HPX-1600
USER GUIDE

Chapter 3-5:
SDH/SONET – Tributary Connections

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1. INTRODUCTION

The Haliplex HPX-1600-SS product, supports multiplexing of E1/T1 and E3/T3 tributary circuits over SDH/SONET networks. Connection management is by the Windows application HPXView. This chapter describes the specific features of HPXView used to map Haliplex Interface Modules (IMs) into SDH/SONET, STM-1/OC-3 payloads.

The HPX-1600-SS supports SDH and SONET payloads of T1, E1, E3 and DS3 tributaries as defined in ITU standards and illustrated in the figures below.

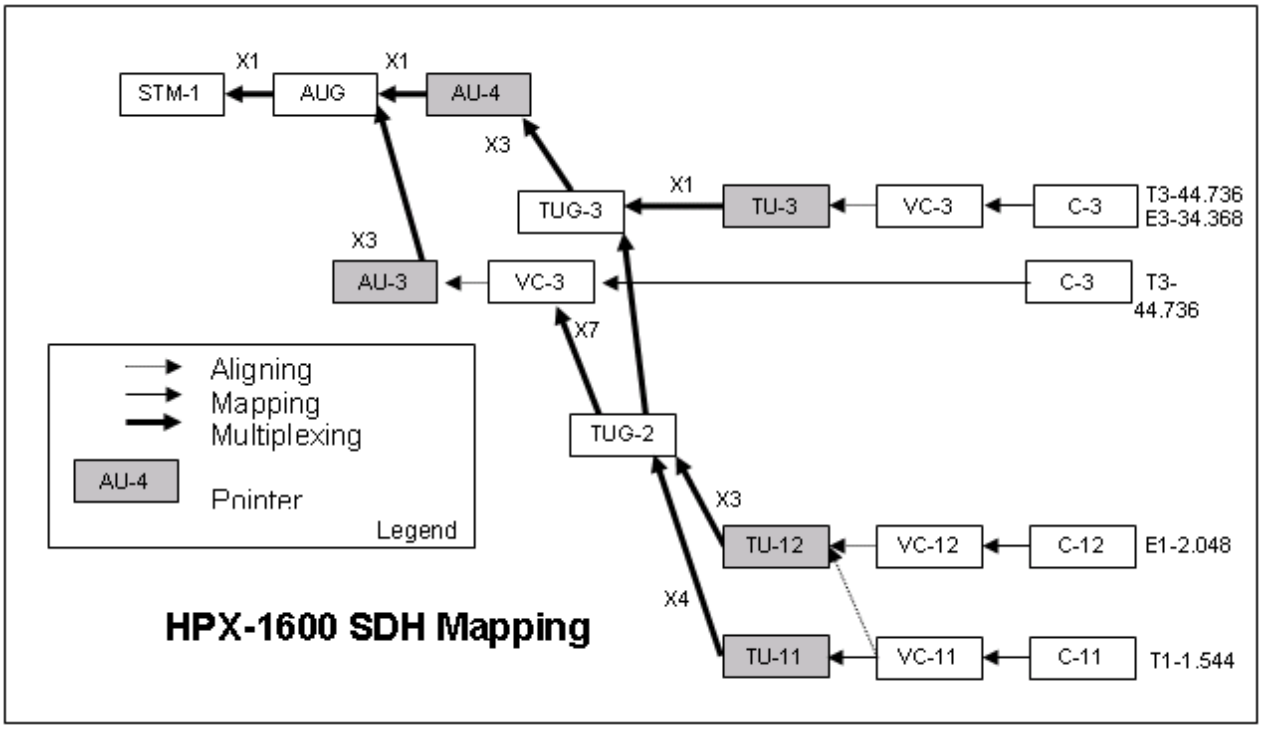


Figure 1: SDH payload mapping

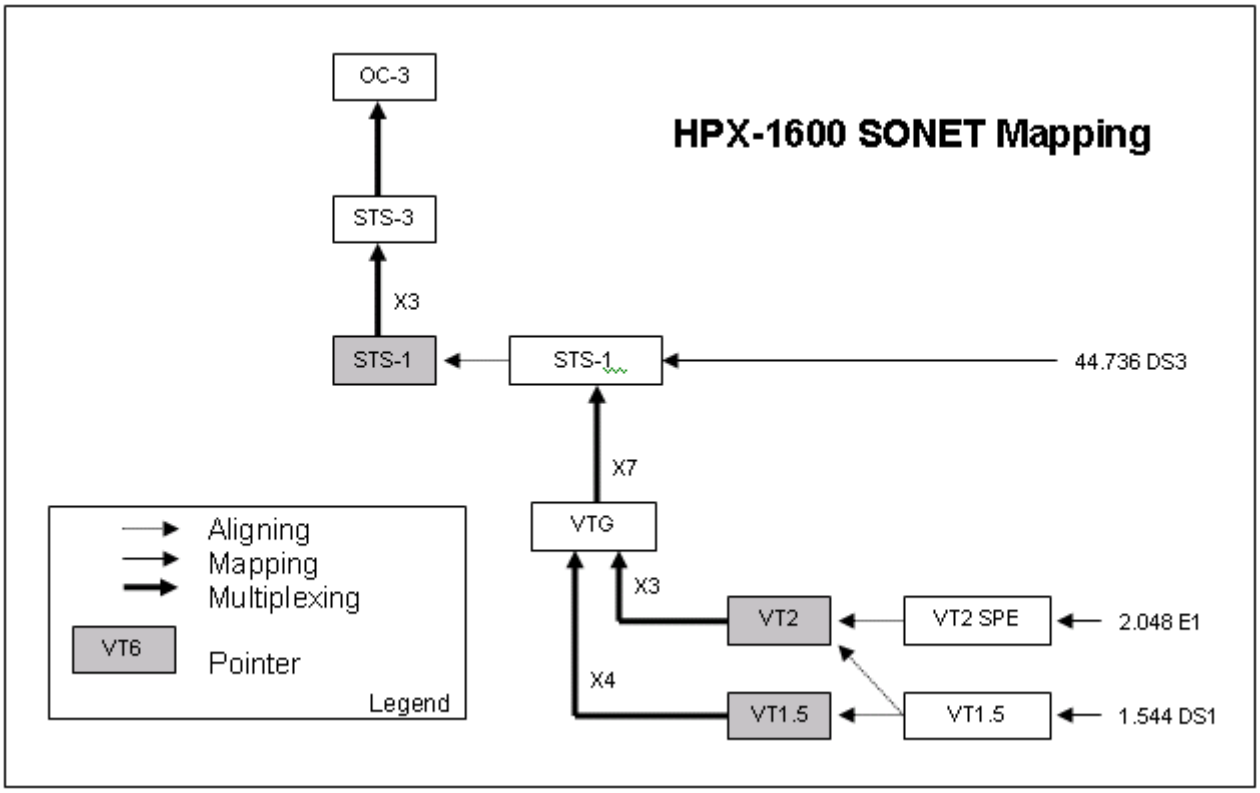


Figure 2: SONET Payload mapping

The HPX-1600-SS carries the SDH/SONET tributary payloads described in figures 1 and 2 in an asynchronous manner. That is each tributary may operate with an independent clock source.

Tributary interfaces which require bandwidth less than those tributaries specified by the SDH/SONET mapping above, must be groomed in the DACS into a composite E1/T1 stream before mapping to an SDH/SONET payload. A maximum of eight such composite E1 streams can be mapped from the DACS to the SDH/SONET Mapper.
Tributary interfaces mapped to the DACS operate Synchronously, that is all with a common clock, such that all the DS0 (64Kbps) time slots are aligned and can be exchanged between composite E1/T1 connections to the DACS.

Ethernet tributaries that required bandwidth concatenated from multiple SDH/SONET payloads are supported by the Ethernet-Mapper. The Ethernet–Mapper performs an inverse multiplexer function by mapping a 10/100BaseT Ethernet interface over multiple E1/T1 or E3/DS3 SDH/SONET circuits.

The HPX-1600-SS has provision for a total of three mapper modules which can be installer in any combination. Each mapper supports a maximum of;

- 28xT1, 20xE1,
- 3xE3, 3xDS3
- 8 port Ethernet.

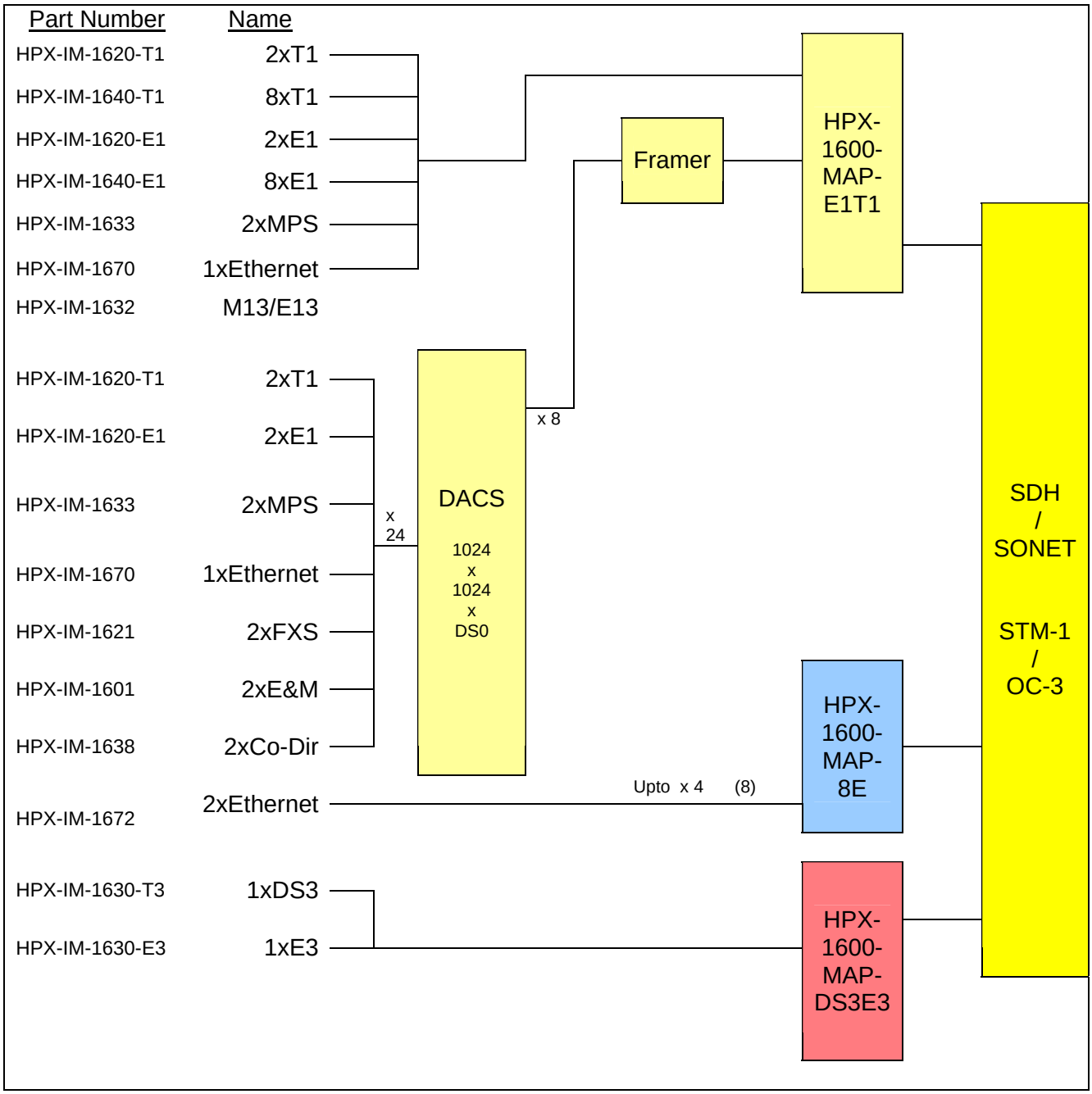


Figure 3: Tributary to Trunk data flow

2. TRIBUTARY CONFIGURATION USING HPXVIEW

Connect the HPXView session to the target HPX-1600-SS via serial port or TCP/IP over Ethernet. A successful connection will result in the display of a window similar to that below.

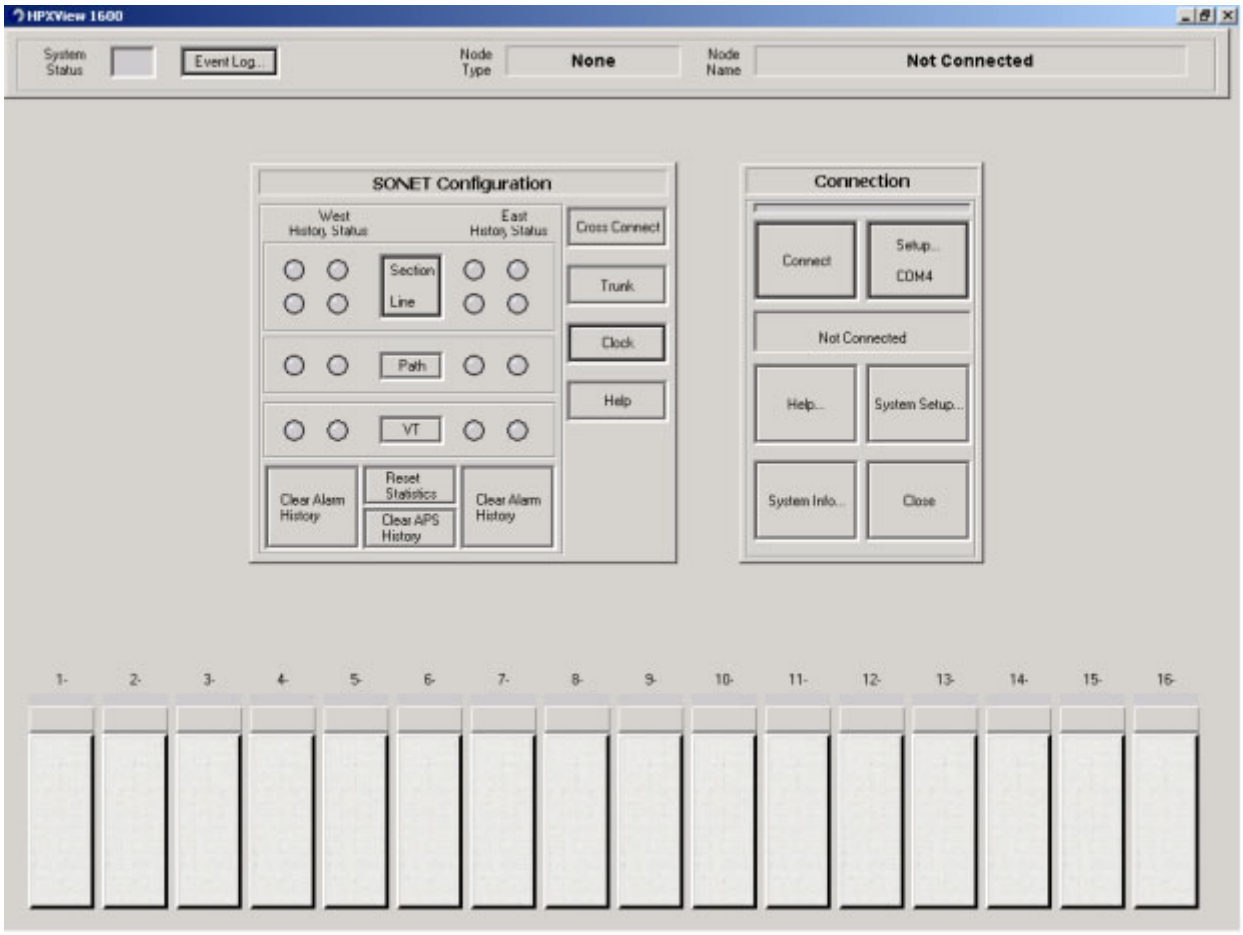


Figure 4: HPXView to HPX-1600-SS

To manage the tributary connections to the trunk, click on the “Cross Connect” button to display a window similar to that in Figure 7.

2.1. CONFIGURE THE VC & VT BANDWIDTH

The HPX-1600-SS has default settings of virtual container or virtual tributary which are displayed in the cross connect window the first time a node configuration is commenced. These are;

For SDH (AU-4)

- 3x TU-3, (represented as a bar) each containing;
  - 7x TU-2 (represented as frames) each containing;
    - 3x TU-12 (represented as squares) each containing an E1 payload
    - 4x TU-11 (represented as squares).each containing a T1 payload

For SONET

- 3x STS-1, (represented as a bar) each containing;
  - 7x VT-6 (represented as frames) each containing;
    - 3x VT-2 (represented as squares) each containing an E1 payload.
    - 4x VT-1.5 (represented as squares) each containing a T1 payload.

To change the VC/VT bandwidth, Right-click on a white square that represents a VC/VT, select “Tributary type”, then select the required tributary type. The change will be immediately displayed in the graphic.

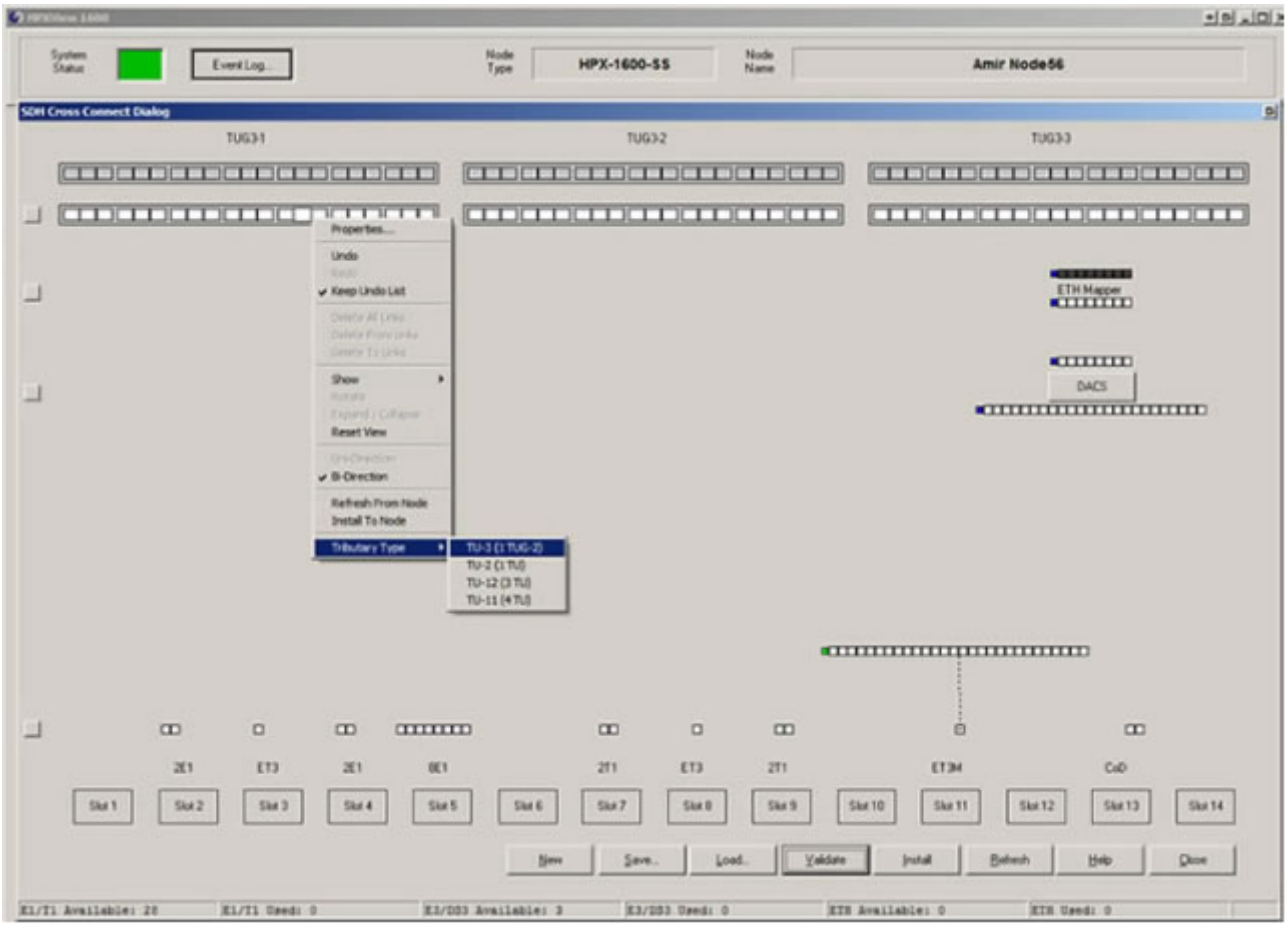


Figure 5: SDH VC type selection

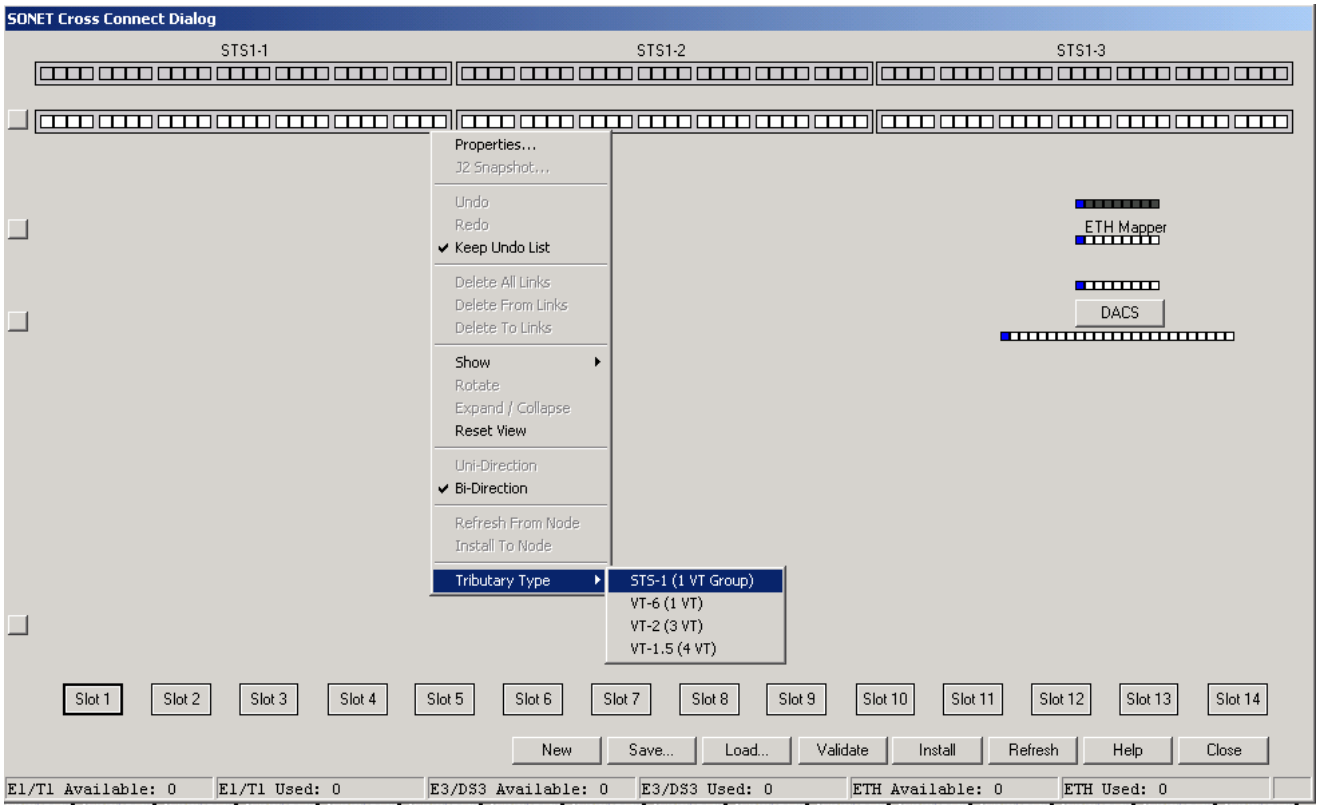


Figure 6: SONET VT type selection

2.2. SDH / SONET CROSS CONNECT

To map a tributary IM such as an T1 simply click on the T1 port icon and drag to the destination tributary unit group of choice. The three TUG3-x grey coloured bars at the top of the screen represent the maximum tributary unit payload of 63x E1 tributaries or 84 x T1 tributaries for a STM-1/Oc-3 trunk. These are grouped as defined in Figure 1 – SDH payload mapping and Figure 2 – SONET payload mapping.

Tributary unit Groups (TUG) can be changed to carry E1, T1 or E3/DS3
As in the figure below, the middle TUG has been configured as a VC-3 to carry not 21xE1 but either 1xE3 or 1xDS3.

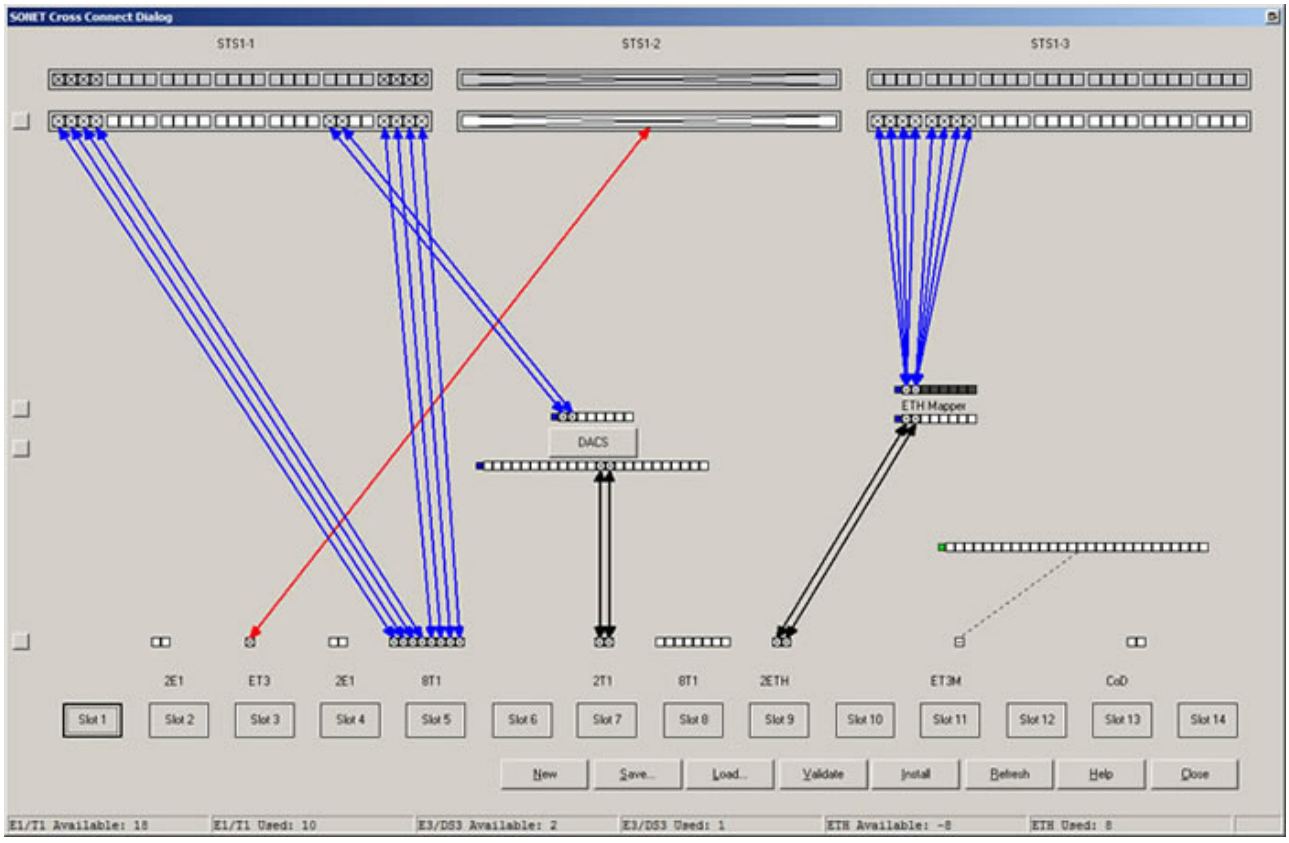


Figure 7: SDH tributary connections

Tributary unit bandwidth should be configured before an interface connection is dragged to it. To configure the type of SDH/SONET tributary, right-click on the white square of the VC and select the “tributary type” option from the drop down box.

The grey coloured TUG3 structure at the top of the screen may be represented by either two or three rows of TUG3s. If no trunk protection circuits exist, then there will two rows, else there will be three rows. The top two rows represent either the “Working” and “Protection” trunks or the “East” and “West” trunks depending on the network topology terminal or ring.

The lowest row of white squares represents the local termination of the tributary units.

2.2.1. CONTROL: BUTTONS

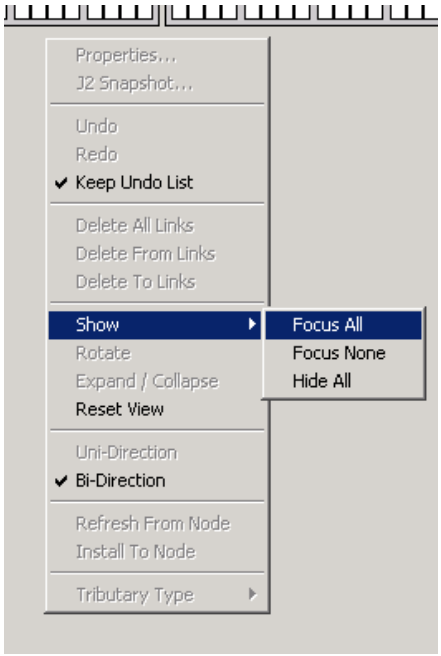
The SDH/SONET Cross Connect window has these feature buttons;

NEW	Deletes the current cross connect.
SAVE	Prompts for a filename to save the current cross connect to disk.
LOAD	Prompts for a filename of a previously saved cross connect.
VALIDATE	Verifies the cross connections to IMs actually exist.
INSTALL	Uploads the current PC cross connect to the HPX-1600-SS.
REFRESH	Downloads the current HPX-1600-SS to the PC.

2.2.2. CONTROL: MENU

A Right click in the grey area of the SDH/SONET cross connect window, displays the drop down menu as in Figure 8.

This menu allows repetitive Undo and Redo of cross connects up to a maximum of 40 actions.

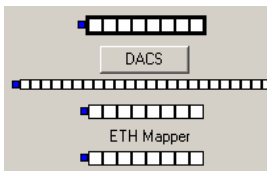


To delete a specific cross-connect, right click directly on either end of a link, then select “Delete All Links” from the menu. This will delete only the selected link.

A complex cross connect window can be clarified by focussing on only the components being addressed. The Interface Module, DACS, TU and Ethernet-Mapper can be faded or focussed from the drop down menu or by the four check boxes on the left margin of the window as depicted in Figure 8.

Figure 8: Right click menu

2.2.3. TAILOR THE SCREEN APPEARANCE



The DACS and Ethernet-Mapper icons can be moved to any location of the window by dragging the “blue handles” at the left edge of each icon. Clicking on the “Install” button will save the new screen location of these icons with the cross connect to the connected node.

Figure 9: Blue drag handles

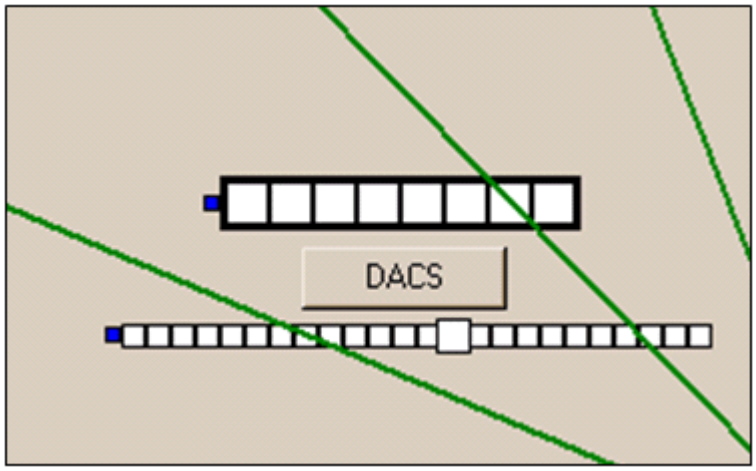
Double clicking on the “green handle” will rotate the tributary icon bar 90 degrees clockwise. Clicking on the “Install” button will save the new screen location of these icons with the cross connect to the connected node.

Figure 10: Green drag handles

2.2.4. DACS

The DACS has the same specifications and usage as for the HPX-1600-IA. For instructions on usage, please refer to the Chapter; 3-3 DACS Configuration.
To enter the DACS window click on the DACS button.

DACS Enters the small DACS configuration.



The DACS has connections for 32 framed E1/T1 circuits.

Two E1 circuits connect from each interface slot from slot 01 to slot 12. These are represented by the 24 boxes below the "DACS" button.

Eight E1/T1 circuits are available to connect from the DACS to the SDH/SONET trunk. These are represented above the "DACS" button.

Figure 11: DACS connections

The output of the DACS passes through a Framer module before connection to the SDH/SONET tributary circuit. The Framer primary function;

- To insert and extract voice control signals from the DACS into a composite E1/T1 signal.
- To align timeslots from SDH/SONET VC/VT circuits to the DACS

Configuration of the voice signal framing (refer Chapter 4-1) is by a right-click on the selected DACS output and making the appropriate selection as in the E1 and T1 examples below

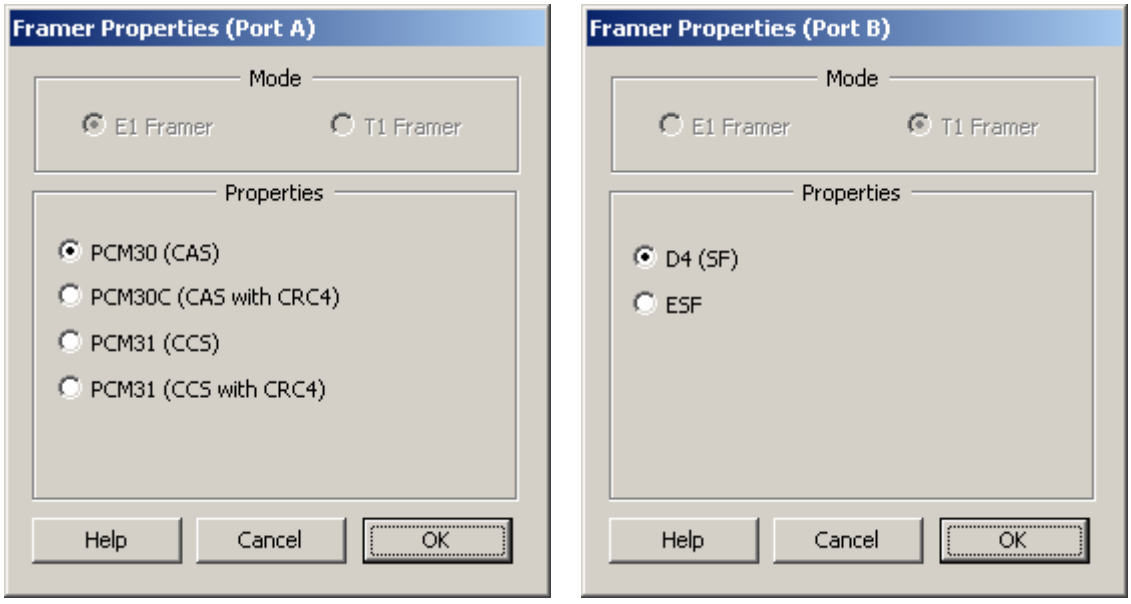


Figure 12: Framer configuration

2.3. CONFIGURATION EXAMPLE

The figure below illustrates several different types of SDH cross connect. Refer to the numbers beside the circles for the table of notes below.

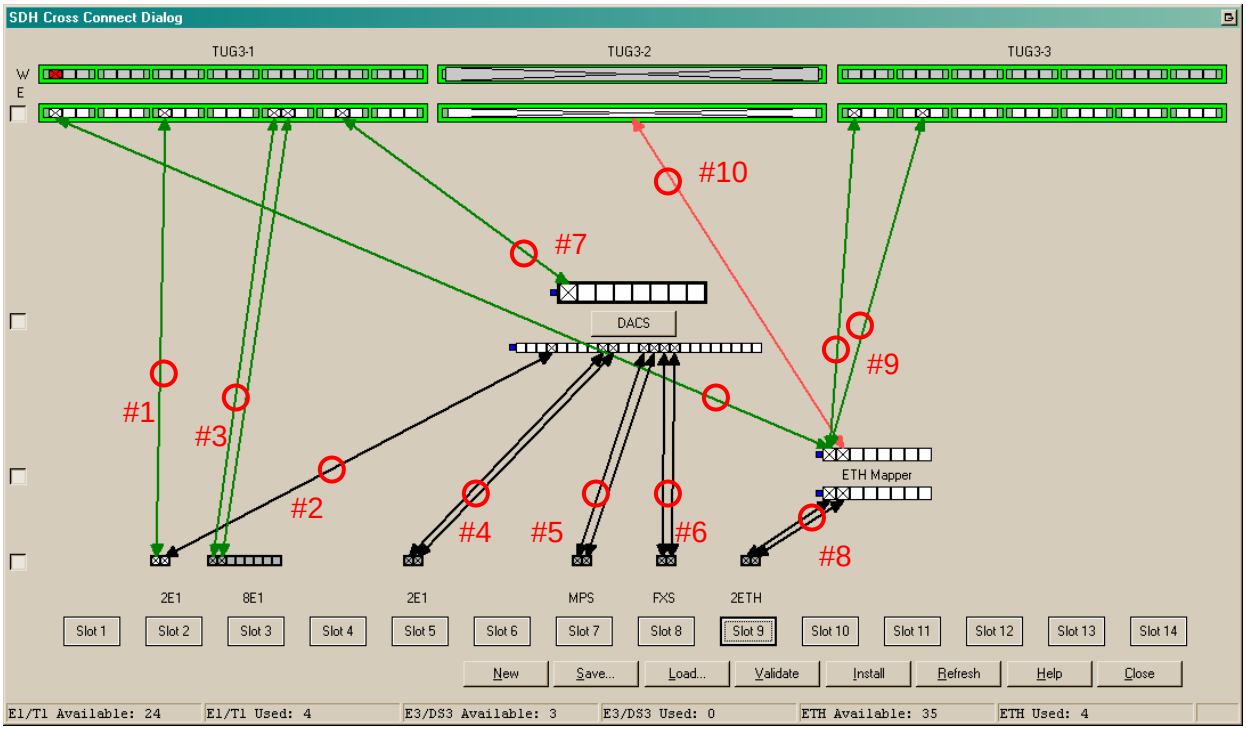


Figure 13: SDH Cross Connect

Note	From	To	Comments
1	IM02 port A	SDH 1-3-1	Dual E1 port A Async mapped to SDH payload address, TUG3-1, TUG2-3, VC12-1
2	IM02 port B	DACS	Dual E1 port B Synch mapped to DACS
3	IM03 port A&B	SDH 1-5-1 and 1-5-2	Octal E1 Port A and B Asynch mapped to SDH payload address, TUG3-1, TUG2-5, VC12-1 and TUG3-1, TUG2-5, VC12-2
4	IM05 port A&B	DACS	Dual E1 ports A & B Synch mapped to DACS (most common application is for fractional E1)
5	IM07 port A&B	DACS	MPS ports A and B mapped to DACS.
6	IM08 port A&B	DACS	FXS both A and B ports (64Kbps) phone interfaces mapped to DACS
7	DACS port A (PCM30)	SDH 1-6-2	Port A output of the DACS with groomed combination of all of the above DACS inputs connects to SDH TUG3-1, TUG2-6, VC12-2
8a and 9	IM09 port A	SDH 1-1-1 3-1-1 3-2-2	Dual Ethernet port A 10BaseT via Ethernet Mapper port A to a concatenation of 3x VC-12 (= 6Mbps) SDH bandwidth
8b and 10	IM09 port B	SDH 2-1	Dual Ethernet port B 100BaseT via Ethernet Mapper port B to a VC-3 (= 45Mbps) SDH bandwidth

Table 1: SDH cross: connect notes

2.3.1. CROSS CONNECT RULES

The following describes a number of rules that apply to SDH cross connects. These rules are automatically enforced by HPXView and as such do not need to be memorised but are included for completeness of information.

- Configure interface ports and framer, and install before making cross connections.
- All ports of a multi port E1 or T1 IM can be mapped to the SDH.
- E1 or T1 IM ports are mapped asynchronously. No control over the framing of the local interface is possible. IM interface controls are all “greyed out”.
- All sub rate (nx64Kbps) IM (MPS, FXS, E&M, Ethernet) must be mapped to the DACS.
- The dual port E1 and T1 interface modules support mixed mapping. i.e. One port mapped Asynch to the SDH and the other port mapped Synch to the DACS.
- The Octal E1 and T1 interface modules support Async mapping only.
- An IM mapped to the DACS must only use the port number of the DACS equal to the IM slot.
- The DACS ports 13, 14, 15 and 16 always connect to the eight framer ports above the DACS.
- All voice interface IMs must be groomed into a composite E1 or T1 digital streams in the DACS. These composite E1/T1 streams require CAS processing in timeslot 16 which is performed by the DACS/SDH framer.