



Haliplex
Communication Systems

HPX-1600 USER GUIDE

**Chapter 2-4:
HPX-IM-1670
Ethernet IM**

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RECORD OF CHANGES

Revision	Date	Author	Section	Description
4.06	15-10-07	Matt D.	1	Changed Figure 2. Removed HPX100 Minor editing change – previous paragraph.

1. GENERAL CHARACTERISTICS

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.



Figure 1 – HPX-1670 Ethernet IM

The Ethernet IM LAN interface auto senses to either 10Mbps or 100Mbps connected network devices. The IM should always be connected as a pair of devices connected over a wide area network trunk.

Mixed LAN interfaces can be used with one IM operating at 100Mbps and the other IM of the pair at 10Mbps. The Ethernet IM provides a bridged, LAN protocol independent solution that requires minimal configuration and self learns the locally connected LAN devices. The WAN interface of the Ethernet IM conforms to ITU standard X.86 – Ethernet over LAPS. LAPS although designed for transmission over SDH can be used in Haliplex multiplexers for transmission over any combination of SDH/SONET/PDH and fibre optic trunk circuits.

The HPX-IM-1670 single Ethernet module in a HPX-1600-IA can be synchronously mapped over a single E1 or T1 circuit.

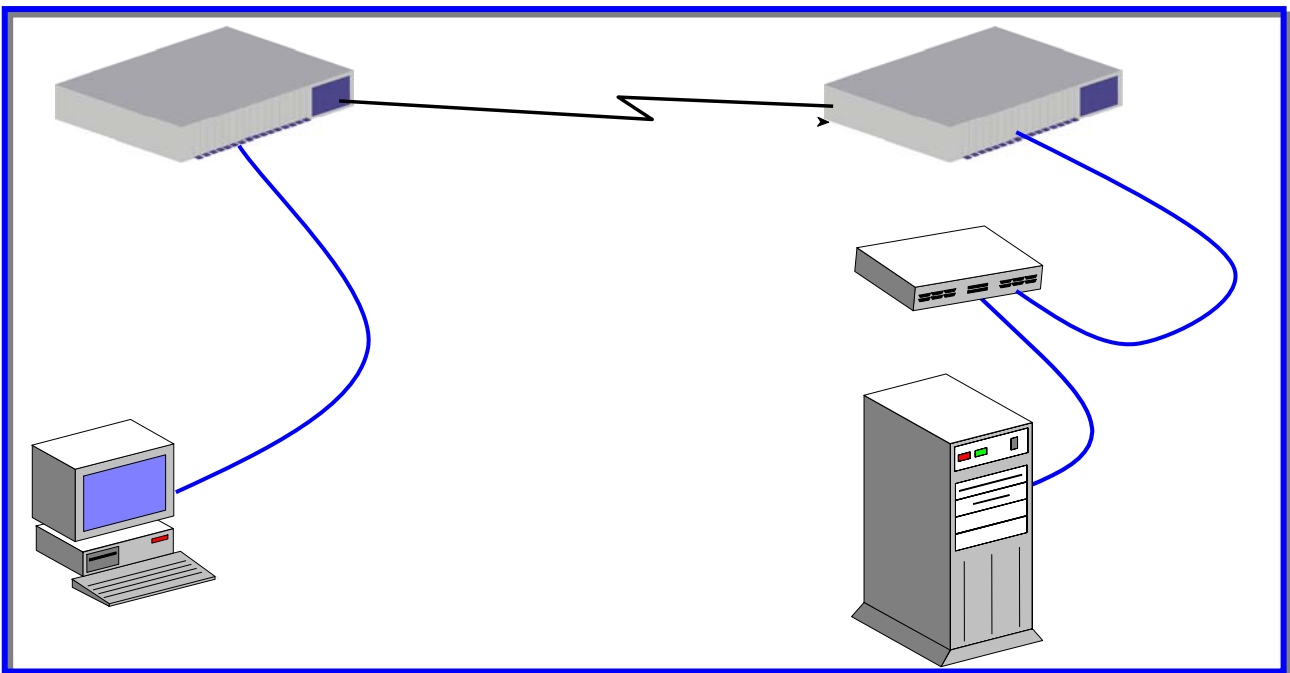


Figure 2 – Ethernet IM LAN Bridge Application

2. IM CONFIGURATION

The IM configuration dialog has configuration tabs as discussed below.

2.1. 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 **Operation** section selects between single and VLAN modes. 1:1 mode is used for normal Ethernet bridging operation. VLAN mode enables the Ethernet stream to be filtered according to the VLAN Port ID selected in the **VLAN** section. The IM is set for 1:1 mode by default. The **VLAN** section is currently not enabled.

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. Some lower data rates may not require scrambling.

The **Trunk Speed** section is used to set the trunk speed. The trunk speed can be changed in 64kbit/s blocks from 64kbit/s to 2048kbit/s. A data stream is mapped to the first timeslot (0) and extends contiguously using as many timeslots as are selected by the trunk speed setting. E.g. a trunk speed of 1024kbit/s would use the first 16 timeslots (0 to 15) as shown on the cross connect summary window in HPXView. By default, the trunk speed is set for 64Kbit/s.

Synchronous mode

The maximum speed of the WAN trunk is 1984Kbps (31 timeslots) when the small DACCS cross-connect is used. This is always the case in the HPX-1600-IA systems and optional in HPX-1600-SS systems.

Asynchronous mode

The full 2048Kbps (32 timeslots) cannot be used in the HPX-1600-IA, other HPX-1600 systems support asynchronous mode, but only if the small DACCS is not traversed.

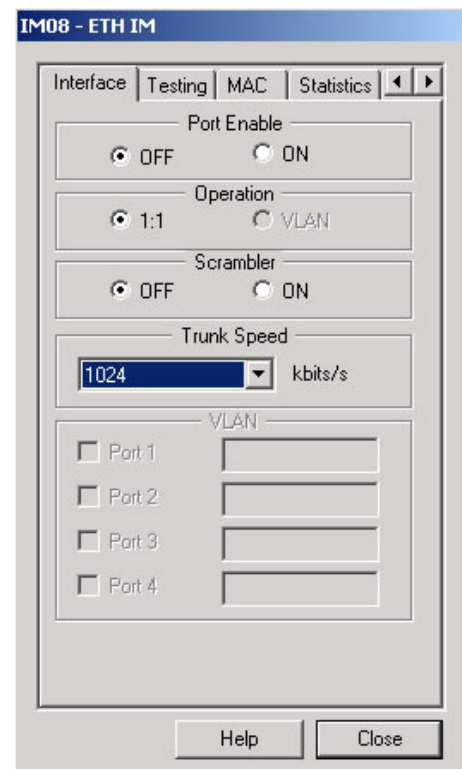


Figure 3 – Ethernet IM Configuration Dialog Interface Tab

2.2. TESTING PARAMETERS

The **Testing** feature should only be used for debug purposes.

The **Loopback Mode** section is used to enable a bi-directional loopback at the IM connector. Data received from the cross connect is returned to the cross connect, and Ethernet data received from the Ethernet port is processed and re-transmitted back to the local LAN.

If connected to a live network in “Loopback” mode, there will be duplication of broadcast packets. This is not a recommended configuration and may cause minor disruptions if left going for any extended period of time, however, most computer operating systems will be able to cope.

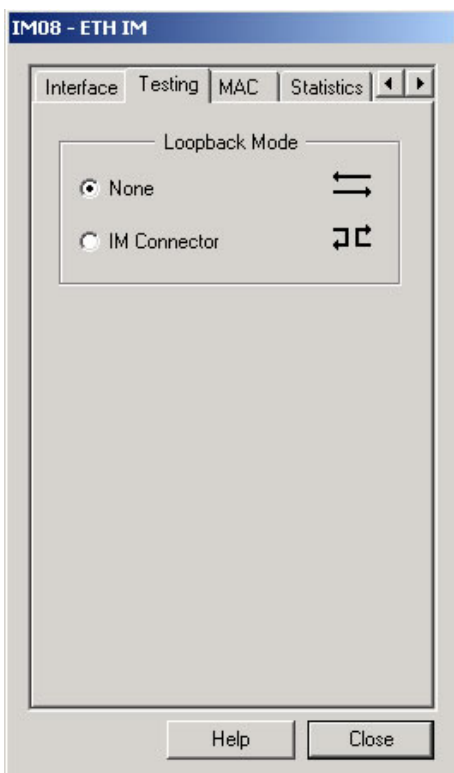


Figure 4 – Ethernet IM Configuration Dialog Testing Tab

2.3. MAC PARAMETERS

This MAC section is used to review MAC addresses that are stored in the Ethernet Filter section of an Interface Module. Up to 1024 addresses can be stored

The Ethernet IM stores each MAC address for 170 seconds after which the address is deleted. If the address is still active then the entry will be re-written into the store and the 170 second expiry timer started again.

In the event of more than 1024 MAC addresses filling the storage, then addresses that have been held for less than 170 seconds will be deleted, allowing room for any new ones

If many computers are to be moved from one side of the bridge to the other, you should wait until after the 170 seconds has elapsed to commence bridge operations.

If it still remains a problem then use the “Clear” button to clear all MAC table contents. Once cleared the MAC table will fill again with new “learned” addresses as it encounters them.

The **Refresh** button is used to display the current contents of the filter memory. The list shows all MAC addresses, and therefore all computers known to it.

The **Clear** button is used to reset the contents of the filter memory. Once cleared the MAC table will fill again with new addresses as it learns them. Pressing the CLEAR button will not disrupt normal communications, and does not interfere with the MAC/Filter operation. It is simply a mechanism to help the user clearly see MAC addresses that are used most often near this bridge.



Figure 5 – Ethernet IM Configuration Dialog MAC Tab

2.4. STATISTICS PARAMETERS

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. They show both the Transmit and Receive flow 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. It allows the statistics counters to be reset 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.

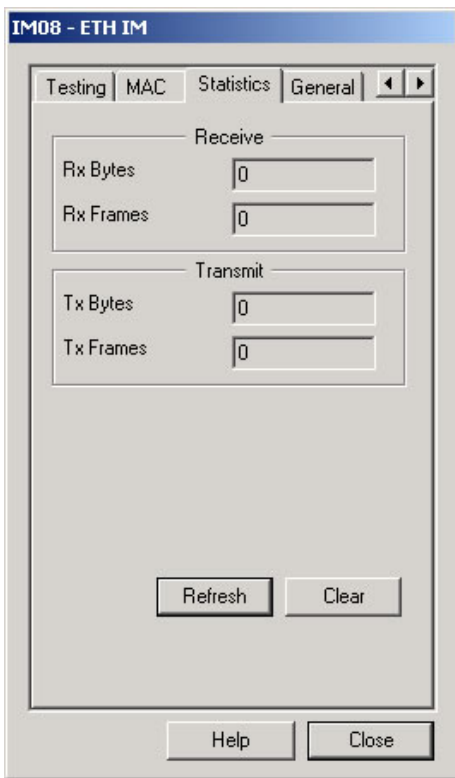


Figure 6 – Ethernet IM Configuration Dialog Statistics Tab

3. IM ALARMS

The Alarm section is used to set the two alarm conditions to the desired priority.

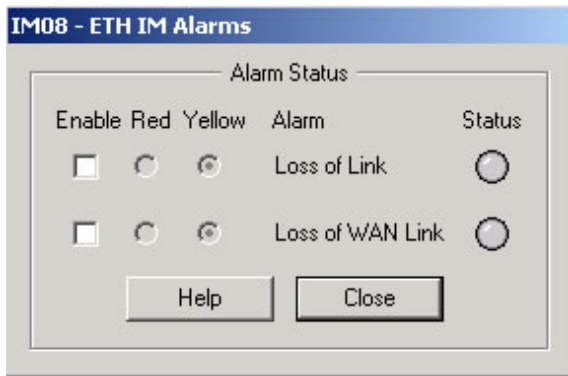


Figure 7 – Ethernet IM Alarm Monitor Setup Window

A **Loss of Link** alarm is used to show when the Ethernet signal is present. An Ethernet IM will detect either a 10 or 100 Mbit/s connection to another port configured as a switch.

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.

If the cross-connect is looped back to itself, or if the ST-bus Loop back mode is enabled, 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.

4. IM INDICATORS

Each Ethernet IM has three alarm indication LEDs on the front panel. The LED interpretations are summarised below in Table 1.

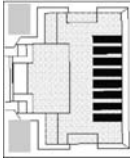
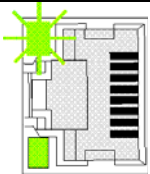
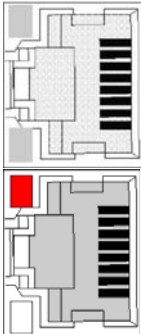
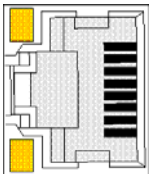
RJ45 LED Display		Interpretation
	All LEDs off	IM is off Or LAN not connected
	Top LED flashing– green Bottom LED - Green	Receiving or Transmitting packet LAN connected
	Third LED from top - Red	WAN link down
	Yellow Yellow	Firmware loaded waiting for Configuration files to be loaded <i>Yellow LEDs for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

Table 1 – Ethernet IM LED Interpretations

5. INTERFACE SPECIFICATIONS

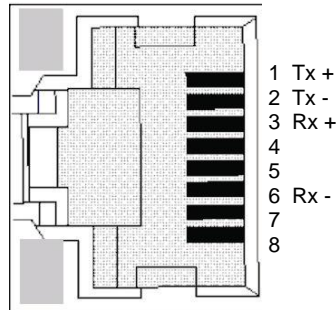


Figure 8: RJ45 pin outs

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 64, where n = 1, . . . 32
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
Bridging function	Has capacity to learn up to 1024 MAC addresses with automatic aging and purging
Standards	IEEE802.3
WAN protocol	Complies with ITU-T X.86(Ethernet over LAPS)
Max frame size	1522 bytes

Table 2: Interface Specifications

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 3: 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 4: Ethernet Cross over patch cable - IM to PC (NIC)

6. 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.*

6.1. ELECTROMAGNETIC COMPATIBILITY (EMC)

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

6.2. SAFETY

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

6.3. IMMUNITY

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