Synway AST Series

TEJ-1A/PCI
TEJ-2A/PCI
TEJ-4A/PCI

Hardware Manual

Version 1.0

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Contents

Copyright Declaration

Revision History

Version	Date	Comments
Version 1.0	2009-2	Initial publication.

Note: Only major revisions to this manual itself recorded herein.

Chapter 1 Overveiw

The Synway TEJ series (hereinafter referred to as 'TEJ') are high-performance, cost-effective digital trunk interface boards and support E1, T1 and J1 environments. The environments are selectable on a per-board basis via software configuration. The TEJ boards improve I/O speed by using DMA technique for data reading and writing on the basis of PCI bus, resulting in reduced CPU usage and increased board density per server. They provide the power to interconnect traditional telephony systems with emerging Voice-over IP (VoIP) technologies.

Compared with other products in Synway AST series, the TEJ board has high integration. It is integrated with the capability of 64ms echo cancellation, eliminating the need of getting supports from extra modules or devices, bringing an obviously better effect of echo cancellation than other subseries in AST.

The excellent combination of the TEJ driver and the Asterisk platform brings the following features to the TEJ series boards.

Supported Data Modes: Cisco HDLC, HDLC, PPP, Multi-link PPP, Frame Relay.

Supported Voice Modes:

- PRI CPE and PRI NET
  - NI1
  - NI2
  - EuroISDN
  - 4ESS(AT&T)
  - 5ESS(Lucent)
  - DMS100
- E&M
  - Wink
  - Feature Group B
  - Featrue Group D
- FXO and FXS
  - Ground Start
  - Loop Start
  - Loop Start with Disconnect Detect

The TEJ series connect Asterisk Server with PSTN, Channel Bank or PBX via T1 or E1 interface. The boards and the corresponding drivers can be used to establish a professional telephony network environment. Figure 1-1 and Figure 1-2 below are typical application models with TEJ.

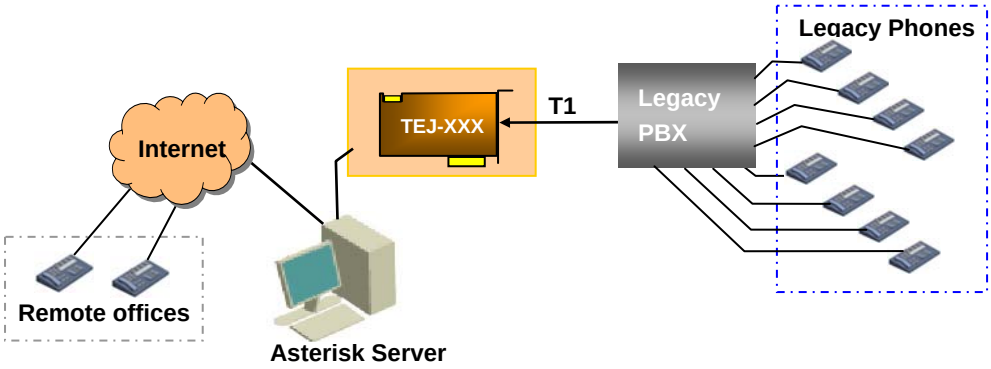
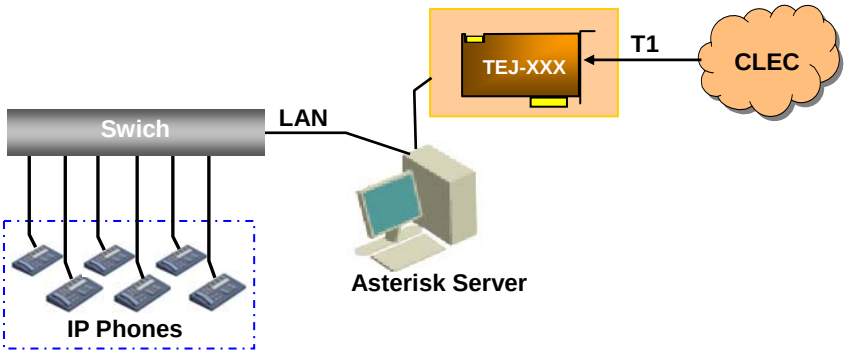


Figure 1-1 Application Model I: Traditional Telephony System



Note: XXX in Figure 1-1 and Figure 1-2 represent the existing and future board models in the TEJ series

Figure 1-2 Application Model II: VoIP Telephony System

1.1 Features

- **PCI 2.2 Bus Support**

  Includes PCI 2.2 bus with burst data transmission rate up to 132 MB/s; PNP (plug and play) feature eliminates the need for jumper leads; universal PCI design supports 3.3V/5V PCI slot.

- **DMA Read and Write**

  The use of PCI-based DMA technique for data reading and writing helps minimize the cost of the host CPU.

- **Compatible with Asterisk**

  Entirely compatible with Asterisk at the hardware/driver level, with all source codes open.

- **RJ48C Jack**

  TEJ-1A/PCI, TEJ-2A/PCI and TEJ-4A/PCI boards respectively have 1, 2 and 4 RJ48C jacks which can either connect directly with digital trunks or convert to BNC connectors via a proper adapter, making connection easy and malfunctions rare.

- **Echo Cancellation**

The self-adaptive echo cancellation feature gives the board the capability of 64ms echo cancellation so as to effectively eliminate echoes under various conditions, canceling out the effect of voice playback on DTMF and busy tones detection, avoiding self-excited oscillation and howling, and minimizing the possibility of registering wrong DTMF and busy tones in a conference call, designed especially for VoIP application environments.

- **Voice CODEC Support**

  Supports A-law, μ-law codecs.

1.2 Operation Principle

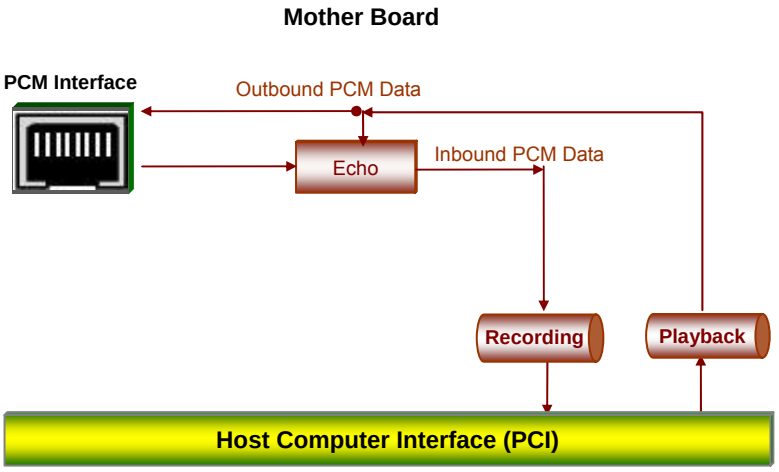


Figure 1-3 Operation Principle

Chapter 2 Installation

2.1 Hardware Structure

- **TEJ-1A/PCI Board**

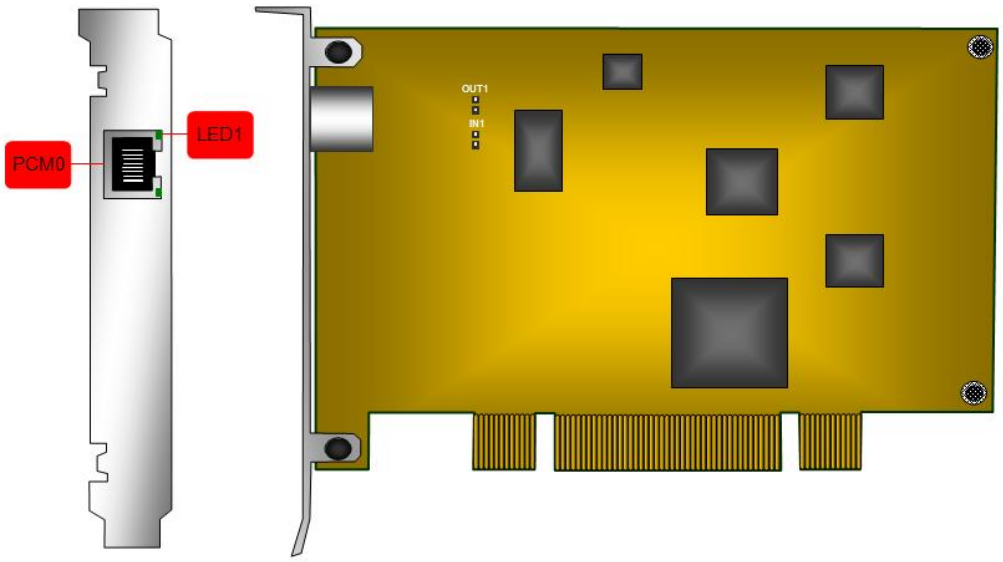


Figure 2-1 TEJ-1A/PCI (Left and Front Views)

- **TEJ-2A/PCI Board**

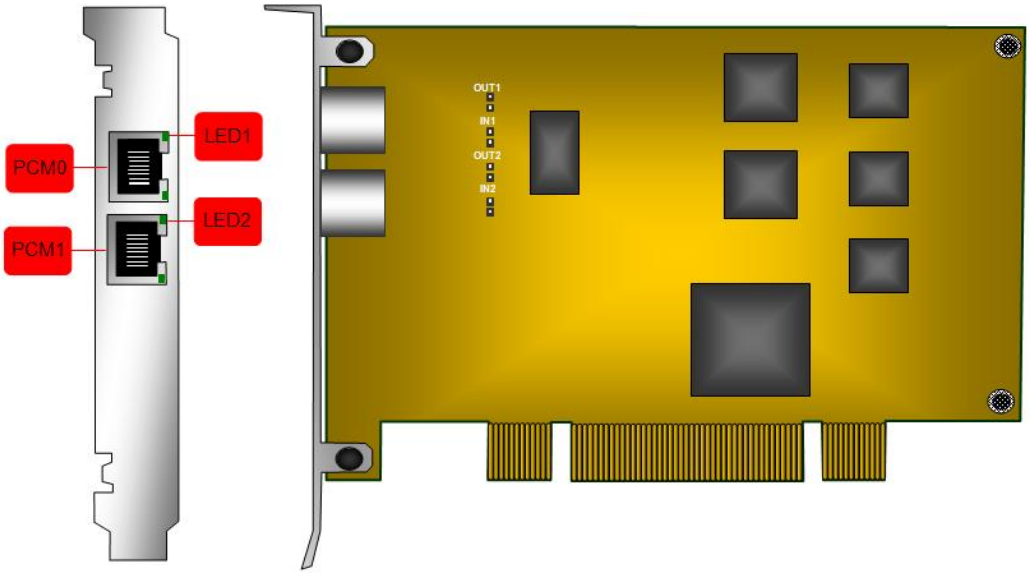


Figure 2-2 TEJ-2A/PCI (Left and Front Views)

- **TEJ-4A/PCI Board**

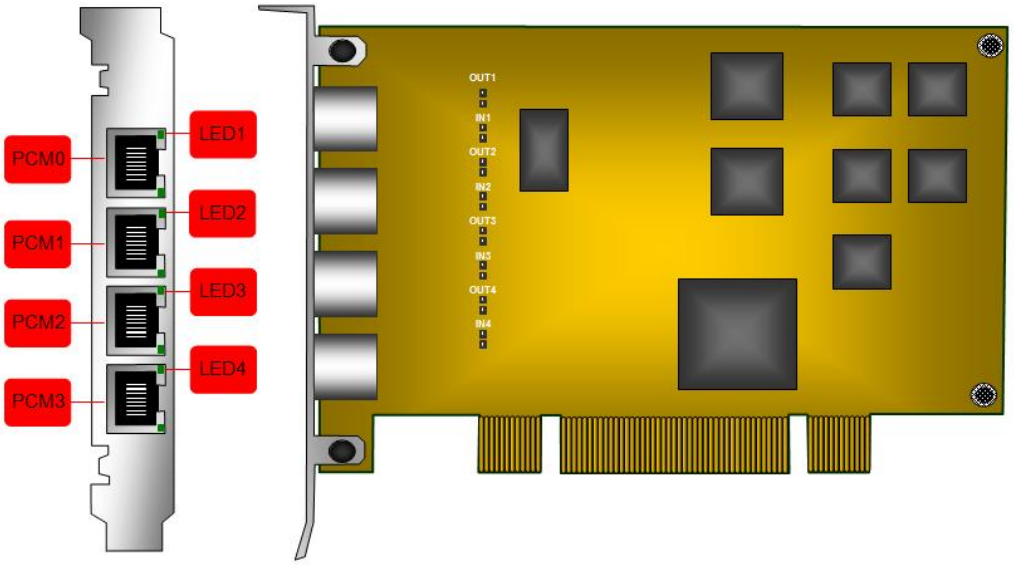


Figure 2-3 TEJ-4A/PCI (Left and Front Views)

Notes: As shown in the above figures, PCM0～PCM3 respectively indicate the 4 trunk interfaces while LED1～LED4 represent their synchronization indicators;

INm and OUTm refer to the grounding jumpers respectively at the receiving and transmitting ends for PCM(m-1), m＝1～4.

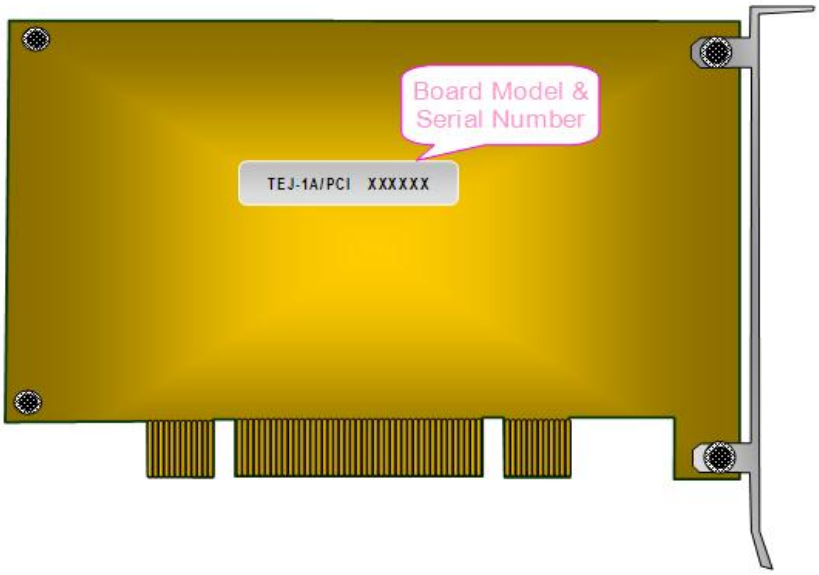


Figure 2-4 TEJ-1A/PCI (Rear View)

2.2 Interface Identification

It's quite important to recognize different kinds of interfaces, as such information is necessary for configuration of Asterisk platform. In real practice, not all interfaces on the board are used at a same time. When to use which interface depends on the installed modules and their particular positions on the board.

All TEJ series boards adopt 8-pin RJ48C jack. See below for the pin layout of RJ48C.

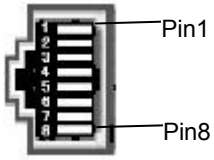
	Pin	Note
	1	RRing
	2	RTip
	3	Not used
	4	TRing
	5	TTip
	6	Not used
	7	Not used
	8	Not used

Table 2-1 RJ48C

2.3 Slot Compatibility

Make sure it compatible with PCI slots when using a TEJ board. Users may choose whichever suitable according to the slot patterns illustrated in Figure 2-5 below.

Figure 2-5 PCI Slots

Slot Number:

0：AGP Pro Slot
1：64-bit 5.0V PCI Slot
2：64-bit 3.3V PCI Slot
3：32-bit 5.0V PCI Slot
4：PCI-E Slot

The TEJ-1A/PCI, TEJ-2A/PCI and TEJ-4A/PCI boards include PCI 2.2 bus and support 3.3V/5V PCI slots. That is, they support the slots numbered 1, 2 and 3 in Figure 2-5, but don't support the slot numbered 0 (AGP slot). The available PNP (plug and play) feature eliminates the need for jumper leads.

2.4 System Requirements

Host System Requirements

CPU: 800MHz Intel® Pentium®III or above

Memory: 64M or more

HD: Depends on individual requirements

Supported Operating Systems

Linux: Debian, Fedora, Rad Hat

2.5 Hardware Installation

Note: Always turn off the power before installation!

Step 1: Configure the grounding jumper.

Disconnect all grounding jumpers in the use of 100ΩT1, 110ΩJ1 or 120ΩE1 balanced twisted-pair cable.

In consideration of various line conditions, this series boards are equipped with two groups of grounding jumpers on each channel which respectively control the groundings of the transmitting and receiving ends. In case the 75ΩE1 unbalanced coaxial cable is used, the grounding jumpers at the receiving end should be disconnected while those at the transmitting end should be short-circuited, provided that the PC is properly grounded. This configuration is the factory default setting and applicable to most situations so that there is usually no need to change it. If it is difficult to ground the local PC, you may short-circuit the on-board grounding jumper at the receiving end and use the transmitting end at the opposite terminal for grounding. If the receiving end at the opposite terminal is grounded (improper operation), the on-board grounding jumper at the transmitting end must be disconnected. Refer to Table 2-2 for details.

Generally speaking, even in the case of proper grounding at both terminals, only the external layer of the E1 coaxial cable at the transmitting end is allowed to be grounded. The grounding of both transmitting and receiving ends may result in a current loop with ground wires, bringing instability to signals. Therefore, such grounding must be strictly avoided.

Opposite Terminal / Local Terminal					
	Transmit End	**grounded**	**grounded**	**non-grounded**	**non-grounded**
	Receive End	**non-grounded**	**grounded**	**non-grounded**	**grounded**
PC grounded	**Transmit End**	short-circuited	disconnected	short-circuited	disconnected

	Receive End	disconnected	disconnected	short-circuited	short-circuited
PC not grounded	**Transmit End**	short-circuited	short-circuited	manage to make the PC grounded	short-circuited
	Receive End	short-circuited	disconnected		short-circuited

Table 2-2 Configuration of Grounding Jumpers for Use of 75ΩE1 Unbalanced Coaxial Cable

Step 2: Properly fit the board onto the PC chassis.

It is suggested to fix the L-brackets on the board with screws before going to the next step.

Step 3: Connect to digital trunks.

Each board provides 1~4 RJ48C jacks, each of which can either connect directly with digital trunks or convert to 2 BNC connectors via an RJ48C-to-BNC adapter. See Figure 2-6 below.

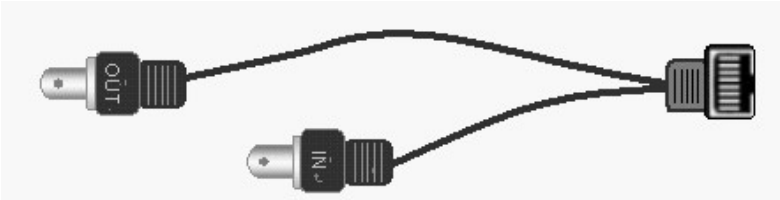


Figure 2-6 RJ48C-to-BNC Adapter

Step4: Set up an application environment.

Connect digital trunks with the on-board RJ48C jacks to establish an application environment.

Step5: Boot your computer and install the driver.

Regarding driver installation, refer to the file ‘SynAST UserManual.doc’ for details.

Appendix A Technical Specifications

Dimensions

160×107mm^2 (excluding L-bracket)

Weight

≈100g

Environment

Operating temperature: 0℃—55℃

Storage temperature: -20℃—75℃

Humidity: 10%—90% non-condensing

Storage humidity: 10%—90% non-condensing

Input/output Interface

Digital trunk interface:

TEJ-1A/PCI: 1 RJ48C jack

TEJ-2A/PCI: 2 RJ48C jacks

TEJ-4A/PCI: 4 RJ48C jacks

E1 interface: Compliant with G.703, including 75Ω unbalanced interface and 120Ω balanced interface

T1/J1 interface: DSX-1 and CSU line build-outs available for different extents of signal losses, including 100Ω and 110Ω balanced interfaces

Audio Specifications

CODEC: CCITT A/μ-Law 64kbps

Distortion: ≤3%

Frequency response: 300-3400Hz (±3dB)

Signal-to-noise ratio: ≥38dB

Echo suppression: ≥40dB

Maximum System Capacity

Depends on the system consumption of Asterisk and the processing capability of computer.

Power Requirements

+3.3V DC: 1000mA

Maximum power consumption: ≤5W

Audio Encoding & Decoding

A-Law 64kbps

μ-Law 64kbps

Sampling Rate

8kHz

Safety

Lightning resistance: Level 4

Appendix B Technical/Sales Support

Thank you for choosing Synway. Please contact us should you have any inquiry regarding our products. We shall do our best to help you. However, our technicians and salesmen are mainly responsible for maintaining our boards and providing relative technical support. If there are problems about Asterisk, please keep touch with Digium Inc. for help.

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