



HPX-1600 USER GUIDE

Chapter 1-10: HPX-1600-EV Configuration

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1. INTRODUCTION

The HPX-1600-EV provides point-to-point connectivity of Ethernet and T1's over DS-3 trunk circuits. It features 10/100 Base-T Ethernet and T1 transmission, combining nxT1 digital access cross connection, and Ethernet Virtual Concatenation (VCAT) transmission functionality to provide powerful grooming and cross connect capabilities across DS-3 trunks.

The integrated nxT1 Digital Cross Connect Switch enables a combination of up to 8 Ethernet segments and up to 28 T1 tributary to be multiplexed over the DS-3 trunk. Cross connect configuration is in increments of T1 bandwidth.

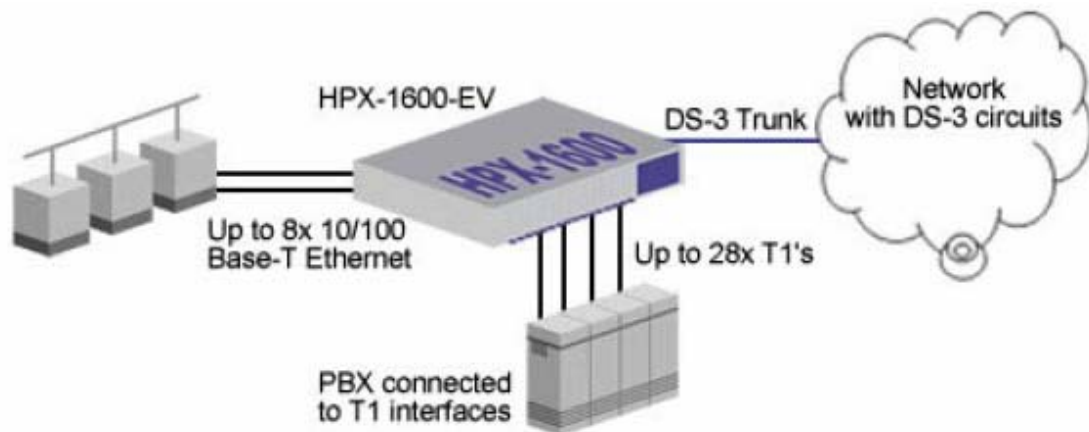


Figure 1: Application of HPX-1600-EV

The DS-3 (45Mbps) trunk uses a Private Haliplex Advanced Serial Transmission that has the following attributes:

- Ethernet higher bandwidth
- Up to 28 concatenated T1 (alternative technologies are limited to a max of 16 concatenated T1)
- Ethernet lower latency
- DS-3 trunk must be transported across intermediate networks without any DS-1 de-multiplexing

2. IMPLEMENTATION

The HPX-1600-EV is supplied with one DS-3 trunk module for trunk connectivity and one 10/100 Base-T Ethernet as a tributary interface. Additional Ethernet interface modules and T1 interface modules may be added. A second DS-3 trunk interface for 1+1 protection will be supported in a future software release. The HPXView management system allows the user to manage the node.

2.1. TRIBUTARIES AND TRUNKS

The HPX-1600-EV multiplexes 10/100 Base-T Ethernet and T1 tributary interface modules into the DS-3 trunk. The 16 slot chassis accepts tributary interface in slots 1 to 14 which can support a maximum of 8 x Ethernet IM's and a maximum of 28 T1 in 14x Dual T1 IM's. The DS-3 (45Mbps) trunk interface modules are installed in slot 15 (working) and slot 16 (protection)

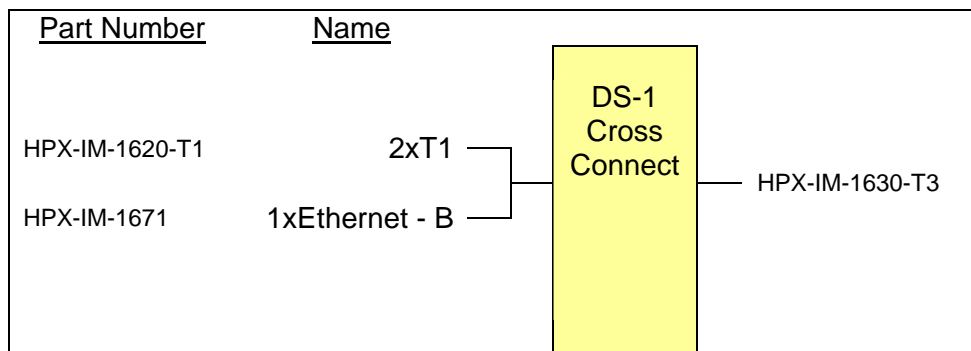


Figure 2: Tributary to trunk data path

IM slot numbers	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
HPX-1600-EV	Dual T1 IM						Single Ethernet IM								DS3 Work / Prot	

Table 1 : Reserved Slot Assignments

3. NETWORK TOPOLOGY

The HPX-1600-EV is connected in a Point-to-Point network with another HPX-1600-EV, depicted in Figure 3.

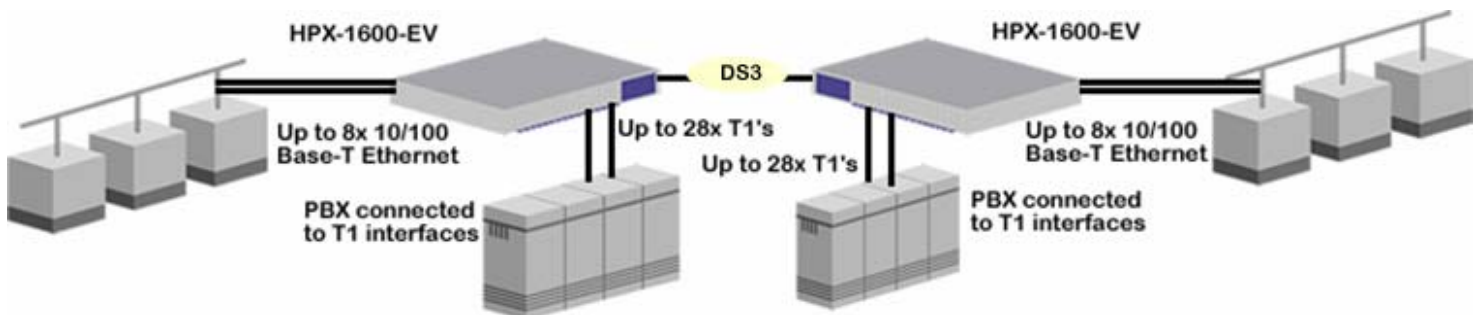


Figure 3: Point to Point multi-service network

4. NODE CONFIGURATION AND MANAGEMENT

4.2. HPXVIEW CONFIGURATION

The HPX-1600-EV is managed with the internationally acclaimed GUI element management system, HPXView. The Windows PC running HPXView is connected the HPX-1600-EV console interface, either by RS232 serial or 10BaseT Ethernet.

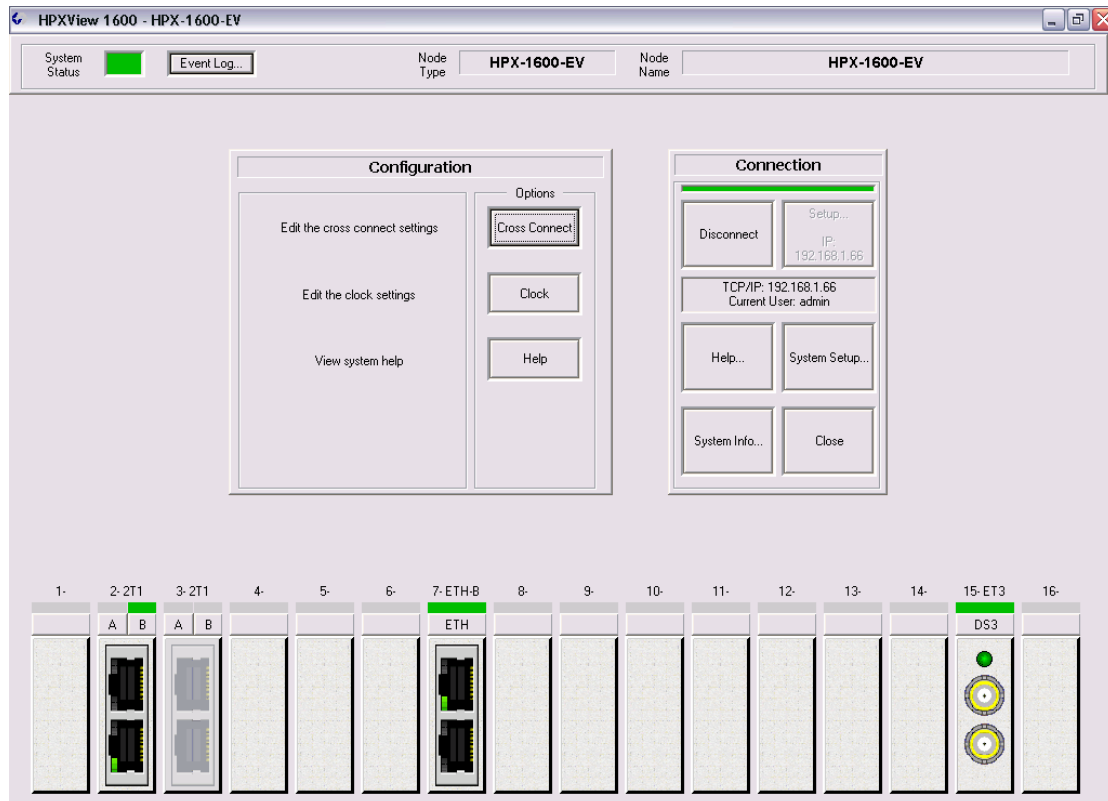


Figure 4: HPXView

5. INSTALLATION - REQUIRED INFORMATION

After you install the chassis, your system administrator must configure the individual and system interfaces before you connect your system to external networks. Refer to Chapter 3-1 – HPXView Setup and Configuration for more detailed information.

Before you commence configuration, you will need information about the network. Following is some of the information you might need, depending on the services you plan to offer:

- ❑ Node name and console IP address for the HPX-1600-EV.
- ❑ Passwords to prevent unauthorized privileged-level access to the configuration.
 - Factory default username/password
 - **admin**
 - **<none>**
- ❑ The source of the network clock reference.

6. OPERATION

6.3. HPX-1600-EV OPERATION

6.3.1. CONNECTIONS AND DISPLAY

The HPX-1600-EV front panel is located on the right side of the front of the unit. Overall HPX-1600-EV system status is reported to the front panel displays. The front panel also houses the connections for power, management workstation and alarm relays.

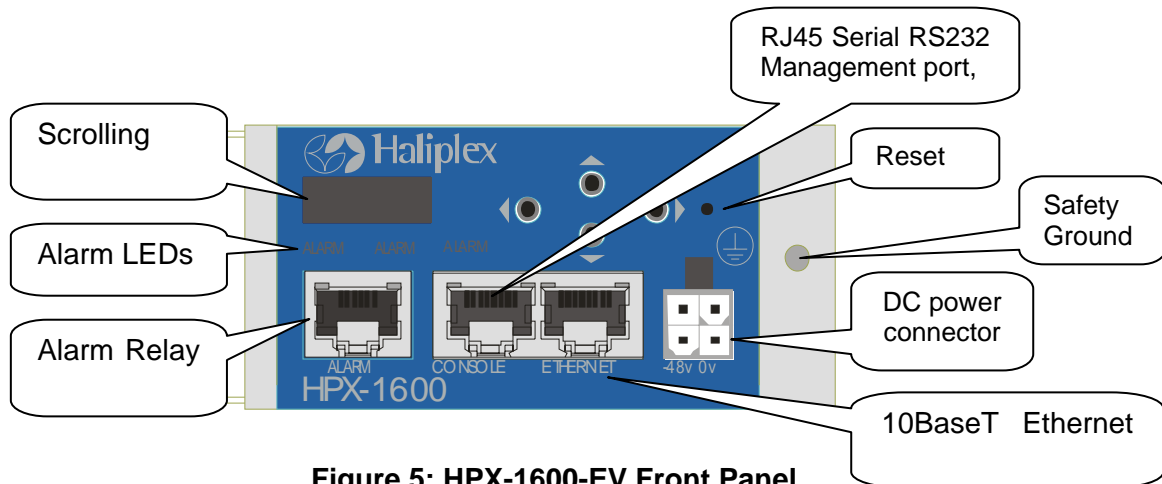
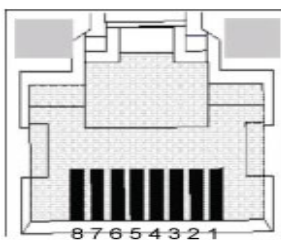


Figure 5: HPX-1600-EV Front Panel

6.3.1.1. CONSOLE

The “Console” port is a RJ45 jack for connection to the HPXView management workstation. This method of connection uses a RS232 serial communications interface. The cable specification may be found in Table 2. Serial data console connection provides a management interface to the locally connected HPX-1600 only.



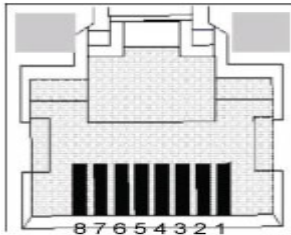
RJ45 pin #	Signal name	DB9 pin #
4	Gnd	5
6	Rx	3
3	Tx	2

Table 2: Console Serial port pin out

Figure 6: Console Serial pin out

6.3.1.2. ETHERNET

The RJ45 connector labelled "Ethernet" provides an IP management connection to the HPX-1600-EV. The Ethernet connector carries management information between a local management station, this HPX-1600-EV and other HPX-1600 family devices at the same location. The Ethernet uses HPXView and SNMP over the IP network protocol to connect the management workstation to the Haliplex nodes. Management access of remote nodes is only possible once the management IP addresses and routing have been configured and are operational.



RJ45 pin #	Signal name	Signal name	RJ45 pin #
1	Tx +	Rx +	3
2	Tx -	Rx -	6
3	Rx +	Tx +	1
6	Rx -	Tx -	2

Table 3: Console Ethernet Cross Over Direct to HPXView PC

Figure 7: Console Ethernet pin out

6.3.1.3. CONSOLE ALARMS

System alarms are defined with three levels of severity. Each level has an associated relay whose contacts are made available via the RJ11 jack. The contacts are normally open, but close when the alarm is active. The three LEDs indicate the alarm status and level of severity. The LEDs are coloured Green, Yellow and Red.

The pin assignments on the RJ11 socket and their associated alarm relay severity level are shown below in Figure 10 and Table 3.

The relay contacts are rated at:

- 0.3A @ 125VAC
- 0.5A @ 60VDC
- 1A @ 30VDC.

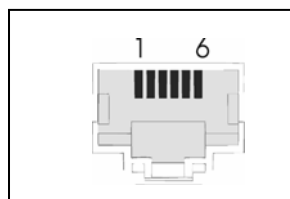


Figure 8: RJ11 Socket (as viewed from the HPX-1600-EV Front Panel)

Alarm Relay Severity Level	RJ11 Pins (Relay Contacts)
Green	1 & 2
Yellow	3 & 4
Red	5 & 6

Table 4: Alarm Relay Severity Levels

- The alarm relay contacts close when the alarm is active
- Under normal operation the Green relay contacts are closed
- If power is removed from the unit, all three of the alarm relays close contacts.

6.3.1.4. RESET

A concealed, momentary contact reset switch is located behind the front panel. Suggested access is with a paper clip or similar thin material through the small hole located in the "alarms" area of the front panel. Do not use a pencil or similar material that could leave conductive material inside the case, where it may cause damage. When pressed, the reset switch applies a reset to the HPX-1600-EV system processor. Do not operate this reset switch while the HPX-1600-EV is in operational use. All communications will be interrupted and data in transit lost. The reset switch is to be used to restart the system as if from a power up.

6.3.1.5. GROUND CONNECTOR

The Haliplex HPX-1600-EV series must be connected to an electrical ground using the ground screw connector on the face of the front panel. This is a safety feature. The equipment grounding should be in accordance with local and national electrical codes. Use a minimum of 16 AWG (1.25 mm²) wire for the ground connection.

All communications equipment should be connected to a common ground. This will result in improved data communications. Rack mounted systems may use the equipment rack as the ground path.

6.3.1.6. DC POWER CONNECTOR

The DC power connector is a four pole jack through which -48VDC is provided to the HPX-1600-SS.

The Haliplex HPX-1600-SS series ships with a 2-wire electrical plug, which will fit into the HPX-1600-SS DC power inlet. The other end of the supplied cable should be connected to the customer supplied -48VDC supply. Use a minimum of 16 AWG (1.25 mm²) wire for the input to each DC-input power supply.

The four poles of the connector are wired in two parallel pairs. Only one pair of connectors needs to be wired. The second pair of connectors is available for optional connection to a redundant -48VDC power supply (not supplied). Diode isolation is provided internally between the primary and redundant -48VDC power supplies.

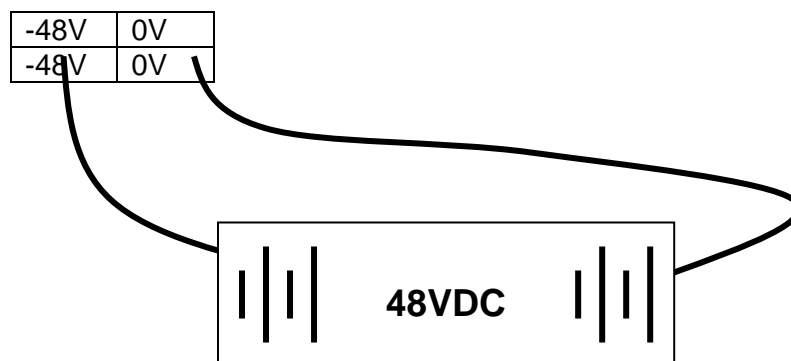


Figure 9: 48V Power Jack (viewed from front)

6.3.1.7. STATUS DISPLAY AND SCROLL BUTTONS

The four character alpha-numeric display conveys system status and diagnostic information. A command menu can be navigated using the four scroll buttons for Up/Down, Left/Right selection. *These buttons will be enabled in a future software release.*

6.3.2. FUNCTIONS

The Front Panel displays a scrolling "HPX-1600-EV" message during normal operation. Pressing the "down" switch take the user into the first level of a menu tree. Use the "Left" and "Right" switches to move around the first level of the menu tree. Press the "Down" switch to select a branch. Pressing the "Up" switch returns to the previous level. *These buttons will be enabled in a future software release.*

6.3.3. POWER UP DISPLAY

At power up, the HPX-1600-EV system progresses through a staged sequence of initialisation. The status can be interpreted from the state of the front panel and IM display LEDs.

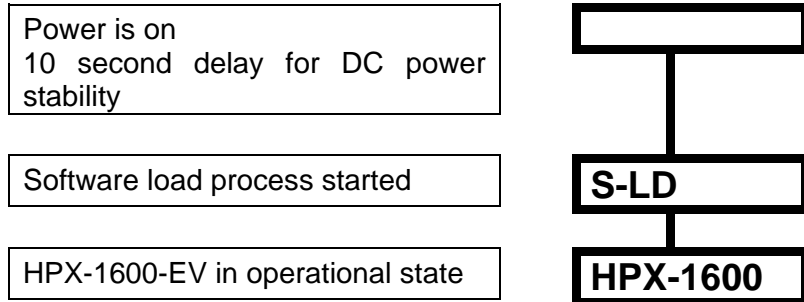


Figure 10: Power up sequence display

The Interface Module LEDs display yellow after the software has been loaded and before the configuration files are enabled. Usually this sequence is too fast to see the “all Yellow” phase. If displayed it may indicate that there is a problem with the configuration file load process.

Initialisation Sequence	IM LED Display
Power On	All Off
IM Firmware Loaded	All Yellow
IM Configuration Files Loaded	Red or Green

Figure 11: IM Initialisation LEDs

7. INTERFACE MODULES

The HPX-1600-EV accepts three interface modules, the HPX-IM-1630 E3/DS3, HPX-IM-1670 Ethernet-B and HPX-IM-1620-T1.

8. HPX-IM-1630 DS3

The DS3 IM is a single port IM that can operate at 45Mbps. It is a single port IM that allows connection via 1.6/5.6 female connectors to equipment that supports DS3. The DS3 IM is used as the trunk interface in IM slots 15 or 16.

The HPXView graphic of the E3/DS3 IM is shown Figure 12.



Note: Adapter cables from 1.6/5.6 to BNC connectors are available.

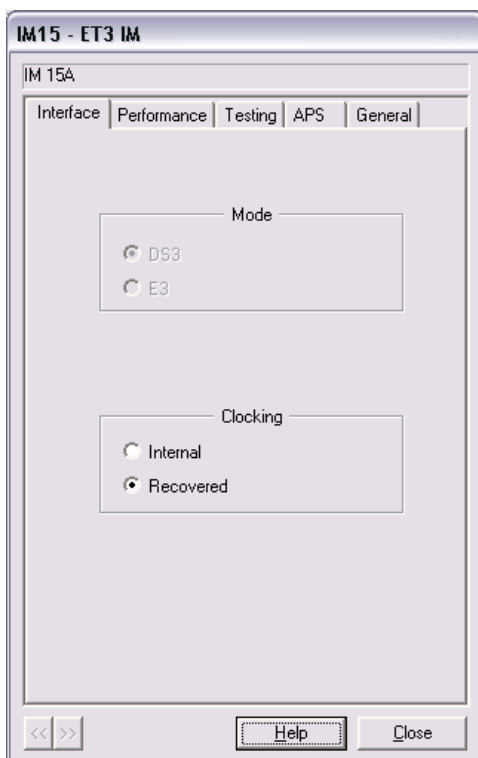


Figure 12: E3/DS3 IM

8.4. IM CONFIGURATION

The IM configuration dialog has configuration tabs as discussed below.

8.4.1. INTERFACE PARAMETERS



The default Mode setting of the IM is DS3. The Clocking setting allows the IM to be clocked internally or recover its clocking from the connected node.

For normal operation:
Set both HPX-1600-EV to Recovered.

For back to back testing:
Set one HPX-1600-EV to Internal.
Set the other HPX-1600-EV to Recovered.

Figure 13: E3/DS3 IM configuration dialog interface tab

8.4.2. PERFORMANCE PARAMETER

There are currently no configurable performance parameters.

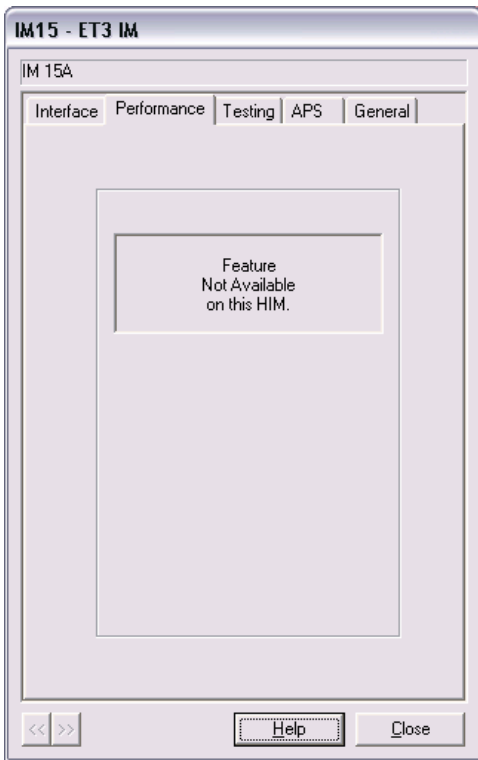


Figure 14: E3/DS3 IM configuration dialog parameter tab

8.4.3. TESTING PARAMETERS

The testing tab of the E3/DS3 IM configuration dialog allows the user to select a loopback option for testing purposes. There are currently 4 loopback options;

- No loopback (default)
- Line loopback
- Equipment loopback
- Line and Equipment loopback

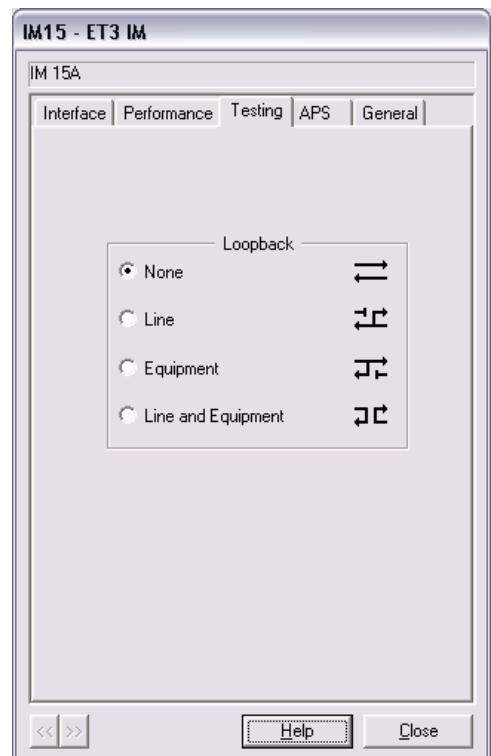


Figure 15: E3/DS3 IM configuration dialog testing tab

8.5. IM TESTING

The following tests are currently available;

- No loopback (default)
- Line loopback (1)
 - Data is sent through the IM connectors to the backplane and loops back to the IM connector, whilst the data sent from the backplane through the IM is dropped.
- Equipment loopback (2)
 - Data is sent through the backplane to the IM connector and loops back to the backplane, whilst the data sent from the IM connector is dropped.
- Line and Equipment Connector loopback (3)
 - Data that is sent through the IM connector loops back out to the IM connector. Data that is sent from the backplane through the IM is looped back out to the backplane.

The location of each of these loopbacks is shown below.

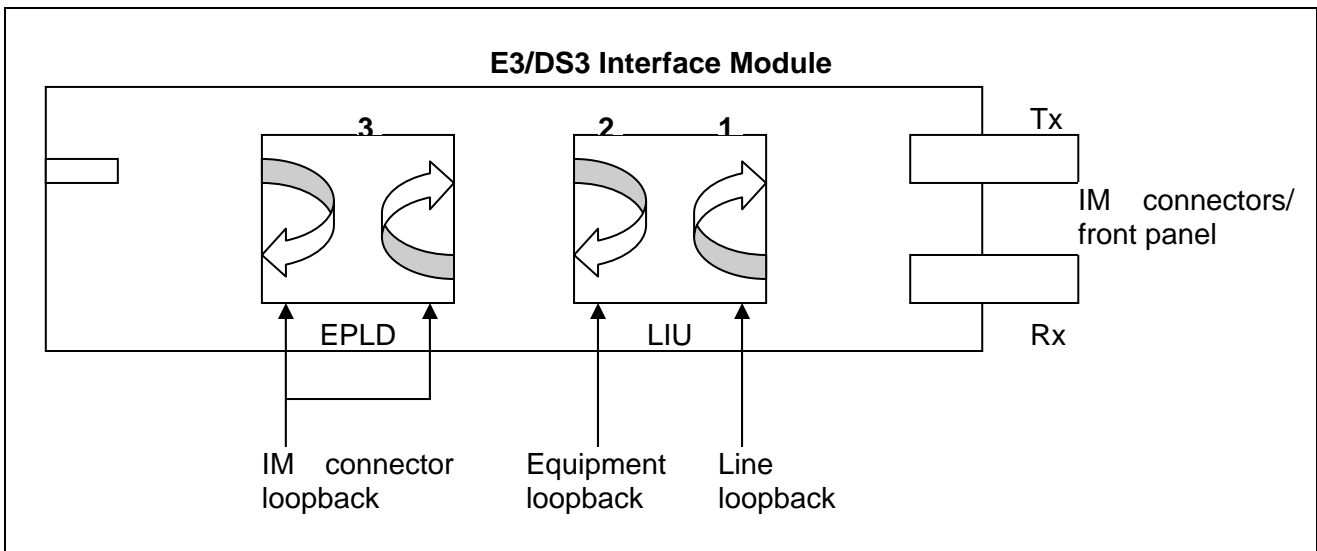


Figure 16: E3/DS3 IM loopback options

8.6. IM ALARMS

The E3/DS3 IM has a Loss of Sync alarm that can be configured and monitored via the IM alarm monitor setup window.

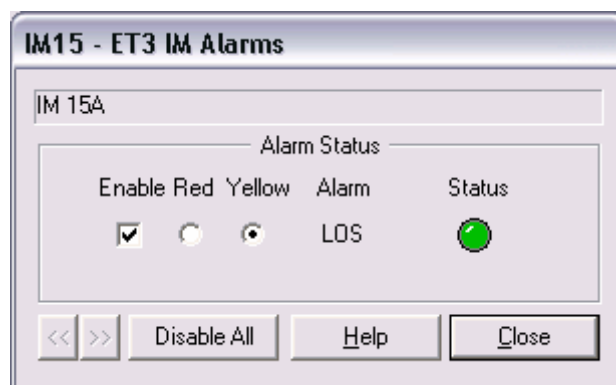


Figure 17: E3/DS3 IM alarm monitor setup window

8.7. IM INDICATORS

The DS3 IM front panel contains a LED. The LED displays the status of the electrical trunk. When the IM is synchronised over an electrical trunk with a peer DS-3 IM the LED is illuminated Green. Failure of synchronisation or Loss of Signal will cause the LED to show Red.

Any alarm condition is latched and displayed for 15 seconds.

Therefore the electrical may be up and operational but still displaying a flashing alarm.

8.8. INTERFACE SPECIFICATIONS

Bit Rate	DS3 – 44.736Mbit/s
Bit rate tolerance	+/- 20ppm
Line coding	HDB3, B3ZS
Electrical connector	1.6/5.6 75 Ohms connector
Transmission Medium	Coax Cable (RG179 or equivalent)
Alarm monitoring per channel	Loss of Signal, TX drive monitor, Line Code Violation
Indicator LED's	Red: Alarm, Green: Ok, Flashing Green: Timing off that IM
Pulse mask	G.703/ANSI T1.107
Transmit Jitter	<0.04 Unit Intervals peak to peak
Jitter tolerance	G.823
Jitter Attenuation	G.735
Transmit Return Loss	Greater than or equal to 20dB @ $F_b/2$ (F_b =Tx bit rate)
Receive Return Loss	Greater than or equal to 20dB @ $F_b/2$ (F_b =Tx bit rate)
Maximum cable attenuation	15dB
Power consumption	Max 3 Watts
Standards	ITU: G.703, G.775, G.823, I.431, ETS 00 166 ANSI T1.107
Interface protection	ITU: K.41

Table 5: Interface Specifications

9. HPX-IM-1671 ETHERNET-B

The Ethernet IM is a single channel 10/100Mbit/s device that allows an Ethernet LAN to be extended over a trunk or WAN. Access to the IM is made via a standard RJ-45 connection. The top port of the IM is configured to appear as a Network Interface Card. To connect the IM to a network switch, a through cable should be used. To connect the IM to a NIC, a crossover cable should be used. The bottom port is not used.

9.9. IM CONFIGURATION

The IM configuration dialog has configuration tabs as discussed below.

9.9.1. INTERFACE PARAMETERS

The **Port Enable** section is used to turn the IM ON or OFF. When the IM is disabled, all front panel LED indicators are turned off. By default, the IM is set enabled.

The “On” position enables port to become active and all IM operations perform as normal.

Initially the IM is set to “Off” where the port is not active but can be configured. Switching to the “Off” position network traffic is ignored, no traffic will pass through the IM and therefore no statistics are kept, alarm monitoring will also be disabled.

The **Scrambler** section allows the user to select whether the scrambler is enabled or not. If selected, a self-synchronous scrambler/descrambler is used at both ends of the channel to randomise the data and ensure there are always transitions. This reduces the likelihood that a stream of all 1s or all 0s will be transmitted.

Trunk Speed is determined from the cross connections of the IM to the DS3. Refer to DACS Section.

The **Link** by default is set to Auto Negotiate where the Ethernet IM auto senses to either 10Mbps or 100Mbps connected network devices. The **Status** displays the link type.

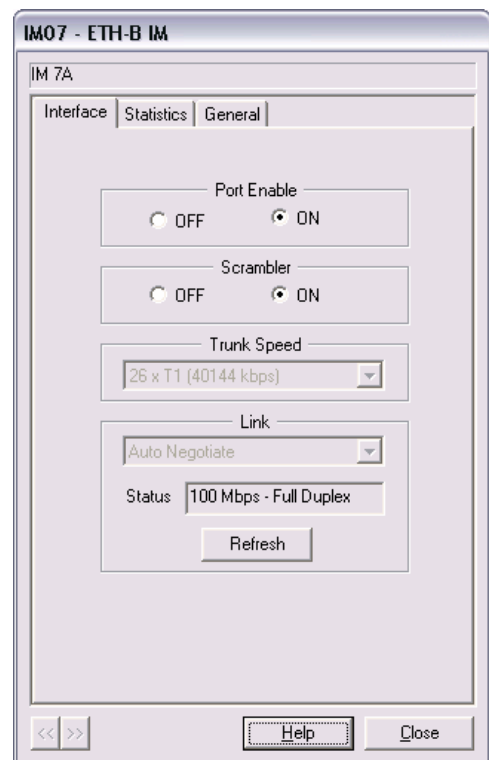
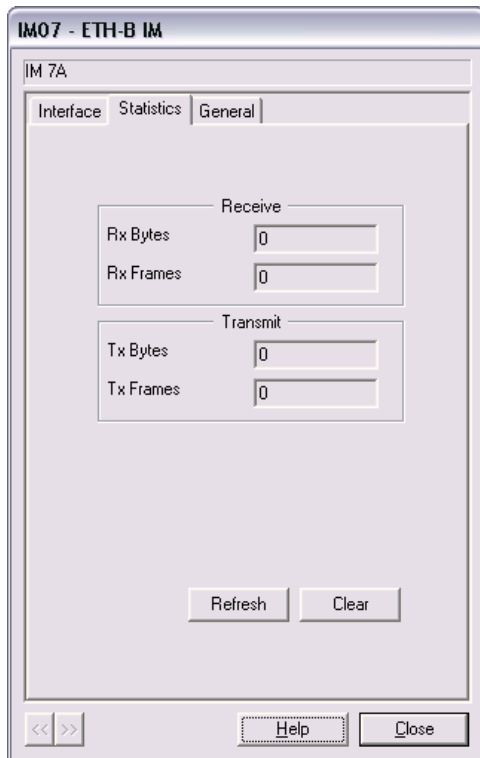


Figure 18: Ethernet IM Configuration Dialog Interface Tab

9.9.2. STATISTICS

The **Statistics** section is used to monitor the traffic that has passed through the IM (Ethernet bridge) and over the WAN. Only packets that pass over the WAN will affect the statistics counters. The Transmit and Receive flow is shown in byte and packet counts.



The payload held in each packet adds to a byte counter. The byte counter does not include the Ethernet Frame overhead.

The **Refresh** button is used to get the current statistics from the IM. This feature presents a “snap shot” of the network statistics at the time the button is pressed.

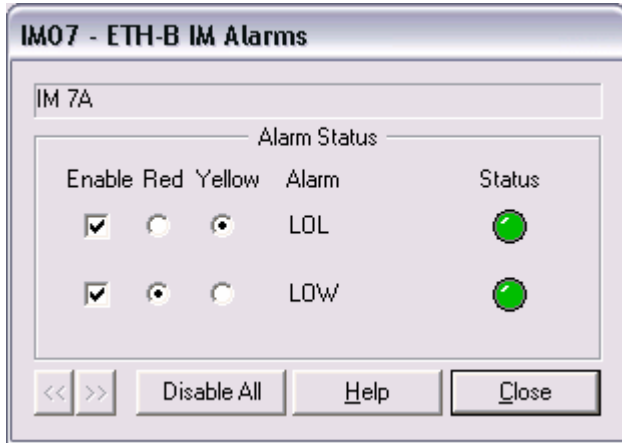
The **Clear** button is used to reset the traffic statistics, the counters are set to zero. Both Transmit and Receive directions will be cleared for byte and packet counters.

Both byte and packet counters are represented inside the Ethernet IM as a 32-bit number. This represents 2^{32} bytes, and is equal to 4,294,967,296 bytes that can be counted before it rolls over to zero again. Please note: a byte counter will roll over much faster than a packet counter by orders of magnitude.

Figure 19: Ethernet IM Configuration Dialog Statistics Tab

9.10. IM ALARMS

The Ethernet IM has alarms that can be configured and monitored via the IM alarm monitor setup window.



LOL: A **Loss of Link** alarm indicates the presence or loss of an Ethernet signal. An Ethernet IM will detect either a 10 or 100 Mbit/s connection to another port configured as a switch.

LOW: A **Loss of WAN Link** alarm is used to show when the IM is connected, via the WAN (or trunk), to another Ethernet IM. To support the WAN Link, each IM periodically sends a small data packet during periods of no LAN activity.

Figure 20: Ethernet IM Alarm Monitor Setup Window

If the cross-connect is looped back to itself the IM will detect its own valid WAN link and signal a “good” state. This can be a deceptive indication when the IM is supposed to be connected through to another IM and is not.

The Trunk Speed setting must be the same for both IMs to properly detect a valid WAN connection.

9.11. IM INDICATORS

Each Ethernet IM has three alarm indication LEDs on the front panel. The LED interpretations are summarised below.

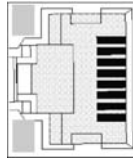
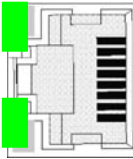
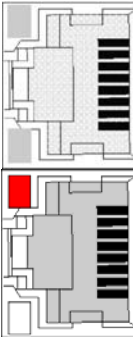
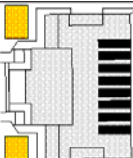
RJ45 LED Display		Interpretation
	All LEDs off	IM is off Or LAN not connected
	Top LED flashing- green Bottom LED - Green	Receiving or Transmitting packet LAN connected
	Third LED from top - Red	WAN link down
	Yellow Yellow	Firmware loaded waiting for Configuration files to be loaded <i>Yellow LEDs for a long period (30secs) indicates a Flash memory upgrade is in progress as during HPXUpgrade</i>

Table 6: Ethernet IM LED Interpretations

9.12. INTERFACE SPECIFICATIONS

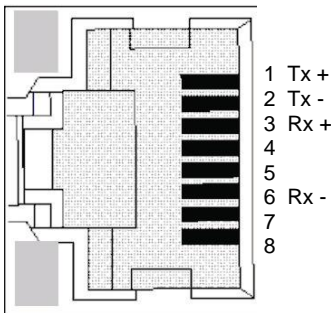


Figure 21: RJ45 pin outs

RJ45 pin #	Signal name	Signal name	RJ45 pin #
1	Tx +	Rx +	1
2	Tx -	Rx -	2
3	Rx +	Tx +	3
6	Rx -	Tx -	6

Table 7: Ethernet patch cable - IM to hub/switch

RJ45 pin #	Signal name	Signal name	RJ45 pin #
1	Tx +	Rx +	3
2	Tx -	Rx -	6
3	Rx +	Tx +	1
6	Rx -	Tx -	2

Table 8: Ethernet Cross over patch cable - IM to PC (NIC)

IM connector	RJ-45 connector configured as a NIC
Link Speed	10/100 Mbit/s (Half or Full duplex auto-negotiation)
Trunk Speed	n x T1 (1.544Mbps), where n = 1,...,28
Power Consumption	~3W
Alarm Monitoring	Loss of Link and Loss of WAN link
Indicator LEDs	LED indicators show the link status, WAN status, Tx/Rx, and firmware upgrade status
Standards	IEEE802.3
WAN protocol	Complies with ITU-T X.86(Ethernet over LAPS)
Max frame size	1522 bytes

Table 9: Interface Specifications

10. HPX-1620-IM DUAL T1

The Dual T1 IM operates at 1544kB/s and allows connection via two RJ48 ports to equipment that supports T1.

The Dual T1 IM is shown below in Figure 22.



Figure 22: Dual T1 IM

10.13. IM CONFIGURATION

The IM configuration dialog has configuration tabs as discussed below.

10.13.1. INTERFACE PARAMETERS

The interface tab allows the user to select the framing, line coding and line build out options.

The **Port Enable** section is used to turn the IM ON or OFF. When the IM is disabled, all front panel LED indicators are turned off. By default, the IM is set enabled.

The “On” position enables port to become active and all IM operations perform as normal.

Initially the IM is set to “Off” where the port is not active but can be configured. Switching to the “Off” position network traffic is ignored, no traffic will pass through the IM and therefore no statistics are kept, alarm monitoring will also be disabled.

The Dual T1 IM by default is unframed.

The **Line Build Out** section requires the user to estimate the length of the cable connecting the dual T1 IM to the tributary circuit. The range into which the estimated length falls should then be selected in the Line Build Out frame. This will ensure that the strength of the signal arriving at the IM is within the IM’s operating range.

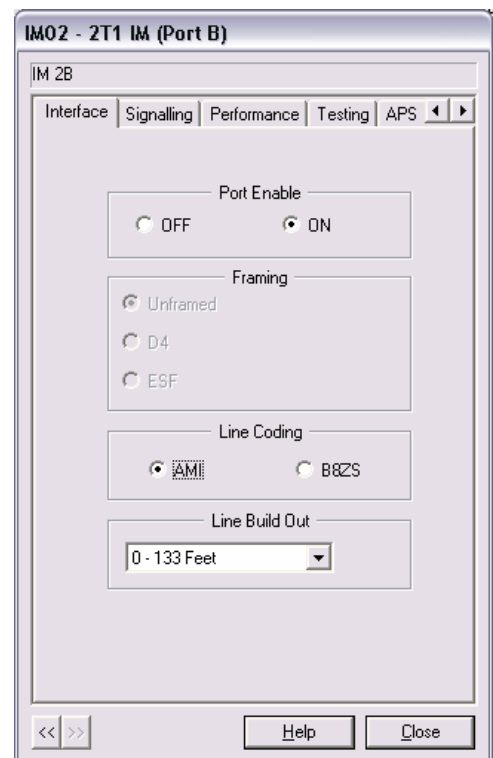


Figure 23: Dual T1 IM Configuration Dialog Interface Tab

10.13.2. PERFORMANCE PARAMETERS

There are currently no configurable performance parameters.



Figure 24: Dual T1 IM Configuration Dialog Interface Tab

10.13.3. TESTING PARAMETERS

The testing tab allows the user to select a loopback mode for testing.

The available loopback modes are

- IM Connector
- LIU Analoge Line

For further detail on the loopback options available, refer to section 3.

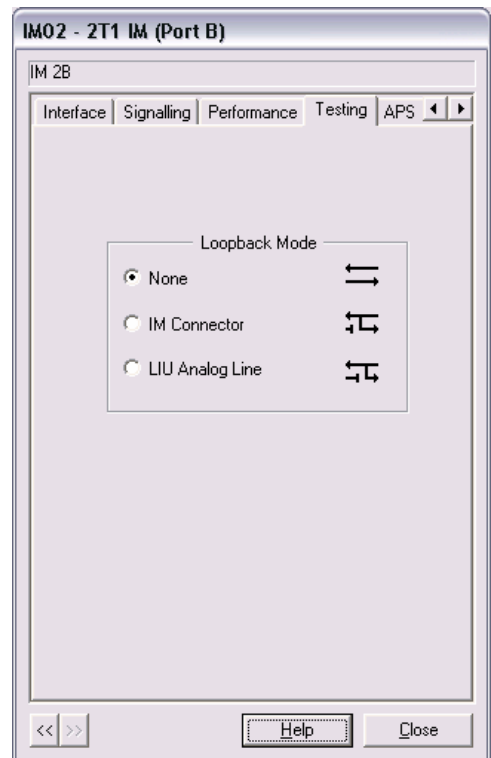


Figure 25: Dual T1 IM Configuration Dialog Testing Tab

10.14. IM TESTING

The Dual T1 IM has loopback set to none as the default setting for normal IM operation. However, for testing purposes, one of two loopback options can be set. The two available loopback options are illustrated below.

- LIU analog line loopback (1)
 - Data is sent through the IM connectors to the backplane and loops back to the IM connector, whilst the data sent from the backplane through the IM is dropped.
- IM connector loopback (2)
 - Data that is sent through the IM connector loops back out to the IM connector. Data that is sent from the backplane through the IM is looped back out to the backplane.

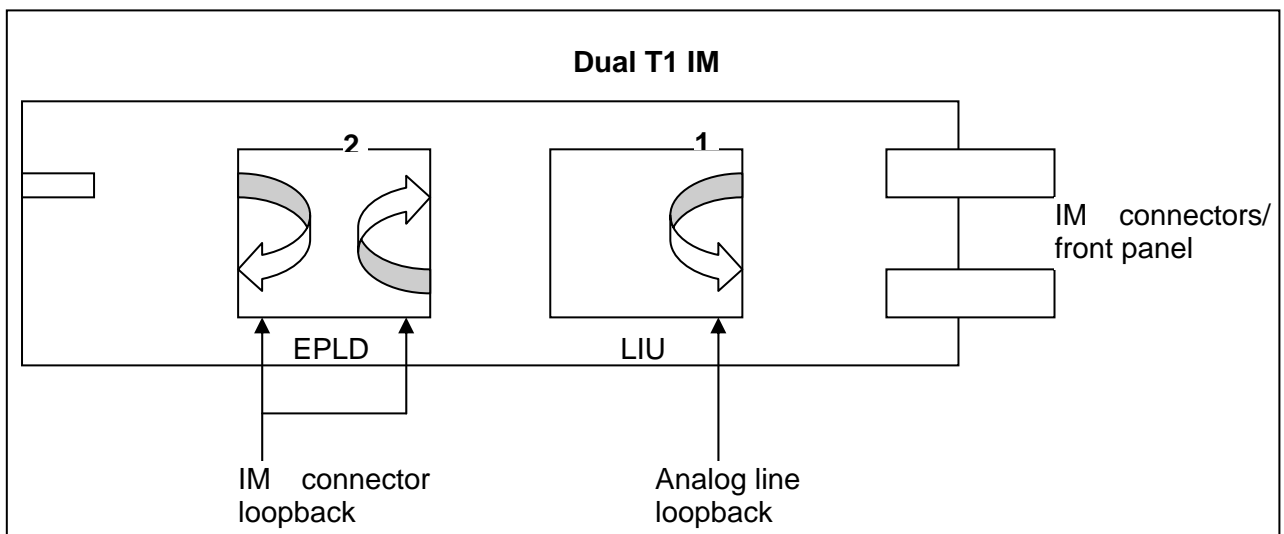


Figure 26: Dual T1 IM loopback options

10.15. IM ALARMS

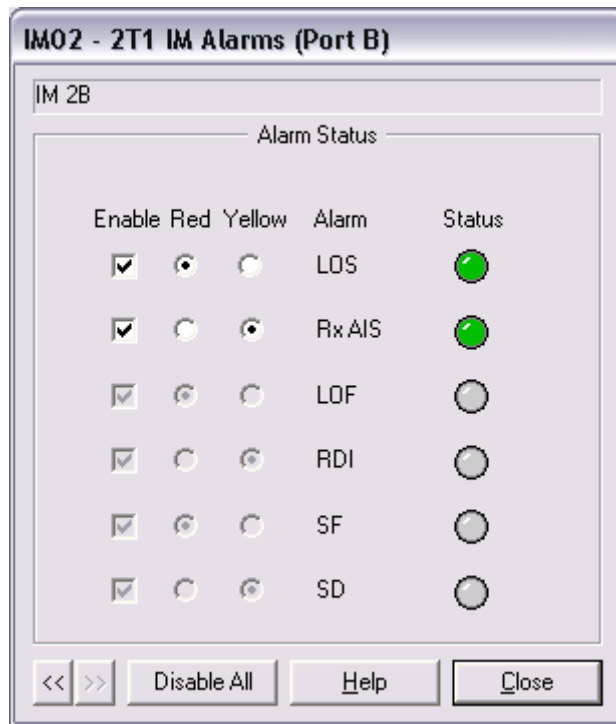


Figure 27: Dual T1 IM alarm monitor setup window

LOS

The LOS alarm is set if the node identifies a loss of signal. On occurrence of a LOS, all the other options are irrelevant.

RxAIS

An AIS alarm is triggered on the occurrence of a terminated network connection at the other end of the network.

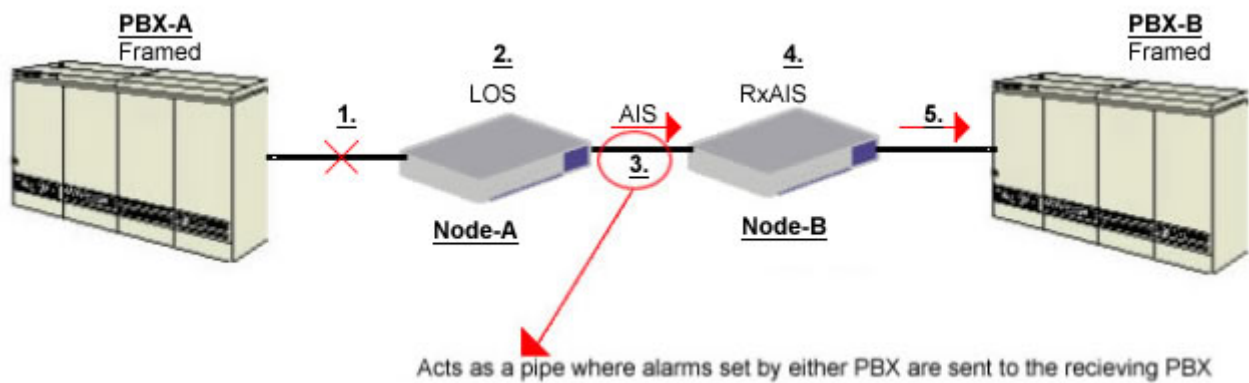


Figure 28: LOS and Rx AIS Alarms

10.16. IM INDICATORS

Each RJ45/48 connector has two LEDs. The state of both the LEDs indicates the status of the software load, clock configuration and the data communications for each port. The LED interpretations for the Dual T1 IM are shown below.

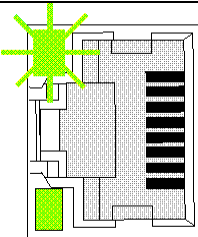
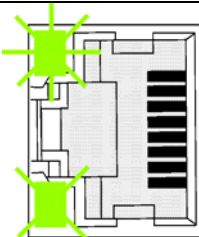
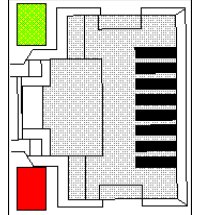
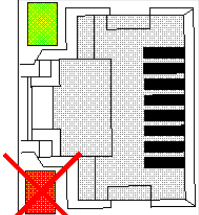
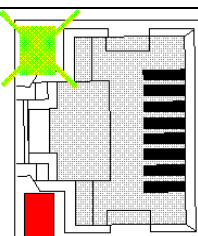
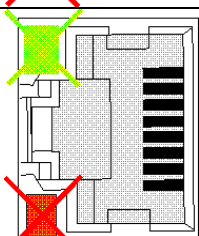
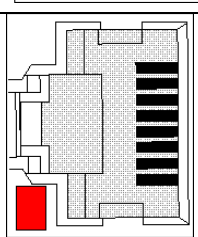
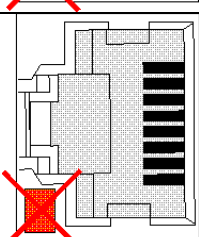
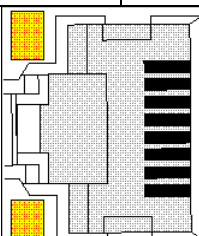
RJ45 LED Display				Interpretation
Not Clock source		Port is an External Clock source		
	Green flashing Green		Green flashing Green flashing	Normal Data Transmission
	Green Red		Green Red flashing	
	Green flashing Red		Green Flashing Red flashing	Error Loss of Frame or Loss of Signal
	None Red		None Red flashing	
		Yellow Yellow		

Table 10: Dual T1 IM LED Interpretations

10.17. IM CABLES

There are two types of cables to connect devices to the Dual T1 IM, one for Network Interface mode and the other for Network Terminal mode of operation. Each cable connects to the IM, 8 pin RJ45 connector.



Note: Unused pins are not connected at the IM. The metal shell of the RJ45 socket may optionally be used as shield.

HPX-1600 Cable 006 Network Interface Mode			
P1	Signal Name	P2	Signal Name
RJ45		RJ45	
1	Tx Tip	4	Rx Tip
2	Tx Ring	5	Rx Ring
3			
4	Rx Tip	1	Tx Tip
5	Rx Ring	2	Tx Ring
6			
7			
8			

Table 11: HPX-1600 Cable 006

HPX-1600 Cable 007 Network Terminal Mode			
P1	Signal Name	P2	Signal Name
RJ45		RJ45	
1	Tx Tip	1	Tx Tip
2	Tx Ring	2	Tx Ring
3		3	
4	Rx Tip	4	Rx Tip
5	Rx Ring	5	Rx Ring
6		6	
7		7	

Table 12: HPX-1600 Cable 007

10.18. INTERFACE SPECIFICATIONS

Connector	Dual RJ-48, 100 Ohm
Trunk Speed	1544kb/s
Signalling	RBS/CAS
Loopbacks	Line loopback and Interface Module loopback
Power Consumption	< 5 Watts
Alarms	LOS: Loss of signal RxAIS: Receive alarm indicator signal
LED Indicators	Normal Data Transmission Error AIS Error LOF or LOS Firmware loaded waiting for configuration files to be loaded

Table 13: Interface Specifications

11. CROSS CONNECT

The HPX-1600-EV provides grooming and cross connect capabilities across DS-3 trunks. The Configuration Summary box in the main HPXView screen has a "Cross Connect" button that displays the cross connect configuration window.

To map a tributary IM, Ethernet and T1, click on the desired tributary port icon and drag to the destination tributary unit of the DS3 trunk. The grey coloured bar with the boxes at the top of the screen represent the maximum tributary unit payload of 28 x T1 tributaries for a DS3 trunk.

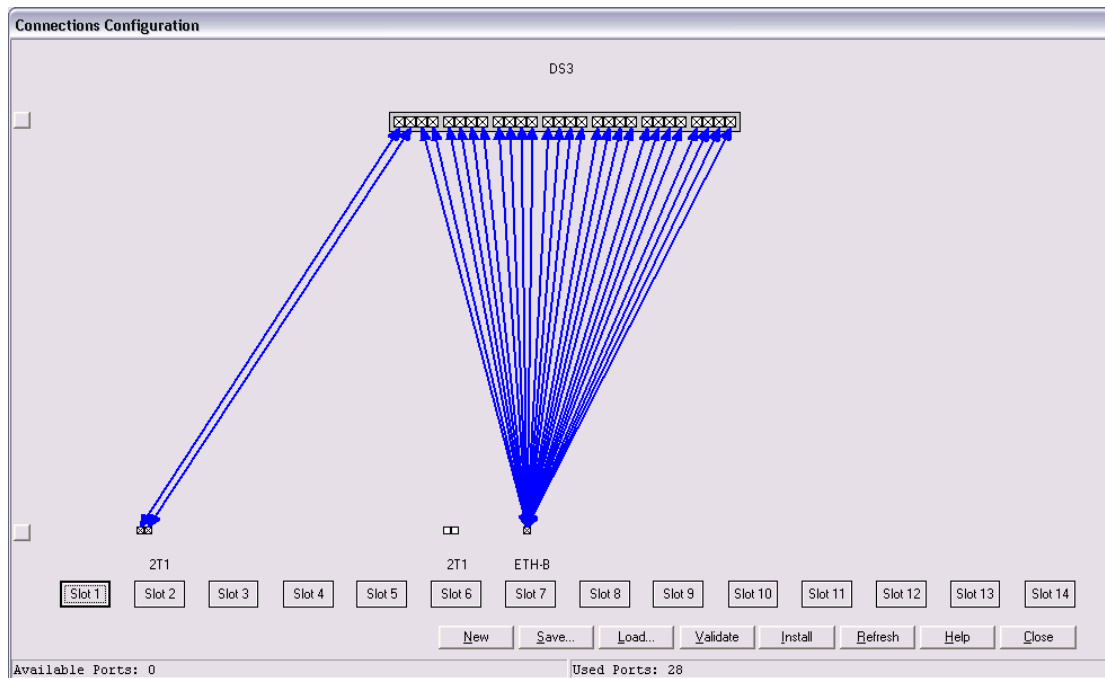


Figure 29: EV Tributary Connections

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

11.19. CONTROL: BUTTONS

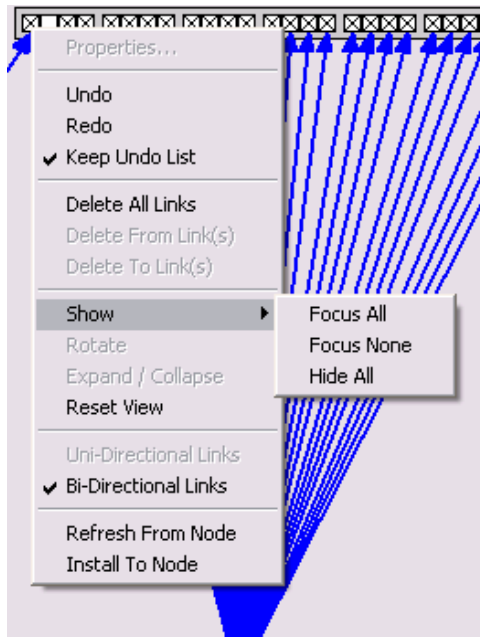
The EV Cross Connect window has these feature buttons;

- | | |
|-----------------|---|
| 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-EV. |
| REFRESH | Downloads the current HPX-1600-EV to the PC. |

11.20. CONTROL: MENU

A Right click in the grey area of the EV cross connect window, displays the drop down menu.

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 and TU can be faded or focussed from the drop down menu or by the four check boxes on the left margin of the window.

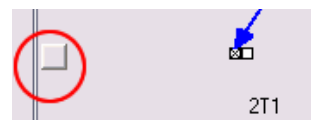


Figure 30: Check Box to Fade and Focus

Figure 31: Right Click Menu

12. CLOCK SYNCHRONISATION

The HPX-1600-EV always uses the DS-3 IM as the clock source.

12.21. DS3 LOOP TIMING

The DS3 IM has the following loop timing possibilities:

- Normal network application
 - DS3 IM's at both ends are recovered, where a station reference clock provides loop timing
- Bench testing
 - Node 1 DS3 is internally clocked, Node 2 DS3 IM recovers the clocking reference from Node 1

12.21.1. NORMAL APPLICATION – ASYNCHRONOUS RECOVERED CLOCK

DS-3 clocking is asynchronous, for each HPX-1600-EV the DS3 recovers the clocking.

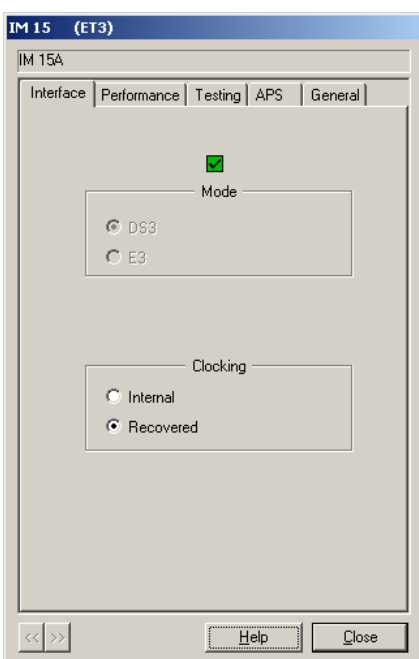
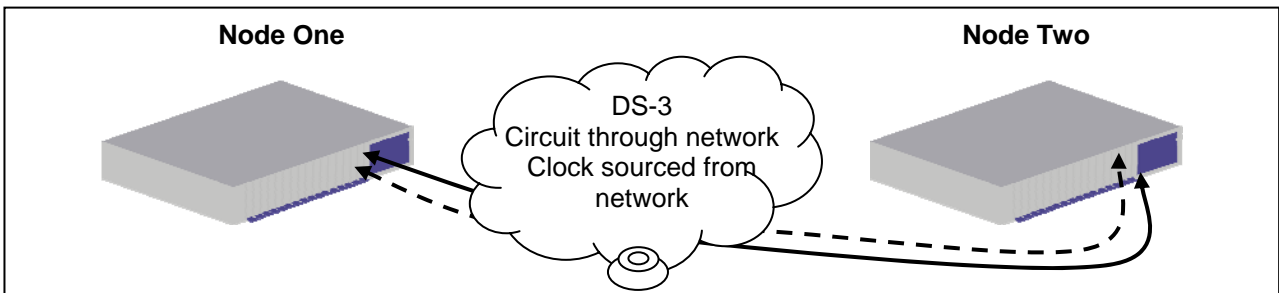
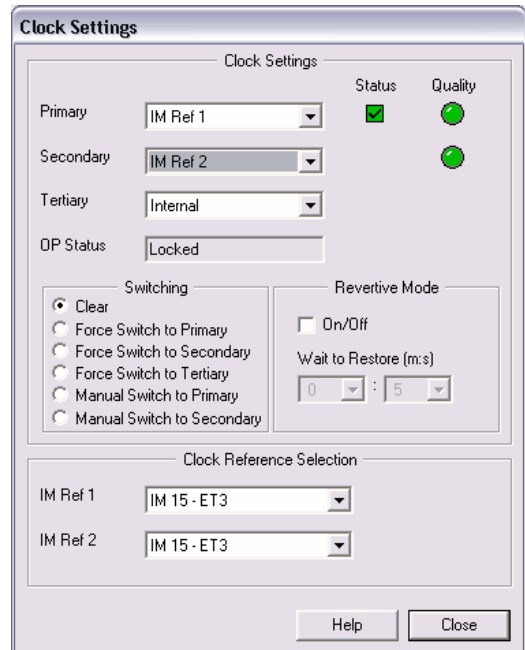
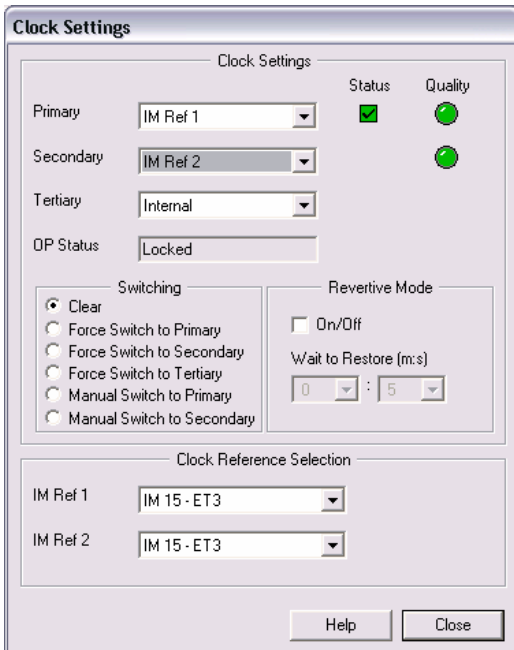
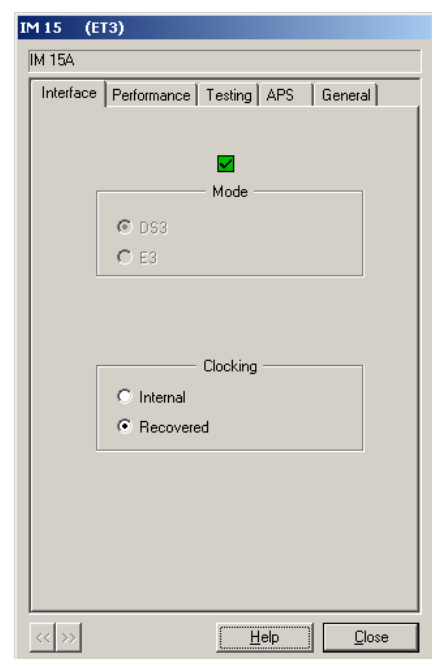


Figure 32 : Configuration for normal operation



12.21.2. DS-3 BACK-TO-BACK TESTING

The DS3 IM of Node 1 is set to internal clocking and Node 2 DS3 recovers the clocking.

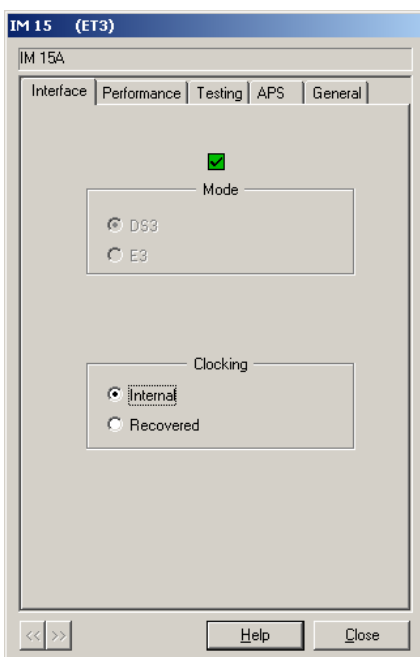
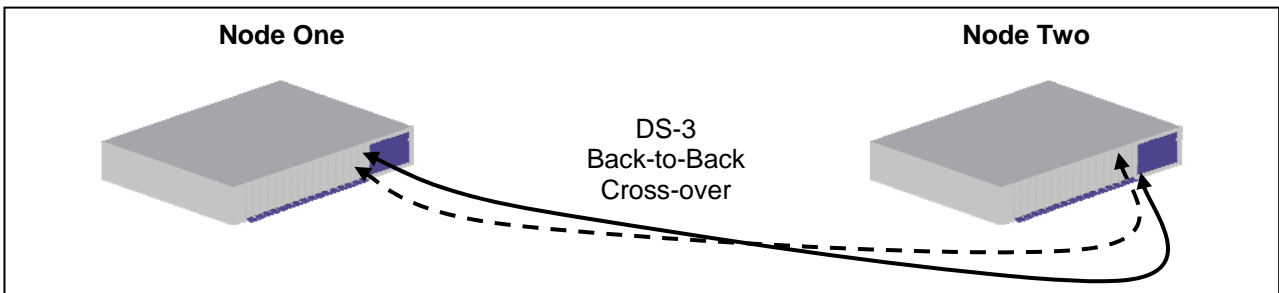
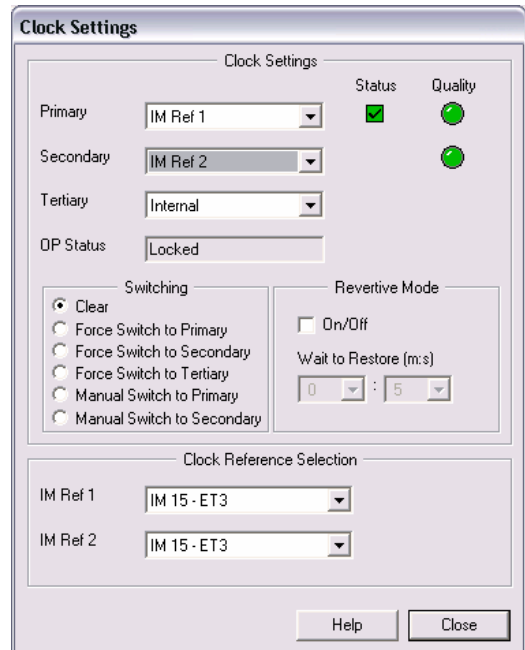
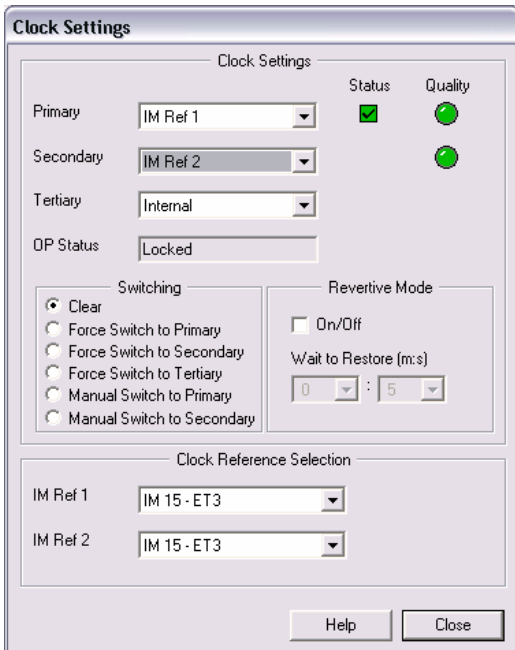
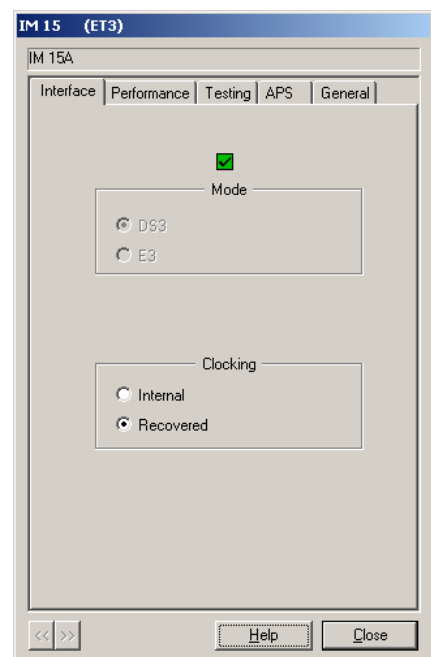


Figure 33 : Configuration for back-to-back testing



13. INTERNATIONAL COMPLIANCES

All HPX-1600 products have achieved the following international compliances;

- CE
- A Tick
- C Tick
- FCC part 15 class B
- UL



FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures

- *Reorient or relocate the receiving antenna*
- *Increase the separation between the equipment and the receiver*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected*
- *Consult the dealer or an experienced radio/TV technician for help*

Warning: *Any changes or modifications not expressly approved by Haliplex Pty Ltd could void the user's authority to operate this equipment.*

13.22. ELECTROMAGNETIC COMPATIBILITY (EMC)

The DS3 IM complies with

- CISPR 22 class B
- EN55022
- FCC part 15 class B
- AS/NZS3548
- EN300386-1

The Ethernet-B IM complies with

- CISPR 22 class B
- EN55022
- FCC part 15 class B
- AS/NZS3548
- EN300386-1

The Dual T1 IM complies with

- CISPR 22 class B
- EN55022
- FCC part 15 class B
- AS/NZS3548

13.23. SAFETY

The DS3 IM complies with

- IEC60950, UL60950, and AS-NZ60950:2000 for General safety

The Ethernet-B IM complies with

- IEC60950, UL60950, and AS/NZS60950:2000 for General safety

The Dual T1 IM complies with

- IEC60950, UL60950, and AS/NZS60950:2000 for General safety
- FCC68

13.24. IMMUNITY

The DS3 IM complies with

- EN61000-4-2
- EN61000-4-3
- EN61000-4-4
- EN61000-4-5
- EN61000-4-11

The Ethernet-B IM complies with

- EN61000-4-2
- EN61000-4-3
- EN61000-4-4
- EN61000-4-5
- EN61000-4-11

The Dual T1 IM complies with

- EN61000-4-2
- EN61000-4-3
- EN61000-4-4
- EN61000-4-5

13.25. PERFORMANCE

The DS3 complies with

- TS 016, G-703 TBR12, TBR13

The Dual T1 complies with

- G-703, FCC-68