Synway AST Series

BRI16 Full-length Board

Hardware Manual

Version 1.0

Synway Information Engineering Co., Ltd

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Contents

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Revision History

Version	Date	Comments
Version 1.0	2011-8	Initial publication

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

Chapter 1 Overview

The BRI16 full-length board (hereinafter referred to as BRI16) is designed with a smart appearance and a flexible structure. The voice quality it provides is rather splendid. The echo canceller which we developed out independently to cancel echoes in hardware supports 128ms for time delay estimation. With the extendable daughterboards and the selectable modules, you can customize systems to what you want. The half-height and full-length design it has minimizes the space to install in a chassis so that most common main frames you find in daily life are big enough to hold it. In a word, this product is really cost effective.

Note: The BRI16 full-length motherboard can extend with a daughterboard to set up a system involving up to 16 ports. To be exact, each motherboard supports up to 8 channels and the extension with a daughterboard which is achieved by the backboard BP200, enables the support of 16 channels (Note：Currently we do not support the use of daughterboard, therefore a single board can support 8 channels at most). See Figure 2-1.

1.1 Features

- **Echo Cancellation**

  1) Compliant with G.168-2002.

  2) The basic motherboard supports 256 point (32ms) for time delay estimation on each channel while the enhanced motherboard supports 1024 point (128ms).

  3) Uses the DSPs on the motherboard to process echoes, not wasting any host resources.

- **DMA**

  Uses the DMA technique for data reading and writing, greatly minimizing the cost of host CPU.

- **Structure**

  1) Assembles piecemeal just like piling up building blocks. A motherboard offers 8 channels and you may use the backboard to extend with a daughterboard to support up to 16 channels. (The daughterboard is unsupported currently.) Although the daughterboard takes some space, it works without the need of PCI/PCIe slots (**at present we can only provide the motherboard that is applicable to PCI and PCI-X slots, and the daughterboard is unavailable now**).

  2) Several kinds of modules are optional for you to install with the mother/daughter boards to achieve different purposes. At present we provide NT200 and TE200.

  3) The half-height and full-length design (Height: 64mm, Length: 270mm) minimizes the space for installation, allowing a great many choices of mainboards and main frames.

  4) You may use the spring steel buckle to fix the backboard on the mother/daughter board so as to prevent them from loosening or disengaging during transportation or removal.

- **Compatibility in Software and Hardware**

  1) Compatible with all commercial and home mainboards.

  2) PCI board 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; general PCI design supports 3.3V/5V PCI slot and PCI-X slot.

  3) PCIe board includes PCI Express 1.0a bus with the single-way transmission rate up to 2.5Gb; supports PCI Express X1, X2, X4, X8, X16 slots (the board with PCIe bus is unavailable now).

  4) Supports Unix, Linux and Solaris.

  5) This board driver is compatible with Zaptel. So it supports a lot of open source PBX systems, like Asterisk, Trixbox, Yate, CallWeaver, FreeSwitch, etc.

- **Interface**

  Four on-board RJ45 jacks: to connect with BRI lines (don't forget to install BRI modules correspondingly), use the BRJ48C-S/T2 adapter to convert each RJ45 to two S/T jacks which can directly connect to BRI lines, making connection easy and malfunctions rare.

- **Power**

  The power is supplied by the host computer. In case only the motherboard is used, connect it with the HD power plug; in case the backboard and the daughterboard are also used, connect the backboard with the HD power plug.

1.2 Operation Principle

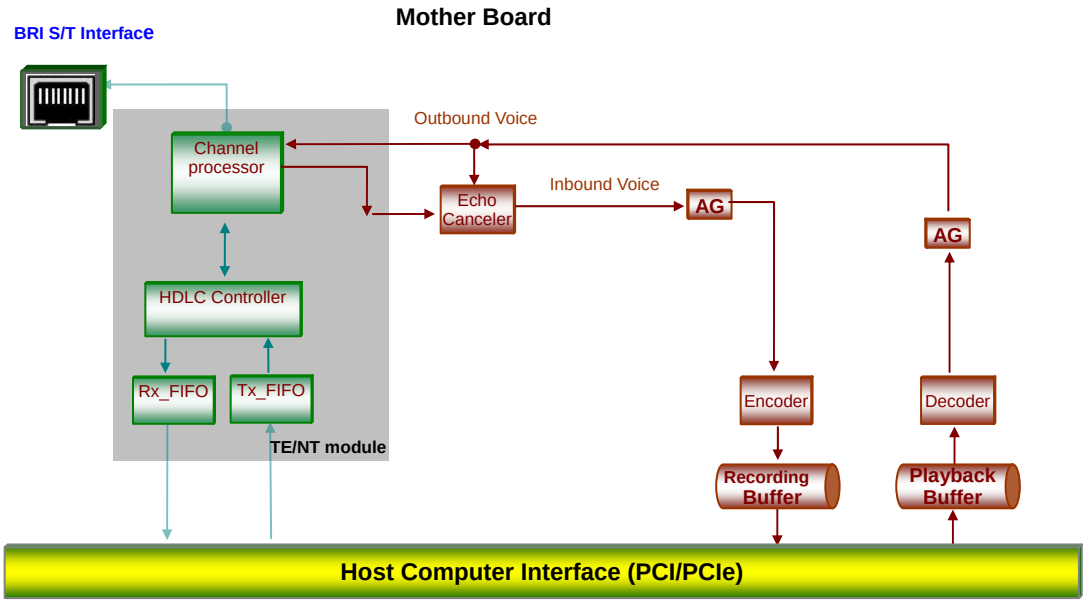


Figure 1-1 BRI16 Full-length Board Operation Principle

Chapter 2 Installation

2.1 Hardware Structure

See Table 2-1 below to find the available models of motherboards, daughterboards, modules and backboards for the BRI16 full-length board (models in grey are not yet published).

Component	Max. Quantity	Model	Comments
Motherboard	1	BRI1610P	Basic full-length motherboard with PCI bus
		BRI1611P	Enhanced full-length motherboard with PCI bus
		BRI1610E	Basic full-length motherboard with PCIe bus
		BRI1611E	Enhanced full-length motherboard with PCIe bus
Daughterboard	1	BRD810	Full-length daughterboard
Module	8	TE200	BRI series TE dual-port module
		NT200	BRI series NT dual-port module
Backboard	1	BP200	Offers 2 slots

Table 2-1 Model list of Motherboards, Daughterboards, Modules and Backboards for BRI16 Full-length Board

Figure 2-1 below illustrates the structure of the BRI16 full-length board which is composed of a motherboard, a daughterboard, a backboard and some pieces of modules.

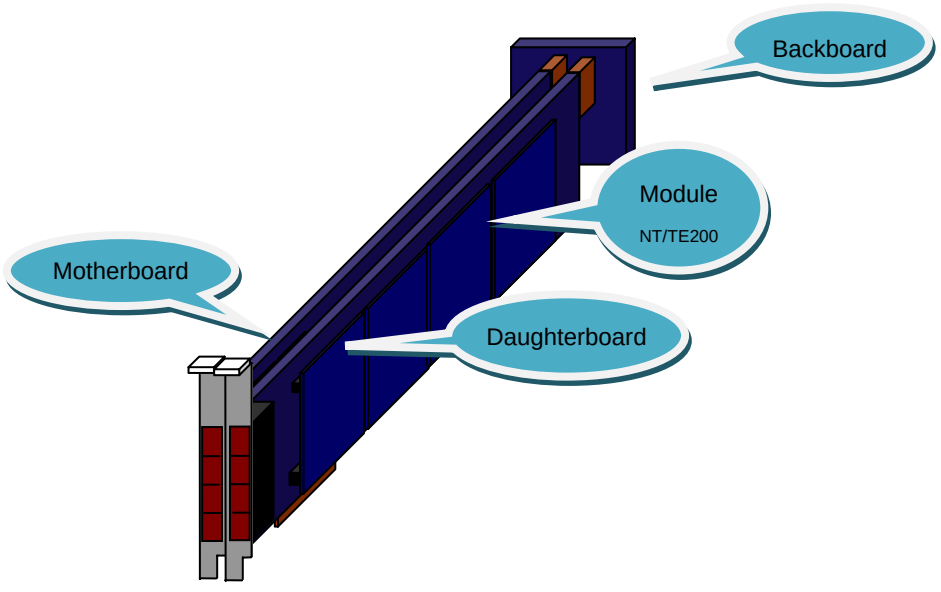


Figure 2-1 Overall Structure

2.1.1 Motherboard

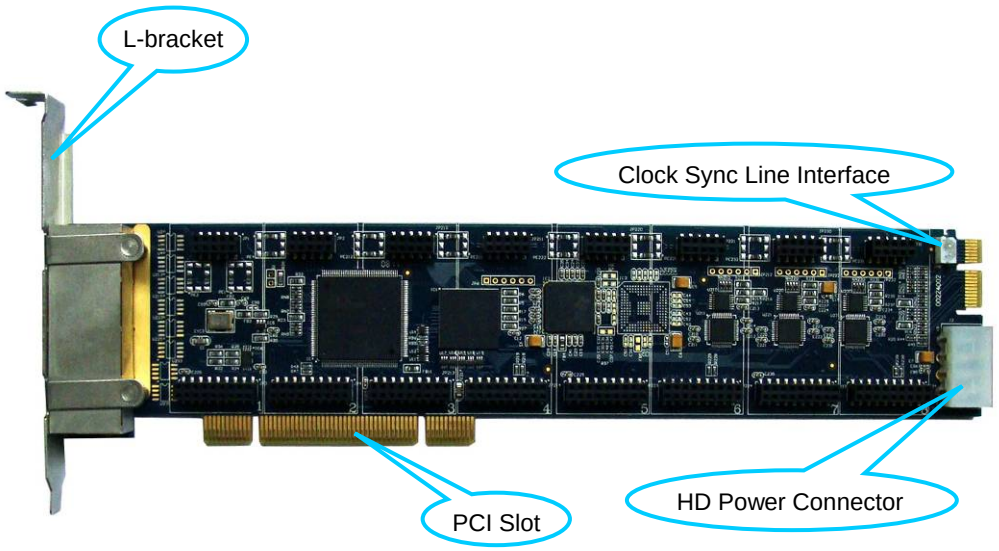


Figure 2-2 BRI1610P Motherboard

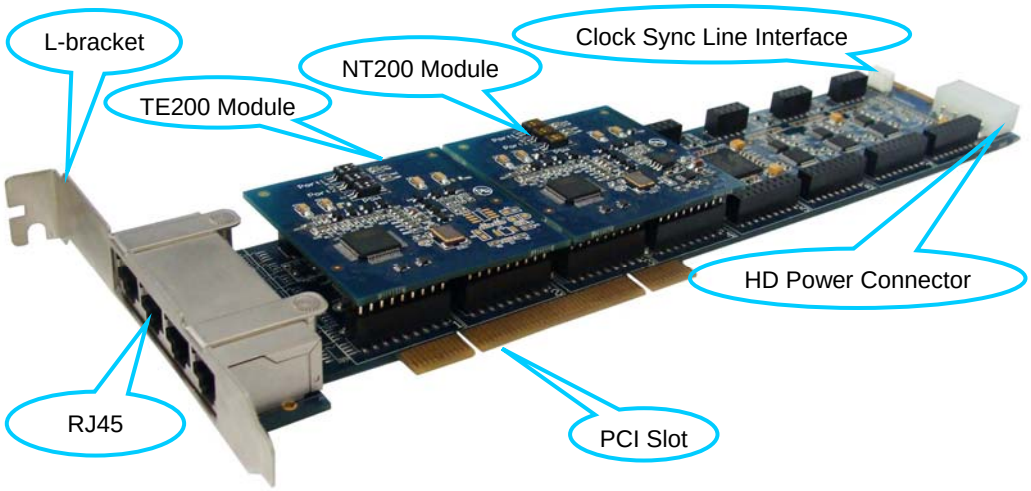


Figure 2-3 BRI1611P Motherboard

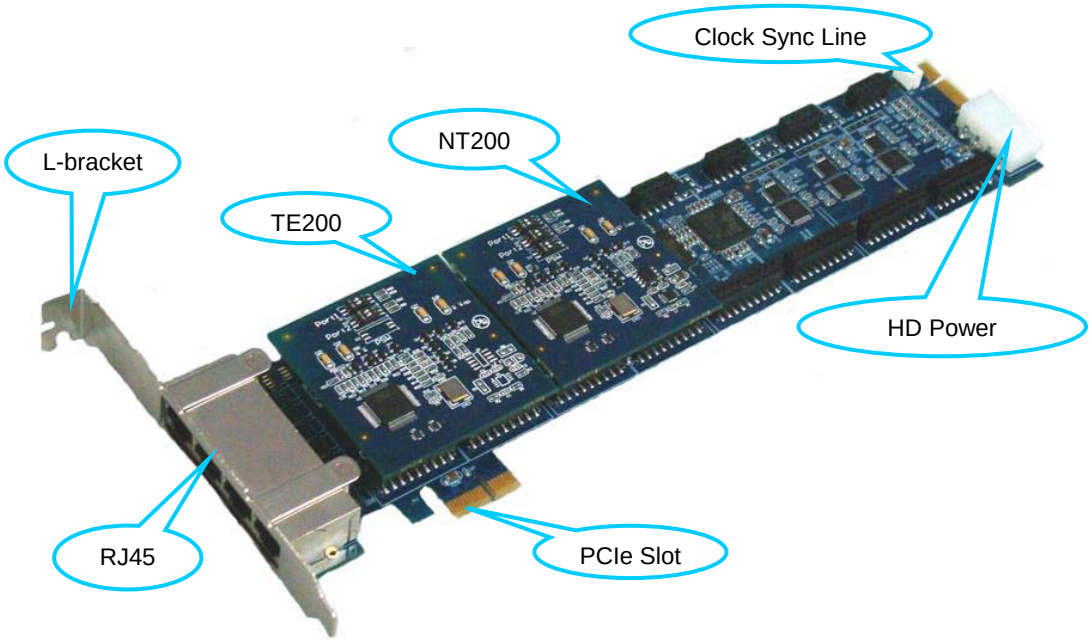


Figure 2-4 BRI1611E Motherboard

2.1.2 Backboard

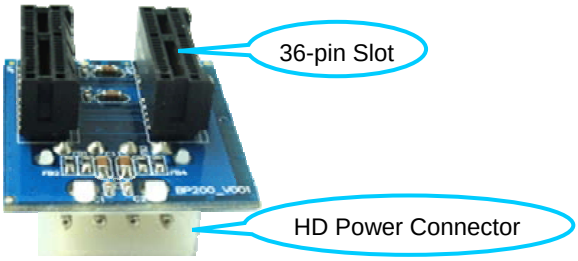


Figure 2-5 BP200 Backboard

2.1.3 Module

The BRI16 full-length board can work with either of the two modules NT200 and TE200, or work with both of them at the same time.

- **TE200 (TE dual-port module)**

This module offers two BRI channels in TE mode, with S/T interface. By default, the module TE200 is not set to 100Ω, but you can set the matching impedance to 100Ω manually. See Figure 2-6 for its hardware structure.

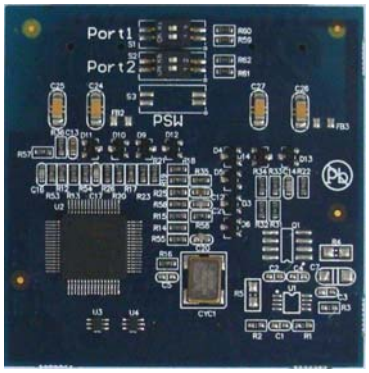


Figure 2-6 TE200

- **NT200 (NT dual-port module)**

This module offers two BRI channels in NT mode, with S/T interface. By default, the module NT200 is not set to 100Ω, but you can set the matching impedance to 100Ω manually. Equipped with the electric powersupply circuit, this module can provide 38V line feed to the S/T interface. You can choose whether to output the feed or not by setting the switch (PSW). By default the line feed is not output. Refer to Figure 2-7 for its hardware structure.

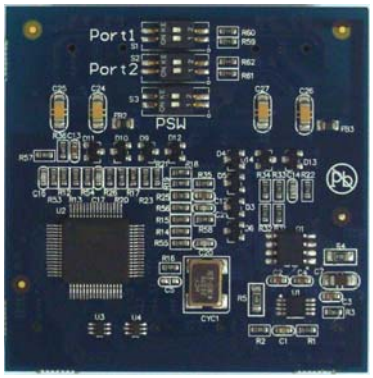


Figure 2-7 NT200

2.2 Interface and Channel Number Identification

The BRI16 full-length board uses the RJ45 interface. The motherboard and the daughterboard respectively provide four 8-pin RJ45 jacks each of which corresponds to one module and two BRI channels. That is to say each RJ45 jack has 8 pins and corresponds to two S/T interfaces. See below for the pin layout of the RJ45 jack with two different modules.
When corresponding to the NT200 module, see Table 2-2.

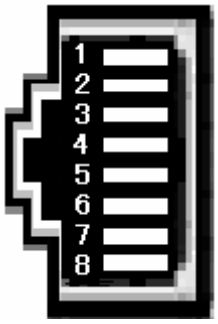
	Pin	Note
	1	RB+
	2	TB+
	3	RA+
	4	TA+
	5	TA-
	6	RA-
	7	TB-
	8	RB-

Table 2-2 RJ45 Pin Layout

When corresponding to the TE200 module, see Table 2-3.

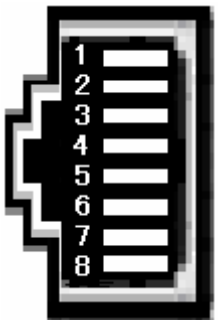
	Pin	Note
	1	TB+
	2	RB+
	3	TA+
	4	RA+
	5	RA-
	6	TA-
	7	RB-
	8	TB-

Table 2-3 RJ45 Pin Layout

As shown above, in an RJ45, Pin3~Pin6 correspond to one BRI channel while Pin1, Pin2, Pin7 and Pin8 correspond to the other. In this way, each RJ45 accommodates two channels. Our company provides a special adapter (model: BRJ48C-S/T2) to convert one RJ45 to two S/T interfaces. See Figure 2-8 below.

Figure 2-8 BRJ48C-S/T2 Adapter

A BRI16 full-length board provide up to 16 channels each of which has a fixed number.

Figure 2-9 below illustrates the corresponding relations among the RJ45 interfaces on the motherboard, the channels and the modules.

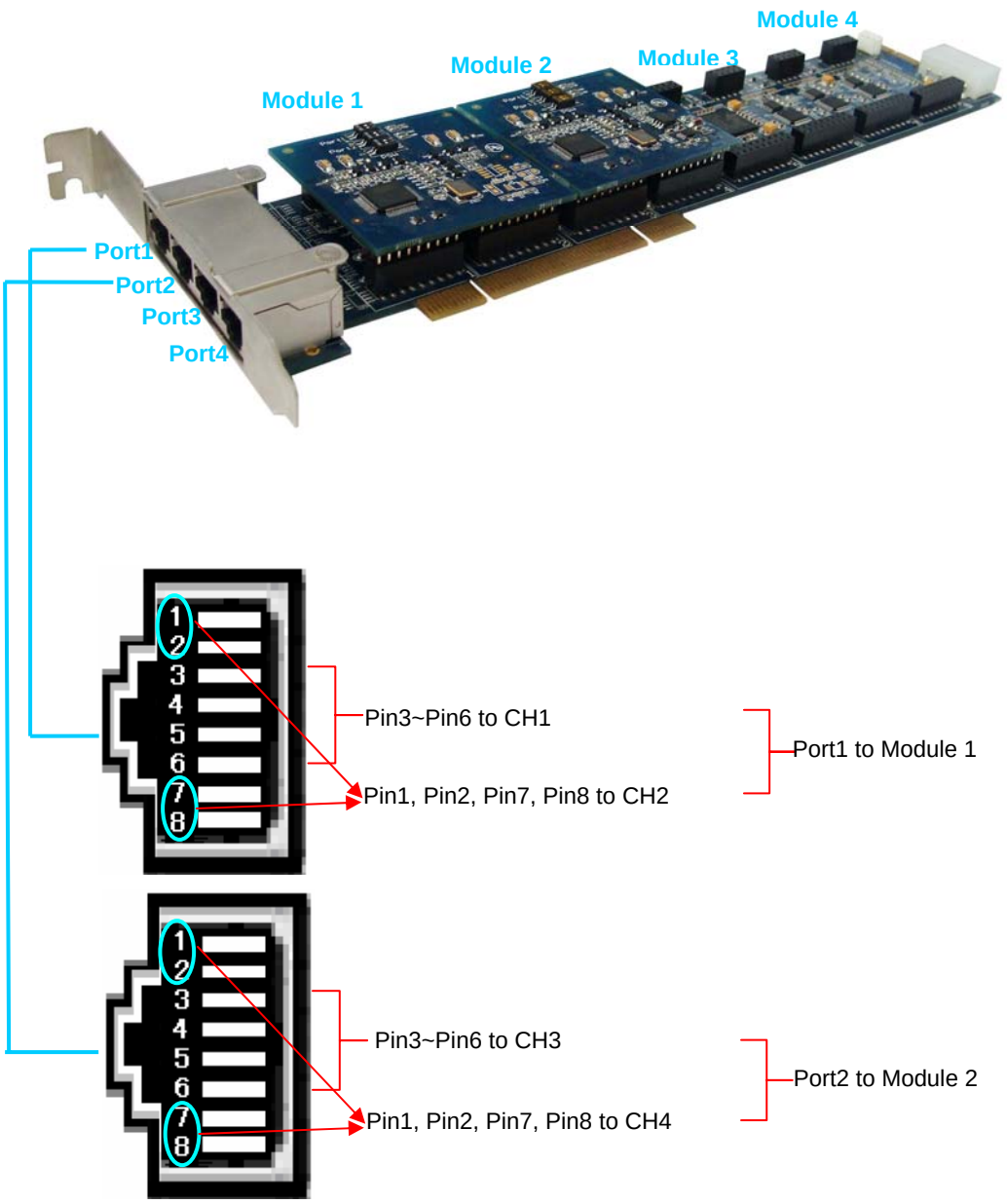


Figure 2-9 Relations among RJ45 interface, Channel and Module

Notes:

1) Each RJ45 interface is only related to modules on the corresponding position. As shown in Figure 2-9 above, the interface Port1 only corresponds to Module1. It doesn't matter that what kind of module (NT200 or TE200) Module1 is. Likewise, Port2 is related to Module2 and the like.

2) The relations between the on-board interfaces and the inserted modules for the daughterboard are the same as that for the motherboard. The unique difference just lies on the channel number. When the motherboard is used with the daughterboard, channels on the motherboard are the first 8 channels (CH1~CH8) and those on the daughterboard are the latter 8 channels (CH9~CH16). It doesn't matter that on which position of the backboard the motherboard or the daughterboard is fixed, or whether a slot is inserted with a board or not.

2.3 System Requirements

Host System Requirements

CPU: 2.0GHz Intel® Celeron® or above

Memory: 512M or more

HD: Depends on individual requirements

Supported Operating Systems

Linux RH7.2/RH9.0/AS4/FC4/SUSE10

2.4 Hardware Installation

Note: Always turn off the power before installation!

Step 1: Check if all the boards and modules within the package are in good state.

Step 2: Plug all modules you need onto the motherboard/daughterboard.

Step 3: Fit the motherboard into the PCI/PCIe slot on the chassis.

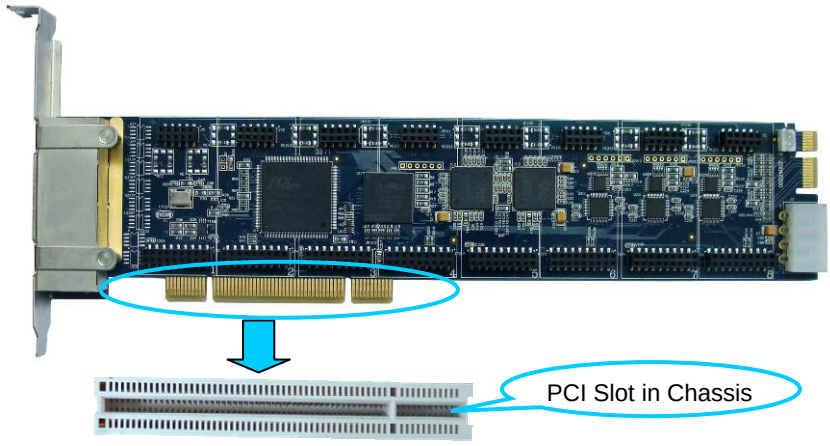


Figure 2-10 Insert Motherboard to PCI/PCIe Slot

Fix the screws on the L-bracket and then go to the next step.

Note: Skip Step 4 if you do not use any daughterboard in practice.

Step 4: Fit the daughterboard onto the chassis.

Likewise, fix the screws on the L-bracket and then go to the next step.

Note: Daughterboards need not be inserted into PCI/PCIe slots.

Step 5: If there is no need for daughterboard extension, the backboard is unnecessarily used. Connect the HD power plug properly to the motherboard; otherwise, the board can not run normally. If there is a need for daughterboard extension, the backboard BP200 must be used. Connect the backboard to the HD power

plug and use it to connect the motherboard and the daughterboard.

See Figure 2-11 for how to insert the power plug in the chassis onto the backboard. See Figure 2-12 for how to insert the HD power plug onto the motherboard.

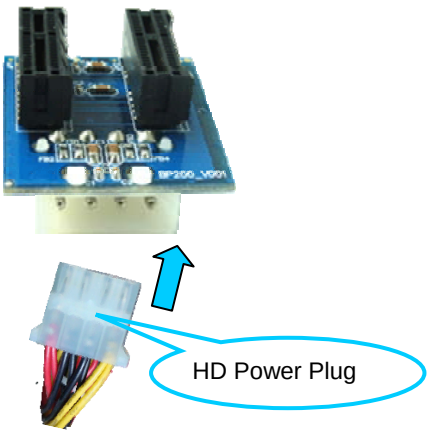


Figure 2-11 Fit HD Power Plug to Backboard

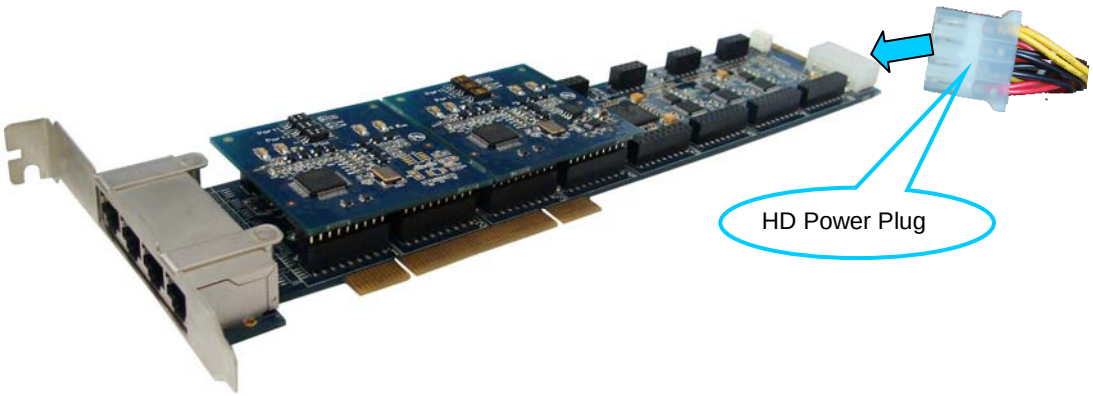


Figure 2-12 Fit HD Power Plug to Motherboard

Note: If you only use the motherboard (without the daughterboard) in practice, make sure to connect the HD power plug with the power interface on the motherboard; or the board will not work.

Step 6: Install the spring steel buckle.

Notes:

1) **The spring steel buckle is used to further fasten daughterboards/motherboards to the backboard. Usually there is no need to install the spring steel buckle provided the connection of daughterboards/motherboards and the backboard is secure enough.**

2) **When all slots on the backboard are inserted with motherboards/daughterboards, install two spring steel buckles at both ends of the backboard, one for each end.**

3) **We provide at most two spring steel buckles with a product set in the package.**

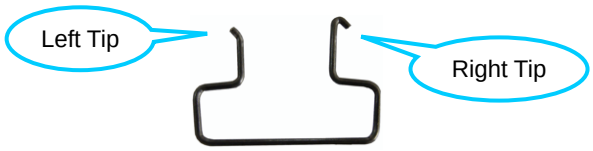


Figure 2-13 Spring Steel Buckle

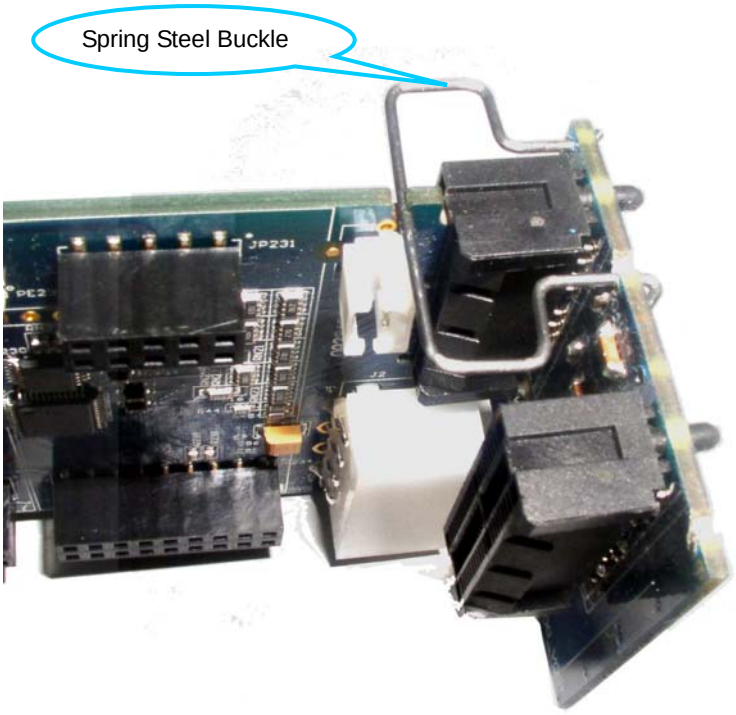


Figure 2-14 Fasten with Spring Steel Buckle

To install the spring steel buckle, follow the steps below:

1) Insert the left tip of the spring steel buckle to the small hole on the backboard. See the figure below.

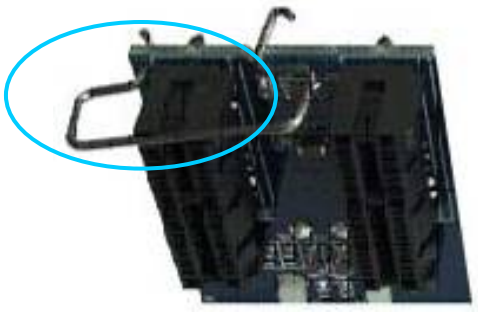


Figure 2-15 Insertion of Left Tip

2) Push the right tip of the spring steel buckle down into the oblique slot on the edge of the backboard. See the figure below.

Figure 2-16 Insertion of Right Tip

3) After the spring steel buckle is installed properly, insert the motherboard (or daughterboard) as shown in the figure below.

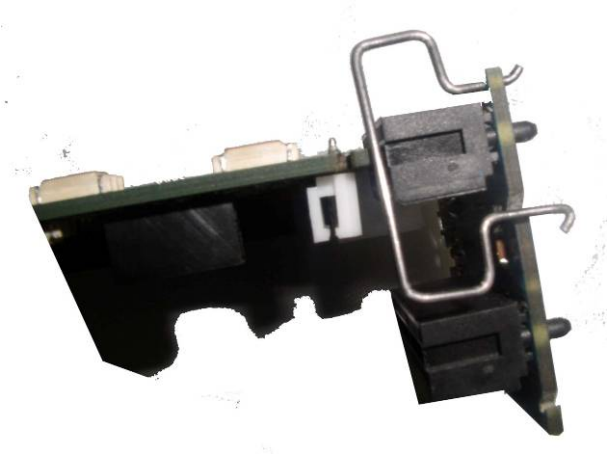


Figure 2-17 Insertion of Motherboard

4) Then push the spring steel buckle down into the little slot on the top edge of the motherboard. Now the motherboard is well fastened.

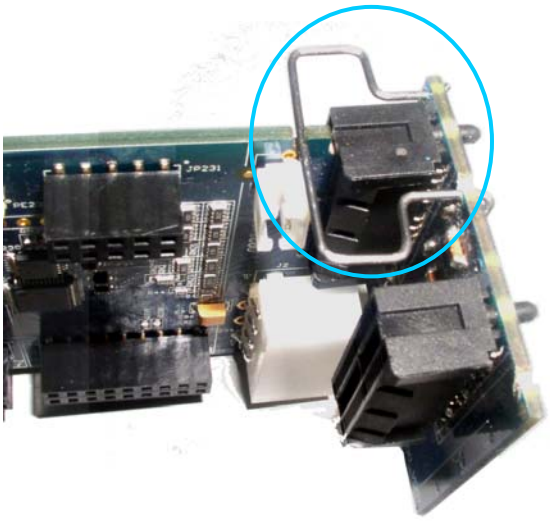


Figure 2-18 Buckling Motherboard

Attention: The steps to uninstall the spring steel buckle are just contrary to install.

Step 7: Set up an application environment.

Connect the line from the NT port in central office with the TE port and the line from the TE port in central office or an ISDN phone with the NT port to set up an application environment. If the TE port in central office or the ISDN phone requires the NT port to provide feed, you should turn on the PSW slide switch of the corresponding channel as well as the slide switch corresponding to Port1 or Port2 on the module NT200.

Step 8: Connect the clock synchronization line.

Note: Skip this step if there is no need to get clock synchronization for multiple boards.

The clock synchronization line is used to connect more than one BRI16 full-length motherboards or connect BRI16 full-length boards with other kinds of boards (e.g. digital trunk boards or analog boards) so that these boards can use a same clock to reduce the errors in faxing and to ensure the accuracy of data transmission between different boards. (Note: The synchronization of BRI16 full-length motherboards and daughterboards is achieved by the backboard, not the clock synchronization line.)

After connecting a clock synchronization line with two boards, you have to make proper configurations on it to let these two boards work synchronously. Follow the steps below.

1. For two BRI16 full-length motherboards, when they are connected with a clock synchronization line, powered on and loaded automatically with the driver, please execute the following command to activate the clock synchronization configuration.

   #>echo 12 > /sys/module/bri16/parameters/clockconf

2. For a BRI16 full-length motherboard and a board of other model (such as a digital trunk board), when they are connected with a clock synchronization line, powered on and loaded automatically with the driver, please execute the following command to activate the clock synchronization configuration.

   #>echo 1 > /sys/module/bri16/parameters/clockconf

Note: If the file /sys/module/bri16/parameters/clockconf does not exist, you may try to use /sys/module/bri16/clockconf to replace /sys/module/bri16/parameters/clockconf on the premise that the driver has been loaded.

See Figure 2-19 below.

Figure 2-19 Clock Synchronization Line

See Figure 2-2 for the clock synchronization line interface on the motherboard.

Step 9: Boot your computer and install the driver.

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

Note: All pictures in this document are for reference only, please prevail in kind.

Appendix A Technical Specifications

Dimensions

270x64 mm^2 (excluding L-bracket)

Weight

Motherboard: about 120g

(excluding modules)

Module: about 15g

Backboard: ≤10g

Environment

Operating temperature: 0℃—55℃

Storage temperature: -20℃—85℃

Humidity: 8%—90% non-condensing

Storage humidity: 8%—90%
non-condensing

Input/output Interface

4 RJ45 jacks which can be converted into 8 S/T interfaces per signal motherboard or daughterboard

Interface type: S/T ITU-T I.430

Transmission code: AMI code

Terminating Resistance: 100Ω (optional)

Output power: 38V±2V (NT only, optional)

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

1 board per system; up to 8 channels per board

Power Requirements

Total Power Consumption includes the electricity use of all motherboards and daughterboards.

A single motherboard
(with modules fully inserted)
+3.3V DC: 1100mA
(power consumption: 3.63W)
+12V DC: 1000mA
(power consumption: 12W, supplied by power socket, all NT200)
+5V DC: 1000mA
(power consumption: 5W, supplied by power socket)

A single daughterboard
(with modules fully inserted)
(The daughterboard is unsupported currently)
+12V DC: 1000mA
(power consumption: 12W, supplied by power socket, all are NT200)
+5V DC: 1000mA
(power consumption: 5W, supplied by power socket)

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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