Synway CTI Series

SHD-30/60C-CT/PCI

SHD-30/60C-CT/PCI/FAX

Digital Trunk Voice Board

Hardware Manual

Version 2.0

Synway Information Engineering Co., Ltd

www.synway.net

Contents

Copyright Declaration

Revision History

Version	Date	Comments
Version 1.0	2007-3	Initial publication
Version 2.0	2008-4	Changes: Added some description on the newly launched board models SHD-30C-CT/PCI/FAX and SHD-60C-CT/PCI/FAX which support faxing.

Note: Please visit our website http://www.synway.net to obtain the latest version of this document.

Chapter 1 Overview

The CTI Series SHD-30/60C-CT/PCI is a digital trunk voice board with PCI bus, and has almost all functions required by call/voice processing systems that connect by E1/T1 trunks. SHD-30/60C-CT/PCI/FAX supports faxing and all features of SHD-30/60C-CT/PCI.

1.1 Functions

- A single board accommodates 1 or 2 E1/T1 trunks
- Supports CAS (SS1, MF R2), SS7 (TUP, ISUP) and ISDN connection
- Supports phone-calling and voice-processing functions
- Activity/silence detection
- Automatic Gain Control (AGC) support in recording operation
- FSK detection and transmission
- Allows DTMF transmission and detection during voice recording or playback
- Includes H.100 bus, compatible with MVIP bus, SC and ST bus, facilitating smooth connectivity to third-party boards with H.100 bus for the transfer of acquired voice signals to other devices
- The flexible distributed conferencing system sets no limit on the number of simultaneous conferences and participants in each conference, allows monitoring and recording of the whole conference and each individual speaker
- The on-board lightning-proof circuit reaches the telecom standard and eliminates the damage caused by the lightning
- Each board has a unique hardware serial number written in the firmware to distinguish itself from other boards and prevent piracy. The number is available via an easy function call with applications
- The on-board authorization code identification circuit is designed for software safety. Users can apply to our company for the authorization code
- A single SHD-30/60C-CT/PCI/FAX board can support up to 32 fax channels, each of which allows faxing at the rate of 14400bps

1.2 Features

- **PCI 2.2 Bus Support**

  Includes PCI 2.2 bus with 3.3V/5V slot voltage and burst data transmission rate up

to 132 MB/s; supports the connection to PCI-X slot; PNP (plug and play) feature eliminates the need for jumper leads.

- **Signaling Interface**

  SS1 provides two levels of interfaces respectively for MFC transmission/reception and SS1 connection; SS7 provides two levels of interfaces respectively for MTP and TUP/ISUP, meeting various customer requirements.

- **Signaling Processing**

  Installed with loadable signaling processing module, each board supports CAS (SS1, MF R2), SS7 and ISDN, eliminating the need for extra signaling boards. The signaling can be upgraded via a simple software configuration, without having to change the hardware.

- **Signaling Links**

  Each board supports up to 2 signaling links and the signaling hot-backup feature, i.e. signaling messages can be processed by the standby server at any time when something is wrong with the links being used, which increases the flexibility and reliability in a great extent. All the timeslots ranging from 1 to 31, not only the 16th one, can be used for SS7 and ISDN signaling.

- **Programmable Tone Detector**

  Detects single or dual tones at any frequency, offering facility for use with a variety of PBXes and key telephone systems.

- **Software Configurable Terminal Matching Method**

  Offers easy connection of similar interfaces that support either G.703-compliant (use of the 75Ω E1 coaxial cable and the 120Ω E1 twisted-pair cable) or T1.403-compliant (use of 100Ω T1 coaxial cable) terminal matching methods with a variety of digital trunks and optical transceivers. Both transmit and receive terminals can be configured by software.

- **Specialized Driver Algorithm**

  The driver uses SPECDial - a specialized driver algorithm - to perform a complete automatic dial process through digital lines and accurately identify the called-party status.

- **Echo Cancellation**

  The self-adaptive echo cancellation feature effectively eliminates echoes under various conditions, which cancels out the effect of voice playback on DTMF and busy tone detection, avoids self-excited oscillation and howling, and minimizes the possibility of registering wrong DTMF and busy tones in a conference call.

- **Barge in**

Supports the Barge-in function.

- **Various CODECs Support**

  Offers a large selection of voice CODECs, including hardware-based A-Law (G.711), μ-Law, IMA-ADPCM, software-based 16-bit Linear PCM, MP3 and VOX.

- **Supports WAV File**

  The recorded voice files can be edited and played by audio tools such as Cooledit.

- **Synway's Unified SynCTI Driver Development Platform**

  Synway owns the intellectual property rights for the unified high-intelligence SynCTI driver development platform. Each system supports up to 2048 channels. The complex call procedures can be analyzed and controlled through simple function calls on the driver platform, without having to understand details.

1.3 Operation Principle

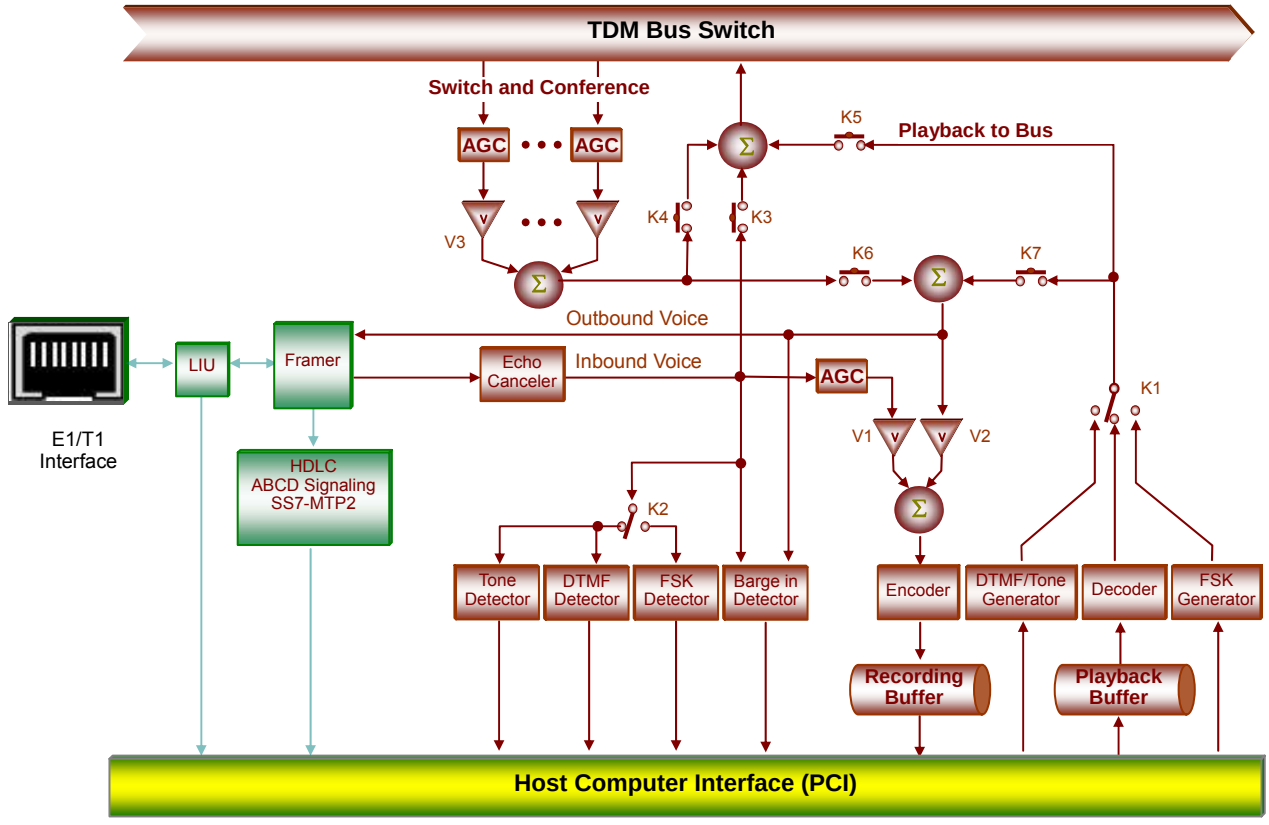

Figure 1-1 Operation Principle

Chapter 2 Installation

2.1 Hardware Structure

- **SHD-30C-CT/PCI Board**

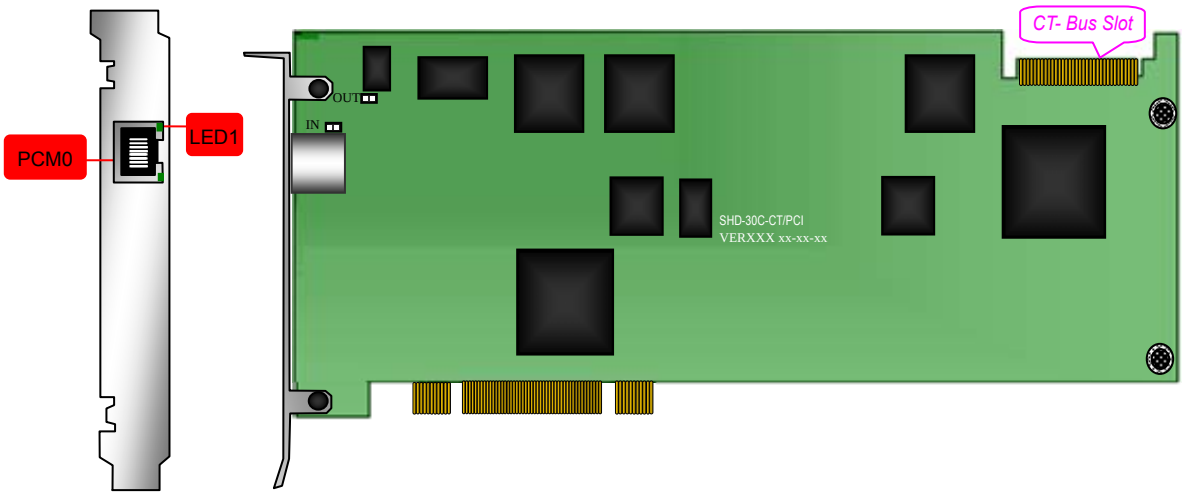

Figure 2-1 Left and Front Views

Mark	Definition
PCM0	The 1st E1 transmit/receive interface
LED1	The synchronization indicator of PCM0
IN	The grounding jumper of PCM0 at the receiving end
OUT	The grounding jumper of PCM0 at the transmitting end

Table 2-1

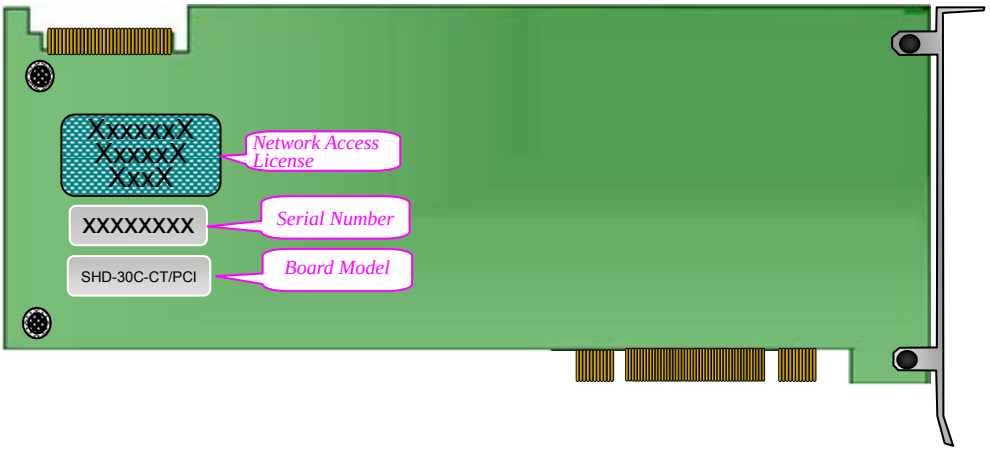

Figure 2-2 Rear View

- **SHD-60C-CT/PCI Board**

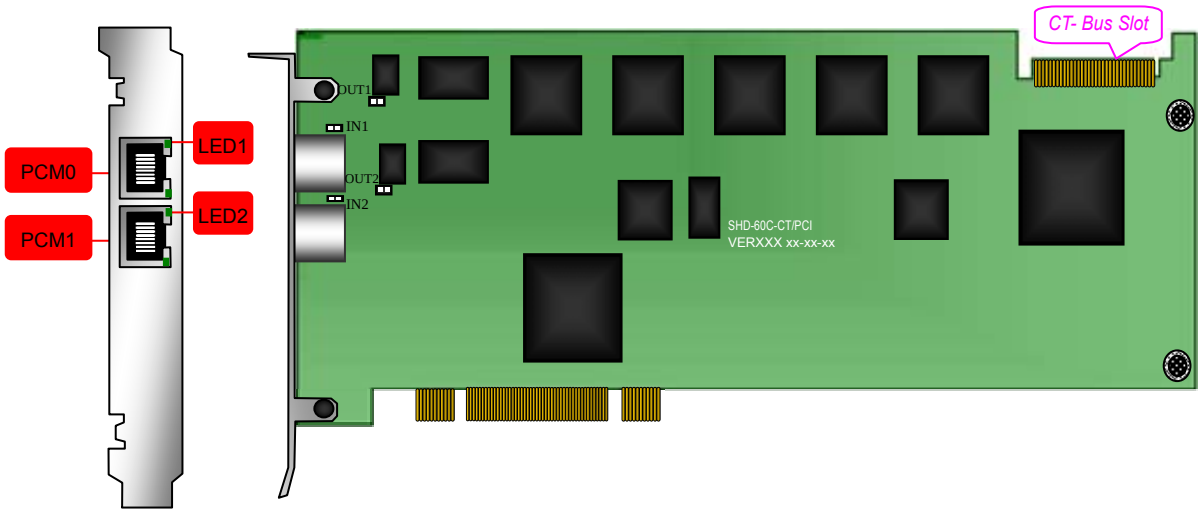

Figure 2-3 Left and Front Views

Mark	Definition
PCM0	The 1st E1 transmit/receive interface
PCM1	The 2nd E1 transmit/receive interface
LED1	The synchronization indicator of PCM0
LED2	The synchronization indicator of PCM1
IN1	The grounding jumper of PCM0 at the receiving end
OUT1	The grounding jumper of PCM0 at the transmitting end
IN2	The grounding jumper of PCM1 at the receiving end
OUT2	The grounding jumper of PCM1 at the transmitting end

Table 2-2

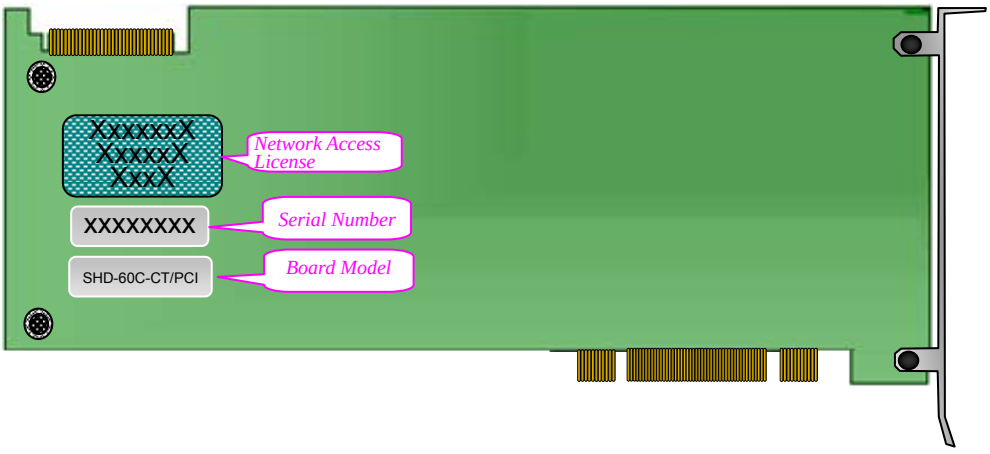

Figure 2-4 Rear View

- **SHD-30C-CT/PCI/FAX Board**

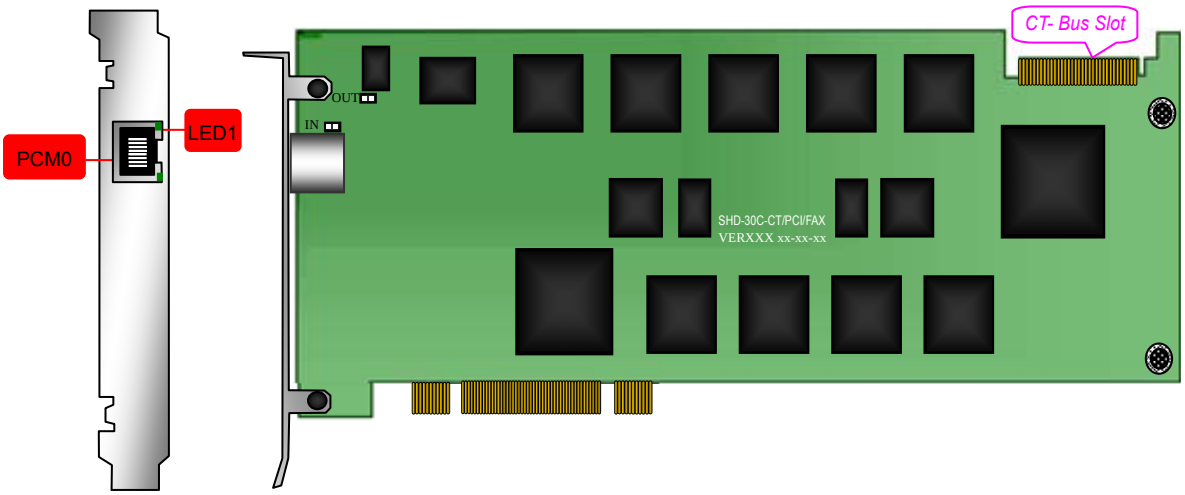

Figure 2-5 Left and Front Views

Mark	Definition
PCM0	The 1st E1 transmit/receive interface
LED1	The synchronization indicator of PCM0
IN	The grounding jumper of PCM0 at the receiving end
OUT	The grounding jumper of PCM0 at the transmitting end

Table 2-3

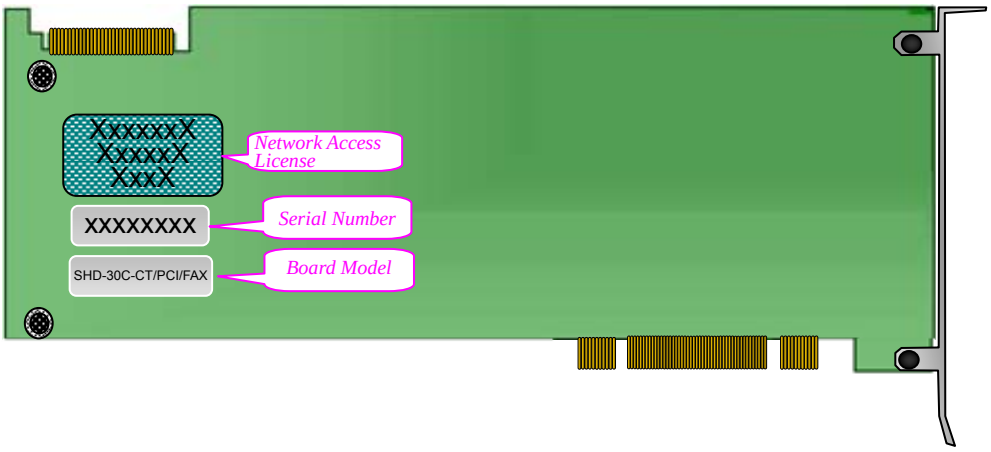

Figure 2-6 Rear View

- **SHD-60C-CT/PCI/FAX Board**

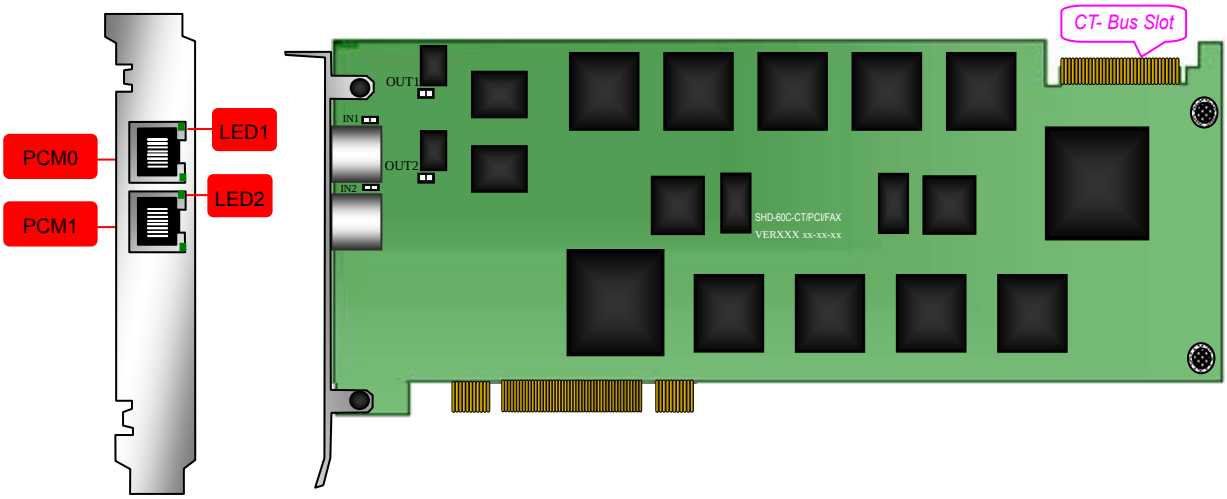

Figure 2-7 Left and Front Views

Mark	Definition
PCM0	The 1st E1 transmit/receive interface
PCM1	The 2nd E1 transmit/receive interface
LED1	The synchronization indicator of PCM0
LED2	The synchronization indicator of PCM1
IN1	The grounding jumper of PCM0 at the receiving end
OUT1	The grounding jumper of PCM0 at the transmitting end
IN2	The grounding jumper of PCM1 at the receiving end
OUT2	The grounding jumper of PCM1 at the transmitting end

Table 2-4

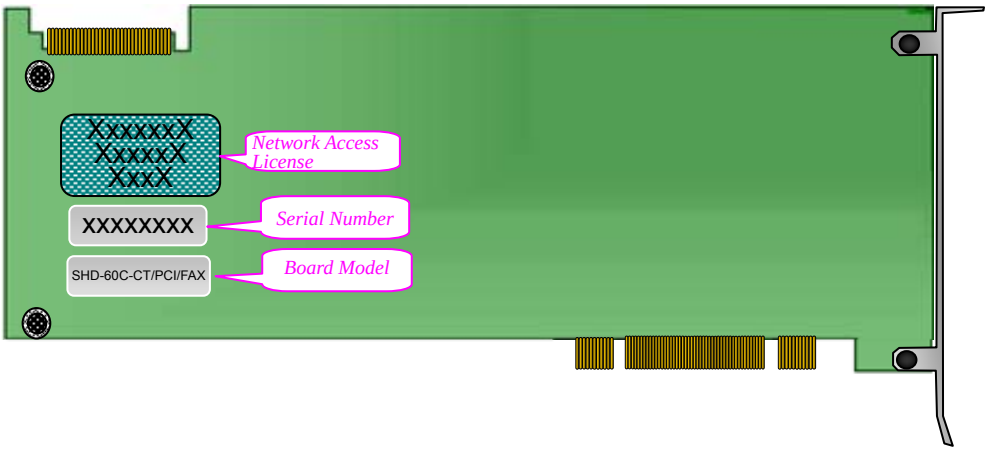

Figure 2-8 Rear View

The synchronization indicators illustrated above function as follows:

LED	Definition	Lamp Status	Implication
Green Lamps	Sync	ON	synchronous
		OFF	asynchronous
		FLASH	synchronous but unsteady

Table 2-5 On-board Synchronization Indicators

2.2 System Requirements

Host System Requirements

CPU: 300MHz Intel® Pentium® Ⅱ or above

Memory: 256M or more

HD: Depends on individual requirements

Supported Operating Systems

Refer to *SynCTI Programmer's Manual.pdf.*

2.3 Installation Procedure

Note: Always turn off the power before installation!

Step 1: Properly fit the required digital trunk board into the PCI slot on the chassis.

Step 2: Connect to digital trunks.

In case the on-board interface (RJ48C) differ in type from that of the connected digital trunk (BNC), the RJ48C-to-BNC adapter as shown below is required. See Figure 2-9.

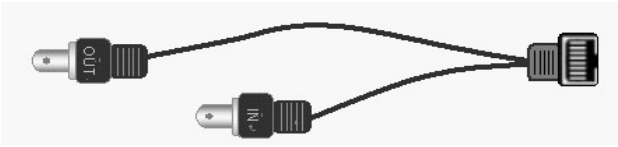

Figure 2-9 RJ48C-to-BNC Adapter

If users would like to construct lines for conversion by themselves, they should not only make the line match the on-board interface, but also ensure correct connection of the receive line and its corresponding transmit line. Figure 2-10 is the pin layout for RJ48C.

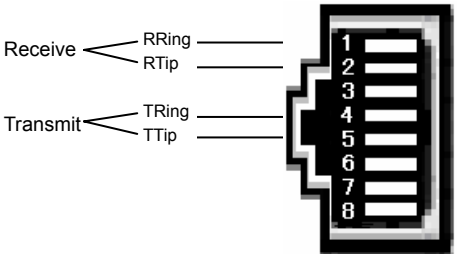

Figure 2-10 Pin Layout for RJ48C

Notes:

① Prevent the cross connection of transmit and receive lines. Such mistake can be found out by observing the on-board synchronization indicators. If the indicator is on, that means the receive line is in a normal state; if the indicator is off or flashing, that means the receive line goes abnormal (probably due to the cross connection). However, the state of transmit lines can not be judged via synchronization indicators but should be examined by the opposite terminal.

② On-board synchronization indicators do not start working until the PC is powered on and the board is successfully initialized.

Step 3: Connect H.100 bus interfaces on all boards by bus cable.

Skip this step if there is no need for bus exchange between multiple boards.

Notes:

① See Figure 2-11 for correct insertion. Do not twist or insert in the opposite direction.

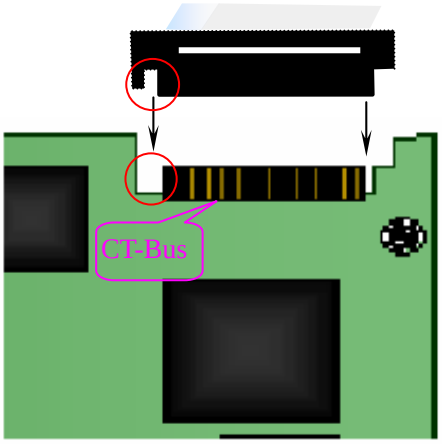

Figure 2-11 Connection of H.100 Bus

② There are two clock settings for our boards: When between-board bus exchange is not required, each board sets its own clock and does not have to be connected to the bus cable; otherwise, each board must be connected to the bus cable to follow the clock of the cable.

③ The bus cable houses stiff conducting material. Therefore, when it has been shaped, do not bend it repeatedly or violently lest it is broken.

Step 4: Configure the grounding jumper.

In consideration of various line conditions, this series boards are equipped with two grounding jumpers for each PCM which respectively control the grounding of the transmitting end and the receiving end. ① In the 120Ω E1 mode and the 100Ω T1 mode , you must disconnect the grounding jumpers and ensure both the transmitting and receiving ends not grounded; ② In the 75Ω E1 mode, the grounding jumpers at the receiving end should be disconnected and the ones at the transmitting end be short-circuited, provided

that the PC is properly grounded. This configuration is the factory default setting and applicable in most situations so that there is usually no need to change it. ③ If there is difficulty in grounding the PC at the local terminal, you may short-circuit the on-board grounding jumper at the receiving end and use the transmitting end at the opposite terminal for grounding. ④ 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 2-6 for details.

Generally speaking, in the case of proper grounding at both terminals, only the external layer of the coaxial cable (E1/T1 trunk) 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 2-6 Configuration of Grounding Jumpers in 75Ω E1 Mode

Step 5: Boot your computer and install the driver.

Regarding driver installation, refer to the file *SynCti_InstManual*.

Step 6: Configure the operating parameters for the board.

Refer to *SynCTI Programmer's Manual* for details.

Key Tips:

- As the system is expected to run for long hours unmanned, 'energy-saving' mode should be turned off for both the CPU and the HD in CMOS or WINDOWS operating system. This is to ensure full-speed operation of the computer, or it may lead to a drop in performance or unexpected errors after running for some time.
- A chassis installed with voice boards must be grounded for safety reasons,

according to standard industry requirements. A simple way is earthing with the third pin on the plug. No or improper grounding may cause instability in operation as well as decrease in lightning resistance.

Appendix A Technical Specifications

Dimensions

310×115mm^2 (excluding L-bracket)

Weight

≈ 250g

Environment

Operating temperature: 0℃—55℃

Storage temperature: -20℃—85℃

Humidity: 8%—90% non-condensing

Storage humidity: 8%—90% non-condensing

Input/output Interface

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

T1 interface: Compliant with T1.403

Audio Specifications

CODEC: CCITT A/μ-Law 64kbps, IMA ADPCM 32kbps

Distortion: ≤3%

Frequency response: 300-3400Hz (±3dB)

Signal-to-noise ratio: ≥38dB

Echo suppression: ≥40dB

Maximum System Capacity

Up to 8 digital trunk boards concurrently per system; up to 30/60 channels per board

Power Requirements

Maximum power consumption: ≤8W

Faxing

V.17: 14400, 12000, 9600, 7200 bps

V.29: 9600, 7200 bps

V.27: 4800, 2400 bps

Signaling

SS1: Compliant with DL and MFC standards stipulated in GF002-9002

SS7: Compliant with related provisions stated in Q771-Q795

DSS1: Compliant with Q.933

Audio Encoding & Decoding

16Bit PCM	*128kbps*
8Bit PCM	*64kbps*
A-Law	*64kbps*
μ-Law	*64kbps*
VOX	*32kbps*
ADPCM	*32kbps*
GSM	*13.6kbps*
MP3	*8kbps*

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.

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