



HPX-1600 USER GUIDE

Chapter 1-6: SDH-AU4 Terminal Mode Point-to-Point configuration Example

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1. INTRODUCTION

The HPX-1600-SS integrates SDH/SONET transmission and multiplexing with Optical Multiplexing, Cross Connect and Integrated Access functionality.

The HPX-1600-SS allows users to connect traditional E&M, FXS, serial data (V.35/V.24/X.21/RS-530/RS-530A), n x 64K E1, Ethernet along with multiple E1/T1 circuits and E3/DS3 across trunks using SDH framing with STM-1 bandwidth or SONET framing with OC-3 bandwidth. Ethernet support includes dynamic concatenated bandwidth in multiples of T1/E1 and E3/DS3.

The inbuilt cross connect functionality allows customers to establish traditional Digital Data Networks (DDN) and integrate them with SDH/SONET facilities. The DDN functionality is built into the HPX-1600-SS allowing users to build new DDN infrastructure or integrate it with existing ones. The standard DACS is a 1024x1024 DS0 type.

The modular approach to the HPX-1600-SS allows network providers to mix and match multiple services using a wide variety of Interface Modules (IMs).

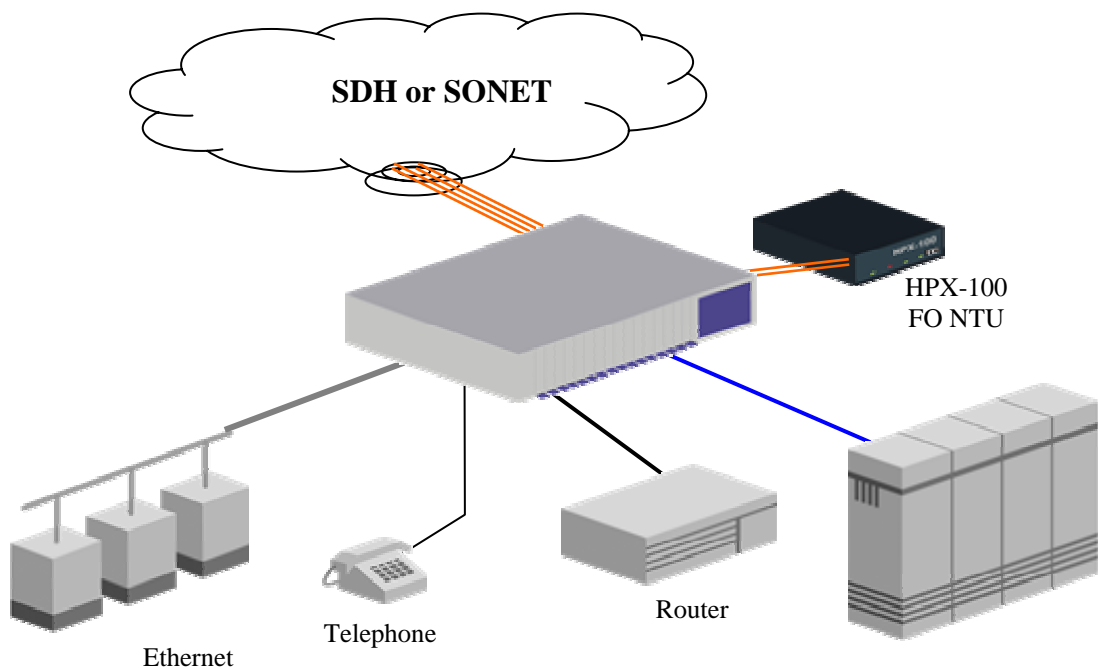


Figure 1 - Application of HPX-1600-SS in SDH/SONET Networks

2. IMPLEMENTATION

The HPX-1600-SS is supplied with two STM-1 (OC-3) optic trunk IMs for trunk connectivity and can accept a range of IMs for tributary interfaces. The HPXView management system allows the user to manage the node.

2.1. SDH MAPPING

New and existing Interface Module types can be installed and multiplexed over the SDH/SONET trunk. E1/T1 and E3/DS3 circuits are mapped into SDH asynchronously as a default although the user can select each port on the IMs to be synchronised to one of a number of sources.

Low speed (DS0) IMs, voice and data can be groomed into a composite E1 or T1 stream before transmission over the SDH/SONET trunk.

The HPX-1600-SS provides for SDH/SONET framing and mapping, aligning and multiplexing of PDH signals. The PDH signals are mapped into virtual containers or virtual tributaries according to the following specifications.

SDH multiplexing and mapping is conducted in accordance with ITU-T G.707.

- 2.048Mbps Mapped to a VC-12 compliant to ITU-T G.707 section 10.1.4.1
- 1.544Mbps Mapped to a VC-11 compliant to ITU-T G.707 section 10.1.5.1
- 45Mbps Mapped to a VC-3 compliant to ITU-T G.707 section 10.1.2.1
- 34Mbps Mapped to a VC-3 compliant to ITU-T G.707 section 10.1.2.2

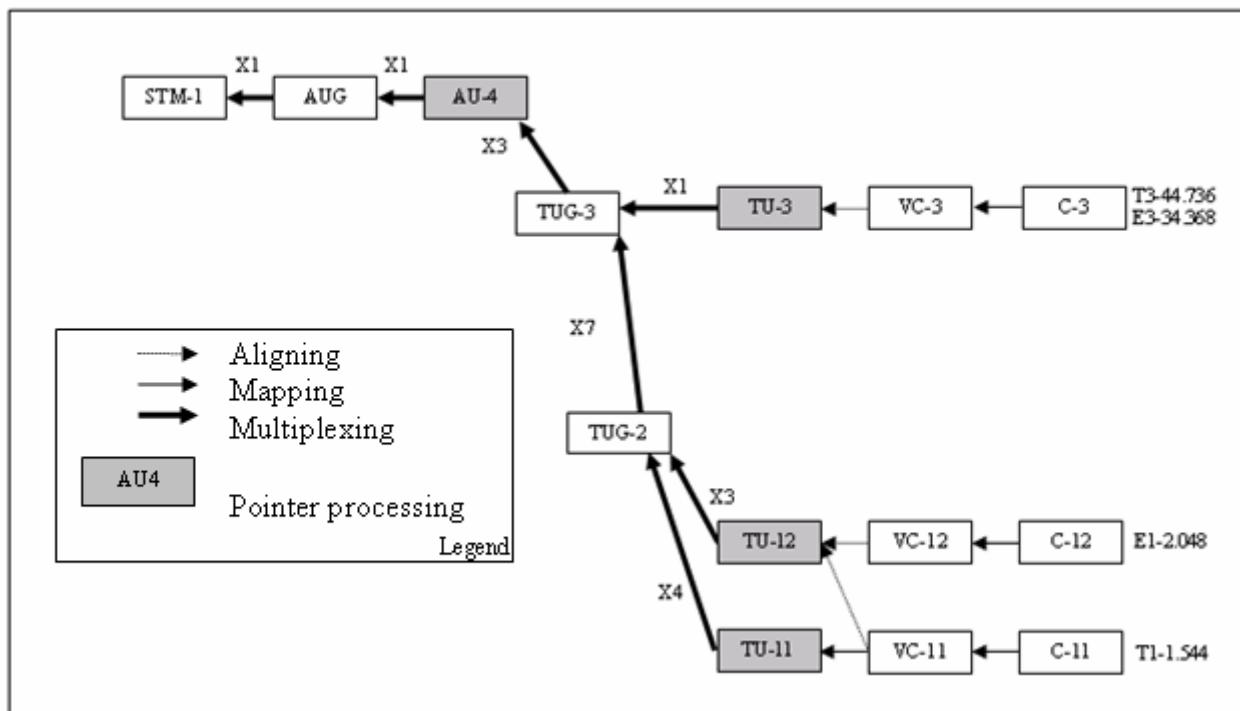


Figure 2 - SDH AU4 mapping

2.2. POINT-TO-POINT MSP (1+1) TERMINAL

This is a simple point-to-point terminal protection that requires that the HPX-1600-SS fibre optic interfaces be connected as follows;

- STM-1/OC-3 (IM15) Transmit of the local node connects to STM-1/OC-3 (IM15) Receive of node number
- STM-1/OC-3 (IM16) Transmit of local node connects to STM-1/OC-3 (IM16) Transmit of node number

- Working (arrow indicates direction from Transmit to Receive)
- ⋯ Protection (arrow indicates direction from Transmit to receive)

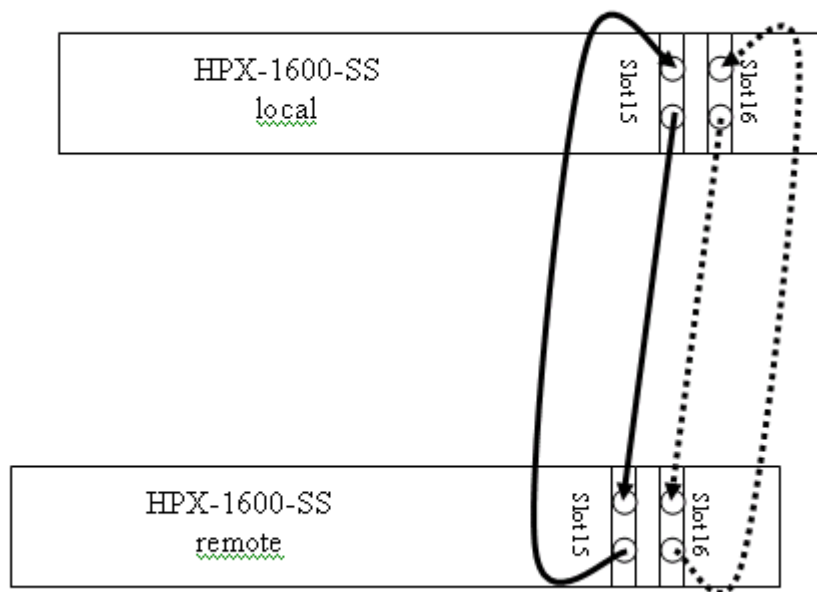


Figure 3 – 1+1 Fibre Optic Ring connections to STM-1(OC-3) IM

In this (1+1) protection mode, the fibre optic connection is simple. Configuration and alarm interface describe the fibre optic interfaces by interface slot number and the currently active trunk as “working” with the alternative trunk as “protection”. Interface slot 15 is “working” and slot 16 is “protection”.

2.3. NETWORK PROTECTION

In a ring structure, the HPX-1600-SS supports path protection in SDH SNCP and SONET UPSR. Protection of linear networks is supported for SDH multiplexer (ITU-T G.783), Multiplexer Section Protection (MSP) 1+1 APS and SONET line, SWITCHED 1+1 APS.

The automatic protection functionality is derived from the SDH/SONET Daughter Card (SDC) and supports protection of STM-1 trunks against trunk associated failures within a multiplexed trunk link. This function complies with ITU-T G.783 and can be configured to use either:

- Uni-directional with K byte notification or
- Bi-directional k-byte switch synchronisation.

In unidirectional mode a break in the fibre from Node A to Node B will cause only the A to B direction to switch to the protection fibre. B to A will remain on the working fibre. K bytes only provide notification.

In Bi-directional mode a break in the fibre from Node A to Node B will cause a negotiation to occur using the K bytes and both A to B and B to A will switch to the protection fibres.

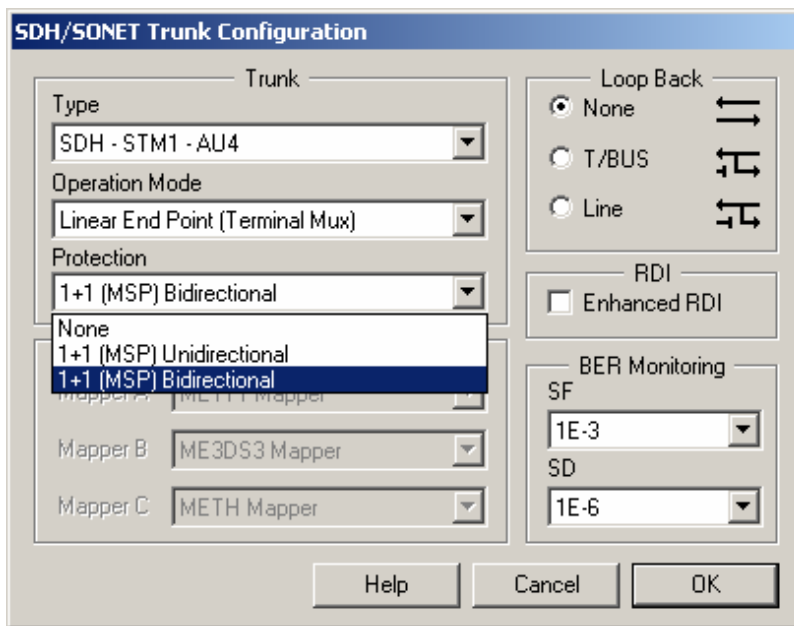


Figure 4 – SDH/SONET Trunk Configuration Protection

2.3.1. MSP 1+1 / LINE SWITCHED POINT-TO-POINT

Figure 5 shows a point-to-point configuration over four optic fibres. Fibres may be routed over diverse paths. The SDH signal is bridged over both paths. Protection is provided for failure of a single fibre only.

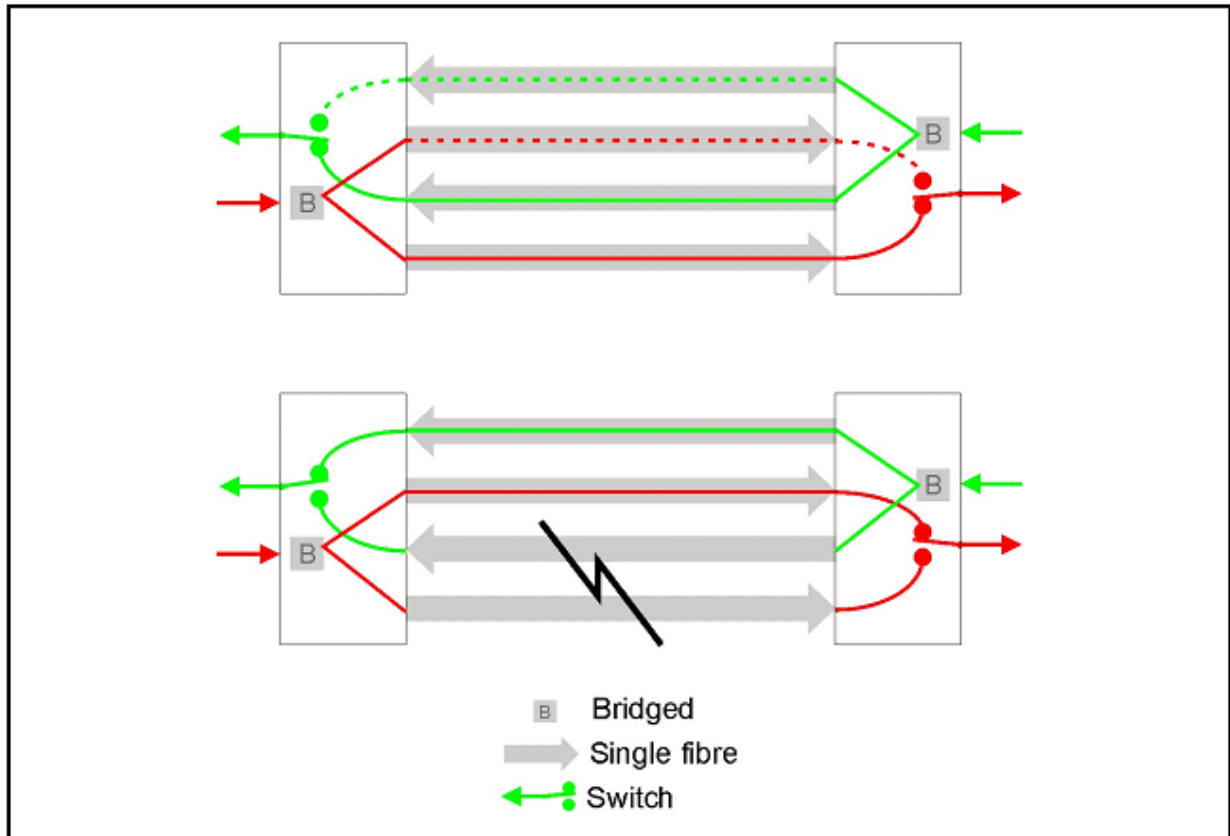


Figure 5 – Point to point MSP 1+1 protection

2.4. TRUNK AND DATA PATH CONFIGURATION

Once the SDH/SONET network TRUNK and APS have been selected and the physical fibre optic connected, the trunk and data paths must be configured.

The path alarm configuration dialogs are accessed from the SDH/SONET configuration windows. These are shown below in Figure 6.

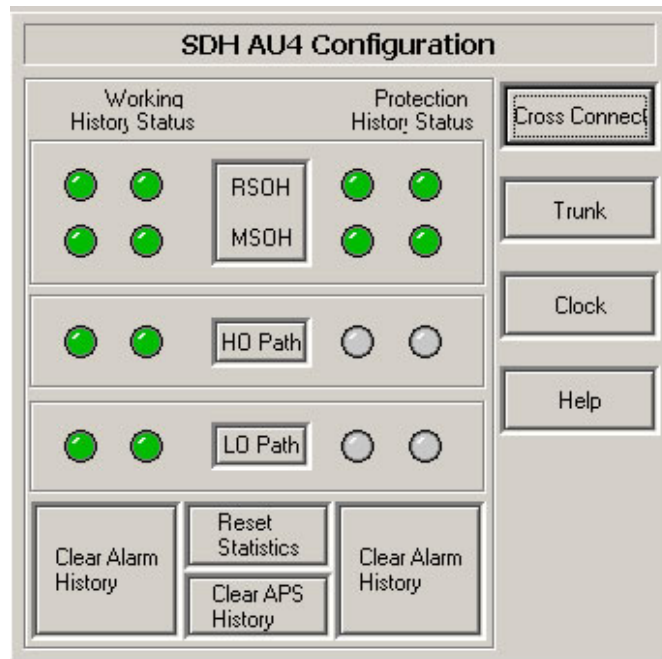


Figure 6 – SDH Configuration Windows

The following sections of this manual illustrate the configurations required with example screens. It should be noted:

- SDH example is for a Terminal topology

2.4.1. SDH TRUNK AND DATA PATH CONFIGURATION

Configure the overhead bytes in the following order;

- Regenerator,
- Multiplexer,
- High Order Path,
- Low Order Path.

For each of these configuration windows, there is a “J byte” field to enter a unique text string that is associated with the payload at that layer. This field has “received”, “transmitted”, and “expected” string fields.

The “expected” value is compared with the “received” J bytes, the “transmitted” value is forwarded to the next node for the same comparison. The J bytes are used to allow intuitive interconnection of multiple nodes. Unique textual labels are encapsulated with data as it is transmitted, at the destination a comparison is performed between the received and the “expected” text to confirm that the correct connection is made. Path labels are provided for the RSOH (Are we connected to the correct node?), at the HO-path (Are we connected to the correct HO payload?) and the LO-path (Are we connected to the correct tributary?)

Each alarm can be enabled as either a red or a yellow alarm. The history and current status of each alarm are also displayed. If any of the configured yellow alarms are active, the tributary unit box will be yellow. If any configured red alarms are active, the box will be red. If red and yellow alarms are active, the box will show red.

If the box is green, it indicates that all user configured alarm events are inactive.

Alarms can be disabled on a layer basis or individually at any given layer. This means that as a network is commissioned, the installer can disable all low order alarms until the higher order is established.

2.4.1.1. REGENERATOR & MULTIPLEXER CONFIGURATION

The HPX-1600-SS is a compact and fully featured SDH access multiplexer that has access to the SDH Section Overhead Bytes. Alarms can be configured individually for both Regenerator and Multiplexer Sections. The “J0” bytes are used to trace between the HPX-1600-SS adjacent nodes. Each node in the ring should transmit “J0” bytes to identify the upstream (adjacent) unit. Haliplex suggest that the user configure as follows:

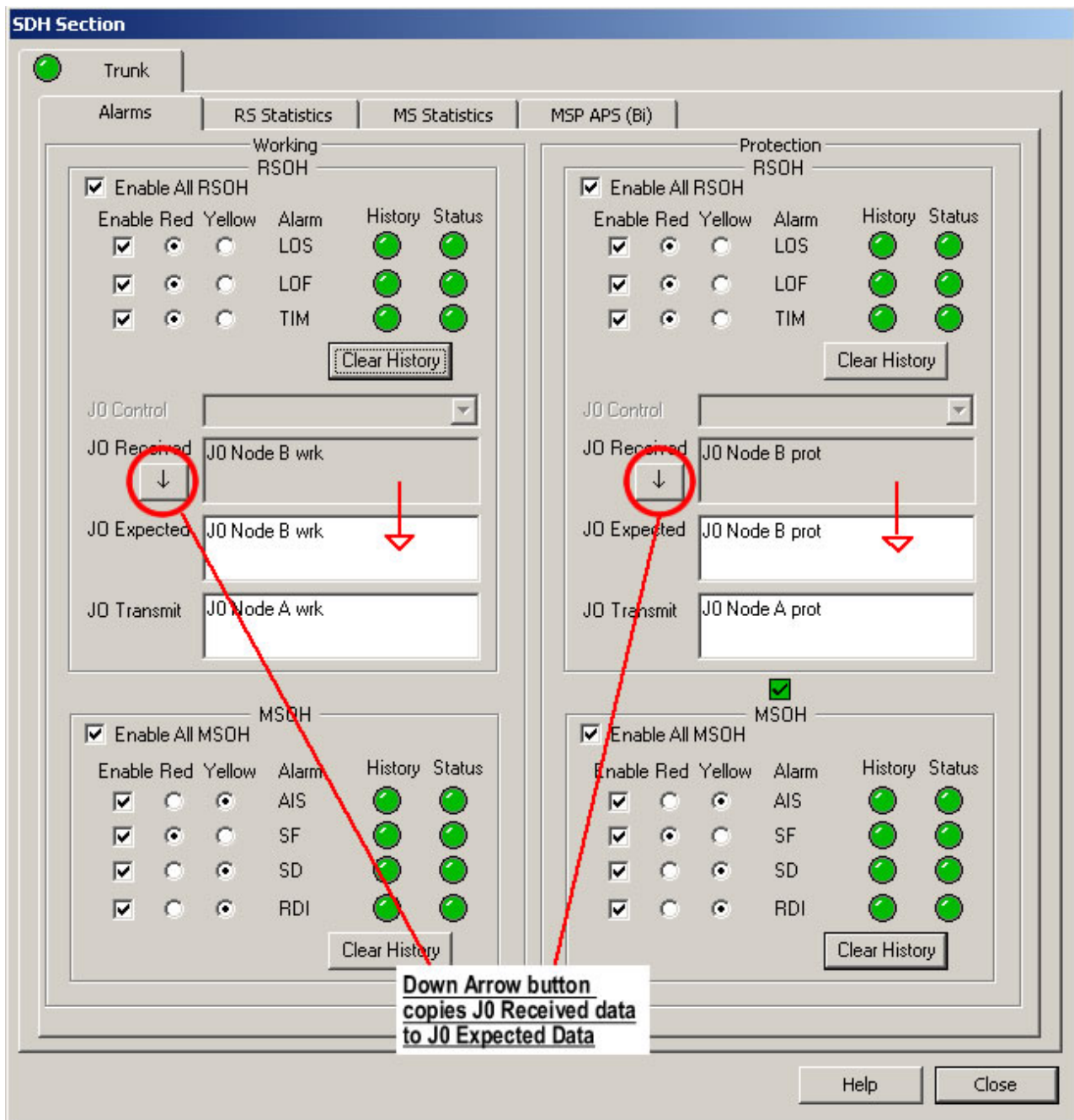


Figure 7 - RSOH & MSOH alarms and J0 bytes

At each node the received J0 bytes can be copied to the “Expected” field by clicking on the down arrow button. The Transmit field should be simple to identify as a trace between the two adjacent nodes. An example between nodes “A” and “B” would be “A-B”.

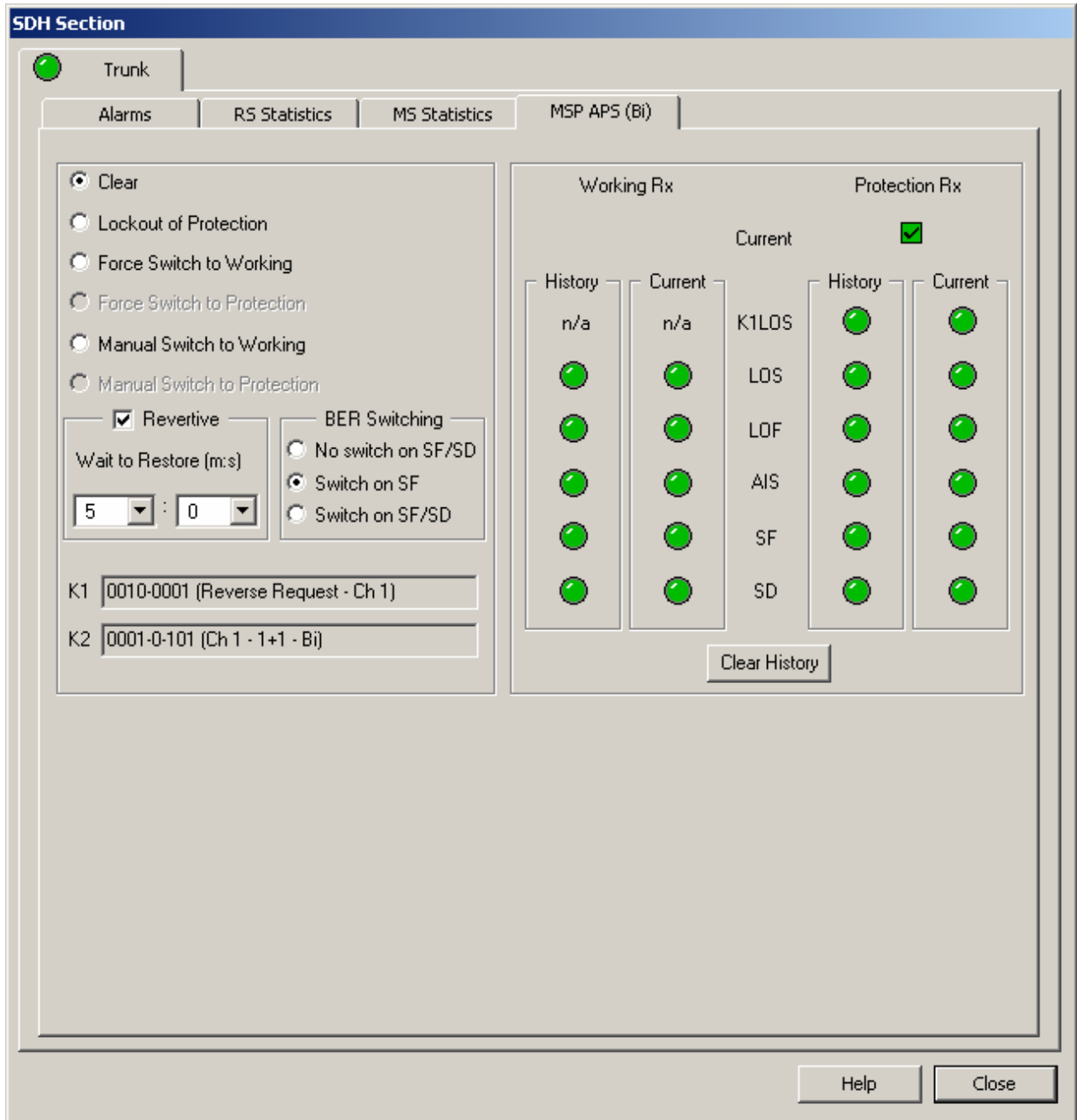


Figure 8 – MSP APS configuration and control

The MSP APS window displays current and historical status of the fibre optic interfaces. The green “tick” icon identifies the active fibre trunk. The Bit Error Rate is monitored and trunk protection can be configured to switch on signal Failure and/or Degradation. If the “Revertive” box is ticked, then the active trunk will switch from protection back to working after a switch over when the signal quality of the working trunk is within specification and the configured timer has expired.

2.4.1.2. HIGH ORDER BYTES CONFIGURATION

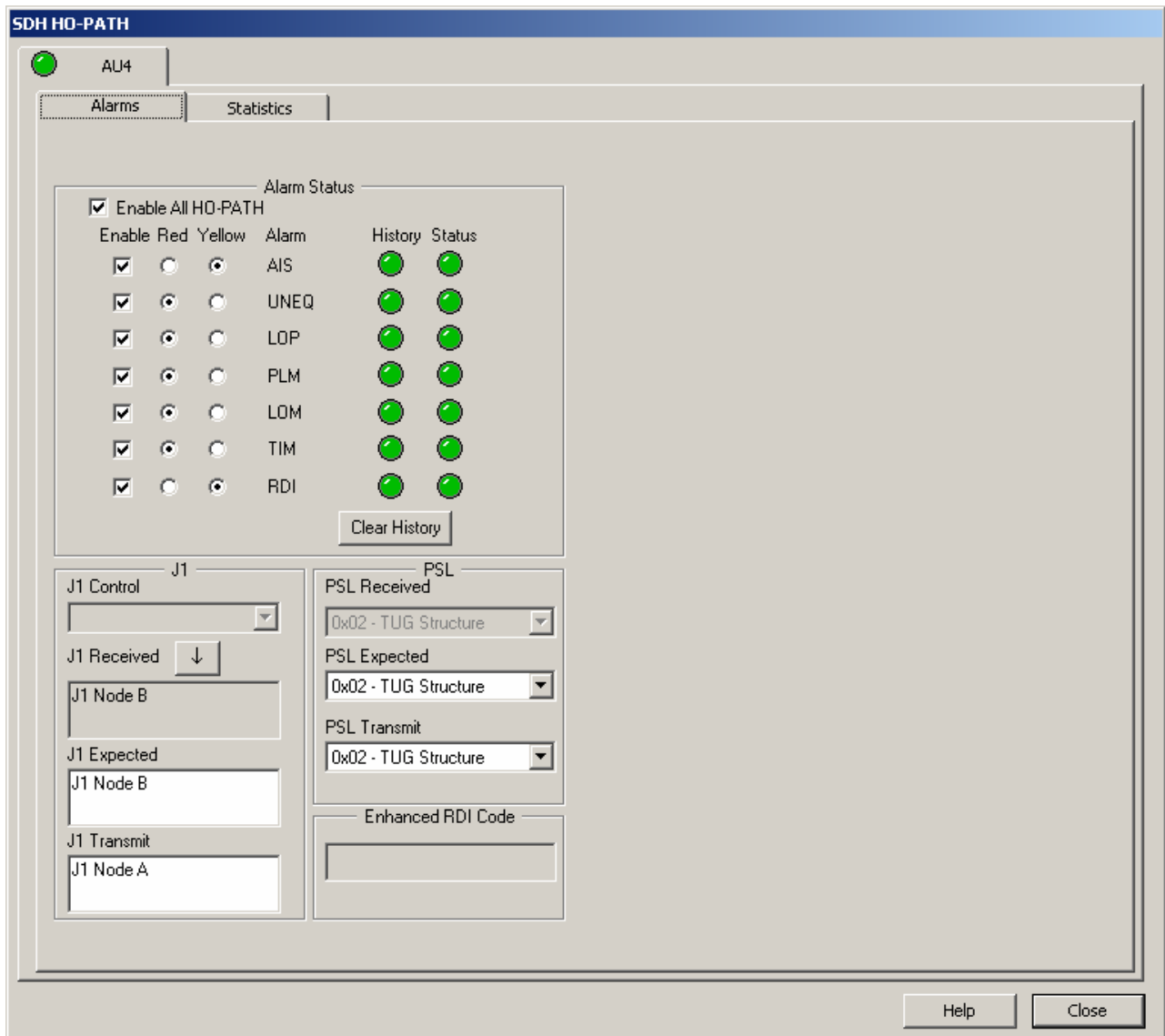


Figure 9 - High Order Path alarms and J1 bytes

2.4.1.2.1. E3 AND DS3 TRIBUTARIES

The High Order (J1) bytes are used to define and trace the actual path end to end between nodes on the SDH ring. The Path Signal Label values should be selected as “bit synchronous”.

2.4.1.2.2. E1 AND T1 TRIBUTARIES

The High Order (J1) bytes are used to define and trace the path between adjacent nodes on the SDH ring. The Path Signal Label values should be selected as “TUG structure” or Tributary unit Group.

At each node the received J1 bytes can be copied to the “Expected” field by clicking on the down arrow button.

The Path Signal Label (PSL) section is used to compare the received and expected payload types, to protect against mis-configuration. The payload type used must match at both ends of the link such that they are set to the same type. The PSL setting of “Equipped” is a wild card match for any service.

2.4.1.3. TRIBUTARY CIRCUIT CONFIGURATION

The Low Order path is used to transport T1 and E1 data streams. The “J2” bytes are used to trace this path. The tributary circuits **must** be selected and mapped to the selected Tributary Unit Group (TUG) and installed **before** the Low Order path can be configured. Tributary circuits can be T1/T3 or E1/DS3 IM interfaces or framed E1 stream outputs from the Digital Access Cross Connect. Refer to Chapter 3 for details on cross connect of tributaries and DACS.

The TUG-3 groups are displayed as the three possible addressable TUG-3 payloads, which is the maximum capacity of the SDH STM-1 network. Each TUG3 group contains the possible payload of seven TUG2 groups. Tributaries may be mapped to VC12 or VC11 containers within each TUG2 group. The user is free to use any TUG3 groups.

The HPX-1600-SS will dynamically distribute the payloads across the installed mapper daughter boards. There is no direct relationship between the TUG3 group addressing and the installed mapper hardware. The user can define VC12 tributary circuits for 1-1-1, 2-1-1 and 3-1-1 with only a single E1/T1 mapper installed.

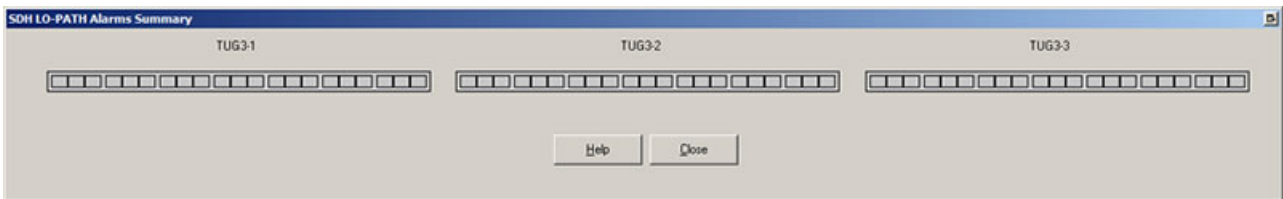


Figure 10 - Low Order Path

To configure the Low Order Path and “J2” bytes, a cross connect must be established from the DACS or an IM to the VC to be configured. Click “Install” to install the cross connect to the node. The Alarms panel will then be enabled.

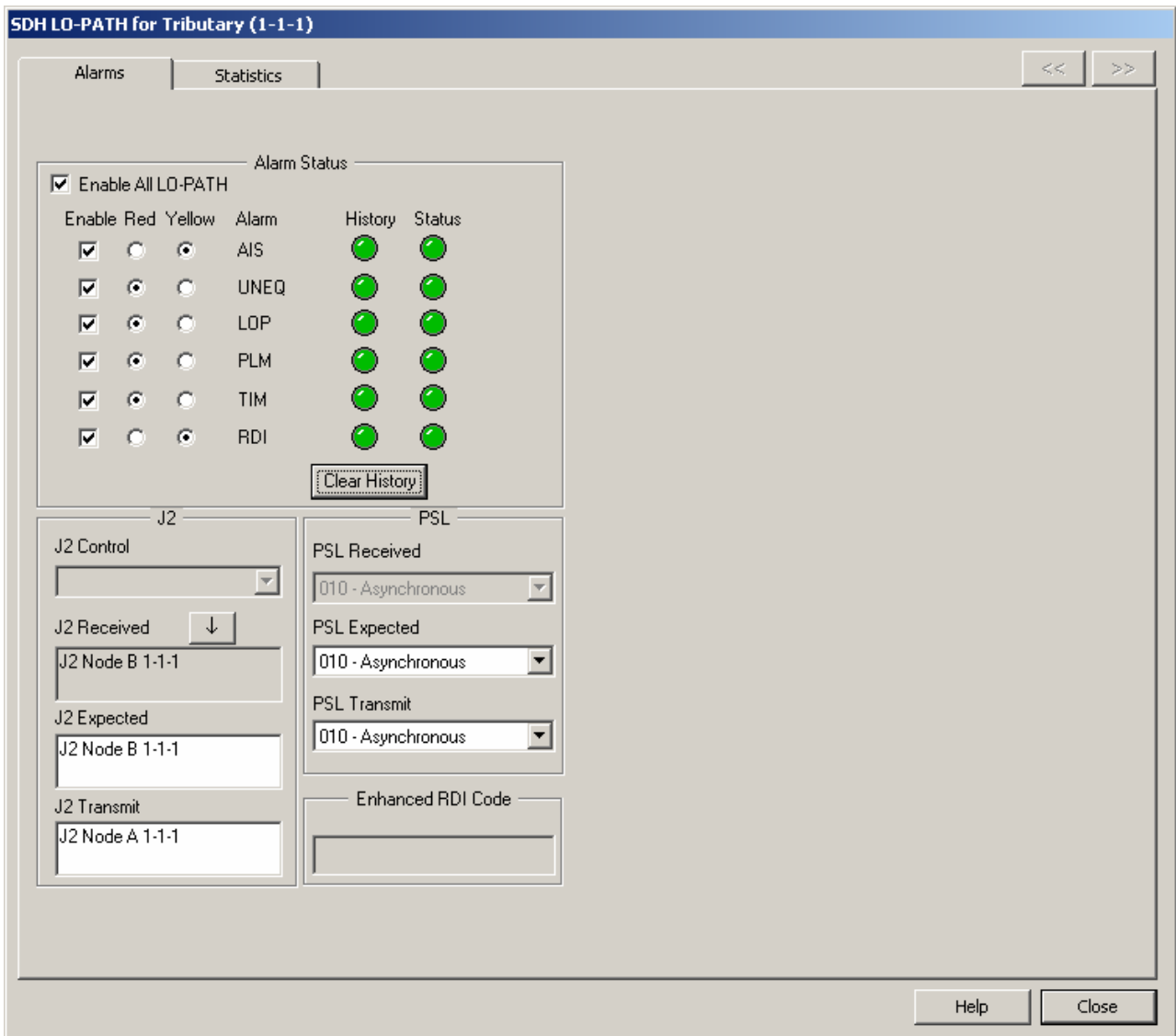


Figure 11 - Low Order Path Alarms and J2 bytes

To configure the Low Order Path and “J2” bytes, left click on the tributary unit button to select, then right click to display the window as below.

The “J2” trace bytes are used to define the network ring end-to-end path information. After the LO Path alarms are configured, the tributary button will change from a grey appearance to the colour of the currently highest severity, active alarm.

The Path Signal Label (PSL) section is used to compare the received and expected payload types, to protect against mis-configuration. The payload type used should be set so that both ends of the link are set to “Equipped”.

