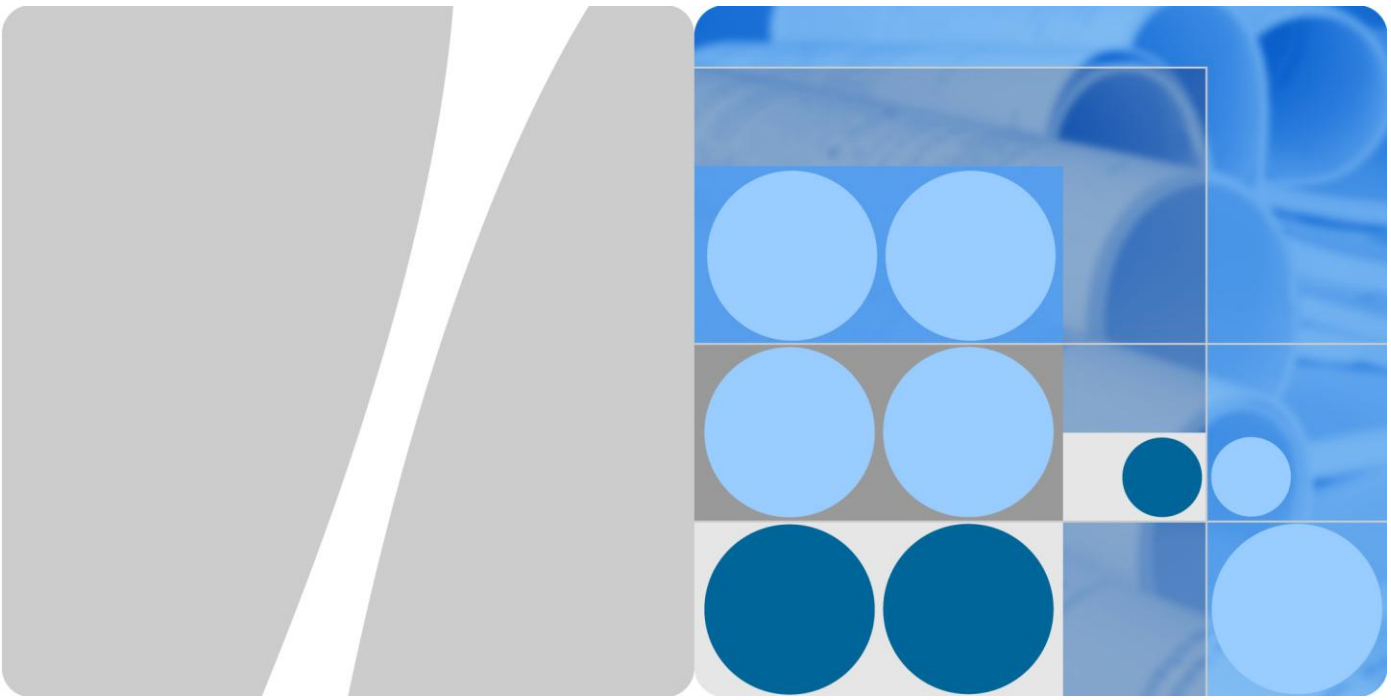

SoftCo VoIP Integrated Exchange V100R002C04SPC600

Description

Issue 05

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Contents

1 Overview

About This Chapter

This chapter describes the product positioning and features of the SoftCo.

The SoftCo product consists of SoftCo9500 and SoftCo5816, and integrates the functions of many communication devices.

The SoftCo has various services, open interfaces, advanced architecture, high process capability, high reliability and easy maintenance.

1.1 Positioning of the SoftCo

The SoftCo product consists of SoftCo9500 and SoftCo5816, and integrates the functions of many communication devices.

The SoftCo VoIP integrated exchange is the IP voice communication device that Huawei provides for:

- Governments
- Tax authorities
- Electric-power industry
- Financial industry
- Enterprises and their branches

Table 1-1 lists the SoftCo product models and their application conditions.

Table 1-1 SoftCo product models and their conditions

Product Model	Recommended Application Condition
SoftCo9500	More than 800 internal subscribers
SoftCo5816	Less than 800 internal subscribers

The SoftCo integrates the functions of the SoftSwitch, trunk media gateway (TMG), signaling gateway (SG), media resource system (MRS), and POTS (the subscriber line access). The SoftCo can network with the SmartCall 1000, IAD, and UA5000. The SoftCo interconnects and communicates with the gateway or SoftSwitch devices of another system through the protocols such as SIP and H.248. The SoftCo can also be connected to the traditional PSTN network through the signaling such as SS7, Primary Rate Adaptation (PRA), R2.

NOTE
SS7 signaling includes ISDN User Part (ISUP) and Telephone User Part (TUP).

1.2 Features of the SoftCo

The SoftCo has various services, open interfaces, advanced architecture, high process capability, high reliability and easy maintenance.

Various Services

The SoftCo provides the following services:

- ONLY service, simultaneous ringing and sequential ringing service
- CC service

  Based on the modes of attending a conference, the CC service is classified into four types, namely, the CC service through access code, CC service through system convening, CC service through host convening, and CC service through instant convening.
- Support of multiple call restriction modes and intelligent routing
- Support of the supplementary services such as:
  - Calling line identification service
  - Call forwarding service
  - Secretary service
  - Pickup service
  - Number replacement service
  - Hotline service
  - Automatic operator service

NOTE
ONLY = one number link you

Open Interfaces

The SoftCo supports the following interfaces:

- Providing the narrowband interface to interconnect with the PSTN and traditional PBX and supporting the SS7, PRA, R2, and FXS signaling
- Providing the packet trunk to realize the communication between SoftCos or between the SoftCo and the SoftSwitch and supporting the SIP protocol

- Providing the packet protocol to realize the access for packet terminals, supporting the VoIP control protocols such as SIP and H.248, supporting the VoIP transfer protocols such as RTP, and supporting the fax protocols such as T.30 and T.38
- Supporting the protocols such as Telnet and TFTP to access a remote network management system to load the software
- Supporting the SNTP protocol
- Supporting the Domain Name Service (DNS)

NOTE

- PBX = private branch exchange
- RTP = Real-time Transport Protocol
- TFTP = Trivial File Transfer Protocol
- SNTP = Simple Network Time Protocol

Advanced Architecture

The SoftCo provides an advanced architecture:

- Embedded audio conference system that integrates the traditional exchange, SoftSwitch, and voice gateway functions
- Rich embedded IVR resources that realize the functions of friendly voice playing and two-stage dialing
- Supporting the TDM exchange, TDM-IP exchange, and pure IP exchange
- Supporting the following features to ensure that the audio and video materials are transferred with high quality:
  - Various coding and decoding modes
  - Jitter preventive caching
  - Echo cancellation
  - Silence compression
  - Comfort noise generation
  - Automatic gain
  - Packet loss compensation
- The SoftCo9500 provides the single network port, dual network port, and triple network port work modes. In single network port mode, the two network ports work in active/standby mode. In dual network port mode or triple network port mode, the service data and maintenance data can be separated.
- Supporting distributed architecture and centralized management

NOTE

- IVR = interactive voice response
- TDM= time division multiplex

High Processing Capability

The SoftCo has high processing capability.

- Busy hour call completion (BHCC): 180,000 (SoftCo9500 using SMCU board), and 28,800 (SoftCo5816).
- Thirty concurrent calls with the average call connection time being shorter than 1.5s.
- Average time for dynamically switching between voice codes: shorter than 60 ms.

- The SoftCo9500 supports up to 320 conferences and 960 parties. SoftCo5816 supports up to 20 conferences and 60 parties.

High Reliability

The SoftCo has high reliability.

- The MTBF is 62.8 years for the SoftCo9500 and 15 years for the SoftCo5816.
- The service network ports work in active/standby mode. That is, when a service network port is faulty, the other service network port automatically takes over the service.
- The SoftCo9500 supports current balancing, backup, and hot swap of the power module.
- The SoftCo9500 supports the 1:1 hot backup of a main control board. When the active board is faulty, the standby board takes over the services on the active board automatically. The switchover duration is shorter than 3s.
- The SoftCo9500 supports load sharing of media resource boards. In normal cases, all the media resource boards share the load. If a media resource board is faulty, other media resource boards share the entire load.
- The SoftCo9500 supports remote disaster redundancy (DR) and local survival. When SMCUs are configured, the two SoftCo9500 function as the active and standby devices. Other SoftCos (SoftCo9500 or SoftCo5816) function as local devices. In normal situation, the active device synchronizes data to the standby device and local devices in real time. Services are not interrupted even when a SoftCo is faulty, fully meeting requirements on the reliability.
  - Remote DR: When the active device is faulty, the standby device automatically synchronizes data with local devices instead of the active device, ensuring that services are not interrupted. After the active device is restored, you can switch services back to the active device in manual or automatic mode.
  - Local survival: When both the active device and standby device are faulty, users of one local device cannot perform service switching with users of other local devices. but intra-office service switching and service switching with local PSTN users are still supported.

NOTE

MTBF = mean time between failures

Easy Maintenance

The SoftCo is easy to maintain.

- The SoftCo provides different maintenance modes such as the GUI and CLI to support local and remote access from multiple users at the same time.
- The navigation tree structure makes the operation and maintenance interface visual and easy to memorize. The operation and maintenance interface also provides graphical topology view of network components and panel views.
- The signaling tracing and resource tracing functions help maintenance personnel to locate and analyze faults.
- The SoftCo provides functions such as querying, screening, deleting, and saving alarms. The system receives and displays the fault report in real time. This helps maintenance personnel to detect fault sources quickly and correctly and adopt proper measures.
- The SoftCo host can be upgraded through OMU clients. The SoftCo host of the current version is displayed and saved on the OMU client during upgrade. The SoftCo host can be rolled back to the earlier version if an upgrade fails.

NOTE

- GUI = graphical user interface
- CLI = command line interface
- OMU = operation and maintenance unit

2 Hardware of the SoftCo9500

About This Chapter

The hardware of the SoftCo9500 consists of the shelf, boards, power distribution system, fan tray assembly, air filter and POTS-32 subscriber box.

2.1 Shelf

The shelf provides a space for placing and connecting the internal components of the SoftCo. It can also protect the components from contamination and external damage.

Appearance

The shelf of the SoftCo9500 is a standard 6U shelf. It is 436 mm in width, 420 mm in depth, and 264 mm in height. Figure 2-1 shows the front panel of the shelf. Figure 2-2 shows the rear panel of the shelf.

Figure 2-1 Schematic drawing of the SoftCo9500 front panel

1	Indicator light	2	Mount angle

Figure 2-2 Schematic drawing of the SoftCo9500 rear panel

1	Power switch	2	Power module
3	Fan tray assembly	4	Slot

Slots

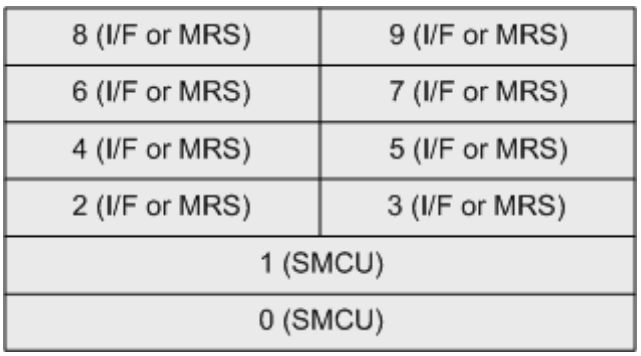
Slots are at the back of the shelf, as shown in Figure 2-2.

The SoftCo9500 provides two SMCU slots and eight slots for the interface board:

- Slots 0-1 are SMCU slots used to install the SC1-SMCU boards. The two boards cannot be installed in the same chassis.
- Slots 2-9 are interface board slots used to install interface boards, SC1-MRS boards. These boards can be used together.

Figure 2-3 shows the slot distribution of the SoftCo9500.

Figure 2-3 Slot distribution of the SoftCo9500



When only one SMCU slot is installed with the SC1-SMCU board, the system runs in the single control mode. When both the SMCU slots are installed with SMCU boards, the system runs in the active/standby control mode and has a higher reliability.

At least, the SoftCo9500 needs to be installed with one SC1-SMCU board and one SC1-MRS board for operation. You can install other boards according to the capacity of the system. For slots that are not installed with boards, you need to install blank filler panels.

Indicator Lights

The POWER, RUN, and ALARM indicator lights are located on the front panel of the SoftCo9500 shelf. Table 2-1 describes the statuses of the indicator lights.

Table 2-1 Statuses of the indicator lights in the SoftCo9500 shelf

Indicator Light	Identifier	Color	Status Description
Power indicator light	POWER	Green	• On: indicates that the power supply is normal. • Off: indicates that there is no power supply.
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 0.5 Hz): indicates that the system runs normally. • Off: indicates that there is no power input, the board is faulty, or the system is starting.
Alarm	ALARM	Red	• Flashing (at 4 Hz): indicates that a critical alarm is generated during the running of the

Indicator Light	Identifier	Color	Status Description
indicator light			system. • Flashing (at 0.5 Hz): indicates that a major alarm is generated. • Flashing (at 0.25 Hz): indicates that a minor alarm is generated. • Off: indicates that no alarm is generated.

2.2 Boards

The boards of the SoftCo9500 include SC1-SMCU, SC1-DTU-4, and SC1-EXU-4.

2.2.1 SC1-MCU

The SC1-MCU board is a main control board of SoftCo. It provides two 100Base-TX service network interfaces and two debugging interfaces.

Main Functions

The main functions of SC1-MCU (SoftCo main control unit) are as follows:

- It provides the SoftSwitch, gatekeeper (GK) and charging functions. The GK database includes the mapping between extensions and their Local Area Network (LAN) IP addresses.
- It processes the media control protocols. It supports the SIP and H.248 protocols and can make conversions between different protocols.
- It provides the functions of L2 switching and TDM exchange.
- It supports 1+1 hot backup. When the active board is faulty, the standby board automatically takes the place of the active board.

CAUTION

The SC1-MCU board and SC1-SMCU board can not be used in one SoftCo at the same time.

Panel

Figure 2-4 shows the panel of the SC1-MCU board.

Figure 2-4 Panel of the SC1-MCU board

1	Indicator light	2	Alarm tone mute button	3	Reset button
4	Ejector handle	5	Debugging serial interface	6	Debugging network interface
7	Service network interface				

Interfaces

There are two service network interfaces, one debugging network interface, and one debugging serial interface on the panel of the SC1-MCU board.

Table 2-2 lists the interfaces on the SC1-MCU board.

Table 2-2 Interfaces on the SC1-MCU board

Interface	Symbol	Attribute	Purpose
Service network interface	100BASE-TX	RJ-45 FE interface. The maximum transmission distance is 100 meters.	It is used to connect to a LAN switch. In single-network-port mode, the two network ports work in active/standby mode. In two-network-port mode, network port 0 functions as the maintaining network port and network port 1 functions as the service network port. The two network ports are connected to different LANs, thus separating service data from maintenance data.
Debugging network interface	ETHERNET	RJ-45 FE interface. The maximum transmission distance is 100 meters.	It is used to configure and debug the SoftCo.
Debugging serial interface	COM	RS-232 serial interface. The maximum transmission distance is 10 meters.	It is used to configure and debug the SoftCo.

Indicator Lights

The RUN, alarm (ALM), and active (ACT) indicator lights are located on the panel of the SC1-MCU board. Table 2-3 describes the statuses of the indicator lights.

Table 2-3 Statuses of the indicator lights on the SC1-MCU board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 1 Hz): indicates that the board is starting. • Flashing (at 0.5 Hz): indicates that the system runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing (at 4 Hz): indicates that a critical alarm is generated during the running of the system. • Flashing (at 0.5 Hz): indicates that a major alarm is generated. • Flashing (at 0.25 Hz): indicates that a minor alarm is generated. • Off: indicates that no alarm is generated.
Active and standby indicator lights	ACT	Green	• On: indicates that the current board is an active board. • Off: indicates that the current board is a standby board.

Button

There is a reset button and an alarm tone mute button (with the symbol of BUZZ OFF) on the panel of the SC1-MCU. The functions of each component are described as follows:

CAUTION

Be careful while operating the reset button. Pressing this button when the system is running normally may stop the running of the services.

- The reset button is used to restart the board and load programs and data.
- The alarm tone mute button is used to mute the alarm tone when the equipment gives out alarms.

2.2.2 SC1-SMCU

The SC1-SMCU board is a main control board of SoftCo. It provides three 100Base-TX service network interfaces and two debugging interfaces.

Main Functions

The main functions of SC1-SMCU (SoftCo main control unit) are as follows:

- It provides the SoftSwitch, gatekeeper (GK) and charging functions. The GK database includes the mapping between extensions and their Local Area Network (LAN) IP addresses.
- It processes the media control protocols. It supports the SIP, H.248 and H.323 protocols and can make conversions between different protocols.
- It provides the functions of L3 switching and TDM exchange.
- It supports hot swap.
- It supports 1+1 hot backup. When the active board is faulty, the standby board automatically takes the place of the active board.

Panel

Figure 2-5 shows the panel of the SC1-SMCU board.

Figure 2-5 Panel of the SC1-SMCU board

1	Indicator light	2	Alarm tone mute button	3	Reset button
4	Ejector handle	5	Debugging serial interface	6	Debugging network interface
7	Service network interface				

Interfaces

There are three service network interfaces, one debugging network interface, and one debugging serial interface on the panel of the SC1-SMCU board.

Table 2-4 lists the interfaces on the SC1-SMCU board.

Table 2-4 Interfaces on the SC1-SMCU board

Interface	Symbol	Attribute	Purpose
Service network interface	100/1000BASE-TX	RJ-45 FE interface. The maximum transmission distance is 100 meters.	It is used to connect to a LAN switch.
Debugging network interface	ETHERNET	RJ-45 FE interface. The maximum transmission distance is 100 meters.	It is used to configure and debug the SoftCo.
Debugging serial interface	COM	RS-232 serial interface. The maximum transmission distance is 10 meters.	It is used to configure and debug the SoftCo. Supports the long-distance access through the Modem.

The service data flows processed on the SC1-SMCU service network ports are classified into the following four types:

- Signaling packet: SIP/H.248/H.323
- Media stream packet: RTP/RTCP
- NMS packet: Telnet/private protocol used for communicating with the BMU and OMU/SNMP/TFTP
- RADIUS/DIAMETER/SNTP

In the three application scenarios of the network ports of the SC1-SMCU, Table 2-5 describes the data flows processed on each network port. Some data flows can be transmitted from network port 0 or network port 1 according to the configuration.

Table 2-5 Application scenarios of the network ports of the SC1-SMCU

Application Scenario	Network Port 0	Network Port 1	Network Port 2
Single-network-port mode	This network port processes all the data flows.	The functions of this network port are the same as those of network port 0. The two network ports are in mutually redundant mode.	This network port is not used.
Two-network-port mode	This network port processes the following data flows: • NMS packet:	This network port processes all the data flows.	This network port is not used.

Application Scenario	Network Port 0	Network Port 1	Network Port 2
	Telnet/private protocol used for communicating with the BMU and OMU/SNMP • RADIUS/DIAMETER/SNTP		
Triple-network-port mode	This network port processes the following data flows: • NMS packet: Telnet/private protocol used for communicating with the BMU and OMU/SNMP/TFTP • RADIUS/DIAMETER/SNTP	This network port processes all the data flows.	This network port processes the following data flows: • NMS packet: Telnet/private protocol used for communicating with the BMU and OMU/SNMP/TFTP • RADIUS/DIAMETER/SNTP

The SC1-SMCU board works in single-network-port mode by default. If it works in two-network-port mode or triple-network-port mode, the network ports need to be configured in different network segments.

Indicator Lights

The RUN, alarm (ALM), and active (ACT) indicator lights are located on the panel of the SC1-SMCU board. Table 2-6 describes the statuses of the indicator lights.

Table 2-6 Statuses of the indicator lights on the SC1-SMCU board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 1 Hz): indicates that the board is starting. • Flashing (at 0.5 Hz): indicates that the

Indicator Light	Identifier	Color	Status Description
			system runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing (at 4 Hz): indicates that a critical alarm is generated during the running of the system. • Flashing (at 0.5 Hz): indicates that a major alarm is generated. • Flashing (at 0.25 Hz): indicates that a minor alarm is generated. • Off: indicates that no alarm is generated.
Active and standby indicator lights	ACT	Green	• On: indicates that the current board is an active board. • Off: indicates that the current board is a standby board.

Button

There is a reset button and an alarm tone mute button (with the symbol of BUZZ OFF) on the panel of the SC1-SMCU. The functions of each component are described as follows:

CAUTION

Be careful while operating the reset button. Pressing this button when the system is running normally may stop the running of the services.

- The reset button is used to restart the board and load programs and data.
- The alarm tone mute button is used to mute the alarm tone when the equipment gives out alarms.

2.2.3 SC1-MRU-128

The SC1-MRU-128 board is a media resource board. It provides two debugging interfaces.

Main Functions

The SC1-MRU-128 board provides the following functions:

- The RTP protocol is used to pack the voice streams when the narrowband voice signals are converted to the broadband voice signals. The RTCP protocol is used to control the voice streams to ensure that the voices are transferred correctly and completely.
- The codec DSP is embedded to implement the functions of voice codec through the G.711, G.723, and G.729 modes and the fax function in the T.30 and T.38 protocols. In

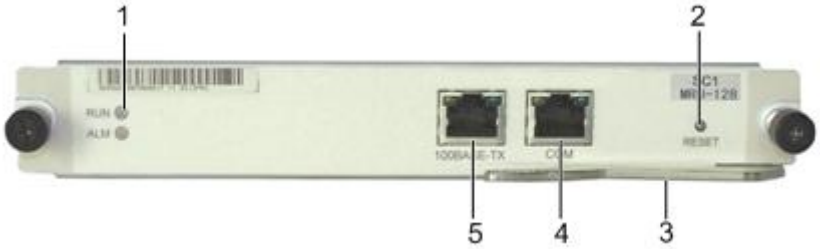
addition, the SC1-MRU-128 board provides the channels for processing 128-channel media resources.

- The universal DSP is embedded and works with the codec DSP to implement the following functions:
  - Checking and sending the dual tone multi-frequency signals
  - Checking and sending the caller ID
  - Checking and sending signal tones
  - Checking and sending the R2 signaling
  - Recording and announcement playing
- The SC1-MRU-128 board supports load sharing. In normal cases, all the media resource boards share the load. If a media resource board is faulty, other media resource boards share the entire load to ensure that the system runs normally.

Panel

Figure 2-6 shows the panel of the SC1-MRU-128 board.

Figure 2-6 Panel of the SC1-MRU-128 board



1	Indicator light	2	Reset button	3	Ejector handle
4	Debugging serial interface	5	Debugging network interface		

Interfaces

There is one debugging network interface and one debugging serial interface on the SC1-MRU-128 board.

Table 2-7 lists the interfaces on the SC1-MRU-128 board.

Table 2-7 Interfaces on the SC1-MRU-128 board

Interface	Symbol	Attribute	Purpose
Debugging network interface	100BASE-TX	RJ-45 FE interface. Its maximum transmission distance is 100 meters.	It is used to debug the SC1-MRU-128 board.
Debugging serial interface	COM	RJ-45 RS-232 serial interface. Its maximum transmission distance is 10 meters.	It is used to debug the SC1-MRU-128 board.

Indicator Lights

The ALM and RUN indicator lights are located on the panel of the SC1-MRU-128 board. Table 2-8 describes the statuses of the indicator lights.

Table 2-8 Indicator lights on the SC1-MRU-128 board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing: indicates that the board is starting or the subscriber does not add the board by using a command after the board starts. • Off: indicates that the board runs normally.

Button

The reset button is used to restart the board and load programs and data.

CAUTION

Be careful while operating the reset button. Pressing this button when the system is running normally may stop the running of the services.

2.2.4 SC1-MRS

The SC1-MRS is the media resource system board of the SoftCo9500 and provides two debugging ports.

Main Functions

The SC1-MRS provides the following functions: number allocation, digit collection, voice playing, CRBT playing, recording, conference, ASR, conversion from the TDM signals to the VoIP signals, T.30 fax, supporting G.711, G.729 and G.723.1. The SC1-MRS provides 256 channels for processing the media resources.

The SC1-MRS supports load sharing. When all the boards run normally, they share loads evenly. When a board fails, other normal boards share the load to ensure the normal running of the system.

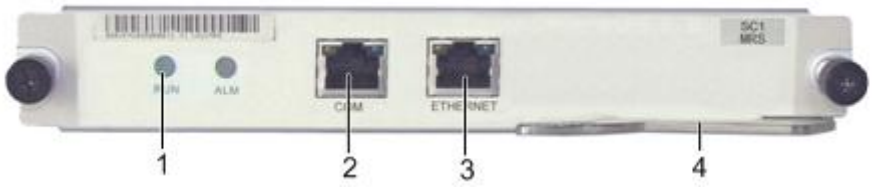
The universal DSP is embedded to implement the following functions:

- Checking and sending the dual tone multi-frequency signals
- Checking and sending the caller ID in FSK
- Checking and sending signal tones
- Checking and sending the MFC signaling
- Recording and announcement playing

Panel

Figure 2-7 lists the interfaces on the SC1-MRS board.

Figure 2-7 Panel of the SC1-MRS board



1	Indicator light	2	Reset button	3	Ejector handle
4	Debugging serial interface	5	Service network interface		

Interfaces

There is one service network interface and one debugging serial interface on the SC1-MRS board.

Table 2-9 lists the interfaces on the SC1-MRS board.

Table 2-9 Interfaces on the SC1-MRS board

Interface	Symbol	Attribute	Purpose
Service network interface	100BASE-TX	RJ-45 FE interface. Its maximum transmission distance is 100 meters.	It is used to access the LAN to communicate with other servers.
Debugging serial interface	COM	RJ-45 RS-232 serial interface. Its maximum transmission distance is 10 meters.	It is used to debug the SC1-MRS board.

Indicator Lights

The ALM and RUN indicator lights are located on the panel of the SC1-MRS board. Table 2-10 describes the statuses of the indicator lights.

Table 2-10 Indicator lights on the SC1-MRS board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing: indicates that the board is starting or the subscriber does not add the board by using a command after the board starts. • Off: indicates that the board runs normally.

2.2.5 SC1-DTU-4

The SC1-DTU-4 board is a digital trunk interface board. It provides four E1 interfaces and a debugging interface.

Main Functions

The SC1-DTU-4 board provides access for digital trunk.

The rate of an E1 interface is 2.048 Mbit/s. The E1 interfaces meet the requirements of G.703 or G.704 and support signaling such as SS7, PRA, R2.

Panel

Figure 2-8 shows the panel of the SC1-DTU-4 board.

Figure 2-8 Panel of the SC1-DTU-4 board

1	Running indicator light	2	Signal indicator light	3	Reset button
4	Ejector lever	5	Digital trunk interface	6	Debugging serial port

Interfaces

The digital trunk interface and debugging serial port are located on the SC1-DTU-4 board. Table 2-11 describes the interfaces.

Table 2-11 Interfaces on the SC1-DTU-4 board

Interface	Identifier	Number	Attribute	Function
Digital trunk interface	E1/T1	1	DB50 socket, supporting the connection to the digital trunk cable of 75 ohm or 120 ohm. The digital trunk interface provides four E1 interfaces and supports the SS7, PRAand R2 signaling. **NOTE** Currently, the T1 trunk is not supported.	This interface realizes the connection to the digital trunk of an upper level office, for example, the LE.
Debugging serial port	COM	1	RS-232 standard serial port and RJ-45 socket. In addition, the transmission distance is less than 10 meters.	This interface is used to debug the functions of the SC1-DTU-4 board.

NOTE
LE = local exchange

Indicator Lights

Four types of the indicator lights are located on the SC1-DTU-4 board: RUN, ALM, loss of signal (LOS), and remote fail alarm (FRA). An LOS indicator light and an RFA indicator light reflect the status of an E1 interface. For example, the LOS and RFA indicator lights that are

indicated by 0 reflect the status of the first E1 interface; the LOS and RFA indicator lights that are indicated by 1 reflect the status of the second E1 interface.

Table 2-12 Indicator lights on the SC1-DTU-4 board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing: indicates that the board is starting or the subscriber does not add the board by using a command after the board starts. • Off: indicates that the board runs normally.
Signal loss indicator light	LOS	Yellow	• When the indicator light is on, it indicates that there is signal loss. • When the indicator light is off, it indicates that there is no signal loss.
Remote alarm indicator light	RFA	Green	• When the indicator light is on, it indicates that the peer equipment fails in receiving the signals. • When the indicator light is off, it indicates that the peer equipment is running normally.

Button

The reset button is used to restart the board and load programs and data.

CAUTION

Be careful while operating the reset button. Pressing this button when the system is running normally may stop the running of the services.

2.2.6 SC1-DTU-8

The SC1-DTU-8 board is a digital trunk interface board. It provides eight E1 interfaces and a debugging interface.

Main Functions

The SC1-DTU-8 board provides access for digital trunk.

The rate of an E1 interface is 2.048 Mbit/s. The E1 interfaces meet the requirements of G.703 or G.704 and support signaling such as SS7, PRA, R2.

Panel

Figure 2-9 shows the panel of the SC1-DTU-8 board.

Figure 2-9 Panel of the SC1-DTU-8 board

1	Running indicator light	2	Signal indicator light	3	Reset button
4	Ejector lever	5	Digital trunk interface	6	Debugging serial port

Interfaces

The digital trunk interface and debugging serial port are located on the SC1-DTU-8 board. Table 2-13 describes the interfaces.

Table 2-13 Interfaces on the SC1-DTU-8 board

Interface	Identifier	Number	Attribute	Function
Digital trunk interface	E1/T1	1	DB50 socket, supporting the connection to the digital trunk cable of 75 ohm or 120 ohm. The digital trunk interface provides four E1 interfaces and supports the SS7, PRAand R2 signaling. **NOTE** Currently, the T1 trunk is not supported.	This interface realizes the connection to the digital trunk of an upper level office, for example, the LE.

Interface	Identifier	Number	Attribute	Function
Debugging serial port	COM	1	RS-232 standard serial port and RJ-45 socket. In addition, the transmission distance is less than 10 meters.	This interface is used to debug the functions of the SC1-DTU-4 board.

NOTE
LE = local exchange

Indicator Lights

Four types of the indicator lights are located on the SC1-DTU-4 board: RUN, ALM, loss of signal (LOS), and remote fail alarm (FRA). An LOS indicator light and an RFA indicator light reflect the status of an E1 interface. For example, the LOS and RFA indicator lights that are indicated by 0 reflect the status of the first E1 interface; the LOS and RFA indicator lights that are indicated by 1 reflect the status of the second E1 interface.

Table 2-14 Indicator lights on the SC1-DTU-8 board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the FLASH when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the FLASH when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing: indicates that the board is starting or the subscriber does not add the board by using a command after the board starts. • Off: indicates that the board runs normally.
Signal loss indicator light	LOS	Yellow	• When the indicator light is on, it indicates that there is signal loss. • When the indicator light is off, it indicates that there is no signal loss.
Remote alarm indicator light	RFA	Green	• When the indicator light is on, it indicates that the peer equipment fails in receiving the signals. • When the indicator light is off, it indicates that the peer equipment is

Indicator Light	Identifier	Color	Status Description
			running normally.

Button

The reset button is used to restart the board and load programs and data.

CAUTION

Be careful while operating the reset button. Pressing this button when the system is running normally may stop the running of the services.

2.2.7 SC1-ATU-8

The SC1-ATU-8 (analog trunk unit-8) board mainly provides access to analog trunk. It can connect eight POTS ports at the local exchange.

Main Functions

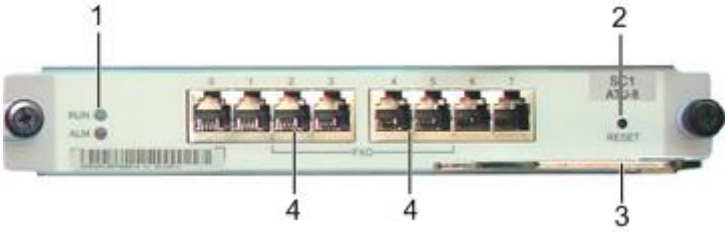
The SC1-ATU-8 board has the following features:

- Circuit protection: It provides protection against high current and high voltage.
- Ringing current detection: It can detect the ringing current signals sent from the peer exchange.
- Feed detection: It can detect whether there is feed from the peer exchange.
- Polarity reversal detection: It can detect polarity reversal of the two telephone wires.
- Simulated pick-up: It can stimulate the pick-up function, thus controlling the opening of the voice channel.
- 2-wire/4-wire conversion: It can realize the conversion between 2-wire circuits and 4-wire circuits.
- Code and decode: It can code and decode voice signals.

Panel

Figure 2-10 shows the panel of the SC1-ATU-8 board.

Figure 2-10 Panel of the SC1-ATU-8 board



1	Indicator light	2	Reset button
3	Ejector handle	4	Analog trunk interface

Interfaces

The SC1-ATU-8 board has interfaces for eight channels of analog trunk.

Table 2-15 lists the interfaces.

Table 2-15 Interfaces on the SC1-ATU-8 board

Interface	Symbol	Attribute	Purpose
Analog trunk interface	FXO (0-7)	RJ-11	It is used to realize analog trunk connection with the peer office.

Indicator Lights

The ALM and RUN indicator lights are located on the panel of the SC1-ATU-8 board. Table 2-16 describes the statuses of the indicator lights.

Table 2-16 Indicator lights on the SC1-ATU-8 board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm	ALM	Red	• Flashing: indicates that the board is starting or the subscriber does not add the

Indicator Light	Identifier	Color	Status Description
indicator light			board by using a command after the board starts. • Off: indicates that the board runs normally.

Button

The reset button is used to restart the board and load programs and data.

CAUTION

Be careful while operating the reset button. Pressing this button when the system is running normally may stop the running of the services.

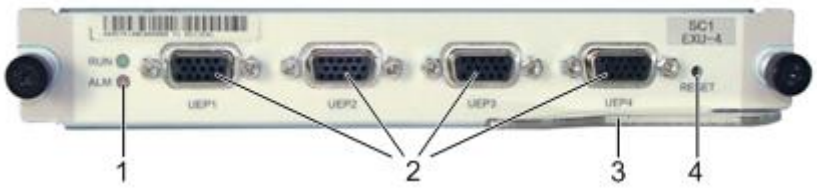
2.2.8 SC1-EXU-4

The SC1-EXU-4 board is an extension board for POTS users. It provides four user extension port (UEP) interfaces.

Panel

Figure 2-11 shows the panel of the SC1-EXU-4 board.

Figure 2-11 Panel of the SC1-EXU-4 board



1	Indicator light	2	UEP interface
3	Ejector leaver	4	Reset button

Interfaces

Four UEP interfaces are located on the panel of the SC1-EXU-4 board. Table 2-17 describes the interfaces.

Table 2-17 Interfaces of the SC1-EXU-4 board

Interface	Identifier	Number	Attribute	Function
UEP	UEP1-UEP4	Four	DB15 connector	This interface is connected to the POTS-32 subscriber box. Four UEP interfaces connect four subscriber boxes.

Indicator Lights

The ALM and RUN indicator lights are located on the panel of the SC1-EXU-4 board. Table 2-18 describes the statuses of the indicator lights.

Table 2-18 Indicator lights on the SC1-EXU-4 board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing: indicates that the board is starting or the subscriber does not add the board by using a command after the board starts. • Off: indicates that the board runs normally.

Button

The reset button is used to restart the board and load programs and data.

CAUTION

Be careful while operating the reset button. Pressing this button when the system is running normally may stop the running of the services.

2.2.9 SC1-ASU

The SC1-ASU is an analog subscriber interface board, which provides 40 foreign exchange subscriber (FXS) interfaces.

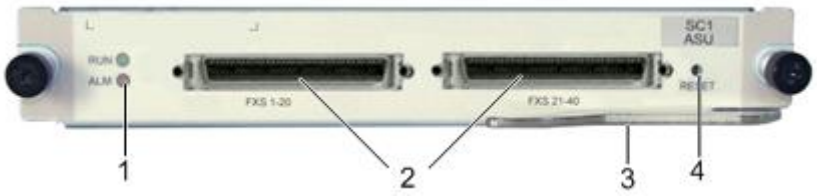
Main Functions

The SC1-ASU board is used to provide the access of the analog phones. Each board can provide the access of 40 phones.

Panel

Figure 2-12 shows the panel of the SC1-ASU board.

Figure 2-12 Panel of the SC1-ASU board



1	Indicator light	2	FXS interface
3	Ejector leaver	4	Reset button

Interfaces

There are two DB68B interfaces on the SC1-ASU board, as described in Table 2-19.

Table 2-19 Interfaces of the SC1-ASU board

Interface	Identifier	Number	Attribute	Function
FXS	FXS 1-20 FXS 21-40	Fourty	DB68B connector	This interface is used to connect to the analog phones. The interface can connect to 40 phones.

Indicator Lights

The ALM and RUN indicator lights are located on the panel of the SC1-ASU board.Table 2-20 describes the statuses of the indicator lights.

Table 2-20 Indicator lights on the SC1-ASU board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing: indicates that the board is starting or the subscriber does not add the board by using a command after the board starts. • Off: indicates that the board runs normally.

Button

The reset button is used to restart the board and load programs and data.

CAUTION

Be careful while operating the reset button. Pressing this button when the system is running normally may stop the running of the services.

2.3 Power Distribution System

The SoftCo9500 uses the 100-240 V AC or -48 V DC power distribution system. The power distribution system is at the top of the shelf. It comprises a power distribution frame (PDF) and power modules.

Figure 2-13 shows the power distribution system.

Figure 2-13 Power distribution system of the SoftCo9500

1 Power switch 2 Power module 3 Alarm tone mute button

2.3.1 PDF

There is one power switch, three power module slots, and one alarm tone mute button on the PDF.

The functions of each component are described as follows:

CAUTION

Be careful with the power switch when the equipment is running normally. Powering off the equipment will stop all the services.

- The power switch is used to power on and power off the SoftCo9500.
- The power module slots are used to install power modules. The numbers of the three slots from left to right are 0, 1, and 2. If there is a vacant slot, insert a blank filter panel into it. Otherwise, a power alarm is generated.
- The alarm tone mute button is used to mute the alarm tone when the equipment gives out alarms.

2.3.2 Power Supply

The SoftCo9500 uses two power supply modules that can be swapped and work in active/standby mode. The AC and DC power supplies are supported.

Figure 2-14 shows an AC power supply module.

Figure 2-14 A AC power supply module

1 AC power socket

Figure 2-15 a DC power supply module.

Figure 2-15 A DC power supply module

1 DC power socket

If DC power supplies are used, the DC power cables shown in Figure 2-16 must be used.

Figure 2-16 DC power cables

The power supply module provides the following functions:

- Equalizing currents and backing up power supplies

  By default, a SoftCo9500 is installed with one power supply module in slot 0. If a SoftCo9500 is installed with two power supply modules, it can equalize currents and back up power supplies. When working normally, each power supply module shares the load with the current output. When a power supply module stops working, the other power supply module continues to work.

- Supporting hot swapping

  You can insert a power supply module directly into a vacant slot of the power distribution frame without powering off the SoftCo9500. When a backup power supply module is installed, you can remove a power supply module without affecting the running of the SoftCo9500.

CAUTION

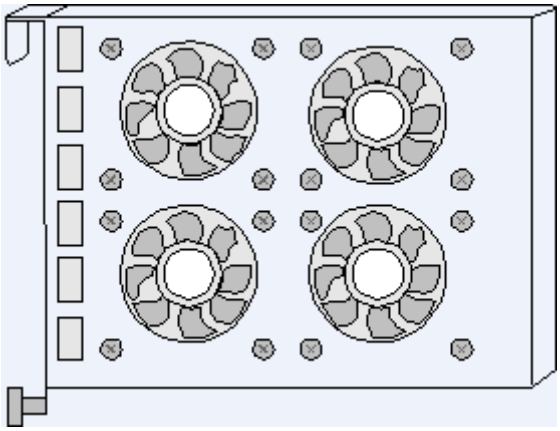
When two power supply modules are configured, you cannot configure both the AC and DC power supply modules on a SoftCo.

2.4 Fan Tray Assembly

The fan tray assembly dissipates heat and improve the stability of the equipment.

The fan tray assembly of the SoftCo9500 is vertically mounted on the left of the rear panel of the device. Four fans are installed in the fan tray assembly. Figure 2-17 shows the fan tray assembly.

Figure 2-17 Fan tray assembly of the SoftCo9500



When the system runs, the fans draw out the hot air inside the equipment and expel the air to the left. At the same time, cool air comes in from the right side. The fans ensure the heat dissipation and improve the stability of the equipment.

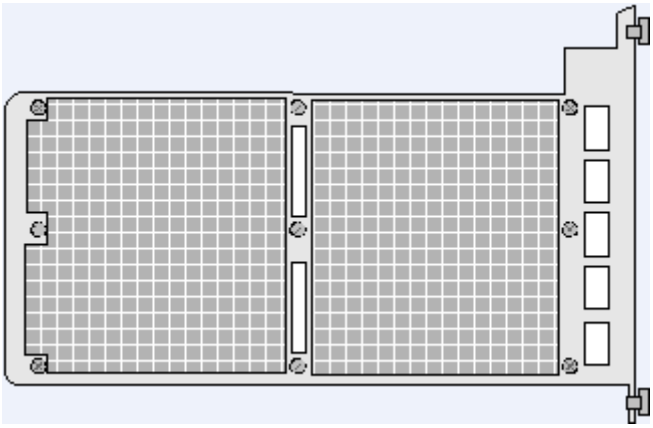
2.5 Air Filter

The air filter protects the equipment from dust.

The air filter is vertically mounted on the left of the equipment front. In this way, it protects the boards and backplane inside the shelf.

Figure 2-18 shows the air filter.

Figure 2-18 Air filter of the SoftCo9500



NOTE

Before the device is delivered to customers, the air filter is already installed and it is blocked by the front panel. Therefore, you cannot see the air filter.

2.6 POTS-32 Subscriber Box

The POTS-32 subscriber box can provide access for common telephones.

Main Functions

Each subscriber box can connect with 32 POTS lines. It is connected to the UEP interface of the SC1-EXU-4 or the SoftCo5816 through a cable with the DB15 plug.

The POTS-32 uses independent power supply. The voltage range of it is 100-240V AC. It supports hot swap. The SC1-EXU-4 and SoftCo5816 can automatically recognize the UEP interface to which a subscriber box is connected, which is convenient from management and maintenance aspects.

Appearance

The shelf of the POTS-32 is a standard 1U shelf. It is 440 mm in width, 342 mm in depth, and 43 mm in height.

Figure 2-19 shows the front panel of the POTS-32. Figure 2-20 shows the rear panel of the POTS-32.

Figure 2-19 Schematic drawing of the POTS-32 front panel

1	Mount angle	2	Indicator light

Figure 2-20 Schematic drawing of the POTS-32 rear panel

1	Antistatic mounting hole	2	UEP interface	3	Analog telephone interface
4	Power switch	5	AC power interface	6	Grounding screw

There are ventilation holes on both sides of the POTS-32. These ventilation holes are used for heat dissipation of the device.

CAUTION

Do not block the ventilation holes. Leave enough space on both sides of the POTS-32 for heat dissipation. Otherwise, the internal components will get overheated, which will affect the normal running of the device.

Figure 2-21 shows the schematic drawing of the POTS-32 side panel.

Figure 2-21 Schematic drawing of the POTS-32 side panel

Interfaces

There is one 220V AC power interface, one UEP interface (DB15), and four DB26 analog telephone interfaces on the rear panel of the POTS-32.

Table 2-21 lists the interfaces.

Table 2-21 Interfaces on the rear panel of the POTS-32

Interface	Symbol	Attribute	Purpose
AC power interface	~100-240V; 50/60Hz;2.0A	-	It is used to connect to the power supply. The input voltage ranges from 100 V AC to 240 V AC and the rate is 50 Hz or 60 Hz.
UEP interface	UEP	DB15 connector	It is used to connect to the UEP interface of the SC1-EXU-4 or the SoftCo5816.
Analog telephone interface	POTS	DB26 connector	It provides access for analog telephones. Each DB26 interface can connect with eight POTS users. Four DB26 interfaces can connect with 32 POTS users in total.

Indicator Lights

There are two indicator lights on the front panel of the POTS-32: RUN and ALARM. Figure 2-19 shows the position of these indicator lights. Table 2-22 lists the indicator lights.

Table 2-22 Indicator lights on the front panel of the POTS-32

Indicator Light	Symbol	Color	Status Description
Running indicator light	RUN	Green	• When the indicator light flashes, it indicates that the system is running normally. • When the indicator light is in other status, it indicates that there is failure in the subscriber box.
Alarm indicator light	ALARM	Red	• When the indicator light is on, it indicates that there is a failure in communications between the subscriber box and the SoftCo host. • When the indicator light flashes at 1 Hz, it indicates that the subscriber box is waiting service programs to be loaded. • When the indicator light flashes at 2 Hz, it indicates that the service programs are being loaded into the subscriber box. • When the indicator light is off, it indicates that the subscriber box runs normally after it starts. • When the indicator light is in other status, it indicates that there is a failure in the subscriber box.

Switch

There is a power switch on the rear panel of the POTS-32. It is used to power on and power off the subscriber box.

CAUTION

Be careful with the power switch when the subscriber box is running normally. Powering off the device will stop all the services.

3 Hardware of the SoftCo5816

About This Chapter

This chapter describes the shelf and boards of the SoftCo5816.

3.1 Shelf

The shelf provides a space for placing and connecting the internal components of the SoftCo. It can also protect the components from contamination and external damage.

Appearance

The shelf of the SoftCo5816 is a standard 2U shelf. It is 442 mm in width, 345 mm in depth, and 89 mm in height. Figure 3-1 shows the front panel of the shelf. Figure 3-2 shows the rear panel of the shelf.

Figure 3-1 Schematic drawing of the SoftCo5816 front panel

1	Mount angle	2	Indicator light

Figure 3-2 Schematic drawing of the SoftCo5816 rear panel

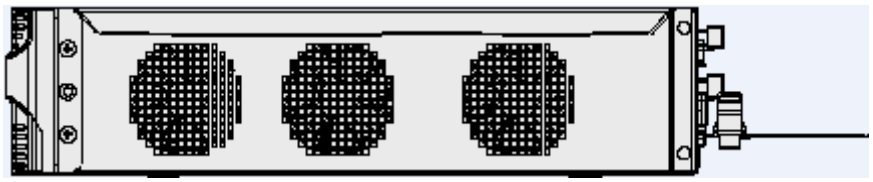
1	UEP interface	2	Service network interface	3	Debugging serial interface
4	Slot	5	Analog trunk interface	6	Analog telephone interface
7	Alarm tone mute button	8	AC power interface	9	Power switch
10	Grounding screw	11	Antistatic mounting hole		

There are ventilation holes on both sides of the SoftCo5816. These ventilation holes are used for heat dissipation of the equipment. Figure 3-3 shows the side panel of the SoftCo5816.

CAUTION

Do not block the ventilation holes. Leave enough space on both sides of the SoftCo5816 for heat dissipation. Otherwise, the internal components will get overheated, which will affect the normal running of the system.

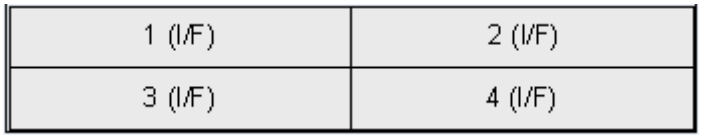
Figure 3-3 Schematic drawing of the SoftCo5816 side panel



Slots

Slots are at the back of the shelf, as shown in Figure 3-2. The SoftCo5816 provides four interface board slots, as shown in Figure 3-4.

Figure 3-4 Slot distribution of the SoftCo5816



You can install interface boards according to the capacity of the system. For slots that are not installed with boards, you need to install blank filler panels.

Interfaces

All the interfaces in the SoftCo5816 shelf are located on the rear panel. Table 3-1 describes the interfaces.

Table 3-1 Description of the interfaces on the rear panel of the SoftCo5816 shelf

Interface	Identifier	Attribute	Function
Service network interface	100BASE-TX	FE network interface and RJ-45 socket	This interface connects a device to the LAN and functions as the external IP service interface of the device. The transmission distance is less than 100 meters. The two service network interfaces work in active/standby mode.
Debugging serial port	CONSOLE	RS-232 standard serial port and RJ-45 socket	This interface is used to configure and debug a device. The transmission distance is less than 10 meters.
AC power interface	~100 V-240 V; 50/60Hz;2.0A	-	This interface takes in AC power. The input voltage ranges from 100 V AC to 240 V AC and the rate is 50 Hz or 60 Hz.
UEP interface	UEP1-UEP4	DB15 connector	This interface connects the board to the POTS-32 subscriber box and allows the expansion of call access through POTS interfaces. Four UEP interfaces connect four subscriber boxes.
Analog telephone interface	POTS	DB26 connector	The SoftCo provides eight POTS interfaces for the access for eight analog telephones.

NOTE

- FE = fast Ethernet
- LAN = local area network

The RUN and ALM indicator lights are located on the front panel of SoftCo5816 shelf. The indicator lights on the Ethernet port are located beside the service network interface on the rear panel. Table 3-2 describes the statuses of the indicator lights.

Table 3-2 Statuses of the indicator lights in the SoftCo5816 shelf

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing (at 4 Hz): indicates that a critical alarm is generated during the running of the system. • Flashing (at 0.5 Hz): indicates that a major alarm is generated. • Flashing (at 0.25 Hz): indicates that a minor alarm is generated. • Off: indicates that no alarm is generated.
Indicator lights on the Ethernet port	-	Green	• On: indicates that the connection between the port and the device is stable. • Off: indicates that the port is not connected to a device or the connection is abnormal.
	-	Orange	• Flashing: indicates that the port is receiving or transferring data. • Off: indicates that no data is being transferred or received on the port.

Switch and Button

There is a power switch and an alarm tone mute button (with the symbol of BUZZER) on the rear panel of the SoftCo5816. The functions of each component are described as follows:

CAUTION

Be careful with the power switch when the equipment runs normally. Powering off the equipment will stop all the services.

- The power switch is used to power on/off the SoftCo5816.

- The alarm tone mute button is used to mute the alarm tone when the equipment gives out alarms.

3.2 Boards

The boards of SoftCo5816 include SC0-DTU-4.

3.2.1 SC0-DTU-4

The SC0-DTU-4 board is a digital trunk interface board. It provides four E1 interfaces.

Main Functions

SC0-DTU-4 provides access for digital trunk.

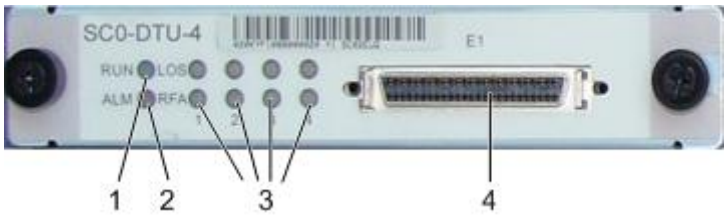
The rate of E1 interfaces is 2.048 Mbit/s. Specifications of the E1 interfaces comply with the G.703/G.704 standards suggested by ITU-T. In addition, the E1 interfaces support PRAand R2 signaling.

If you want to insert or remove a board when it is powered on, insert the board in two seconds after the blade is removed.

Panel

Figure 3-5 shows the panel of the SC0-DTU-4 board.

Figure 3-5 Panel of the SC0-DTU-4 board



1,2 Running indicator light 3 Signal indicator light 4 Digital trunk interface

Interfaces

The digital trunk interface is located on the SC0-DTU-4 board. Table 3-3 describes the interfaces.

Table 3-3 Interfaces on the SC0-DTU-4 board

Interface	Identifier	Number	Attribute	Function
Digital trunk interface	E1	1	DB50 socket, supporting the connection to the digital trunk cable of 75 ohm or 120 ohm. The digital trunk interface provides four E1 interfaces	This interface realizes the connection to the digital trunk of an upper level

Interface	Identifier	Number	Attribute	Function
			and supports the PRAand R2 signaling.	office, for example, the LE.

Indicator Lights

Four types of the indicator lights are located on the SC0-DTU-4 board: RUN, ALM, loss of signal (LOS), and remote fail alarm (FRA). An LOS indicator light and an RFA indicator light reflect the status of an E1 interface. For example, the LOS and RFA indicator lights that are indicated by 0 reflect the status of the first E1 interface; the LOS and RFA indicator lights that are indicated by 1 reflect the status of the second E1 interface.

Table 3-4 Indicator lights on the SC0-DTU-4 board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing: indicates that the board is starting or the subscriber does not add the board by using a command after the board starts. • Off: indicates that the board runs normally.
Signal loss indicator light	LOS	Green	• When the indicator light is on, it indicates that there is signal loss. • When the indicator light is off, it indicates that there is no signal loss.
Remote alarm indicator light	RFA	Green	• When the indicator light is on, it indicates that the peer equipment fails in receiving the signals. • When the indicator light is off, it indicates that the peer equipment is running normally.

3.2.2 SC0-ATU-8

The SC0-ATU-8 board mainly provides access to analog trunk.

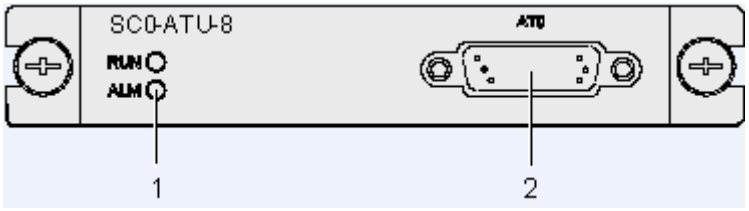
Main Functions

The SC0-ATU-8 board can connect to eight POTS ports at the peer office.

Panel

Figure 3-6 shows the panel of the SC0-ATU-8 board.

Figure 3-6 Panel of the SC0-ATU-8 board



1	Running indicator light	2	Analog trunk interface

Interface

There is one DB26 connector (with the symbol of AT0) on the panel of the SC0-ATU-8 board. It can provide access to eight channels of analog trunk.

Indicator Lights

There are two indicator lights on the panel of the SC0-ATU-8 board: ALARM and RUN.

Table 3-5 lists the indicator lights.

Table 3-5 Indicator lights on the SC0-ATU-8 board

Indicator Light	Identifier	Color	Status Description
Running indicator light	RUN	Green	• On: indicates that the board is faulty. • Flashing (at 4 Hz): indicates that the board is writing data to the Flash Memory when the system is running. • Flashing (at 2 Hz): indicates that the board is writing data to the Flash Memory when the system starts. • Flashing (at 0.5 Hz): indicates that the board runs normally. • Off: indicates that there is no power input or the board is faulty.
Alarm indicator light	ALM	Red	• Flashing: indicates that the board is starting or the subscriber does not add the board by using a command after the board starts. • Off: indicates that the board runs normally.

4 Interfaces, Signaling, and Protocols

About This Chapter

The SoftCo series products provide open and standard interfaces, and support SS7, PRA, R2, SIP, H.248, H.323, Telnet, TFTP, SNTP Signaling/Protocol.

4.1 Interfaces

The SoftCo series provide FE interfaces, E1 digital trunk interfaces, and debugging interfaces.

Table 4-1 lists the external interfaces of the SoftCo series.

Table 4-1 External interfaces of the SoftCo series

Product	Interface	Component Providing the Interface	Number of the Interfaces	Function of the Interface
SoftCo9500	FE interface	SC1-SMCU	Three	This interface connects a device to the LAN and functions as the external IP service interface of the device. The SoftCo can work in single-network-port, two-network-port mode or triple-network-port mode according to the configuration.
	E1 interface	SC1-DTU-4	Four E1 interfaces per board	This interface provides the access for digital trunks to enable the connection to the

Product	Interface	Component Providing the Interface	Number of the Interfaces	Function of the Interface
				digital trunk of an upper level office, for example, the LE.
	E1 interface	SC1-DTU-8	Eight E1 interfaces per board	This interface provides the access for digital trunks to enable the connection to the digital trunk of an upper level office, for example, the LE.
	FXS interface	SC1-ASU	Fourty	All the interfaces can connect to 40 phones.
	Debugging interface	SC1-SMCU	Two per board	This interface is used to configure and debug a device. One debugging interface is an Ethernet interface. The other debugging interface is an RS-232 serial interface (RJ45 connector).
	UEP interface	SC1-EXU-4	Four	This interface connects the board to the POTS-32 subscriber box and allows the expansion of call access through POTS interfaces. Four interfaces can connect the board to four subscriber boxes.
SoftCo5816	FE interface	Shelf	Two	This interface connects a device to the LAN and functions as the external IP service interfaces of the device. The two service network interfaces work in active/standby mode.
	E1 interface	SC0-DTU-4	Four E1 interfaces per board	This interface provides the access for digital trunks to enable the connection to the digital trunk of an upper level office, for example, the LE.
	POTS interface	Shelf	Eight	This interface provides access for eight analog telephones.
	UEP interface	Shelf	Four	This interface connects the board to the POTS-32 subscriber box and allows the expansion of call access through POTS interfaces. Four interfaces can connect the SoftCo to four subscriber boxes.

Product	Interface	Component Providing the Interface	Number of the Interfaces	Function of the Interface
	Debugging interface	Shelf	One	This interface is used to configure and debug a device and is an RS-232 serial interface (RJ45 connector).
POTS-32	UEP interface	Shelf	One	This interface is used to connect the UEP interface of an upper-level device, for example, the SC1-EXU-4 board and the SoftCo5816.
	POTS interface	Shelf	Thirty two	This interface provides access for analog telephones. Each DB26 port supports access for eight POTS users. Therefore, four DB26 ports support access for 32 POTS users.

4.2 Signaling and Protocols

The SoftCo supports SS7, PRA, R2, SIP, H.248, H.323, Telnet, TFTP, SNTP Signaling/Protocol.

The SoftCo series products provide open and standard interfaces, which is useful for interconnection with other devices.

Figure 4-1 shows the distribution of main signaling and protocols.

Figure 4-1 Distribution of signaling and protocols supported by SoftCo

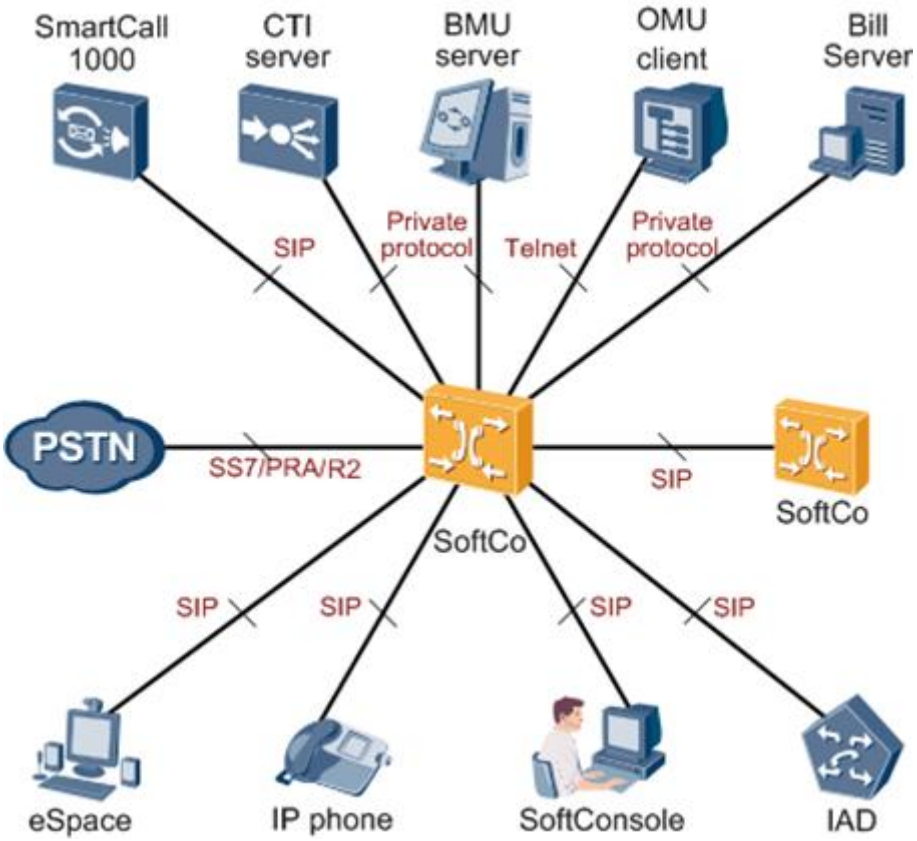


Table 4-2 lists the signaling and protocols supported by the SoftCo.

Table 4-2 Signaling and protocols supported by the SoftCo

Signaling/Protocol	Function
SS7	It is used to realize the interconnection between the SoftCo and the switching device supporting the SS7 signaling. It enables the SoftCo to access the E1 trunk provided by the switching device.
PRA	It is the ISDN signaling used to realize the interconnection between the SoftCo and the ISDN exchange equipment. It enables the SoftCo to access the E1 trunk provided by the ISDN exchange equipment.
R2	It is the channel associated signaling used to realize the interconnection between the SoftCo and the traditional exchange equipment. It enables the SoftCo to access the E1 trunk provided by the traditional exchange equipment.
SIP	It is the Session Initiation Protocol used to realize the interconnection between different SoftCo equipment. It can also be used to connect to IADs and SIP multimedia packet terminals.
H.248	It is a type of media gateway control protocol used to connect to the UA5000.

Signaling/Protocol	Function
H.323	The prootocol is used to realize the interconnection between the SoftCo and the SMCU video conference system.
Telnet	It is a standard terminal emulation protocol used for OMUs or remote operation and maintenance terminals to connect to the SoftCo.
TFTP	It is the Trivial File Transfer Protocol used to load programs and configuration data from the TFTP server by the SoftCo host.
SNTP	It is Simple Network Time Protocol. The server (SoftCo) uses this protocol to provide the synchronization clock service for the client (IP terminal and console server).

5 Functions and Services

About This Chapter

The SoftCo supplies functions and services in abundance.

5.1 Features

The SoftCo provides the voice supplementary services and customized services for enterprise networks, industry networks, and government dedicated networks.

In narrowband voice communications, the SoftCo provides all functions of the traditional private branch exchange (PBX). In VoIP communications, the SoftCo performs as a small softswitch system.

The SoftCo integrates the following functions:

- Softswitch function
- Trunk media gateway (TMG) function
- Signaling gateway (SG) function
- Media resource system (MRS) function
- Access to analog user line

The SoftCo is a multi-function device. For the media gateway, the SoftCo functions as the control device. For the SIP terminal, the SoftCo functions as a user agent.

Table 5-1 describes the features of the SoftCo.

Table 5-1 Features of the SoftCo

Feature	Description
Call control and processing	The SoftCo supports intra-office and inter-office calls. It also supports establishing two-party and multi-party calls. In addition, the SoftCo controls the media gateways in sending signal tones.
Call restriction on CPU overload	When the load of the CPU reaches the threshold, the SoftCo restricts the intra-office calls, incoming calls, and outgoing calls.
Supported signaling and protocols	The SoftCo supports the H.248 and SIP protocols and the SS7, PRA, and R2 signaling.
Intelligent routing	The SoftCo automatically selects a route when the IP trunk or TDM trunk is faulty and configures the trunk routing policy to ensure the stability of inter-office communication and the minimum cost.
Virtual IP-PBX	Through the virtual IP-PBX feature, a SoftCo can serve for multiple enterprises. The subscribers of different enterprises cannot call each other by dialing short numbers and the subscribers are independent of each other. In this case, it seems that each enterprise uses an independent PBX.
Services	The SoftCo provides the PSTN and ISDN services, including basic and supplementary services. The SoftCo also provides operator console service, video service, and unified message service.
Interconnection	The SoftCo interconnects with the PSTN network through the SS7, PRA, and R2 signaling, with the SIP terminals and adjacent SoftCo through the SIP protocol, and with the UA5000 through the H.248 protocol.
IMS integration	The SoftCo can connect to the IP Multimedia Subsystem (IMS). Then the SoftCo can substitute for subscribers under the SoftCo and conventional PBX subscribers connected through the SoftCo to register to the IMS. Then the enterprise subscribers can use various services provided by the IMS.
Collection and generation of CDRs	The SoftCo can collect and generate CDRs.
Traffic statistics	By using the OMU or UCEMS tool, you can collect statistics on the incoming, intra-office, and inter-office, local calls and toll through the SoftCo during a time segment.
Signaling tracing	By using the OMU or UCEMS tool, you can trace the broadband and narrowband signaling that interact with the SoftCo, and thus provide the location methods for troubleshooting.
Voice processing	The SoftCo supports common encoding and decoding modes, including G.711A/u, G.723.1, iLBC, and G.729A, and supports the CDMA codec transparent transmission. The SoftCo also supports voice activity detection, silence compression, echo cancellation, and the anti-jittering technology, which ensures the carrier-level voice quality.
Fax processing	The SoftCo supports the T.30 and T.38 fax protocols and fax transparent transmission mode, which ensures the reliability of fax

Feature	Description
	transmission.
Reliability and scalability	All modules support the hot patch function. When installing patches for the software, you are not required to restart the SoftCo. Services will not be affected either. Boards support hot swap, which ensures the easy online capacity expansion.
Management	The SoftCo provides the following management functions: • Management through the Telnet protocol • Management through the SNMP protocol • Management through the GUI interface • Management through the command line interface • Self service • Signaling tracing • DNS client • Alarm management • Performance management
Security	The SoftCo controls and manages level-based access authority.

5.2 Services

The SoftCo supports intra-office calls and inter-office calls. The SoftCo has dozens of supplementary services for supplement and modification of the basic functions.

Table 5-2 lists the basic voice services supported by the SoftCo.

Table 5-2 Basic voice services supported by the SoftCo

Basic Service	Description
Intra-office call	The SoftCo supports the call between intra-office users, including POTS, SIP, and H.248 users.
Inter-office call over narrowband	The SoftCo supports the call between an intra-office user and an out-office user through the PRA, SS7, or R2 trunk. The out-office user can be PSTN user or traditional PBX user.
Inter-office call over IP	The SoftCo supports the call between an intra-office user and an out-office user through the SIP trunk. The out-office user can be IP-PBX user or SoftSwitch user.

Table 5-3 lists the supplementary services supported by the SoftCo. For details on the services, refer to the Services Configuration(CLI).

Table 5-3 Supplementary services supported by the SoftCo

Service types	Supplementary service
Calling services	Local Number Querying Service
	Service of Calling Line Identification Presentation
	Service of Calling Line Identification Restriction
	Service of Calling Number Forcible Displaying
	Call Forwarding Conditional Service
	Service of Call Forwarding Unconditional
	Service of Call Forwarding No Reply
	Service of Call Forwarding Busy
	Service of Call Forwarding Offline
	Call Transfer Service
	Call Hold Service
	Call Park Service
	Call Waiting Service
	Three-Party Service
Conference call service	CC Through Individual Dialing-in
	CC Through System Convening
	CC Through Host Convening
	Instant Conference
Call-out restriction services	Call-out Restriction Service
	Password-based Call Restriction
	Anonymous Call Restriction Service
	Password Change Service
	Simple-Card-Number-based Call Restriction Service
	Outgoing Call Duration Restriction Service
	Configuring Call Restriction Data
	Configuring the Toll Fraud Prevention Function
Services of call back	Service of Registered Call on Busy
	Service of Call Back on Busy
	Call Back on No Reply Service
Pickup services	Co-Group Pickup Service

Service types	Supplementary service
	Designated Pickup Service
Number replacement services	Service of Number Replacement on the Same Phone
	Service of Number Change Announcement
Secretary services	Secretary Service
	Secretary Station Service
	Advanced Manager and Secretary Service
Hotline services	Delay Hotline Service
	Instant Hotline Service
Agent services	Service of Break-in
	Service of Forced Release
	Privilege User Service
	Playback Service
Ringing service	Simultaneous Ringing Service
	Sequential Ringing Service
	Distinctive Ring Tone Service
Unified Message Services	Service of Call Transfer to Voice Mailbox Unconditional
	Service of Call Transfer to Voice Mailbox on No Reply
	Service of Call Transfer to Voice Mailbox on Busy
	Fax Mailbox Service of one-terminal-one-number
	Fax Mailbox Service with Unified Access Code
VU Service	
Enhancing Services	Do-not-Disturb Service
	Absent User Service
	Alarm Clock Service
	Multi-Number Service
	Number Portability Service
	Abbreviated Dialing Service
	Direct Dialing In Service
	PBX Group Line Selection Service
	ONLY Service
	Card Service

Service types	Supplementary service
	Collect Call Service
	CRBT Service
	Configuring the Fax Service
	Status Checking Service
Management and setting	Remote Activation Service
	Canceling All Registered Services

6 Operation, Maintenance, and Management

About This Chapter

The operation and maintenance is needed by running network. You can manage the SoftCo through OMS NE management system, Telnet, or serial cable.

The operation and maintenance unit (OMU) is the NE management system for SoftCos. The OMU performs functions such as alarm management, performance management, configuration management, security management, etc.

You can configure and debug devices by connecting to the service interface of the SoftCo host through Telnet from a remote operation and maintenance terminal.

You can connect the serial interface of the local operation and maintenance terminal with the debugging serial interface of the SoftCo host. Then you can connect to the SoftCo through HyperTerminal on the local operation and maintenance terminal, to configure and debug the SoftCo.

6.1 OMU NE Management System

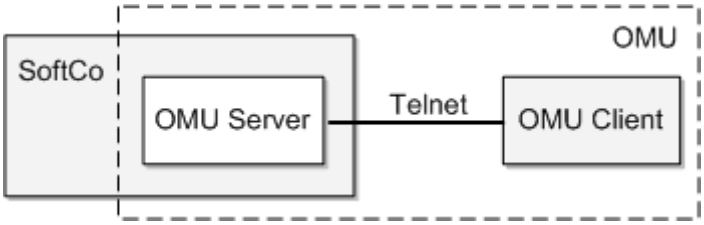
The operation and maintenance unit (OMU) is the NE management system for SoftCos. The OMU performs functions such as alarm management, performance management, configuration management, security management, etc.

6.1.1 System Structure

The OMU adopts the client/server structure and consists of the OMU server and OMU client.

Figure 6-1 shows the system structure of the OMU.

Figure 6-1 System Structure of the OMU



- OMU server

  The OMU server is integrated in the SoftCo host. The OMU server manages the alarms, tracing, performance, devices, and logs of the SoftCo, and reports the corresponding information to the OMU client.

- OMU client

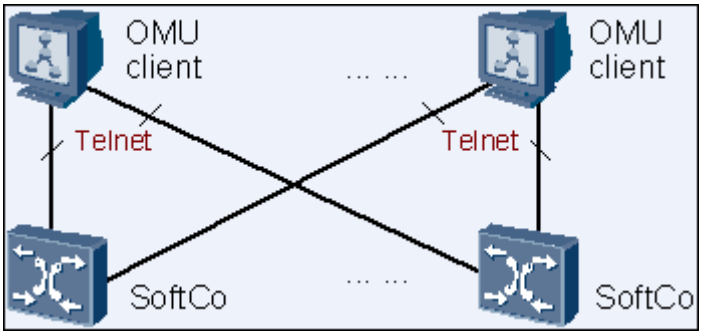
  The OMU client is installed on a PC that does not function as the SoftCo. The OMU client connects to the OMU server in telnet mode. The OMU client provides a GUI for users to perform operations such as topology management, alarm management, configuration management, device management, device upgrade, and log management.

6.1.2 System Networking

The OMU client that connects to the SoftCo in telnet mode can manage the SoftCo. One OMU client can manage multiple SoftCos, and one SoftCo can be managed by multiple OMU clients.

Figure 6-2 shows the OMU networking.

Figure 6-2 OMU networking



6.1.3 Main Functions

The OMU performs functions such as alarm management, performance management, topology management, configuration management, security management, and signaling tracing.

Table 6-1 lists the main functions of the OMU.

Table 6-1 Main functions of the OMU

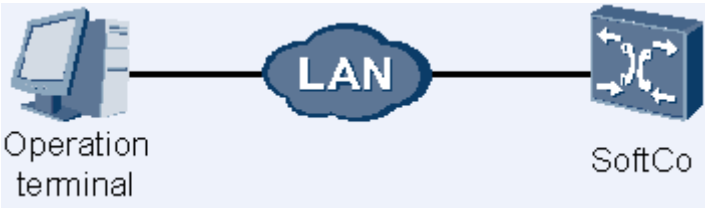
Management Function	Function Subitem
Alarm management	• Displaying and querying real-time alarms • Displaying and querying history alarms • Filtering alarms • Collecting statistics on alarm by level • Setting alarm tones • Clearing alarms
Performance management	• Viewing the Digital signal processing (DSP) status • Viewing the status of the CPU and memory • Viewing the status of E1 circuits
Configuration management	• Adding, deleting, modifying, and logging in to the SoftCo • Performing topology management Topology management is used to present and manage the network topology with a SoftCo as the center. Through the management, you can learn the networking of the SoftCo, the devices attached to the SoftCo, the devices interconnected with the SoftCo through the trunk, and the running status of the devices. • Configuring data and querying status through the command navigation tree • Configuring data and querying status through the device panel • Configuring data and querying status through the CLI or by running commands in batches • Managing patches and versions
Signaling tracing	• Tracing and parsing the SIP and H.248 broadband signaling • Tracing and parsing the SS7, PRA, and R2 narrowband signaling • Reporting the traced messages with a user phone number being the tracing condition • Managing tracing tasks • Displaying messages and signaling in real time • Automatically saving messages and signaling • Querying history messages and signaling • Deleting messages or signaling
Security management	• Managing users • Managing system run logs and user operation logs • Locking and unlocking the OMU client

6.2 Remote Operation and Maintenance Terminal

You can configure and debug devices by connecting to the service interface of the SoftCo host through Telnet from a remote operation and maintenance terminal.

Figure 6-3 shows the connection to the SoftCo host through remote operations. The CLI function provided by the SoftCo is that you can enter commands on the operation terminal and obtain the execution result. Therefore, you can manage the devices conveniently.

Figure 6-3 Connection for logging in to the SoftCo host through remote operations



The SoftCo CLI has the following two operation modes:

- View

  After you log in to the SoftCo host, the default operation mode is View. In this mode, you run the show command and common CLI commands such as **clear**, **help**, **list** and **exit**.
- Config

  You can switch to the Config mode from the View mode. In the Config mode, besides all the commands in the View mode, you can also run the configuration command and equipment maintenance commands, such as **reboot** and **switch board**.

The SoftCo CLI has defined two levels of users:

- Normal users (normal)

  Normal users are created by administrators. They can only enter the View mode and run the commands applicable in the View mode.
- Administrators (admin)

  Administrators are created by the default administrator. The default administrator of the system is **admin**. Administrators can run all the commands applicable in the View mode. Besides, they can switch to the Config mode by running the **enable** command in the View mode. In the Config mode, they can run all the commands applicable in the Config mode.

The SoftCo CLI supports the following types of commands:

- CLI basic commands
- SoftCo show commands
- SoftCo configuration commands
- SoftCo maintenance commands

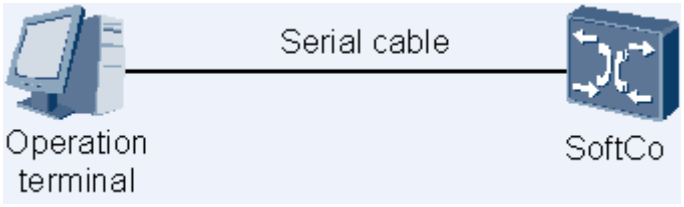
6.3 Local Operation and Maintenance Terminal

You can connect the serial interface of the local operation and maintenance terminal with the debugging serial interface of the SoftCo host. Then you can connect to the SoftCo through HyperTerminal on the local operation and maintenance terminal, to configure and debug the SoftCo.

Through the CLI, you can enter commands on the operation and maintenance terminal and get the running results.

Figure 6-4 shows the connection for locally logging in to the SoftCo host.

Figure 6-4 Connection for locally logging in to the SoftCo host



For the operation modes, user levels and command types supported by the CLI refer to 6.2 Remote Operation and Maintenance Terminal.

7 Technical Specifications and Environment Requirements

About This Chapter

This chapter describes the main technical specifications and environment requirements of the SoftCo.

7.1 Technical Specifications

This part describes the technical specifications of the SoftCo.

7.2 Environment Requirements

This part describes the environment requirements of the SoftCo.

7.1 Technical Specifications

This part describes the technical specifications of the SoftCo.

7.1.1 Dimensions and Weight

This part describes the dimensions and weight of the SoftCo components.

Table 7-1 lists the dimensions of the SoftCo components.

Table 7-1 Dimensions of the SoftCo components

Component	Width	Depth	Height
Shelf of the SoftCo9500	436 mm	420 mm	264 mm (6U)
Shelf of the SoftCo5816	442 mm	345 mm	89 mm (2U)
SC1-SMCU of the SoftCo9500	367 mm	280 mm	-
Interface board of the SoftCo9500	170 mm	280 mm	-
Interface board of the SoftCo5816	125 mm	180 mm	-
POTS-32 subscriber box	440 mm	342 mm	43 mm (1U)

Table 7-2 lists the weight of the fully loaded SoftCos.

Table 7-2 Weight of the fully loaded SoftCos

Type	Weight
SoftCo9500	About 30 kg
SoftCo5816	About 10 kg
POTS-32 subscriber box	About 4.5 kg

7.1.2 Power Supply and Power Consumption

This part describes the power supply and power consumption of the SoftCo.

Table 7-3 lists the power supply and power consumption of the SoftCo.

Table 7-3 Power supply and power consumption of the SoftCo

Type	Typical Configuration	Rated Voltage	Input Voltage Range	Frequency of Power Supply	Maximum Power When Fully Loaded
SoftCo9500	2SMCU/3MRS/5DTU	110V/220V AC	100V-240V AC	50Hz/60Hz	400 W
	2SMCU/MRS/7ASU	110V/220V AC	100V-240V AC	50Hz/60Hz	600 W
	2SMCU/MRS/7ASU	-48V/-60V DC	-38~-75V DC	direct current	560W
SoftCo5816	-	110V/220 V AC	100-240 V AC	50Hz/60Hz	140 W
POTS-32	-	110V/220 V AC	100-240 V AC	50Hz/60Hz	70 W

7.1.3 System Processing Capability

This part describes the system processing capability of the SoftCo.

System Parameters

The following are the system parameters of the SoftCo:

- Bandwidth of the TDM data bus: 8 Mbit/s for each slot
- Bandwidth of the IP data bus: 100 Mbit/s

- Bandwidth of an IP interface: 100 Mbit/s

System Capacity

Table 7-4 lists the capacity of the SoftCo system.

Table 7-4 Capacity of the SoftCo system

Specification	SoftCo9500 Using SC1-SMCU	SoftCo5816
Maximum user capacity	10000	800
Maximum number of concurrent intra-office calls	2000	120
Maximum capacity of digital trunks	600 channels, supported by five SC1-DTU-4 boards and three SC1-MRS boards 900 channels, supported by four SC1-DTU-8 boards and four SC1-MRS boards	240 channels, supported by two SC0-DTU-4 boards
Maximum capacity of SIP trunks	2000	240

Conference Processing Capability

The SoftCo has the conference processing capability as follows:

- The SoftCo9500 supports up to 320 conferences and up to 960 participants (8 MRS boards are needed). For a single conference, the SoftCo9500 supports up to 60 participants. Each MRS board supports up to 40 conferences and up to 120 participants.
- The SoftCo5816 supports up to 20 conferences and up to 60 participants. For a single conference, the SoftCo5816 supports up to 60 participants.

NOTE

If participants of a conference use IP phones that encode and decode voice in G.729 and G.723 mode, the maximum number of participants supported by the SoftCo decreases.

7.1.4 EMC

This part describes the standards of Electromagnetic compatibility (EMC) of the SoftCo.

The SoftCo complies with the following standards of EMC:

- EN 55022: 1998 + A1: 2000 + A2: 2003
- EN 55024: 1998 + A1: 2001 + A2: 2003
- CISPR 22: 2003
- CISPR 24: 1997 + A1: 2001 + A2: 2002
- IEC 61000-3-2: 2001/EN 61000-3-2: 2000
- IEC 61000-3-3: 2002/EN 61000-3-3: 1995 + A1: 2001

- ETSI EN 300 386V1.3.3: 2005
- AS/NZS CISPR 22: 2004
- ANSI C63.4: 2003
- IEC 61000-4-2: 2001/EN 61000-4-2:1995
- IEC 61000-4-3: 2006/EN 61000-4-3: 2002
- IEC 61000-4-4: 2004/EN 61000-4-4: 2004
- IEC 61000-4-5: 2005/EN 61000-4-5: 1995
- IEC 61000-4-6: 2006/EN 61000-4-6: 1996
- IEC 61000-4-11: 2001/EN 61000-4-11: 1995

7.1.5 Security Specifications

This part describes the security specification of the SoftCo.

The SoftCo complies with the following security specifications:

- IEC 60950-1
- EN 60950-1
- UL 60950-1
- CSA C22.2 No 60950-1
- AS/NZS 60950-1
- BS EN 60950-1
- GB4943

7.2 Environment Requirements

This part describes the environment requirements of the SoftCo.

The following are the environment requirements of the SoftCo:

- Storage temperature: -40℃ to +70℃
- Temperature for long-term running: 0℃ to 45℃
- Temperature for short-term running: -5℃ to +55℃
- Humidity: 5%-95% RH, no condensing
- Altitude: The SoftCo can keep its performance with the altitude being no more than 3000 m.

NOTE

Short-term running means that the SoftCo works for a continuous period of no more than 48 hours, and the cumulated working time of the SoftCo in a year does not exceed 15 days.