Synway SSW Series

FXM3201P(SSW)

AST Analog Voice Board

Special-for-Switch

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	2010-8	Initial publication

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

Chapter 1   Overview

FXM3201P(SSW) (hereinafter referred to as FXM32_SSW) is an analog voice board special for the Synway UMCT intelligent switch in Asterisk. It 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. This product is really cost effective. With the extendable daughterboards and the selectable modules, you can customize systems to what you want.

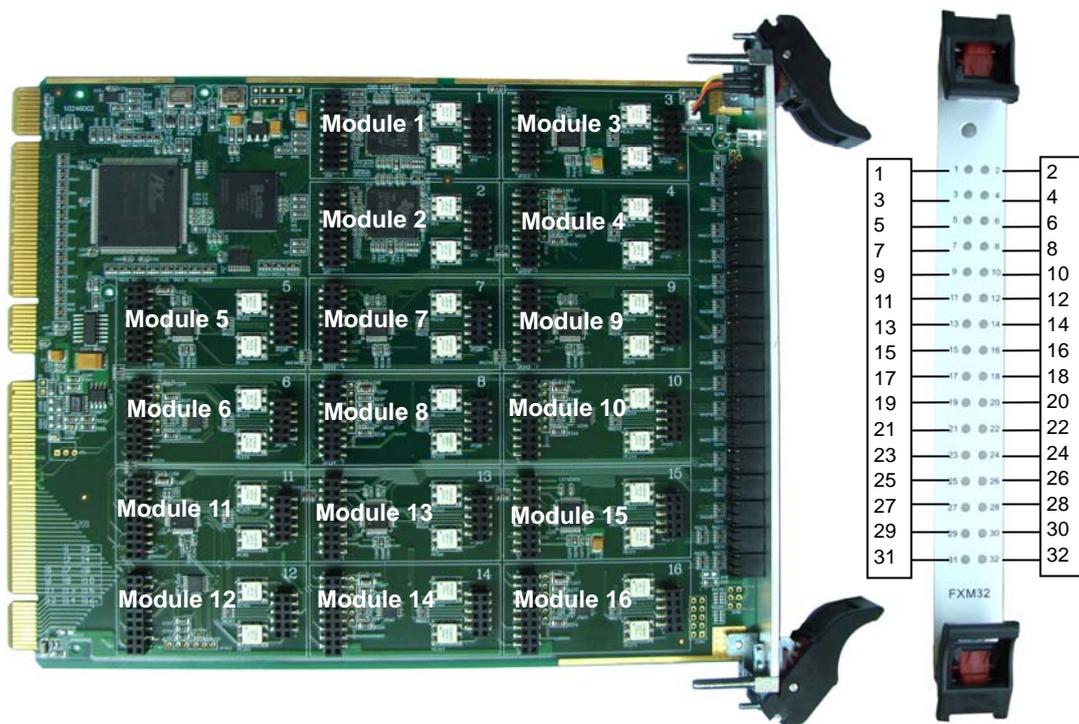Figure 1-1 below shows the overall structure of FXM32_SSW.

Figure 1-1 Overall Structure of FXM32_SSW (Right and Front Views)

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.

4)   Not only cancels out the effect of voice playback on DTMF and busy tones detection, but

also avoids self-excited oscillation and howling, minimizes the possibility of registering wrong DTMF and busy tones in a conference call, especially suitable for VoIP application environments.

- **DMA**

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

- **Structure**

  1) A single board supports up to 32 analog voice channels.

  2) Several kinds of modules are optional for you to install with the mother/daughter boards to achieve different purposes. Actually, we provide FXS, FXO and FXC (a compound body of FXS and FXO). FXC has the capability to ensure safe communication even when the PC is powered off, which eliminates the damage caused by sudden power cuts.

  3) Thanks to the modular design, it is allowed to assemble different number of modules and to acquire analog channels as many as you want (less than 32 per board).

  4) To satisfy the requirement on complex PBX connection, we provide the outlet board RFX321 to connect on-board channels with phone lines. This outlet board has two RJ21 connectors, allowing the direct link to many third-party PBXes and the successful establishment of calls on up to 32 channels at the same time. It is equipped with the lightning-proof circuit, greatly improving the complete security.

- **Compatibility in Software and Hardware**

  1) 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.

  2) FXM32_SSW has the same processing circuit and software environment as the Synway FXM32 series PCI/PCIe boards. The board driver is compatible with Zaptel and therefore supports a lot of open source PBX systems, like Asterisk, Trixbox, Yate, CallWeaver, FreeSwitch, etc.

- **Interface**

  FXM32_SSW can be extended to have two RJ21 connectors through the outlet board RFX321. These two RJ21 connectors can either be converted to 32 RJ11 jacks with the help of two SHR-24DA-JB interface converters from Synway, or be used directly to connect with a third-party PBX or a patch panel.

- **Power**

  As our developers have considered the characteristic of FXM32_SSW while designing the Synway UMCT intelligent switch, the use of FXM32_SSW does not require extra power.

- **Indicator**

There are 32 two color indicators reserved on the baffle of the motherboard, corresponding to 32 channels. Red represents the FXO channel while green indicates the FXS channel.

● **Hot Swapping**

Equipped with hot-swap circuits on the board, supporting insertion and extraction of boards while the system is running, easy for maintenance and backup.
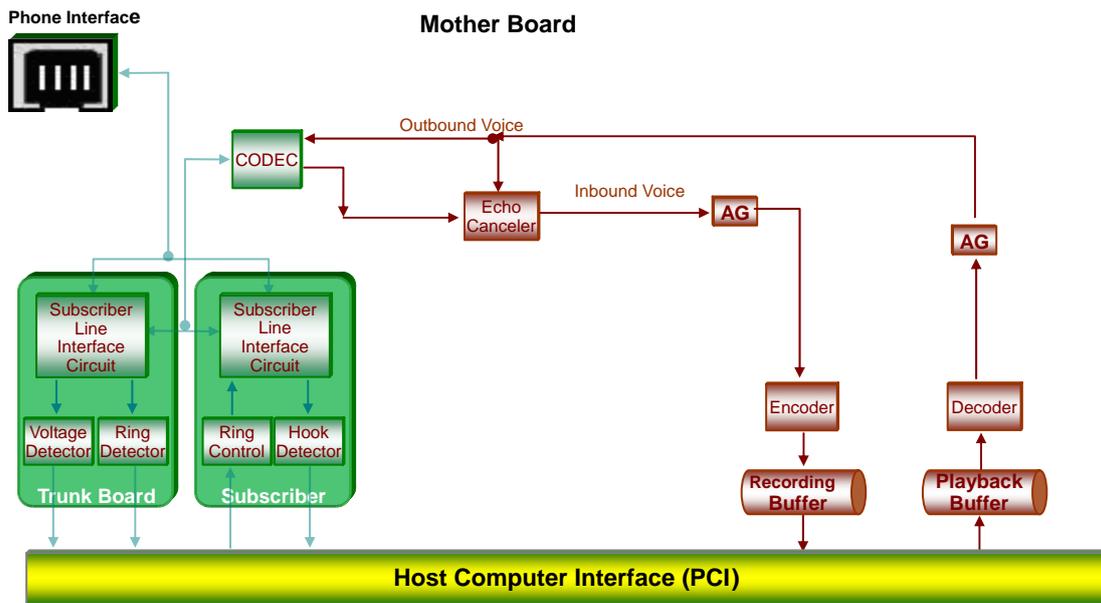
1.2   Operation Principle

Figure 1-2 Operation Principle

Chapter 2   Installation

2.1   Hardware Structure

See Table 2-1 below for available models of FXM32_SSW motherboard, outlet board and other components.

Component	Maximum Quantity	Model	Comments
Motherboard	1	FXM3201P(SSW)	Enhanced motherboard with PCI bus
Module	16	FXO200	Trunk module
		FXS200	Station module
		FXC200	Composite module
Outlet Board	1	RFX321	Offers 2 RJ21 connectors, ready for connection with 32 channels
RJ21 Line	2		To connect the RJ21 connector on the outlet board with the interface converter
Interface Converter	2	SHR-24DA-JB	Convert RJ21 to RJ11

Table 2-1 Model List

What the following Figure 2-1 illustrates is composed of an FXM3201P(SSW) motherboard, an FXO200 trunk module and an FXS200 station module.
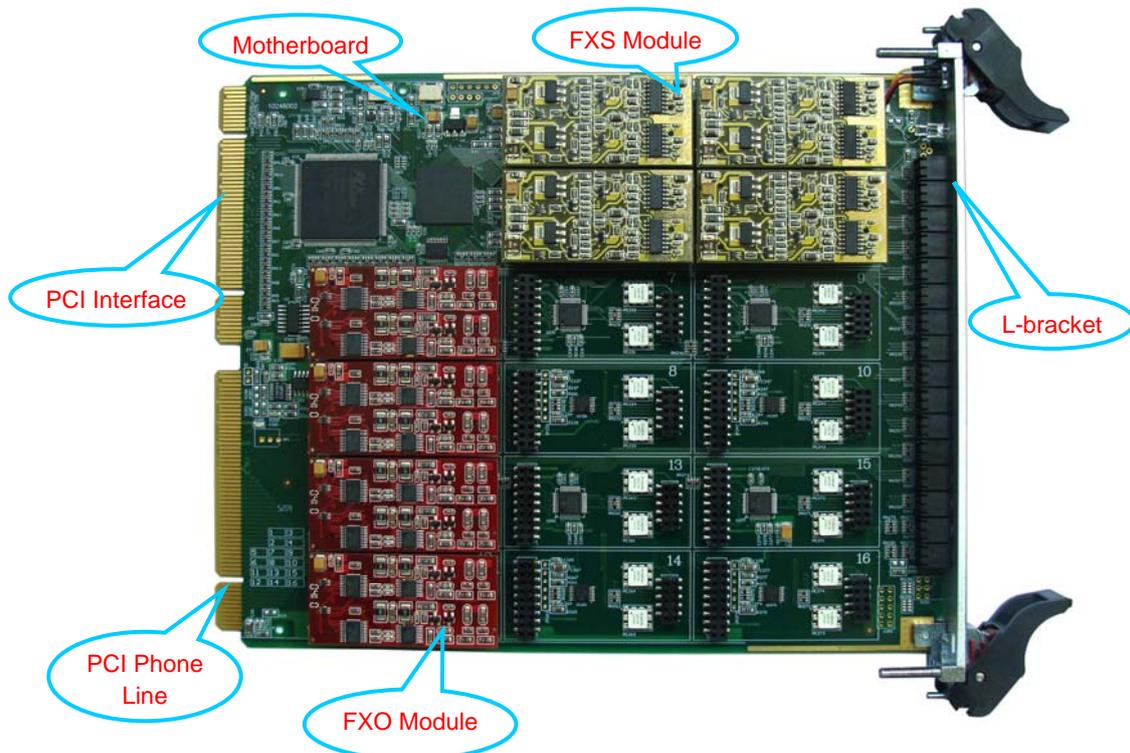

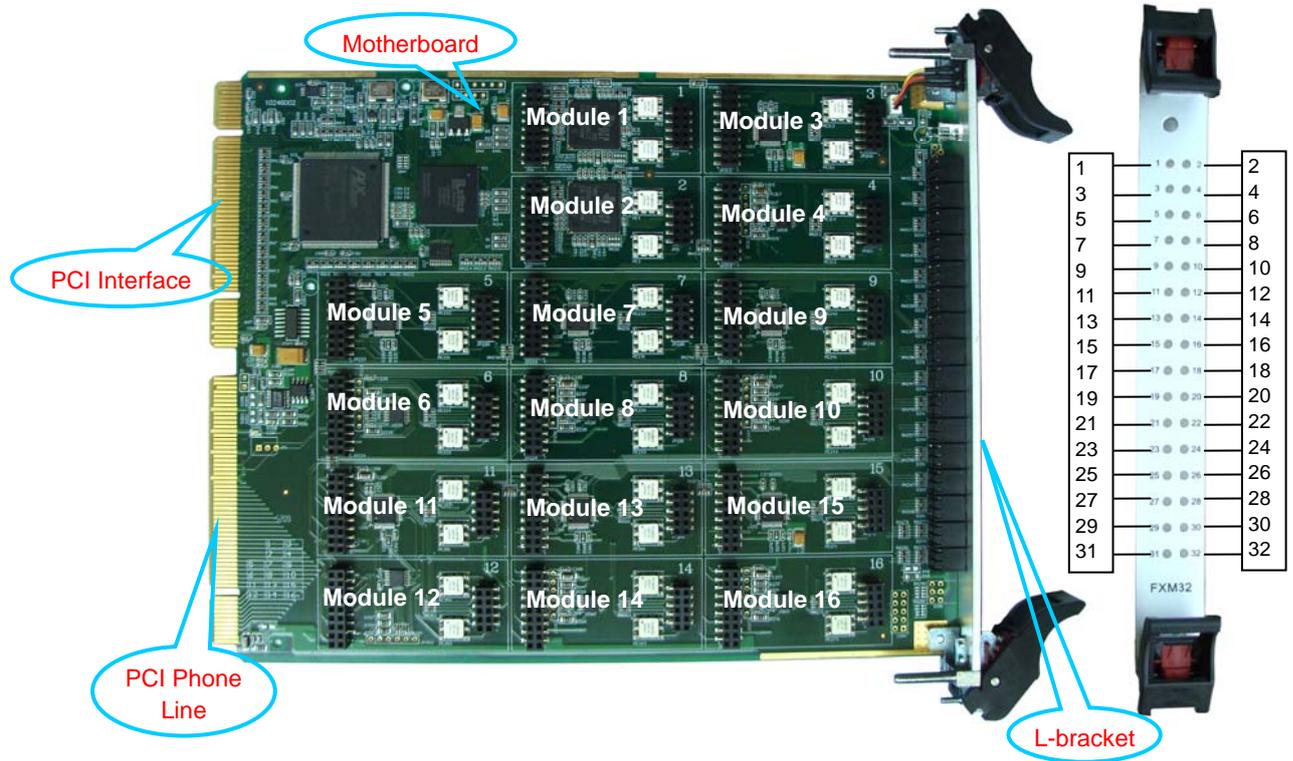Figure 2-1 Overall Structure

2.1.1 Motherboard

Figure 2-2 Motherboard
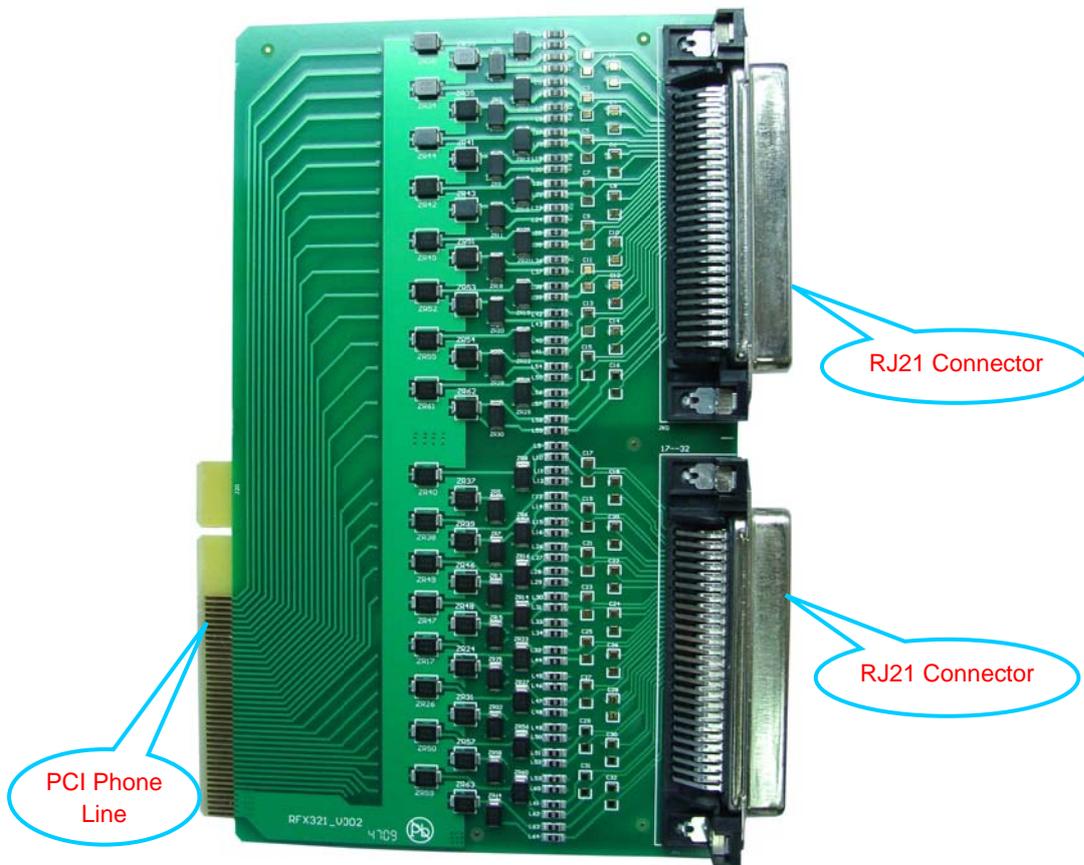
2.1.2 Outlet Board

Figure 2-3 Outlet Board

2.1.3 Module

The FXM32_SSW can have FXO, FXS or FXC (composite module) only, or be equipped with two or three of them at the same time.

● **FXO (Trunk Module)**

This module is equipped with the lightning-proof circuit that reaches the telecom standard, and connects its corresponding channel directly to local lines from Central Office Terminal (COT), with the abilities to detect line voltage, diagnose line failure, and judge the on-hook/off-hook state of the station phone which is linked with it. See Figure 2-4 for its hardware structure.
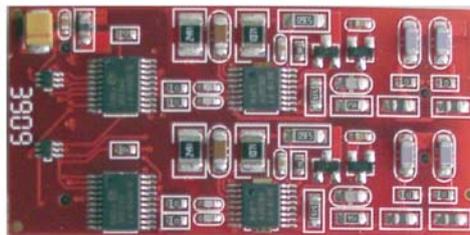

Figure 2-4 Trunk Module

● **FXS (Station Module)**

This module functions either as a station phone provided it links directly to a telephone or as an extension phone for the PBX, supporting delivery of the calling party information in FSK/DTMF to the phone. It uses -48V standard battery feed voltage and the integrated overcurrent/overvoltage circuit protection system, can accommodate a subscriber line in length of up to 5.5km. Refer to Figure 2-5 for its hardware structure.
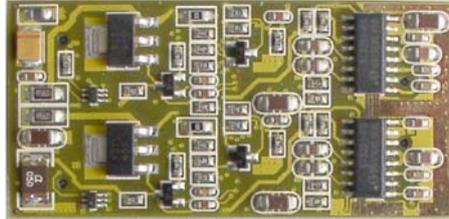

Figure 2-5 Station Module

- **FXC (Composite Module)**

A composite module accommodates a trunk channel and a station channel. It has a special capability of ensuring safe communication via an automatic direct connection of the trunk and station channels when the driver is not running or the PC is powered off.
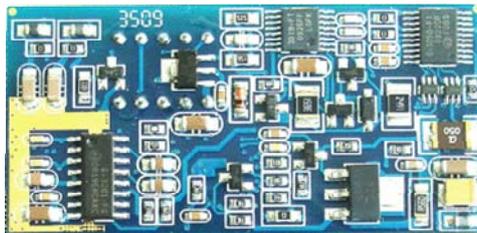

Figure 2-6 Composite Module

2.2 Interface Identification

FXM32_SSW can be extended with two RJ21 connectors by connecting the outlet board through the PCI interface. Actually, in each RJ21 only the first 16 pins are used.
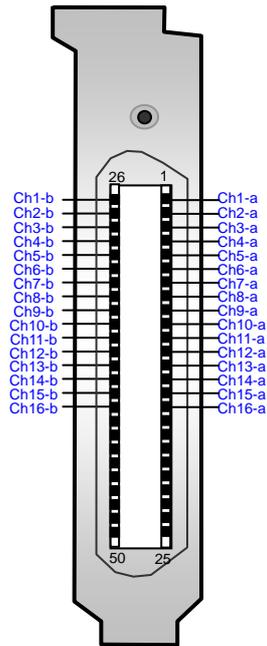The pin layout of RJ21 is shown as follows.

Figure 2-7 RJ21

The RJ21 connecting line we provide has 3 specifications (3m, 5m and 10m) for you to choose. They are all 25-twisted-pair communication cables using the international standard spectrum, can connect directly to our board. The 25 pairs of pins in RJ21 can be arranged by color in two different ways.See Table 2-2 and Table 2-3 for details. (To be exact, the 1st and the 26th pins are the first pair; the 2nd and the 27th pins constitute the second pair; …; the 24th and the 49th pins are the 24th pair; the 25th and the 50th pins constitute the 25th pair. Actually, only the first 24 pairs are used by 24-channel boards.)

Pair Number	1	2	3	4	5	6	7	8
Color	White Blue	White Orange	White Green	White Brown	White Grey	Red Blue	Red Orange	Red Green
Pair Number	9	10	11	12	13	14	15	16
Color	Red Brown	Red Grey	Black Blue	Black Orange	Black Green	Black Brown	Black Grey	Yellow Blue
Pair Number	17	18	19	20	21	22	23	24
Color	Yellow Orange	Yellow Green	Yellow Brown	Yellow Grey	Purple Blue	Purple Orange	Purple Green	Purple Brown

Table 2-2

Pair Number	1	2	3	4	5	6	7	8
Color	Black Grey	Black Brown	Black Orange	Black Green	Black Blue	Red Grey	Red Brown	Red Orange
Pair Number	9	10	11	12	13	14	15	16

Color	Red Green	Red Blue	Yellow Grey	Yellow Brown	Yellow Orange	Yellow Green	Yellow Blue	Purple Grey
Pair Number	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Color	Purple Brown	Purple Orange	Pruple Green	Purple Blue	White Grey	White Brown	White Orange	White Green

Table 2-3

Notes:

1) Each channel is related to only the module at the corresponding place, as shown in the figure below.
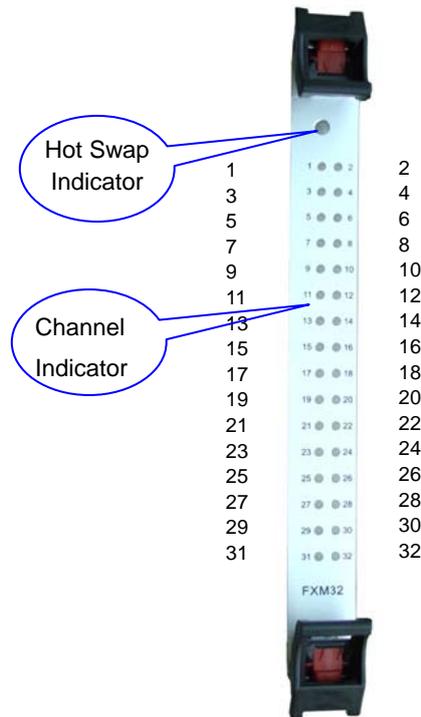

Figure 2-8

2) When an FXM32_SSW board is running, the indicators corresponding to trunk channels stay red, and those corresponding to station channels stay green. The indicators being unused do not light up.

2.3 Channel Number Identification

An FXM32_SSW set provides up to 32 channels, each of which has a fixed number.

The channel number is fixed on the motherboard corresponding to the module position. The channel type is decided by the type of the installed module.
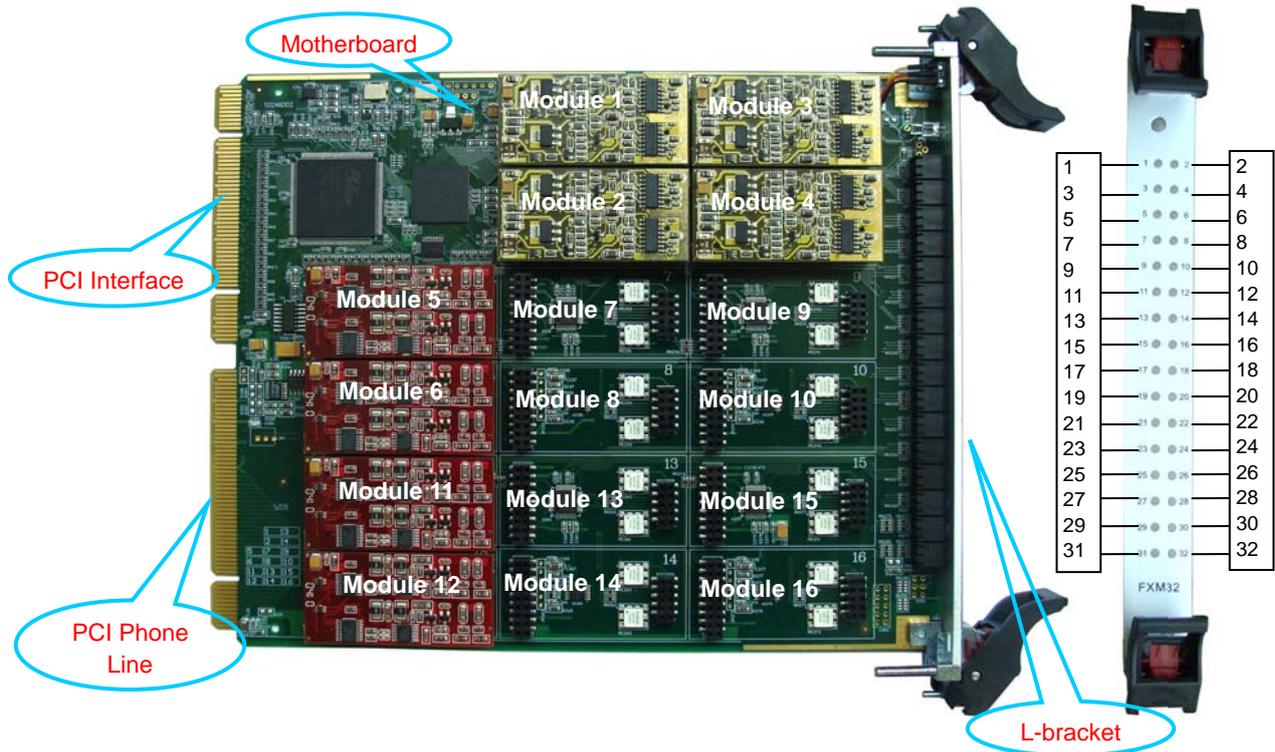
Figure 2-9

Note: Only applicable to the Synway UMCT intelligent switch.

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.

Fit all modules to corresponding channels on the motherboard. Refer to Figure 2-9 (just an example).

Step 3: Fit the motherboard into the slot on the switch.

Step 4: Connect the outlet board to the corresponding interface on the switch.

Step 5: In use of RJ21 for direct connection, just connect the RJ21 line directly to the outlet board; in use of the interface converter to convert RJ21 to RJ11, make sure you have both the SHR-24DA-JB interface converter and the RJ21 line and use the RJ21 line to connect two SHR-24DA-JB interface converters (only the first 16 pins of each interface converter are usable) with the outlet board.

Step 6: Set up an application environment.

Connect phone lines with the port to an FXO module and the telephone with the port to an FXS module, to establish an application environment.

Step 7: Boot your computer and install the driver.

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

Step 8: Synchronize the clock.

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

The clock synchronization signal is used to connect more than one FXM32_SSW motherboard or connect FXM32_SSW boards with other kinds of boards (e.g. digital trunk 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 clock synchronization between FXM32_SSW motherboards and other boards is achieved via the outlet board, without the need to use the clock synchronization line.)

To make these two boards work synchronously indeed, you have to do proper configurations. Refer to the steps below.

1) For two FXM32_SSW motherboards, after they are installed properly into the switch, powered on and loaded automatically with the driver, please execute the following command to activate the clock synchronization configuration.

    #>echo 12 > /sys/module/fxm32/parameters/clockconf

2) For an FXM32_SSW motherboard and a board of other model (such as a digital trunk board), after they are installed properly into the switch, powered on and loaded automatically with the driver, please execute the following command to activate the clock synchronization configuration.

    #>echo 1 > /sys/module/fxm32/parameters/clockconf

Note: If the file /sys/module/fxm32/parameters/clockconf does not exist, on the premise that the driver has been loaded, you may try to use '/sys/module/fxm32/clockconf' to replace '/sys/module/fxm32/parameters/clockconf' in the above command.

Appendix A Technical Specifications

Dimensions

219x175 mm^2 (excluding L-bracket)

Weight

Motherboard: about 185g

(excluding modules)

Module: about 10g

Outlet board: about 90g

Environment

Operating temperature: 0℃—55℃

Storage temperature: -20℃—85℃

Humidity: 8%—90% non-condensing

Storage humidity: 8%—90%
non-condensing

Input/output Interface

Telephone line jack: 2 RJ21

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 how many slots on the PBX

Power Requirements

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

Only motherboards
(with modules fully inserted)

+3.3V DC: 4300mA
(power consumption: 14.2 W)

+12V DC: 4000mA
(power consumption: 48W)

Impedance

Insulation resistance for PC isolation from telephone line: ≥2MΩ/500V DC

Telephone line impedance:

Compliant with the national standard impedance for three-component network

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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