1	INP2	INP2	INP1	Clean
Manual Mode PM/GB	No switch point	Total Loss	INP1	0	INP2	0	No switching
		Loss of INP1	INP1	0	INP2	0	No switching
		Loss of INP2	INP1	0	INP2	0	No switching
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching
		Syntax Switch Request PS	INP1	0	INP2	0	No switching
		Syntax Switch Request Both	INP1	0	INP2	0	No switching
		User Switch	INP1	0	INP2	0	Not allowed as no switch point

Manual Mode PS	Switch point	Total Loss	INP1	0	INP2	0	No switching
		Loss of INP1	INP1	0	INP2	0	No switching
		Loss of INP2	INP1	0	INP2	0	No switching
		Syntax Switch Request Clean	INP1	0	INP2	0	No switching
		Syntax Switch Request PS	INP1	0	INP2	0	No switching
		Syntax Switch Request Both	INP1	0	INP2	0	No switching
		User Switch	INP1	INP2	INP2	INP1	Packet Switch

Table 7-2: GOP Repeat Mode – Enabled

7.4. MY STREAMS ARE MORE THAN 3 SECONDS DELAYED

The buffering capability of the 7780R2x1-ASI-CS-2 is limited to 3 seconds per switch. If the streams arrive more than 3 seconds apart then it will be necessary to install a 7780DLY-ASI which can delay an ASI stream up to 16 seconds. Please contact Evertz or an Evertz reseller for further information.

8. 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
GOP Group of Pictures
FEC Forward Error Correction
HEX Hexadecimal
ISO International Organization for Standardization
ITU International Telecommunication Union
MGT Master Guide Table
MPEG Moving Picture Experts Group
MPTS Multiple Program Transport Stream
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
SPTS Single Program Transport Stream
SI Service Information
TDT Time and Date Table
TOT Time Offset Table
TS Transport Stream
UTC Universal Time Co-ordinated

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