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REVISION HISTORY

REVISION	DESCRIPTION	DATE
0.1	Preliminary	Jun 07
1.0	Added Overview Section	May 08

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 120Mb/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

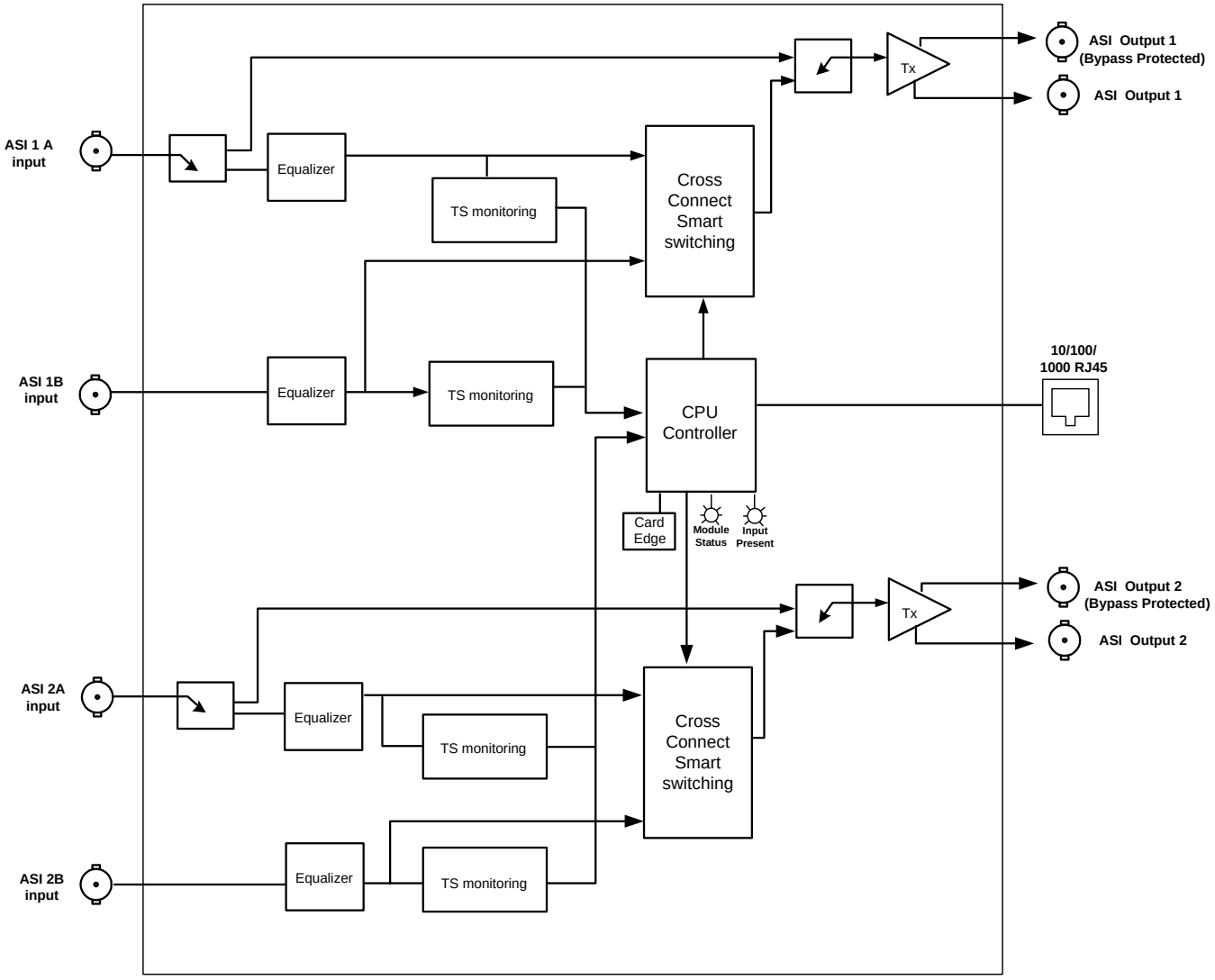


Figure 1-1: 7780R2X1-CS-2 Block Diagram

2. INITIAL 7780R2X1-CS-2 CONFIGURATION

To successfully install the 7780R2x1-CS-2 you will need the following:

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

This manual assumes that the VLPro installation has already been updated by the network administrator and the VLPro Client has been restarted. Refer to section 7 for further information if you are the Network Administrator.

Locate, on a 7700 chassis, two adjacent vacant slots. Unpack the 7780R2X1-CS-2 and separate the rear card from the main card. Locate, on the rear of the rack, the two slots and remove the blanking panels. Insert the rear card into the back of the chassis and secure using the four screws provided.

Before inserting the front card, connect the multi-coloured serial cable to the board using the serial cable provided. Now insert the 7780R2X1-CS-2I front card into the front slots ensuring the card lines up with the slot runners on the top and bottom 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. The connectivity lights for the Ethernet port on the rear plate will illuminate to confirm that the card is properly inserted. 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 to the serial port of your computer. Open a Terminal session and configure your COM port for the following configuration:

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

Apply these settings and return to the terminal window. Now press return, the session should respond by displaying the Main Menu.

Now select option (1) *Network Configuration*. If you prefer to use DHCP then you may select option (5), otherwise and continue from step 4:

1. Select option (1) *Set IP Address* and configure the IP address for the 7780R2X1-CS-2 ensuring that IP address is not already in use on the network.
2. Now select option (2) *Set Netmask* 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.*

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

Note: In smaller systems it is not unusual for your VLPro Sever and Client to be on the same computer.

Your initial setup is now complete. All other configuration can be performed through the VLPro Client.

3. CONNECTING TO VLPRO

Open VLPro and click on the refresh tree icon. Expand the hardware tree by clicking on the "+". Your 7780R2x1-CS-2 should appear as a newly listed device with the IP address used earlier to configure the card. It may take a few minutes to appear while the card and switch negotiate network settings (this can be verified directly on the switch if necessary).

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.

4. 7780R2X1-CS-2 OVERVIEW

The 7780R2x1-CS-2 provides a means of switching between two identical ASI streams without any visual or audible interruptions to any of the channels in the stream. The part number 77880R2X1-CS-2 refers to the dual switch version that provides two fully independent clean switches in one two-slot board for a standard 7700 3RU chassis.

The board can operate in two different modes, Packet-matching or GOP boundary switching. The packet-matching mode makes a clean switch by buffering and finding the same reference point in both streams. When a switch is initiated the stream input is seamlessly swapped. Downstream devices will not be able to detect this change and no interruption will occur on professional or consumer set top boxes. This mode is ideal for identical inputs from the same route source (the same mux).

In GOP mode, the switch will wait for the end of the group of pictures and generate a switch on the next I frame to reduce the visual artefacts. Often the switch is very clean. Downstream devices will not display an outage that is often expected from ASI switches. However, some visual artefacting may be present. This mode is ideal for non-identical streams (exactly the same content from different muxes).

Clean switching is still possible between the two streams even if one of them is delayed (maximum 3 seconds per switch). While it is possible to make manual (clean) switches for engineering works, the switch can be fully configured to respond to TR101 290 test conditions and each is fully independently custom configurable. This capability provides a rapid response clean switch to signals that may be beginning to break up or have begun to exceed the specified limitations of the tests.

The 7780R2X1-CS-2 specifications are as follows:

General:
3 Second buffer, per clean switch up to 213M/bs
2 x RJ45 10/100/1000 Mb/s Ethernet port

Inputs and Outputs per switch:
2 x ASI Inputs
- Min ASI TS Input bitrate – 100Kb/s
- Max ASI TS Input bitrate – 213Kb/s

2 x ASI Output
- Min ASI TS output bitrate – 100Kb/s
- Max ASI TS output bitrate – 213M/bs

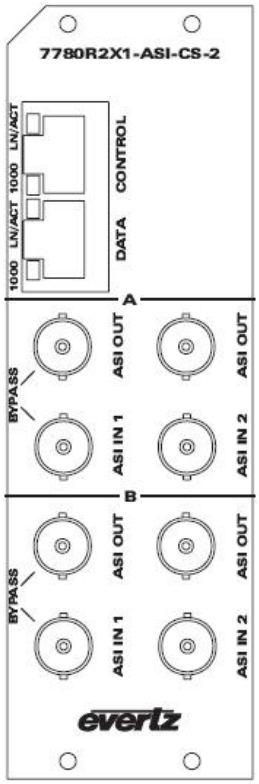
Monitored Parameters TR 101 290:
1.1 TS_sync_loss
1.2 Sync_byte_error
1.3 Pat_error
1.4 Continuity_count_error
1.5 PMT_error

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

Tables and Repetition:
DVB SI repetition error (NIT, SDT, EIT, RST, TDT)
ATSC PSIP tables repetition error (MGT,TVCT,CVCT,EIT,RRt, STT)

5. REAR PANEL CONNECTIONS

The rear panel consists of eight BNC connectors and two Ethernet ports as shown below:



ETHERNET: The upper Ethernet port is for VLPro control and should be connected to the control network. Connection should only be made to the network once the initial IP configuration has been completed.

The lower second Ethernet port is reserved for future use and should not be connected to the network.

BNC GROUP A: The upper group of ports (group A) consists of the two inputs; left bottom and right bottom are inputs 1 and 2 respectively. The upper left port is the main output that is also bypass protected (the ASI input 1 is passed directly through in the event the card is extracted). The output to the right, labelled ASI OUT is a second output from the internal distribution amplifier. This output is lost when the card is extracted but is useful for monitoring purposes.

BNC GROUP B: The lower group of ports (group B) consists of the two inputs; left bottom and right bottom are inputs 1 and 2 respectively. The upper left port is the main output that is also bypass protected (the ASI input 1 is passed directly through in the event the card is extracted). The output to the right, labelled ASI OUT is a second output from the internal distribution amplifier. This output is lost when the card is extracted but is useful for monitoring purposes.

6. FRONT PANEL CONTROLS

Located on the front of the card edge are the following controls and LED's:

1. User toggle switch (toggles up and down).
2. Four (4) Character dot matrix display.
   a. This provides a convenient access to quick user functions, the menu can be started by pushing the push button, when ready to select your option press the push button again.
   b. Reset > Yes or no

Note: Resetting the switch will cause an outage on both clean switches.

   c. Select> Switch 1 or Switch 2
      i. Select Input 1 or Input 2

Note: It is only possible to make clean switches. The 7780 will switch as soon as the next switch point is found. It is not possible to make a forced manual switch.

3. A set of LED's to display the connectivity state of the Ethernet connections:
   a. D1 A red and a green LED indicating the health of the board. Red indicates that the board is in reset. A green LED is software controlled and should illuminate shortly after the board completes the booting.
   b. D2 indicates that the large FPGA chip has loaded successfully. It should distinguish shortly after the power is applied
   c. D11 & D12 are reserved for future use.
   d. D17, a red LED that indicates the small FPGA chip is loaded; this should turn off shortly after the power is applied.
   e. D23 Ethernet 0 10M/bs
   f. D24 Ethernet 0 100M/bs
   g. D25 Ethernet 0 1000M/bs
   h. D26 Ethernet 0 Duplex
   i. D27 Ethernet 0 Rx
   j. D28 Ethernet 0 Tx
   k. D23 Ethernet 1 10M/bs
   l. D24 Ethernet 1 100M/bs
   m. D25 Ethernet 1 1000M/bs
   n. D26 Ethernet 1 Duplex
   o. D27 Ethernet 1 Rx
   p. D28 Ethernet 1 Tx

7. TROUBLESHOOTING

7.1. VLPRO DOES NOT DISPLAY THE 7780R2X1-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.

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

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.

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

Now shutdown the server by selecting from the menu: *File>Shutdown Server*. 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.

8. ABBREVIATIONS

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

BAT Bouquet Association Table
BER Bit Error Rate
BW BandWidth
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
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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