

Aculab Prosody X PCI card

Installation guide



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Revision record

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1 Introduction

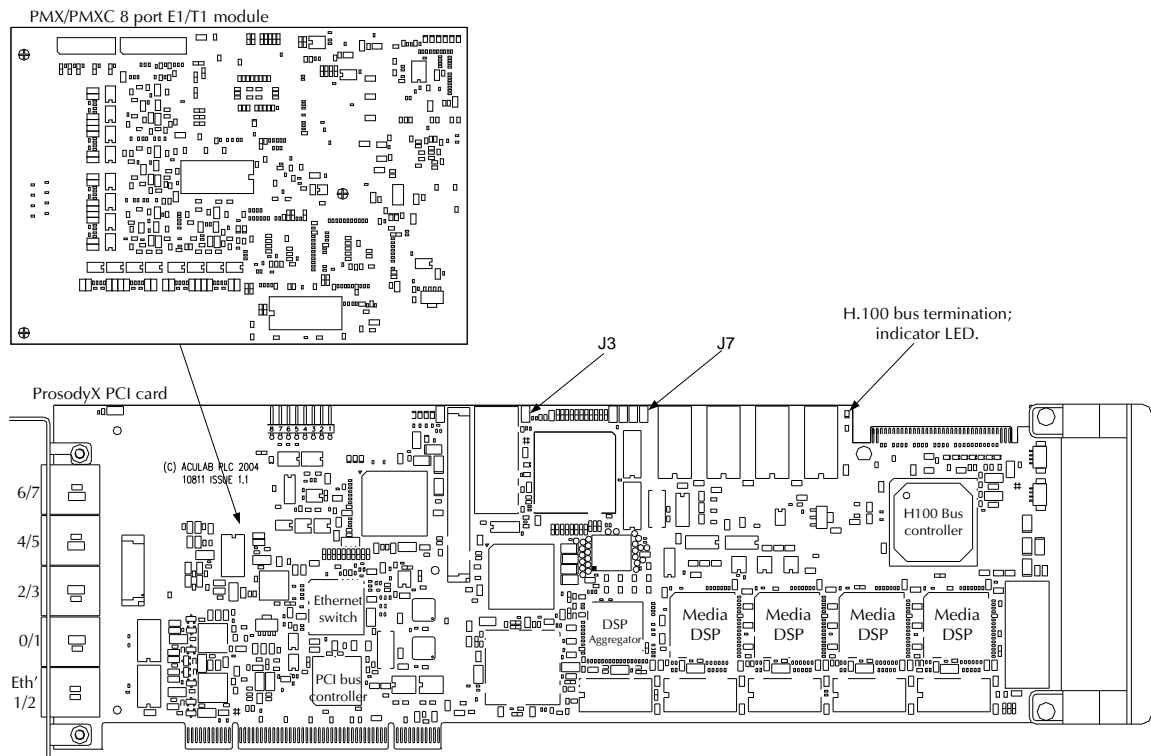
1.1 General

This document is the installation and user guide for the Aculab Prosody X PCI card.

The Prosody X PCI base card includes media processing resources (DSPs). It can be enhanced further by fitting an optional four or eight port E1/T1 primary rate module (PMX), or if additional CAS/SS7 signalling is required, a PMXC. The PMXC option contains signalling DSPs.

The Prosody X PCI card provides an interface between the telephone network, an Ethernet network, a standard PCI bus (including host storage devices), and a standard H.100 TDM bus. The Prosody X PCI card contains a digital switch matrix that allows arbitrarily switched interconnection between:

- 4096 speech paths on the PCI base card H.100 CTBus
- 1, 2 or 4 media DSPs, on the PCI base card, for Prosody speech & IP telephony processing
- Telephone network support via either four or eight E1/T1 ports, (PMX or PMXC)
- Tone, CAS & SS7 signalling DSP support, (PMXC)
- IP Telephony support via a dual Ethernet port, (PMX or PMXC)



The Aculab Prosody X PCI card shown with the optional PMX/PMXC Module

Note Unlike earlier Aculab cards, which used bespoke communication between the base card, PM, and PCI/cPCI (host system), communication between the base card resources, PMX/PMXC, and the host system, now uses standard IP Ethernet protocols managed through the Prosody X base card Ethernet switch. (see [section 2.3](#))

This product is referred to as the 'Prosody X PCI card' in this document unless the context requires a more specific term.

Prosody X PCI base card jumpers

With the exception of Jumpers 3 and 7, all jumpers are for factory use and should not be fitted. J3 and J7 control the flash image source on boot-up for the base card and PMX/PMXC module power PCs; boot-up is normal unless one or both of the jumpers are fitted:

- J3 fitted – Base card PPC will boot from backup flash image
- J7 fitted – PMX/PMXC PPC will boot from backup flash image

For further details of the flash programming functions, please contact Aculab support. The **serial number** of the Prosody X PCI card is used when configuring the Aculab libraries to uniquely identify a Prosody X PCI card in the system. The serial number of the card is located on the reverse of the card on the top edge and has the format P/N ACXXXX S/N XXXXXX WONXXX. Only the six digits following S/N are used during driver configuration, the other numbers are for Aculab use.

Installation

The card installation & connection sections refer to installation of the Prosody X PCI card into a host computer, subsequent connection to the network, and provide hardware control and configuration information.

Approvals

The approval information section, in conjunction with the country-specific appendices, gives the conditions of the Approval for connection to the telephone network, requirements for installation and safety, and other regulatory matters. This section and the appropriate country-specific appendix contain many statements regarding use of the Prosody X PCI card that are legal requirements for connection to the public network. Failure to use the Prosody X PCI cards in accordance with any of these instructions for use may invalidate the approval for connection.

The approval information in section 3 provides general approvals information. To fully appreciate the conditions of approval for connection to the telephone network, it is important that the appropriate country-specific appendices are read in conjunction with the other sections of this document.

Usability statement

Speech processing, call control and digital switch control functions are provided via one of several Aculab libraries that are described in separate publications specific to those topics. The card is not a complete product, and only has usable functionality when associated with a host system and an application program.

Note These instructions for use assume that the various elements are being assembled and integrated by someone competent in such matters and do not constitute an alternative for such competence.

1.2 Uses of the Prosody X PCI card

The Prosody X PCI card is a plug-in card suitable for use in many different types of PCI compatible computers. It provides a platform in which to carry out a range of functions.

Computer Telephony Bus

The H.100 (CTBus) expansion port enables connectivity with various kinds of PCI based speech and data products from different vendors using H.100 compatible devices.

Integration

The Prosody X PCI card is a highly integrated Computer Telephony component. By combining TDM and IP digital access, and the speech processing capabilities of Prosody, Aculab has produced a high throughput, single slot CT component.

Switching

The Prosody X PCI card contains a digital switch matrix that allows arbitrarily switched interconnection between up to 240 channels on the E1-network, up to 184 channels on the T1-network and up to 4096 speech paths (timeslots or channels) on the H.100 CTBus. The H.100 CTBus supports connection to other H.100 devices.

Control

The Prosody X PCI card is always controlled via a Media Access Controller (MAC) and its associated device driver. If the MAC is on the Prosody X PCI card then its device driver is supplied by Aculab. If it is on a regular Network Interface Card (NIC) then its device driver is simply the one already in use for that card. Aculab provides libraries and associated device drivers for a range of operating systems. Please contact Aculab Plc for information on availability.

Media Rich DSPs

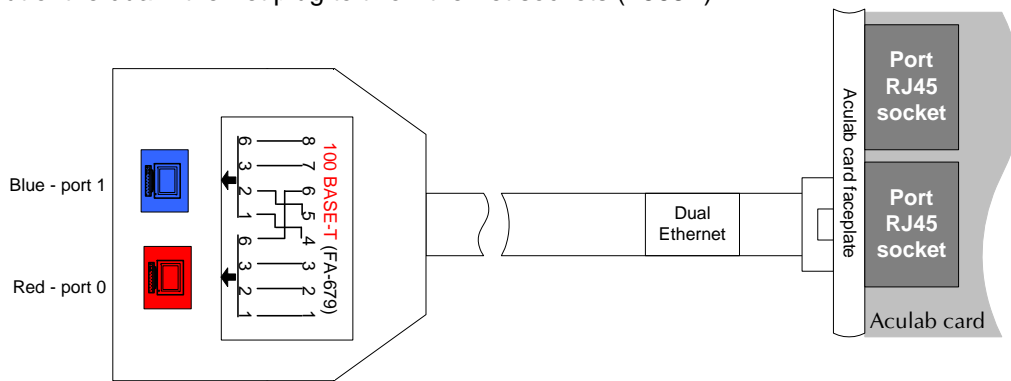
The card has up to 4 media DSPs fitted which allow media the processing of and conversion between IP and TDM based media streams.

1.3 Ethernet Network Attachment

The Prosody X PCI card may be connected to a standard 100Mbps Ethernet, allowing various functions including media processing for IP Telephony and control of the card from a remote host.

Ethernet adapter (10/100BaseT)

Pin out of the dual Ethernet plug to two Ethernet sockets (T568A):



Example Ethernet adapter cable, RJ45 plug to 2 x RJ45 sockets

RJ45 plug	circuit	RJ45 port 0	RJ45 port 1
1	TX A	1	
2	TX A	2	
3	RX A	3	
4	TX B		1
5	TX B		2
6	RX A	6	
7	RX B		3
8	RX B		6
Shield	-----	Shield	Shield

Note When connecting the Aculab card Ethernet port to a 10/100BaseT Ethernet network, the Ethernet adapter should be used.

CAUTION When connecting the Aculab card Ethernet port to a Gigabit Ethernet switch, which may try to use dual channels, the Ethernet adapter must always be used.

1.4 Telephone Network Attachment (PMX or PMXC)

The Prosody X PCI card with an eight-port interface module fitted, attaches to either E1 or T1 digital systems. Each individual port's driver is software configurable for either E1 (75 or 120 Ohms) or T1.

An E1 interface attaches to the 2Mbit digital system or Primary Rate (2.048 Mbit/s) Integrated Services Digital Network (ISDN). Network attachment is via a service provision often used to connect digital PBXs to the telephone network (NT1). Each E1 port may make or receive up to 30 separate calls at a time

A T1 interface attaches to the 1.544Mbit digital system via a Channel Service Unit (FCC, IC or UL Listed CSU). Each T1 port may make or receive up to 23 separate calls at a time

1.4.1 Signalling DSPs (PMXC only)

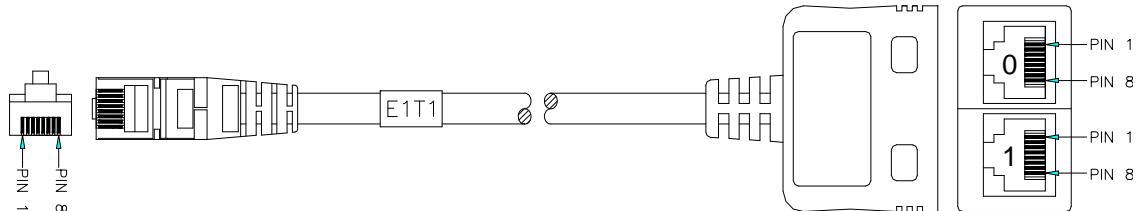
The optional PMXC module includes two DSPs, which are used to process tone, CAS, and SS7 signalling protocols. Refer to the '**Aculab Call, Switch & Speech Driver Installation Guide**' for further information on using and configuring these DSP resources.

1.4.2 Physical connector pinouts

The front plate of the PCI card has 5 RJ45 sockets. The first socket (bottom) is a dual Ethernet port. The remaining four sockets, numbering bottom to top, are dual E1/T1 telephony network ports. Each socket uses all eight pins to provide two circuits per socket. Adapters, (cable splitters) are used to split the two circuits out onto two separate sockets. The E1/T1 and Ethernet adapter pin outs are different, as detailed below:

E1/T1 adapter

Dual E1/T1 plug to double E1/T1 socket adapters:



CAUTION When making a network connection, to reduce the risk of fire, only telecommunications line cord of 26 AWG or larger may be used.

1.4.3 E1 75 ohm network connection

Note Different impedance can be supported on the same E1 variant module; The module can simultaneously support both E1 and T1 ports.

Some legacy E1 PSTN networks require 75 Ohm trunk connection. The default impedance for E1 protocols is 120 Ohm. It is important to confirm with the network operator which impedance the PSTN is using during the installation process, as a mismatch can lead to signal degradation and erratic equipment behaviour that is difficult to diagnose later. The following signalling services may be expected to be configured for 75 Ohm in legacy switching equipment which provides the following protocols:

DASS2
DPNSS
SS7/ISUP
All E1 CAS protocols

Each 75 Ohm trunk is normally connected via a pair of coaxial cables with BNC connectors. A Balun is available to convert between RJ45 and co-axial cabling. The Balun also converts between 120 and 75 Ohm interfaces, so the trunk does not need to be configured for 75 Ohm operation when this type of converter is used.



These are available from Aculab, and provide a pair of BNC connectors labelled as RX and TX for each E1 trunk.

It is important to use 75 Ohm BNC cable when connecting to legacy BNC equipment.

For installation convenience, the BALUN converter may be located at either end of the interconnection – so for example it may be convenient to use available RJ45 patch panels to connect the trunk, and locate the BNC converter adjacent to the legacy equipment.

1.5 Speech processing functions

The Prosody X PCI card is designed for processing digitised speech data, with support for recording/playback, echo cancellation, conferencing, DTMF, and call progress tones.

Further details are available in the Aculab TiNG API guides and Application Notes.

Speech is transferred in either direction between the host storage medium and any of the following:

- Any of the channels on the H.100 CTBus
- Any of the channels on the E1/T1 network connections
- Any RTP endpoints on the Ethernet connection in use

The aggregator DSP and the four media processing DSPs on the Prosody X PCI card can provide various processing functions on the data including:

1.5.1 Playback and recording of speech data

- Compression and decompression between the H.100 64kb/s speech data and the host computer hard drive. Configurable compression rates of 48, 32, 24 kb/s can be encoded/decoded
- Pitch invariant fast and slow replay (50 to 200%) at all data rates
- Trimmed recording to eliminate periods of silence at all data rates
- Echo cancellation

1.5.2 Tone generation and detection

- DTMF detection
- Call progress tone recognition
- Universal tone generation and recognition (user programmable)
- Fax support

1.5.3 Matrix conferencing with echo suppression and noise gating

- Matrix conferencing
- Many to one conferencing and one to many broadcasting
- Speaker tracking
- Gain control and noise/tone suppression of conference inputs
- Echo Cancellation

1.6 Call control

The call control interface is at a low level (in signalling terms), and provides maximum information and control over the various stages of call progress, (set-up, acceptance, clearing, etc). This interface is accessed via a device driver that has been prepared for the operating system in use.

The processor checks each outgoing message provided by the application program for syntax, validity of content and context. If errors are found, the call can be automatically cleared. In these instances the software can form an effective barrier between the application program and the telephone network, protecting the network from invalid call signalling.

Several elements of call signalling related information are available to the application program, although in some cases this depends upon provision by the Public Switched Telephone or Ethernet networks of information along with each call. One such information element is the number used by the caller on calling into the card, (the DDI number); this is only available when the service obtained from the PSTN is of the appropriate type. Another information element, which may be available, is Calling Line Identity (CLI). On incoming calls, CLI makes the telephone number of the calling party available to the application program.

Full details on the control of calls using the Prosody X PCI card are available in a separate publication '**Aculab Call Control API Guide**', which can be downloaded from the support area of the Aculab company web site at www.aculab.com

1.7 Speech and data paths

Speech or data associated with telephone calls are not terminated on the card but are always switched without modification to other cards or on-board modules (DSPs) for processing, for example, speech processing can be performed on the card by the media processing DSPs.

The card maintains bit integrity within timeslots between ports on the card.

There are various categories of Multi-channel path provided by the card, as follows:-

1. E1 (G.703) ports –2Mbit systems or ISDN
T1 (G.703) ports - 1.554Mbit T1 systems or T1 PRI
2. RTP Voice over IP Ethernet ports
3. The host storage via the PCI bus – bi-directional for record and playback, channel count is dependent on compression and host capabilities
4. The H.100 CTBus

Any one 'source' of speech or data may be distributed to a number of separate 'sinks', but it is not possible via switching on the card alone for more than one source to feed a single sink. This conferencing function is only possible on board with the use of the extra processing power of the on-board Prosody X DSP resources.

Full details on the switching of calls using the Prosody X PCI card are available in a separate publication '**Aculab Switch Control API Guide**' which can be downloaded from the support area of the Aculab company web site at www.aculab.com.

1.8 H.100 termination

The Prosody X PCI card can occupy any position in a 'chain' of H.100 CTBus devices interconnected with a suitable ribbon cable.

The H.100 CTBus ribbon cable may consist of no more than 20 connectors, with a typical distance between each connector of one inch, and a maximum bus cable length of 20 inches (including connector terminations).

In addition, in order to assure that the interleaved grounds on the ribbon cable act as effective grounds, The distance between populated CTBus cards should be as short as possible and **MUST BE** less than 7 inches. It is also recommended that the ribbon cable be no longer than required to interconnect the chain of H.100 CTBus devices.

If the Prosody X PCI card is the first or last device at either end of a 'chain', then the card must be placed in terminated bus mode.

Cards are terminated by setting the -ht (H.100 bus mode) switch in the device driver. See the '**Aculab Call, Switch & Speech Driver Installation Guide**'. A single LED indicates the card termination status; the LED is on when the card is terminated.

1.9 H.100 CTBus loading

Prosody X PCI cards have a loading factor of one on the H.100 CTBus. The maximum loading allowed on the H.100 CTBus is 20. The total loading is calculated by adding the loading factor of all the devices on a single H.100 CTBus. The loading limit of H.100 means that theoretically, 20 Prosody X PCI cards can be used in the same host. Some chassis and software driver limitations however restrict the theoretical loading to a maximum of 16 Prosody X PCI cards in the same host. Individual system constraints may reduce this further.

1.10 Host system recommendations

Forced air cooling

A fully loaded Prosody X PCI card has a high density of components, with a combined power rating close to the maximum stated in revision 2 of the PCI standard.

CAUTION In most instances, forced-air-cooling is an essential requirement of a host system. Operation of the Prosody X PCI card without adequate cooling will reduce the reliability of operation and seriously affect the lifetime of the product.

The Prosody X PCI card incorporates on board temperature monitors that enable the cooling system to be regulated to maintain acceptable operating temperatures. The operating limits for these temperatures are given in the Environmental section. (Section 3.5).

2 Card Installation

2.1 Installing the Card

The installation procedure for expansion cards will vary from one type of host computer to another, and the exact details of the installation procedures for expansion cards must be sought in the user guide supplied by the host computer manufacturer. However, in general:

- Do not attempt to install or remove the Prosody X PCI card unless the mains power supply is completely removed from the host computer and all network ports are disconnected from the network.
- To ensure safety, any covers removed from the host computer in order to install the Prosody X PCI card must be replaced before the mains power supply is reconnected.
- Do not connect the Prosody X PCI card to the 2.048/1.554 Mbit/s digital service or Primary Rate ISDN network termination port until this document, and in particular the sections marked 'Installation and Safety', have been read in full and understood.
- Proper ESD (electrostatic discharge) procedures should be maintained throughout.

2.2 Installing/upgrading PMX modules

Adding or changing a PMX would normally be accomplished by returning the card to Aculab for upgrade. The process is however relatively straightforward and can be carried out by competent personnel using the following instructions.

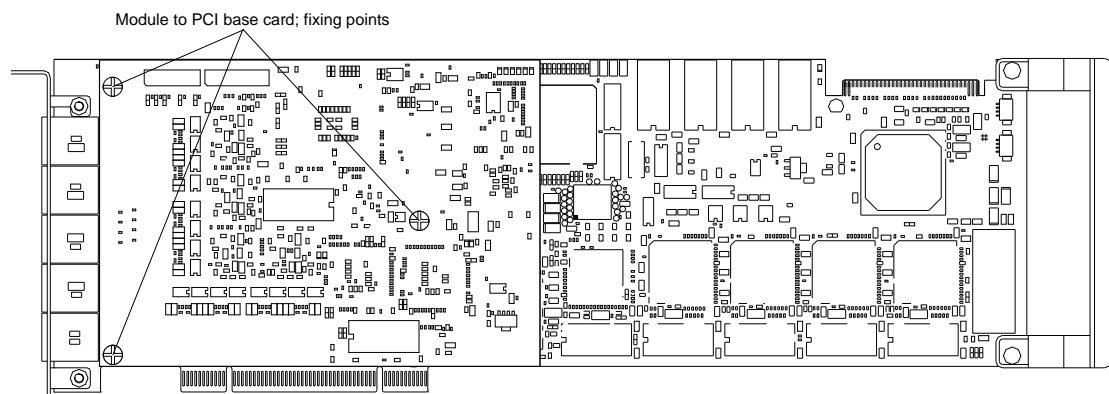
Note Any work carried out on this assembly, which results in any damage whatsoever will invalidate any claims under the Aculab Plc warranty.

2.2.1 Removing an existing card:

1. Remove the power from the host computer and disconnect the mains leads.
2. Remove the covers from the host computer.
3. Ensuring that the appropriate ESD (Electrostatic Discharge) measures are taken, remove any bus cables from the card then remove the Prosody X PCI card from the PCI slot.

2.2.2 Removing an existing PMX module:

1. Remove the three module retaining screws from the top of the PMX
2. Gently separate the PMX module from the baseboard, taking care not to force the separation as this could damage the PMX or the PCI base card connectors.



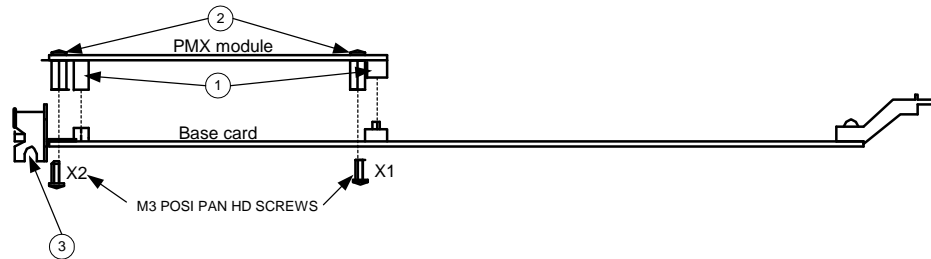
2.2.3 Installing a new PMX module

Only expansion modules designed for this PCI card are suitable for use. Any attempt to use different modules may cause damage, will invalidate warranty and may invalidate approvals.

To install a module:

A new PMX will be provided with a fixing kit containing spacer posts and M3 fixing screws.

1. Fit the spacer posts to the PMX module using three of the M3 fixing screws. ②
2. Fit the module, ensuring correct orientation and mating of the connectors. ①
3. Secure the module to the base card using the remaining three M3 screws. ③



Details of the PMX variants, and their associated product codes, can be found in the [Technical specifications](#) section of this document.

2.2.4 Installing a card into a host:

1. Remove the power and disconnect any mains leads
2. Remove the host computer covers.
3. Locate a vacant full-length PCI slot and, if required, remove the blanking plate.
4. Fit the card to the PCI slot and screw the bracket to the chassis. ③
5. Ensure that adjacent devices/cards do not foul the Prosody X card or PMX/PMXC module.
6. Fit H.100 CTBus ribbon cables between the E1/T1 PCI card connectors and any other cards that are required.
7. Replace the covers on the host computer.
8. Attach the mains leads and apply power.

Having completed installation of a new card, if you have not already done so, you will now need to download and install the required drivers. Please refer to the **Aculab Installation Tool (AIT)** documentation for downloading the Aculab firmware, and the **Aculab call, switch and speech driver installation guide (ACT)** for driver and protocol firmware installation.

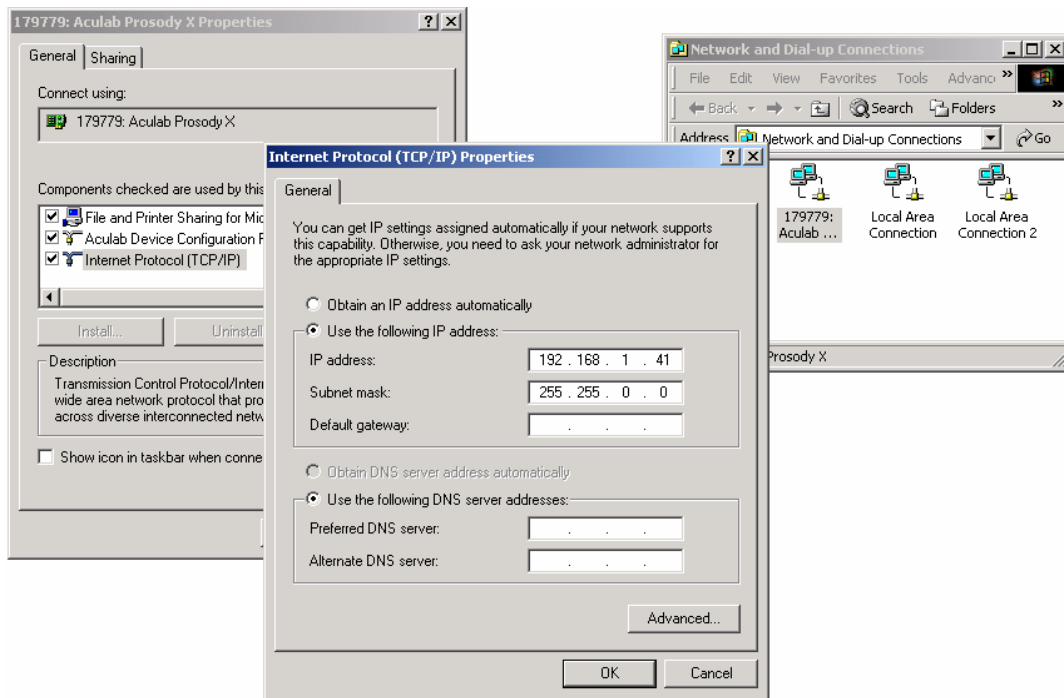
Note Revision 6.4.0 or later firmware is required for the Prosody X PCI and PMX/C devices.

2.3 Configuring the Prosody X card IP addresses

The Prosody X card will be detected by the host system as a network device (NIC). The card is a networked computer (DSPs, Power PCs, etc), an external Ethernet connector, and a host NIC, all connected together by an Ethernet switch. Both the NIC and the network computer require IP addresses to be configured within the same IP subnet-numbering scheme.

2.3.1 Prosody X host NIC IP address

For the Prosody X card to host system Ethernet connection, Windows defaults to DHCP (obtain an IP address automatically). Should you require a static IP address, use the standard Windows connection properties dialogs.



2.3.2 Prosody X networked computer IP address

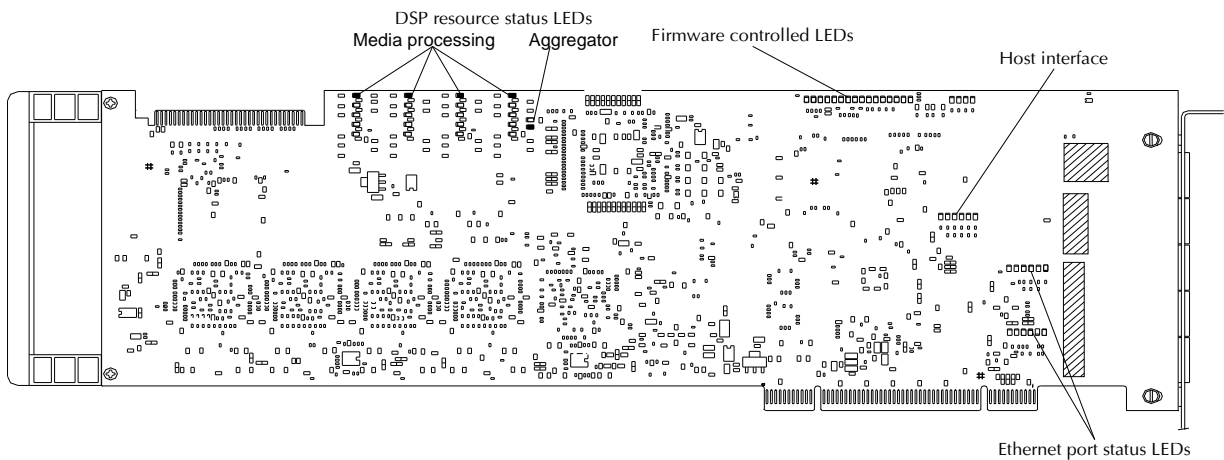
The ACT is used to configure this IP address. The ACT is downloaded from the Aculab web site using the **Aculab Installer Tool (AIT)**.

For further details on using the ACT, please see the **Aculab call, switch and speech driver installation guide (1761.pdf)**. This document also includes details for command line configuration of the PMX/PMXC IP addresses and firmware download to the Aculab cards.

Note Revision 6.4.0 or later firmware is required for the Prosody X PCI and PMX/C devices.

2.4 Prosody X PCI card LED usage

There are a number of surface mount LEDs mounted on the Prosody X PCI card. The LEDs are arranged as shown on the following diagram.



The specific meaning or use of each LED is often subject to the firmware and configuration of the card and are normally for Aculab diagnostic purposes only. In general however, flashing LEDs are an indication of activity on a device, for example:

2.4.1 Media processing DSP farm LEDs

The aggregator DSP LED:

- Red LED Off** when no firmware is running.
- Red LED Blinks every 10-seconds*** when firmware is running but not configured.
- Red LED Blinks every second*** when firmware is running and is configured.
- Green LED** – subject to the firmware running in the DSP, is used to indicate DSP firmware activity, in most instances however it is not used.

* Timings are approximate

The media DSP LEDs:

The behaviour varies depending on the media-processing task being carried out:

- Red LED** – flashes when firmware is running
- Green LEDs** – subject to the firmware running in the DSP, these are used to indicate DSP firmware activity, however in most instances these are not used.

2.4.2 Ethernet port LEDs

The base card front Ethernet port is presented via a dual redundant connection. A set of LEDs is used to indicate the Ethernet status for each connection. Once a connection has been made to a network, that port connections LEDs will show activity, frame clocking etc. Only one of the connections should show activity due to transmit and or receive call traffic.

2.4.3 Host Ethernet port LEDs

The host Ethernet interface LEDs indicate the following, (numbered from right to left):

- 1 = Full/Half Duplex (On = Full)
- 2 = Collision Detect (On = Collision)
- 3 = Link Status (On = good link)
- 4 = Tx
- 5 = Rx
- 6 = Speed (On = 100Mbps, Off = 10Mbps)

2.4.4 Firmware controlled LEDs

All numbering in this section is from right to left.

Base card firmware LED status

The first eight LEDs (1-8) indicate the status of the base card.

If LED 1 is illuminated then LEDs 9-16 are under the control of the PMX.

If LED 2 is illuminated then the card has detected a hardware fault such as an incorrect power supply voltage or excessive temperature.

In normal operation, LEDs 3-8 flash in sequence (scroll or Knight Rider effect).

The second 8 LEDs (9-16) indicate either the initialisation status, or the status of the PMX firmware.

Initialisation / PMX firmware LED status

During initialisation of the card, the 9th to 13th LEDs will light as follows:

LED 9 on – card has started

LED 10 on – PMX is talking to the base card

LED 11 on – card is receiving configuration information from the network

LED 12 on – card has a network configuration

LED 13 on – card has received configuration information from the network

Once initialised, LEDs 9-16 will indicate the status of PMX ports 0 – 7 respectively.

PMX/PMXC firmware LEDs

LEDs 9 to 16 (numbering right to left in the above diagram) indicate the status of ports 0 – 7 respectfully.

If no PMX/PMXC is fitted, LED1 and the PMX LEDs 9 to 16 will be off.

If a PMX/PMXC is fitted, once the PMX is available through the API, LED 1 will be on and the PMX firmware LEDs 9 to 16 will be under the control of the PMX.

With the exception of SS7 protocols, where the default behaviour is layer 1 state monitor, during normal operation the firmware LEDs will be seen to flash to indicate call activity.

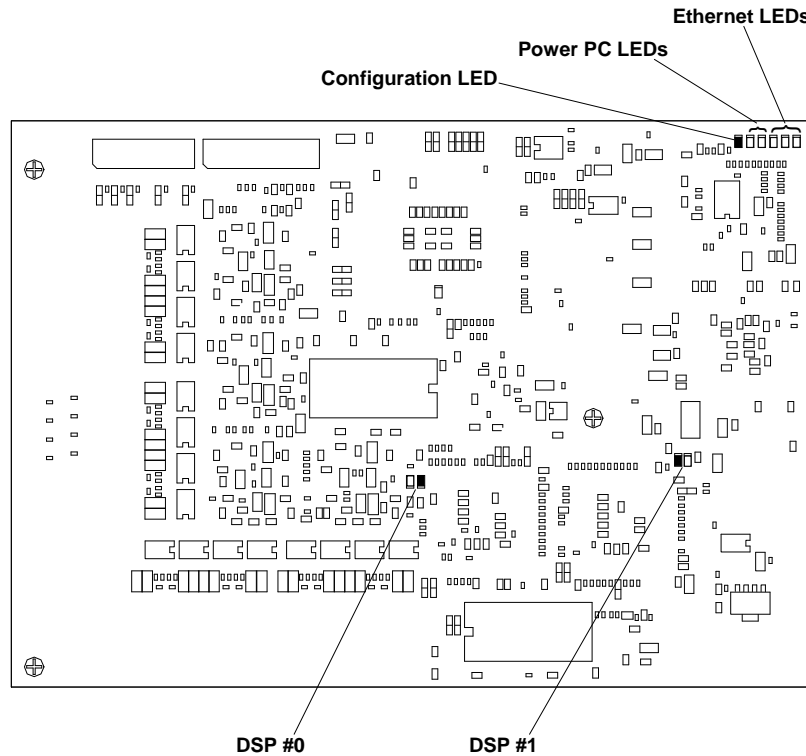
Layer 1 state monitor

This is the default for SS7 protocols. Most other protocol firmwares can be changed to monitor layer 1 by the use of a firmware switch; check the appropriate protocol release notes for details of the available protocol switches.

When monitoring layer 1, the state of a port will be indicated by its associated LED (LED on indicates a good layer 1. LED off indicates a bad layer 1).

2.5 PMX module LED usage

There are 10 surface mount LED's mounted on the PMX module, which may be difficult to see after the card has been installed. The LED's are arranged as shown on the following diagram.



DSP status LEDs

There are two DSPs that can be fitted to a PMXC, DSP 0 and DSP 1. A pair of LEDs, as shown in the above diagram, indicates the status of each fitted DSP as follows:

- A pulsing Red LED indicates clocking.
- A flashing Green LED indicates active firmware.

Configuration LED

If no firmware has been downloaded to the board, the firmware LED will be on, it will only go out once firmware had been successfully downloaded to the board.

Ethernet and Power PC LEDs

The behaviour of these LEDs is subject to the firmware and configuration of the card and are normally for Aculab diagnostic purposes only. In some instances flashing LEDs are an indication of activity on a device, most of the time however they are not used.

3 Approval information

This section provides information on the Approval of the Prosody X PCI card, including information that may affect the Approval status of the card in use. Failure to use the Prosody X PCI card in accordance with any of these instructions may invalidate the Approval for connection. These instructions refer only to the Aculab Prosody X PCI card.

3.1 Safety warnings

Seek advice from a competent telecommunication engineer before installation and connection to a network.

The network ports on the Prosody X PCI cards are only suitable for connection to TNV (telecom Network Voltage) circuits operating as SELV (Safety Extra Low Voltage) TNV class 1.

The ports have the following safety status:

Type of Circuit	Port Description
SELV	Host Bus Interface (PCI)
SELV	H.100 Telecommunications Bus
SELV (TNV class1)	RJ45 Network Interface ports

CAUTION When making a network connection, to reduce the risk of fire, only telecommunications line cord of 26 AWG or larger may be used.

CAUTION A competent engineer must check the integrity of the bonded earth connection between the building installation and the host chassis.

CAUTION The front faceplate on all Aculab PCI cards must be grounded to the chassis bonded earth at all times. Ensure that the card retaining screw has been tightened correctly, and that a good electrical connection has been made between the faceplate and the chassis, before connecting power to the system.

See the country specific appendices following the general approvals information for additional safety related information.

3.2 EMC compliance

The card has been tested for compliance with EMC regulations in the USA, Canada, the UK, Europe and Australia in conjunction with a compliant PC. This does not guarantee that every EMC compliant PC will remain compliant when used with the card. In extreme cases, high frequency energy within the PC may be conducted out of the PC and re-radiated via the network cables. In this case, the network cables may require additional treatment (such as clamp-on ferrite rings), and system-grounding provisions may require modification.

Good quality shielded cables must be used for the network connections in all cases.

If there is doubt regarding the overall EMC performance of a particular system, the user is advised to obtain competent advice, and local systems testing for EMC. Should local testing identify that additional EMC protection is required in the form of E1/T1 trunk cable clamping, you can refer to Appendix E: for guidance on the retrofit of Aculab Ferrite Clamps.

3.3 Approval details

The Approval Number and Approval Holder details are included in the appendices relating to country specific information.

3.4 Usage and type

The usage and type of connections supported by the Prosody X PCI cards are detailed in the appendices relating to country specific information.

3.5 Environmental

The Prosody X PCI card is specified to operate within the following operating conditions:

- Temperature 0 deg to 65 deg Celsius
- Relative Humidity 10% to 90% non-condensing
- Altitude 0 to 2,500 metres
- Weight 0.3 Kg approx.

CAUTION To assist with heat dissipation, a chassis with forced-air-cooling would normally be required.

For systems with no forced-air-cooling, the user must implement measures to ensure that the Prosody X card temperature remains within the specified limits.

3.6 Network timing

The Prosody X PCI card has been tested for compliance with the pulse and jitter requirements of CCITT G.703, I431, ETS300-011 and in some cases additional national or international service requirements.

The Prosody X PCI card usually derives the timing for its network output ports from one of the network receive ports.

Alternatively, the Prosody X PCI card may be configured to derive the timing for network output ports from the H.100 CTBus clock. The jitter performance required to maintain the card's approval status is only guaranteed if the external clock is derived from another Aculab E1/T1 Digital Access card that is connected to the network. Other clock configurations may require further testing to ensure compliance.

3.7 Power supply

The Prosody X PCI card takes its power from the host computer expansion bus and has the following power requirements:

25W Max, including the PMX/PMXC module, with a supply ratio of:

+3.3V DC +/- 5% @ 5A

+5V DC +/- 5% @ 1.5A

It is the user's responsibility to ensure that the host computer will be able to safely supply the power required by the card in addition to any other auxiliary apparatus.

Note To assist with heat dissipation, a chassis with forced-air-cooling is recommended.

3.8 Approved functionality

Details of the approved functionality are included in the country specific appendices.

3.9 Regulatory Warnings.

The CE Marking has been applied to the Aculab Prosody X PCI card to demonstrate compliance with the following European standards.

EN55022 and EN55024 for electromagnetic compatibility.

EN60950 for electrical safety.

3.10 Approval label

When a card has been installed in a host computer, it is the card that is approved and not the host computer. The Approval label should be attached to the card and not the host.

3.11 Documentation release

To ensure operation of the Prosody X PCI card is consistent with the terms of Approval, it is essential that a card is both used with the correct release of the instructions for use, and that it is only used in conjunction with appropriate device drivers.

If an application developer, by virtue of an application program, reduces the functionality of the Prosody X PCI card, providing all of the sections regarding approval, installation and connection are retained, the instructions for use may be rewritten so that only the functionality implemented is described.

3.12 Software release

To ensure correct operation of the Prosody X PCI card, it is necessary that application programs be built using the correct release of software files for the particular revision of the Prosody X PCI card.

The protocol software supplied to run on the card has been tested for compliance with the requirements of the approval authority referred to in the following country specific information appendices for connection to the digital network. The approval label on the card is only valid and applicable if the card is used with the Aculab supplied signalling software appropriate for

the approval label.

Use of any other control software on a port connected to the PSTN is not covered by the approval, and reference must be made to the approvals authority before any connection to the network is made.

3.13 User Responsibilities

There may be configurations of the Prosody X PCI card along with other equipment that may require additional approval testing by an accredited test laboratory.

In particular, in producing the approval certificate for the card, the approval authority did not place any specific restriction on the use of the card apart from any restrictions listed in the appendices covering country specific information.

It is the responsibility of the user to ensure that all of the legal requirements for attachment are met, thus the user is advised to seek competent advice regarding any particular equipment configuration or use.

3.14 Speech calls

If the Prosody X PCI card is used in an application that makes or answers calls with a service code that indicates a speech or telephony call, or any call that may use a partly analogue route, the approval authority may place requirements on the audio signals transmitted. Please refer to the appendices on country specific information for further details.

Many of the speech and FAX resource cards that may be used with the Prosody X PCI card may comply with approval authority requirements, but it is the responsibility of the user to ensure that approval requirements are complied with, either by confirmation via the manufacturer of the card, or by any other suitable means such as independent testing.

Signal sources that do not in themselves guarantee compliance with approval requirements must be conditioned by appropriate circuitry before transmission.

Appendix A: country specific information

This appendix supplies the country-specific information to supplement the Installation Guide for the Prosody X PCI card. These appendices should always be read in conjunction with the other sections of 'Instructions for Use'.

The appendices are arranged in separate sections detailing regulatory requirements for the following countries:

- Appendix B - USA & Canada
- Appendix C - European Union Countries
- Appendix D – Australia & New Zealand

Appendix B: USA/Canada approval details

This section applies only to the 100 Ohm T1 versions of the PMX Modules.

FCC connection requirements

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA. On the exterior of the cabinet of this equipment is a label that contains, among other information, a product identifier in the format **US:AAAEQ##TXXXX**. If requested, this number must be provided to the telephone company.

ACTA Registration Number: US: 5TC XD NA N PMXPCIX
 Ringer Equivalence Number (REN): NAN
 Facility Interface Code (FIC): 04DU9.1SN
 Service Order Code (SOC): 6.0P
 USOC Jack Type: RJ45

An FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed for connection to the telephone network or premises wiring using a compatible modular jack that is Part 68 compliant.

The REN is used to determine the quantity of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. Typically, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line (as determined by the total RENs) contact the local telephone company.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes to its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice so you can make the necessary modifications to maintain uninterrupted service.

If trouble is experienced with this equipment, for repair or warranty information please contact Aculab INC, Customer Service, 197 First Avenue, Suite 130, Needham, MA 02494 +1 781 433 6000. There are no user serviceable components on the card. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. (Contact the state public utility commission, public service commission or corporation commission for information.)

This equipment is hearing aid compatible.

Customer Owned Coin/Credit Card Phones

To comply with state tariffs, the telephone company must be given notification prior to connection. In some states, the state public utility commission, public service commission or corporation commission must give prior approval of connection.

Data Equipment

The table below shows which jacks are associated with which modes of operation:

Mode of Operation	USOC Jack
Programmable	RJ45

Systems

Facility Interface Codes (FIC), Service Order Codes (SOC), USOC Jack Codes and Ringer Equivalence Numbers (REN) are shown in the table below for each port where applicable:

Port	FIC	SOC	USOC Jack	REN
Port 0 – 7 T1	04DU9.1SN	6.0P	RJ45	NAN

UL requirements

This card has been assessed against UL60950-1 and is a listed accessory component under UL file number E178354. The Prosody X PCI card should only be installed in a UL listed PCI bus, based computer system.

Industry Canada warnings

The Industry Canada Label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate terminal equipment technical requirements document(s). The department does not guarantee the equipment will operate to the users satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions might not prevent degradation of service in some situations.

A representative designated by the supplier should co-ordinate repairs to certified equipment.

Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

Service requirements

In case of equipment malfunction, Aculab Plc should carry out all repairs. It is the responsibility of users requiring service to report the need for service to Aculab Plc.

Contact details for the USA and Canada offices, (Aculab USA Inc) are available from the Aculab company web site at www.aculab.com. (E-mail: usa@aculab.com)

Approval number USA

Approval type	FCC part 68 XD component registration
Approval number	US: 5TC XD NA N PMXPCIX
Approval holder	Aculab Plc, Lakeside, Bramley Road, Mount Farm, Milton Keynes MK1 1PT, UK

FCC approves the apparatus for connection to public T1 services as specified in the approval certificate, this appendix, and the 'Installation guide' subject to the conditions set out in these documents.

Approval number Canada

Approval Type	Industry Canada CS-03 issue 8
Approval number	2789A-AC5200

FCC EMC requirements

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.

No changes or modification to the Prosody X PCI card is allowed without explicit written

permission from Aculab, as these could void the end user's authority to operate the device. The card is only intended for use in commercial applications and should not be operated in a domestic environment. It may only be installed by a professional engineer and good quality shielded cables must be used between the network ports and the Channel Service Unit (CSU) to ensure continued compliance to EMC regulations.

Canadian EMC requirements

This Class B digital apparatus meets all requirements of the Canadian interference-causing equipment regulations.

Cet appareil numérique de la Classe B respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.

Usage and type

The Prosody X PCI card is principally designed for use connected to a 1544 Kbps T1 service configured for primary rate ISDN (PRI) with National ISDN 2 signalling. Other types of private circuit use are also appropriate, and other signalling systems are available or planned.

Please contact Aculab for details of supported protocols.

Functionality

- Call initiation
- Call clearing
- Call answering
- B-channel switching
- Host independent installation
- Application program generated by the user
- Independent Operation of the network ports (one or more ports attached to the public network)
- Operational code running from RAM

Speech calls

If the T1 card is used in an application that makes or answers calls with a service code that indicates a speech or telephony call, or any call that may use a partly analogue route, there is a requirement that audio signals transmitted are encoded using CCITT μ -law PCM.

Many of the speech and FAX resource cards that may be used with the T1 card comply with this requirement. It is the responsibility of the user to ensure that this requirement is complied with, by confirmation via the manufacturer of the card, or by any other suitable means such as independent testing.

Signal sources that do not in themselves guarantee compliance with this requirement must be conditioned by appropriate circuitry before transmission.

Card installation & connection

Safety warnings

Interconnection circuits should be such that the equipment continues to comply with the requirements of CSA C22 for SELV circuits, after making connections between circuits using any of the internal ports.

Refer to a competent telecommunications engineer before installation and connection to a network.

L'avertissements concernant la sécurité

Quel que soit le matériel qui est raccordé aux port le système doit respecter les exigence de la norme CSA C22 au sujet des circuits SELV.

Il conviendra de rechercher l'avis d'un technicien de télécommunications avant l'installation de la carte et sa connexion au réseau.

Primary rate interface

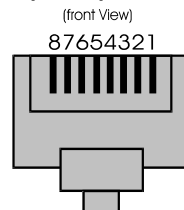
Each network port on the card carries one service connection via a screened twisted pair cable of 100ohm characteristic impedance. There is one transmit pair and one receive pair. A T1 service will normally carry 24 channels and a T1-PRI service will carry 23 channels. The card is designed to connect to an FCC or IC registered Channel Service Unit (CSU), which is not supplied by Aculab. The default line build out setting is suitable for cables up to 133 feet between the card and the CSU.

Network cable pinout

The 8-contact RJ48 (RJ45) Telephone Modular Plug on the cable between the card port adapter cable socket and the network must be wired as follows:

Pin	Signal	Function	Direction
4	LTT	Transmit (tip)	output
5	LTR	Transmit (ring)	output
1	LRT	Receive (tip)	input
2	LRR	Receive (ring)	input

RJ48 (RJ45) connector



The cable and plug must be shielded types to ensure EMC compliance.

If a cable is to be produced to wire into a network trunk connection, the connector on the network end of the cable must be wired as appropriate for the network terminating unit or Channel Service Unit (CSU) provided.

A 'cross-over' cable is required to connect two T1 ports 'back-to-back', for example, when one port is to run an exchange end emulation and the other port a user end application. The cable should be wired as follows.

User End		Exchange End
4	to	1
5	to	2
1	to	4
2	to	5

Appendix C: Approval details for european union countries & UK

This section applies only to the 120 Ohm and 75 Ohm E1 use of the PMX/PMXC module.



Declaration of Conformity

We

Aculab PLC

of

Lakeside

Bramley Road

Mount Farm


Milton Keynes MK1 1PT

United Kingdom.

Declare under our sole responsibility that the product

Aculab ProsodyX PCI card

To which this declaration relates, is in conformity with the Radio and
Telecommunication Terminal Equipment (RTTE) Directive 1999/5/EC

Signed: 
Location: Milton Keynes
Date: 21st November 2005

Position: Managing Director

Usage and type

A 75 Ohm E1 trunk is designed;

- For use when connected to the Public Switched Telephone Network (PSTN) via a 2048 Kbps digital service using Channel Associated Signalling (CAS).
- For use connected to a 2048 Kbps Integrated Services Digital Network (primary rate ISDN) with DASS-2 signalling.
- For use connected to a private circuit using the CCITT G.703 interface at 2048 Kbps in this case the signalling is not specified, and for example includes DPNSS signalling.

A 120 Ohm E1 trunk is principally designed

- For use connected to a 2048 kb/s integrated services digital network (primary rate ISDN) with ETS300-102 signalling, but other types of private circuit use are also appropriate, and other signalling systems are available or planned.

Approved functionality

CAS functionality

- Call initiation
- Call clearing
- Call answering
- Host independent installation
- Application program generated by the user
- Independent Operation of the network ports
- Operational code loaded to RAM
- Data and speech operation

DASS-2 (on the PSN) functionality

- Data and speech operation using any appropriate SIC (Service Indicator Code)
- Call initiation using DASS-2 signaling
- Call clearing using DASS-2 signaling
- Call answering using DASS-2 signaling
- Selection of Supplementary Services
- Host independent installation
- Application program generated by the user
- Independent Operation of the network ports
- Operational code loaded to RAM
- Host Watchdog security feature

Note The SIC determines the type of call being made, and the type of terminal equipment that may terminate the call.

ETS functionality

- Call initiation using ETS300-102 signaling
- Call clearing using ETS300-102 signaling
- Call answering using ETS300-102 signaling
- Host independent installation
- Application program generated by the user
- Independent Operation of the network ports (one or both ports attached to the network)
- Operational code running from RAM

Speech calls

If the Prosody X PCI card is used in an application that makes or answers calls with a service code that indicates a speech or telephony call, or any call that may use a partly analogue route, there is a requirement that audio signals transmitted are encoded using CCITT A-law PCM, and do not exceed a 1 minute mean power level of -9dBm.

Many of the speech and FAX resource cards that may be used with the Prosody X PCI card comply with this requirement. It is the responsibility of the user to ensure that this requirement is complied with, by confirmation via the manufacturer of the card, or by any other suitable means such as independent testing.

Signal sources that do not guarantee compliance with this requirement must be conditioned by appropriate circuitry before transmission.

Card installation & connection

Safety warnings

Interconnection circuits should be such that the equipment continues to comply with the requirements of 2.3 of EN60950 for SELV circuits, after making connections between circuits using any of the internal ports.

The host PC into which the Prosody X PCI card is fitted is classed as an indirect attachment. The PCI bus connector provides an interconnection circuit between the host PC and the Prosody X PCI card. Similarly, equipment connected to the Prosody X PCI card H.100 CTBus are also classed as indirect attachments.

Installation and safety

The card must be installed such that, with the exception of the PCI, H.100 bus connections, clearance and creepage distances shown in the table below are maintained between the Prosody X PCI card and any parts of the host PC or other expansion cards which use or generate a voltage, shown in the following table below.

Clearance mm	Creepage mm	Voltage present on other parts of the host or on expansion cards.
2.0	2.4 (3.8)	Up to 50V rms or dc
2.6	3.0 (4.8)	Up to 125V rms or dc
4.0	5.0 (8.0)	Up to 250V rms or dc
4.0	6.4 (10.0)	Up to 300V rms or dc
For a host or other expansion card fitted in the host, using or generating voltages greater than 300V (rms or dc), advice from a competent telecommunications safety engineer must be obtained before installation of the relevant equipment.		Above 300Vrms or Vdc

Clearance distances refer to the shortest distance between parts, measured through air. Creepage distances refer to total distances measured across surfaces when installed in a normal office environment. The creepage distances in parenthesis apply where the local environment within the PC is subject to conductive pollution or dry non-conductive pollution that could become conductive due to condensation.

If in doubt seek advice from a competent telecommunications safety engineer.

In order to maintain the host independent approval of the Prosody X PCI card, it is essential that, when other expansion cards are introduced which use or generate a hazardous voltage, the minimum creepage and clearances specified above are also maintained. A hazardous voltage is one that exceeds 42.4V ac peak or 60V dc. If you have any doubt, seek advice from a competent engineer before installing other adapters into the host equipment.

Failure to install the Prosody X PCI card in accordance with these instructions will invalidate the Approval.

75 ohm Line Interface

Each network port on the card carries one 30-channel service connection. For 75 ohm characteristic impedance coaxial cable connection, an RJ45 to BNC adapter is required. Each adapter contains a pair of BNC coaxial connections, one for the transmit cable and one for the receive cable.

75 Ohm network connection

The connection of the network input and output ports on the E1 card to the network termination port (NTP) must be via coaxial cables with a nominal impedance of 75 ohms terminated with a 75 ohm BNC plug.

Note There may be a maximum cable lengths imposed by the PTO.

The cable connected to the input port on the E1 card (the black BNC) must be connected to the output of the NTP and the cable connected to the output port (the white BNC connector) must be connected to the input of the NTP.

The identification of the input and output of the network termination port is the responsibility of installation personnel.

120 Ohm line interface

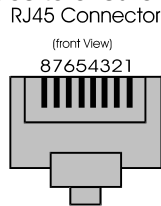
Each network port on the card carries one 30-channel service connection via a screened twisted pair cable of 120 ohm characteristic impedance. There is one transmit pair and one receive pair.

120 Ohm network connection

The 8-contact RJ45 Telephone Modular Plug on the cable between the adapter and the network must be wired as follows:

Pin	Signal	Function	Direction
4	LTT	Transmit (tip)	output
5	LTR	Transmit (ring)	output
1	LRT	Receive (tip)	input
2	LRR	Receive (ring)	input

The cable and plug must be shielded types to ensure EMC compliance.



If a cable is to be produced to wire into a network trunk connection, the connector on the network end of the cable must be wired as appropriate for the network terminating unit provided.

If a 'cross-over' cable is required to connect two E1 ports 'back-to-back', for example, when one card is to run exchange end emulation and the other card a user end application. The cable should be wired as follows:

User End		Exchange End
4	to	1
5	to	2
1	to	4
2	to	5

Network connection via other apparatus

If other apparatus, including cable or wiring is to be connected between an E1 card and the point of connection to the network, then all of that apparatus must comply with the following:

- a. The overall transmission characteristic of all the other apparatus, upon electrical conditions presented to one another by the apparatus and the network connection, shall be such as to introduce degradation no greater than the requirement for direct connection. The attenuation shall be assumed to follow the \sqrt{f} law, and the loss at a frequency of 1024KHz shall not exceed 6dB.
- b. All that other apparatus shall comprise only apparatus approved for the purpose of connection between the apparatus and the network. Cable, wire and wiring accessories shall comply with Approval No: NS/G/1235/M/100009 Section 22, Telecommunications Act 1984 Approval of cable, wire and wiring accessories for connection between certain digital telecommunication apparatus, published by OFTEL.
- c. The installation should comply with the Wiring Code Part 2, published by OFTEL.

The MEF watchdog

Once running, the DASS-2 port processors enable an internal 'watchdog' timer that they must persistently and regularly update. Any error condition that causes processing to falter will cause the watchdog to generate a processor reset. This is the 'Major Equipment Failure' (MEF) condition, and will result in a 'no signal' being presented at the particular G.703 output port, which is the required behaviour under these conditions.

Service requirements

In case of equipment malfunction, Aculab Plc should carry out all repairs. It is the responsibility of users requiring service to report the need for service to our company. Service can be obtained from:

Aculab Plc
Lakeside, Bramley Road
Mount Farm, Milton Keynes
MK1 1PT, England
UK

Phone : +44 1908 273800 Fax : +44 1908 273801 E-mail : support@aculab.com

EN55022 declaration

This is a class B product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

No changes or modification to the Prosody X PCI card are allowed without explicit written permission from Aculab, as these could void the end user's authority to operate the device.

Appendix D: Approval details for Australia & New Zealand

Approval types



C-Tick Mark
(EMC Australia)

Supplier Identification
Approval Holder

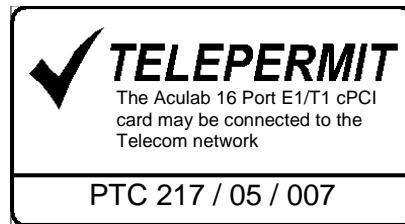


A-Tick Mark
(Telecom Australia)

N4292

Aculab Australia

Aculab NZ Representative - via Aculab Australia



Telepermit
(Telecom New Zealand)

PTC 217/05/007

The current contact details for the Australia offices, are available from the Aculab company web site at www.aculab.com.

Approval by the ACA for connection to primary rate ISDN will be held by the local subsidiary of Aculab Plc, as specified in this document and subject to the conditions set out in this appendix. The Telepermit approval is issued to Aculab's New Zealand Representative, who is contactable through our Australian office. The PMX module has NZ approval PTC 217/05/007.

Usage and type

The Prosody X PCI card is principally designed for use connected to a 2048 Kbps integrated services digital network (primary rate ISDN) with TS038 signalling including the New Zealand Primary Rate ISDN network

Other types of private circuit use are also appropriate, and other signalling systems are available or planned.

The Australian and NZ Approvals are only applicable when the Prosody X PCI card is used with Aculab supplied signalling software appropriate for use in the country covered by the Approval.

Approved functionality

- Call initiation
- Call clearing
- Call answering
- Application program generated by the user
- Independent Operation of the network ports (one or more ports attached to the network)
- Operational code running from RAM

Speech calls

If the Prosody X PCI card is used in an application that makes or answers calls with a service code that indicates a speech or telephony call, or any call that may use a partly analogue route, there is a requirement that audio signals transmitted are encoded using CCITT A-law PCM, and do not exceed a 1 minute mean power level of -9dBm.

Many of the speech and FAX resource cards that may be used with the Prosody X PCI card comply with this requirement. It is the responsibility of the user to ensure that this requirement is complied with, by confirmation via the manufacturer of the card, or by any other suitable means such as independent testing.

Signal sources that do not guarantee compliance with this requirement must be conditioned by appropriate circuitry before transmission.

Card installation & connection

Safety warnings

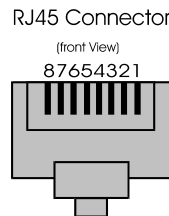
The Primary Rate E1 ISDN Interface is a TNV interface as detailed in section 6 of AS/NZS 60950.

To ensure ongoing compliance with AS/NZS 60950:2000:

- Where equipment is to be electrically connected to other equipment, interconnection circuits shall be selected to provide continued conformance with the requirements of section 2.3 for SELV circuits, and with the requirements of clause 6 for TNV circuits, after making connections between equipment's.
- Make sure that the integrity of the SELV system is maintained when connection is made through any other interface port within the system. If in any doubt seek competent advice.
- All host equipment incorporating the E1 ISDN Interface *must* be earthed.

Network cable pinout

The 8-contact RJ45 Telephone Modular Plug on the cable between the LIU port adapter cable socket and the network must be wired as follows:



Pin	Signal	Function	Direction
4	LTT	Transmit +ve (tip)	output
5	LTR	Transmit -ve (ring)	output
1	LRT	Receive +ve (tip)	input
2	LRR	Receive -ve (ring)	input

If a cable is to be produced to wire into a network trunk connection, the connector on the network end of the cable must be wired as appropriate for the network-terminating unit provided.

If a 'cross-over' cable is to be produced to connect two Prosody X PCI cards 'back-to-back', for example, when one card is to run an exchange end emulation and the other card a user end application, the cable may be wired as follows.

User End		Exchange End
4	To	1
5	To	2
1	To	4
2	To	5

Appendix E: Technical specifications

Prosody X card variants

Prosody X with 4 rich media DSPs	AC5200
Prosody X with 2 rich media DSPs	AC5210
Prosody X with 1 rich media DSP	AC5220

PMX/C module variants

PMXC8- 8 ports and 2 DSPs	AC5420
PMX8 - 8 ports and no DSPs	AC5430
PMXC4- 4 ports and 2 DSPs	AC5440
PMX4 - 4 ports and no DSPs	AC5450
PMXC2 – 2 ports and 2 DSPs	AC5460
PMXC1 – 1 port and 1DSP	AC5480

Primary rate interface

E1 2Mbit to G.703/G.704/I431
 Double-frame, CRC4 multi-frame and CAS multi-frame supported
 HDB3 line encoding
 T1 1.544Mb to G.703/G.704/ANSI T1.403
 D4 and ESF support
 AMI or B8ZS line encoding

Connectors

PMX modules—8 way RJ45/RJ48 balanced (120R/100R or 75ohm)
 Ethernet – EIA/TIA T568A Category 5 standard.

TDM interfaces

H.100 compliant interface supporting connection to any of the 4096 timeslots

Switching

2048 full duplex channel switching between the local resources and the H.100 bus.
 Eight trunk 240/192/184 channels between network and TDM interface (E 1/T1/T 1 PRI)
 256 channels per STARECORE DSP resource
 512 Channels (full duplex) to module based DSP resources for signalling support
 Flexible switching between any two resources, this includes the Signalling DSPs, media DSPs, trunks and H.100 bus channels.

Clocking

Without PMX module - CT bus slave
 With PMX module - CT bus master supporting clock fallback

Embedded processors

Freescale PowerPC MPC8241, and Freescale Starcore MSC8101/3 and MSC8122

Power supply - 25W Max including PMX module

DC Supply voltages:

Nominal	Maximum	Minimum
3.3	3.465	3.135
5.0	5.25	4.75

Environmental monitoring

An operating temperature within the range of 0 deg to 65 deg Celsius must be maintained.
 See the **Aculab resource API guide**, `acu_get_prosody_ip_device_info()` API.

CAUTION To assist with heat dissipation, in most instances a chassis with forced-air-cooling will be required.

Physical dimensions

All Aculab PCI products conform to PCI local bus specification revision 2.1
 Overall dimensions (excluding face plate):

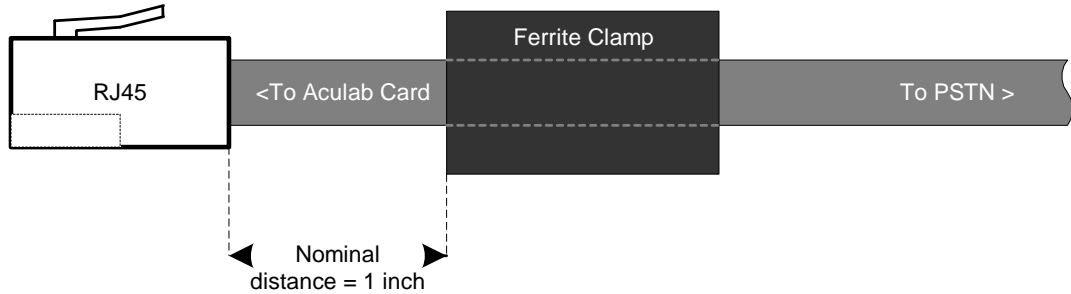
Height 106.68mm +/- 0.127mm
 Depth (including retainer) 340.74mm +/- 1.57mm
 Depth (excluding retainer) 312mm +/- 0.127mm

Each PCI card fits into a single card slot without impinging any adjacent slots

Appendix F: Ferrite clamp fitting instructions

The following diagram depicts the correct fitting of Aculab part number AC0440 Ferrite clamps. These may be fitted as required, for example, when local EMC testing of a system identifies the need for E1/T1 trunk cable clamping.

Europe & USA/Canada



The Ferrite clamp consists of two halves of a ferrite core encased in a hinged plastic holder that is closed and latched around a cable up to 6mm in diameter

Please contact Aculab should you require further clarification on obtaining and using Ferrite Clamps.