Ed. 00

OfficeServ 7400

System Description

SAMSUNG ELECTRONICS

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INTRODUCTION

Purpose

This document introduces product overview, H/W configuration, Specification and functions of OfficeServ 7400, which are required to understand the OfficeServ 7400 system.

Document Content and Organization

This document consists of four chapters and abbreviations.

CHAPTER 1. Overview of OfficeServ 7400

Describes the features and the main functions of OfficeServ 7400 over all and introduces system configuration and interface programming.

CHAPTER 2. H/W of OfficeServ 7400

Introduces H/W features, Cabinet composition, boards by functions and configuration of OfficeServ 7400. In addition, this chapter describes various stations, wireless equipment and additional equipment available for OfficeServ 7400.

CHAPTER 3. Specification of OfficeServ 7400

Introduces the detailed standards, such as system capacity, electrical standards, power standards, ring and tone, equipment specification, of OfficeServ 7400.

CHAPTER 4. Functions of OfficeServ 7400

Describes Call, VoIP, Data, Unified Messaging Service(UMS), and Web and System management functions provided by OfficeServ.

ABBREVIATION

Provides solutions for the abbreviations used in this manual.

Conventions

The following types of paragraphs contain special information that must be carefully read and thoroughly understood. Such information may or may not be enclosed in a rectangular box, separating it from the main text, but is always preceded by an icon and/or a bold title.

NOTE

Indicates additional information as a reference.

Reference

OfficeServ 7400 Installation Manual

Describes the condition to install the OfficeServ 7400 system and how to inspect and operate the system.

Revision History

EDITION	DATE OF ISSUE	REMARKS
00	2005. 09.	First Edition

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CHAPTER 1. Overview of OfficeServ 7400

This chapter describes the features and the main functions of OfficeServ 7400 overall and introduces System Structure, Interface and Programming.

1.1 Introduction to System

OfficeServ 7400 is the most proper communication product for mid/large-sized offices and provides the complex function including voice, data and internet functions. OfficeServ 7400, also, provides the data exchange function using data network as well as the voice call function. Users can enjoy various phone functions and applications at the various platforms such as digital phones, IP phones, mobile phones, PCs and servers.

1.1.1 Main Functions

Main functions and features of OfficeServ 7400 are as follows:

Integrated Communication Environment

OfficeServ 7400 provides the data transmission service by using Local Area Network(LAN), Wide Area Network(WAN) modules as well as the voice call function. Users can conveniently communicate by using wireless/wired integration platforms(Telephones, PCs, Wireless Phones and peripherals) function.

Next-generation Platform

OfficeServ 7400 provides a genuine IP solution integrating mail server, Session Initiation Protocol(SIP) server, Voice over IP Unified Messaging Service VoIP UMS functions via IP-based feature server.
The IP-based feature server is a Linux platform that can continuously add the successive feature server module.

High Quality IP Phone Function

OfficeServ 7400 separates the priority of data packets and voice packets from grouping so that it guarantees the following Quality of Service(QoS) in voice call:

- Layer 2 QoS: Priority Processing(802.1p), VLAN(802.1q)
- Layer 3 QoS: Class Based Queuing(CBQ), Real-time Transmission Protocol(RTP) Priority Queuing, On-Demand Bandwidth management for WAN.

WAN and LAN Functions

OfficeServ 7400 is equipped with WAN and LAN interface modules so that it can exchange data with external Internet and internal Intranet via 10/100 BASE-T or 1000 BASE-TX/SX/LX interface without additional data equipment.

Wireless LAN Service

OfficeServ 7400 provides the wireless LAN solution for wireless/wired complex service in office zone. OfficeServ 7400 uses Combo Access Point(AP) that serves separated data and voices and supports hand-off and QoS. Since OfficeServ 7400 uses a wireless LAN BTS, it allows users to make wireless/wired voice/data communication and access Internet.
Also, an efficient and convenient working environment can be made at any time or place because sophisticated mobile stations are used for the 7400.

Text-To Speech (TTS) Response

OfficeServ 7400 converts text messages such as e-mails to voice messages and allows the users to listen to the messages through phones.

Mail Server and Instant Messaging

OfficeServ 7400 integrates voice messages and e-mails to function as a mail server, which converts the integrated messages depending on the users' needs and resends them, and sends/receives instant messages.

A Variety of Application Solutions

OfficeServ 7400 offers a variety of application solutions such as OfficeServ News, OfficeServ EasySet, Internet Call Center, R-NMS, On-board Voice Mail Solutions, Integrated Fax Server, and Digital Integrated Recording Systems.


NOTE

Integrated and Application Solution

- 'Integrated' means that OfficeServ 7400 system inter-works with an external solution server and the system and the server operates as one integrated function.
- For detailed information about how to use each application solution, refer to the User's Guide for each application.

Convenient Installation and Expandability

OfficeServ 7400 can be conveniently installed as follows: the basic cabinet and expansion cabinet of the OfficeServ 7400 are mounted on the 19-inch rack. Multiple service boards can be expanded or installed in the universal slot.

1.1.2 System Architecture

OfficeServ 7400 is configured with the basic cabinet and expansion cabinet mounted on the 19-inch rack as well as OfficeServ feature server mounted on the external Linux server. The Main Control Processor 40(MP40) board, which is the main control part, is installed into the basic cabinet and manages the entire OfficeServ 7400. The Line Control Processor 40(LP 40), which is the sub-control part, is installed into the expansion cabinet, controls boards and sends/receives data to/from the MP40. The other components are boards, the power supply, and a fan.

The service configuration diagram of the OfficeServ 7400 system is shown in the figure below:

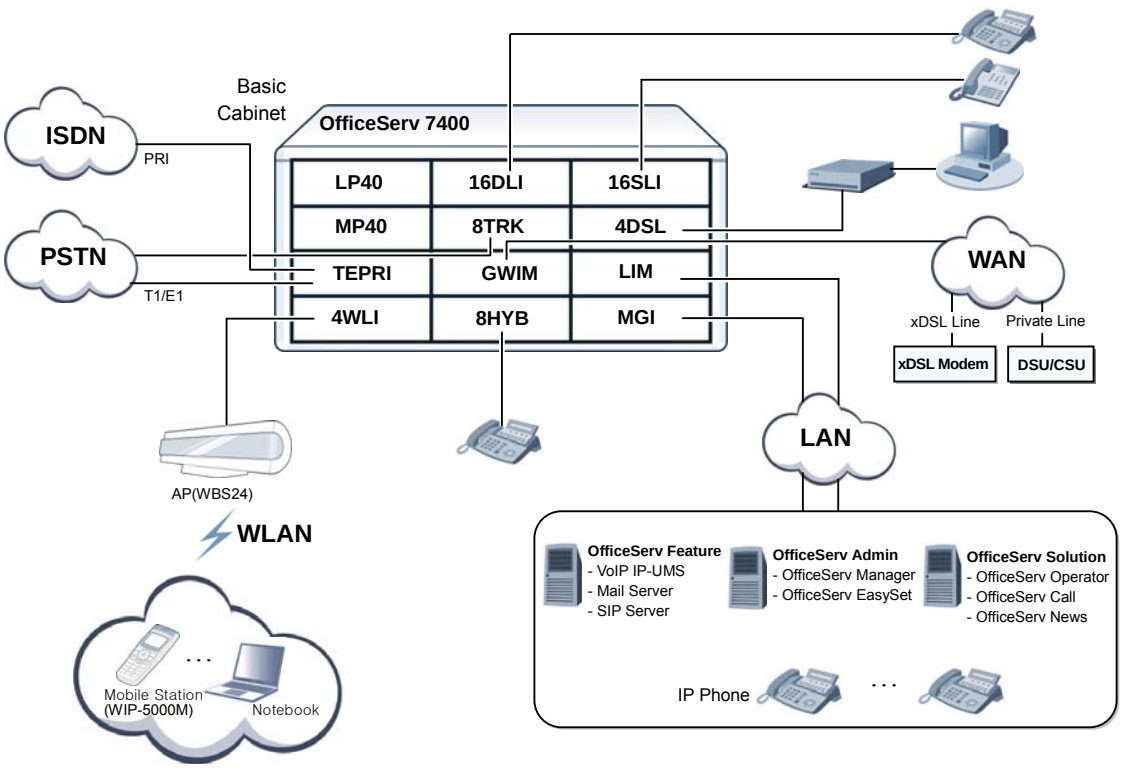

Figure 1.1 Configuration of OfficeServ 7400 Service

Voice Trunk Line Part

The voice trunk line part is configured with digital trunk lines and analog trunk lines.
T1E1PRI(TEPRI)
/TEPRI2 functions as E1, T1 and Primary Rate Interface(PRI) digital trunk line on a board, sends/receives voices through the trunk line and transmits the data information of 64 kbps per channel. The 8Trunk(8TRK) functions as Polarity Reverse Detection(PRS) and Caller ID(CID) provides the Metering Pulse Detection function in option.
In addition, it sends/receives voices as analog trunk line function and transmits the data information of 64 kbps per channel.

Voice Station Part

The voice station part is configured with Digital Line Interface(DLI), which is a digital station, and Subscriber Line Interface(SLI), which is an analog station, and provides voice services and provides the voice service. Multiple station boards can be mounted depending on the combination of port numbers and stations. Examples of the digital station have the 16DLI and 8DLI boards. Those of the analog station have the 16SLI and 8SLI boards.
In addition, the hybrid-type 8HYB, which is the combination of analog and digital stations, exists.

Data Transmission Part

The data module is configured with the GWIM, which is a WAN interface board, and the LIM/LIM-P/GLIMP, GSIM, which is a LAN interface board. The LIM/LIM-P board sends or receives data to/from internal Intranet, provides 10/100 BASE-T interface and functions as a switching hub. The LIM-P board provides the Integrated Power over Ethernet(Integrated PoE) function.
The GLIMP board provides the Layer 2 LAN interface to support internal data networks and serves 10/100 BASE-T Fast Ethernet(FE) and 1000 BASE-TX/SX/LX interface for data transmission.
The GSIM board provides the Gigabit LAN interface of Layer 2 and Layer 3 to support data networks and serves the 1000 BASE-TX/SX/LX interface.
The GWIM board, which is a board for data communication with external Internet, provides the WAN interface to support data networks.
The 4 Digital Subscriber Line(4DSL) board provides services to the data subscribers up to 1 km away from the internal Intranet. The subscribers can use Ethernet services within the transmission distance of 1 km.


NOTE

Abbreviations of Board Names

GWIM: Gigabit WAN Interface Module

LIM: LAN Interface Module

LIM-P: LAN Interface Module with PoE

GLIMP: Gigabit LAN Interface Module with PoE

GSIM: Gigabit Switch Internet Module

Voice Application Part

The voice application module consists of the Voice over Internet Protocol(VoIP) that transmits voice to the data network and the Wireless Local Area Network(WLAN) that transmits voice wirelessly. The Media Gateway Interface(MGI)/Media Gateway Interface 64channel(MGI64) board offers the VoIP function by converting voices into data. The 4 Wireless LAN Interface(4WLI) board uses Digital Adaptor for Subscriber Loop(DASL) to connect to a wireless BTS and sends/receives voice to/from the phone system and wireless BTS. The 4WLI board accommodates up to 4-BTS and the OfficeServ 7400 system accommodates up to 16-4WLI board and 640-subscriber.

Configuration of the Application

The OfficeServ 7400 has a commercial server on the Linux platform in the outside of its cabinet and provides the application software below. OfficeServ Solution and OfficeServ Admin have separate servers.

- Mail Server
- SIP Server
- VoIP-Unified Messaging Service(UMS)
- OfficeServ Solution(CTI, OfficeServ Operator)
- OfficeServ Admin(Web Management, PCMMC, OfficeServ EasySet, System Manager)

1.2 Interface

This section describes the interfaces between the sub-modules of OfficeServ 7400 and the ones between the VoIP elements.

1.2.1 Interfaces between Sub-modules

Table 1.1 Interface between Sub Modules

Categories	Types	INterfaces
LIM/LIM-P Interface	Physical Access	IEEE 802.3 10 BASE-TX, IEEE 802.3u 100 BASE-TX
	Connector Type	RJ-45
GLIMP Interface	Physical Access	IEEE 802.3 10 BASE-TX, IEEE 802.3u 100 BASE-TX, IEEE 802.3z 1000 BASE-SX/LX, IEEE 802.3ab 1000 BASE-TX
	Connector Type	RJ-45, SFP(Small Form-factor Pluggable Connector)
GSIM Interface	Physical Access	IEEE 802.3z 1000 BASE-SX/LX, IEEE 802.3ab 1000 BASE-TX
	Connector Type	SFP(Small Form-factor Pluggable Connector)
GWIM Interface	Physical Access	IEEE 802.3z 1000 BASE-SX/LX, IEEE 802.3ab 1000 BASE-TX, V.35(T1/E1), HSSI(T3/E3)
	Connector Type	SFP, Serial 26-pin connector (non-standard cable), Serial 50-pin connector
	Access Protocol	- PPPoE(PPP over Ethernet), PPP(Point to Point Protocol) - DHCP(Dynamic Host Configuration Protocol) - HDLC(High-level Data Link Control) - Frame Relay
PSTN Interface	Physical Access	T1, E1, FXO(Foreign Exchange Office)
	Connector Type	RJ-45
	Access Protocol	T1, E1, Loop Start
ISDN Interface	Physical Access	ISDN PRI
	Connector Type	RJ-45
	Access Protocol	ISDN PRI
xDSL/Cable Modem Interface	Physical Access	IEEE 802.3u 100 BASE-TX Ethernet
	Connector Type	RJ-45
	Access Protocol	PPPoE and DHCP
Voice Terminal Interface	Analog Phone	FXS(Foreign Exchange Station)
	Digital Phone	SAMSUNG's Digital Phone
	Wireless LAN AP(Access Point)	802.11b, WBS24(SAMSUNG's Wireless LAN AP)

Table 1.1 Interface between Sub-Modules (Continued)

Categories	Types	Interfaces
Interface between Call Server and Data Server	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	UDP(User Datagram Protocol) IPC(Inter Processor Communication)
Interface between Call Server SIP Server	Physical Access	100 BASE-TX Ethernet
	Signal Process	SIP
	Access Protocol	UA(User Agent) to UA
Interface between Call Server and System Manager	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	TCP, UDP IPC
Interface between Data Server and Feature Server	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	DHCP
Interface between Data Server and System Manager	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	TCP, UDP IPC
Interface between Feature Server and System Manager	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	TCP, UDP IPC

1.2.2 Interfaces between VoIP Components

OfficeServ 7400 provides various VoIP interfaces as follows:

- VoIP Networking
- H.323 VoIP Gateway
- SIP VoIP Gateway
- SIP Server
- System SIP User Agent(UA)
- IP Telephone
- Standard SIP Telephone

In view of signal processing, the interface interworking standards between VoIP components are as follows:

- Proprietary TCP Inter Protocol Communication(IPC)
- SIP UA-to-UA
- UA-to-Server

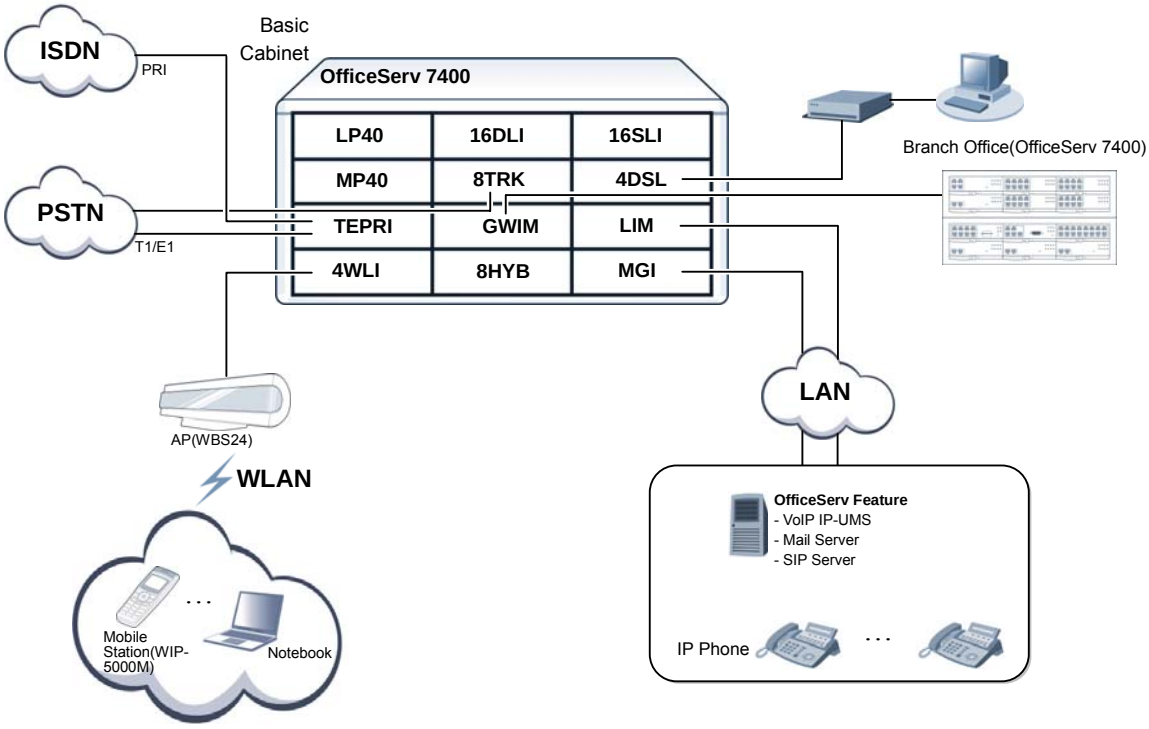

Figure 1.2 Interface between VoIP Components

1.3 Programming

The Man Machine Communication(MMC) program can change the data value used for the system operation program. The MMC program is categorized into three levels, which are technician, operator, and subscriber. Depending on these levels, some MMCs can be programmed by the subscribers while some MMCs cannot.
A password is required for technician level programming or operator level programming; however, a password is not required for subscriber level programming.

Technician-Level Programming

All programs are programmable.
Programming can be made in any stations in the OfficeServ system, but the programming can be made only in a station at the same time.

Operator Level Program

The operator can program only the program specified in ‘Specification of Program 802 Operator Program Range’ by a technician.
Programming can be made in any stations in the tenant group, but the programming can be only made in a station at the same time.

Subscriber Level Program

Only subscriber programs are programmable.

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CHAPTER 2. H/W of OfficeServ 7400

This chapter introduces the hardware features, cabinet configuration, and board functions and configuration of the OfficeServ 7400 system. In addition, this chapter describes terminals, wireless LAN equipment, and additional equipment available in the OfficeServ 7400 system.

Hardware is installed as described in the *OfficeServ 7400 Installation Manual* provided with your system.

2.1 Features of H/W

The H/W of OfficeServ 7400 has the following features:

Safety

The materials and parts used for the OfficeServ 7400 hardware are robust and satisfy the mechanical and electric features required for communication systems.

- The cabinet of the OfficeServ 7400 complies with the industrial standards and is assembled by robust and stable metal welding.
- The OfficeServ 7400 hardware does not generate poisonous or corrosive gas, which might be harmful for human bodies or affect the system operation.
- The OfficeServ 7400 hardware is made of materials considering the feature of Electro-Magnetic Interference(EMI).
- The OfficeServ 7400 hardware has a failure-tolerance to protect the system from the damage caused by over-voltage.

Modularity

The OfficeServ 7400 hardware has functional modules.

- Capacity can be expanded or functions can be changed in each module without interrupting the services for the existing subscribers.
- Each module can be easily installed or removed in the plug-in way.

Maintenance

The OfficeServ 7400 hardware is designed to be maintained with ease and safety.

- The specification of 19-inch rack is observed. The rack is designed to maintain sufficient strength.
- The installers or maintainers can connect cable easily because the ports to be connected to outside are placed on the front panel.
- The front of each module has a LED that indicates failures or operation status so that the operator can easily identify system failures.
- The back of the rack has a ground hole to which a wrist strap for preventing static electricity can be connected.
- The OfficeServ 7400 hardware is designed to protect electronic devices from damages caused by external environment while installing or recovering.

Fire Resistance and Heat Processing

The OfficeServ 7400 hardware is made of fire-resistant materials and parts to protect the hardware from fire.
The OfficeServ 7400 hardware is designed not to affect system performance due to heat generated from inside of the system.

- A specific heat-generated part of the hardware is blocked in order not to affect temperature-sensitive components.
- Four 80 mm fans for cooling are installed to exhale internal air to outside.
- The parts installed into the modules are located on the basis of heat distribution.

2.2 Cabinet Configuration

OfficeServ 7400 consists of three cabinets(basic/expansion cabinet) mounted on the 19-inch rack and a functional server that operates externally.
The Main Control Processor 40(MP40) board, which is the main control part, is installed into the basic cabinet to manage the entire OfficeServ 7400 and performs the switching, the signal processing and subscriber station management functions. The LP40, which is the sub control part and is installed into the basic/expanded cabinet, controls various line boards and sends/receives information to/from the MP40. The other components are boards, the power supply, and fans.

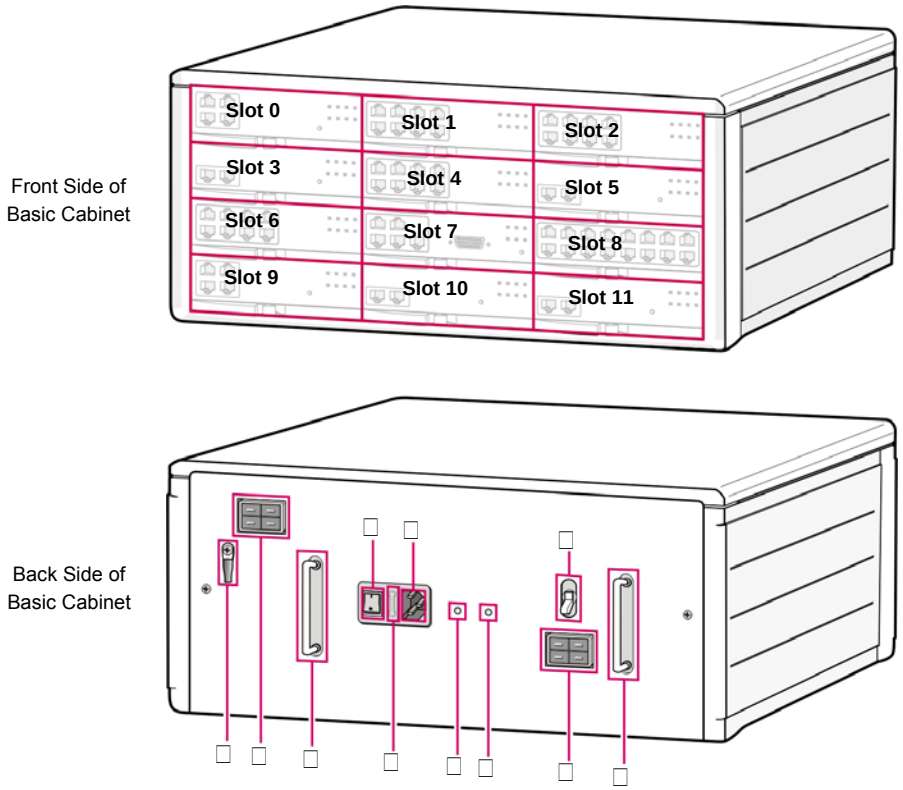


Figure 2.1 Configuration of OfficeServ 7400 Cabinet

Table 2.1 Configuration in the Back side of of OfficeServ 7400

Configuration	Function
Ground Lug	Lug for grounding system communication
External Rectifier Socket	Socket to supply external power to PoE(Power over Ethernet)
Knob for mounting or demounting power module	Knob to use while mounting/demounting a power module
Fuse Holder	Fuse for AC input power
AC LED	The LED turns on while applying AC power.
DC LED	The LED turns on while the DC power normally comes out.
Battery Socket	Socket to connect an external battery
Power Switch	Power switch for OfficeServ 7400
Power I/O Connector	Connector for power cable
Battery Switch	Switch to supply the power to the battery of OfficeServ 7400 or charge the battery.

2.2.1 Configuration of Slots

Each of the basic cabinet and expansion cabinet has 12 slots on which boards can be mounted. The boards below are mounted on the slots depending on the configuration type of the OfficeServ 7400:

Table 2.2 Boards that can be mounted on the slots

Cabinets	Slots	Mountable Boards
Basic Cabinet (OfficeServ Access)	Slot 0	Special purpose for LP40
	Slot 3	Special purpose for MP40
	Slot 1 and 2 Slot 4~11	Boards except MP40 and LP40
Expansion Cabinet (OfficeServ Expansion)	Slot 0	Special purpose for LP40
	Slot 1~11	Boards except MP40 and LP40

For using total capacity of TEPRI2 and MGI64, basic rack that supports 64 channels per slot is used.


NOTE

Blank Board Function

Blank board is a dummy board that functions as a screen to prevent the system from foreign materials when the Universal Slot is not equipped boards.

2.3 Boards by Functions

Each of the basic cabinet and the expansion cabinet in OfficeServ 7400 has 12 slots that can mount boards. Each slot can mount the boards below that can perform the following function depending on the configuration type of OfficeServ 7400.

Table 2.3 Boards by Functions

Functions	Boards
Main Control Part	Basic Cabinet: MP40(Option Board: Modem) Each Cabinet: LP40(Option Board: SCM, RCM or RCM2, MFM, CRM and MIS)
Voice Trunk Line	TEPRI, TEPRI2,4BRI and 8TRK
Voice Station	16DLI2, 8DLI, 16SLI2, 8SLI, 16MWSLI and 8COMBO
Data	4DSL,LIM, LIM-P, GLIMP, GSIM and GWIM(Option Board :GWIMS)
Voice Application	4WLI, MGI(Option Board: MGI2D), MGI64
Power, Pan	PSU and Fan

2.3.1 Control Board

This paragraph describes the configuration and the functions of MCP, which is the main control board that controls all functions of the OfficeServ 7400, and those of LP40, which is the sub control board.

2.3.1.1 MP40 (Main Control Board)

MP40 is the main control board that controls all functions of the OfficeServ 7400 and is mounted on Slot 3 of the basic cabinet. The MP40 performs voice switching, signal processing, and subscriber's station management functions.
The MP40 controls the entire system, performs system booting and data management functions. In addition, the MP40 recognizes/monitors/controls the cards mounted on the Universal slot of the expansion rack by connecting to the LP40 that is an additional rack control module or the LCP that is an expansion rack control module of OfficeServ 7400 through IPC.

The MP40 connected to LAN Interface Module(LIM) via the LAN Interface of the front panel to drive various applications.
The flexibility of the system is improved by accommodating the VoIP function and the load of the system is balanced by using a control board for each cabinet. IPC between cabinets uses HDLC protocol to increase the reliability.

Main Functions

The MP40 board offers the following functions:

- Various application operations via LAN interface
- Convenient installation via SmartMedia
- Database backup
- Port for Universal Asynchronous Receiver and Transmitter(UART) test
- External/Internal Music On Hold(MOH) and Loud/common bell functions
- Time setup and display function
- Digital Phase Locked Loop(DPLL) for the synchronization with digital subscribers

Option Board

The MP40 board can mount a MODEM Board in option.
The MODEM board has the following functions:

- MP40 board has a 2-Wire Full Duplex modem and can commonly use it with iDCS 500 system. Be careful of the direction of the Modem board when mounting/demounting the board to the MP40 board.
- The Modem board operates in OfficeServ 7400 via V.23 interface and uses a modem chip for Central Office, which can perform Pulse Code Modulation(PCM) highway interface. In addition, the Modem board supports V.90 protocol. OfficeServ 7400 controls the Modem board via serial communication using standard AT commands.

Specification

The specification of MP40 sub-control board is as follows:

Table 2.4 Specification of MP40 Board

Categories	Names	Standards
CPU	Processor	MPC8271ZQMIBA
	System Clock	66 MHz
	Package	516 BGA
SDRAM (Memory for programs and data)	Capacity	128 MB(32 MB * 4 EA), 256 MB extendable
	Width of Data Bus	64 Bit
SRAM (Memory for Data, Backup)	Capacity	2 MB(1 MB * 2 EA)
	Width of Data Bus	32 bit
Flash ROM (For Booting)	Capacity	1 MB(512 KB*2 EA)
	Width of Data Bus	8 bit

Table 2.4 Specification of MP40 Board (**Continued**)

Categories	Names	Standards
Time Switch	Device	ZL50018
	Basic Switch	2048 x 2048 Channel
	Data Bus Width	16 Bit
RTC	Device	EPSON_8563BN
	Time for Backup	24 Hours
Smartmedia (Memory for programs and data)	Capacity	32 MB
	Width of Data Bus	8 Bit
NAND Flash ROM (Data memory)	Device	K9F2808U0C
	Capacity	16 MB
EEPROM Data memory (example: MAC Address)	Capacity	1 KB
	Interface	SPI
Engine	Device	STL7065A
	Width of Data Bus	8 Bit

Front View

The front view of the MP40 main control part is as shown in the figure below.

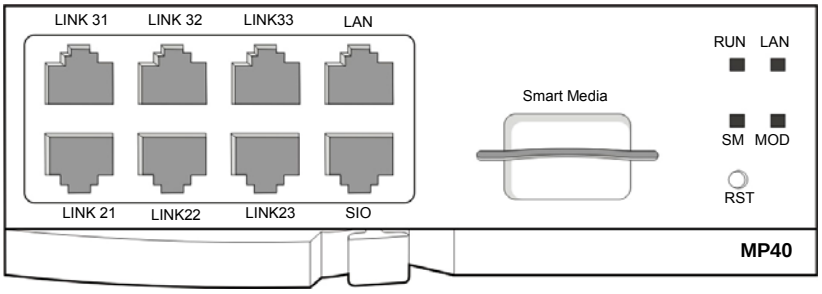


Figure 2.2 Front View of MP40

The components on the front panel of the MP40 board have the functions below:

Table 2.5 Ports of LP40 Board

Ports and LEDs	Functions
LINK21~LINK23	Connection port between MP40 and LP40 in the first expansion rack
LINK31~LINK33	Connection port between MP40 and LP40 in the second expansion rack
LAN	Port to connect 10/100 BASE-T LAN
SIO	UART Port(for test) and CPLD JTAG Port(for management)
RST	Button for LP40 board reset
SmartMedia	Port to mount NAND-type Flash memory

Table 2.5 Ports of LP40 Board (Continued)

Ports and LEDs	Functions
RUN LED	Status of MP40 operation - Off: No-power - On(Green): On Booting - Blink(Green): Normal Operation of Program The blink cycle is 500 ms while running S/W
LAN LED	Status of LAN operation - Off: No-power and no-connection of LAN port - On: The color of the LED shows the LAN transmission speed and connection speed. • Red: Good connection + Operation at 10 Mbps • Orange: Good connection + Operation at 10/100 Mbps
SM LED	SmartMedia Access Status - Off: No-SmartMedia - On: The color of the LED shows the mounting status and the normal operation status after access. • Green: Mounted + Normal Operation • Red: Non-mounted or Mounted + Abnormal Operation - Blink(Green): SmartMedia is mounted and in access mode.
MODEM LED	The mounting status and the operation status of the MODEM - Off: No-MODEM - On(Green): MODEM mounted - Blink(Green): On transmitting data

2.3.1.2 LP40 (Sub-Control Section Board)

LP40 is the minor control board to controls overall functions of OfficeServ 7400 and is mounted on the slot 0 in the basic and expansion cabinets. LP40 manages subscriber cards and terminals under the control of the main control board, MP40, and transfers various event signals generated in the subscriber cards and terminals to MP 40.

Three optional boards are mounted on the LP40 board. It is available to mount optional boards selectively according to a function. For the functions of the optional boards, there are DTMF, R2, CID, Conference and MISC.

Main Functions

The LP40 board provides the following functions:

- Providing LAN Interfaces(Testing Port)
- Providing testing ports for Universal Asynchronous Receiver and Transmitter(UART)
- Conference, caller information, multi-frequency detecting and door phone control
- Internal/external Music On Hold(MOH) and loud/common bell

Optional board

For optional boards that are available to mount on the LP40 board, there are MFM, RCM, MIS, RCM2, SCM and CRM boards. The main functions of each optional board are as follows:

- Multi-Frequency Module(MFM): MFM is an optional board that is composed of ASIC chips detecting the DTMF signal. The MFM board is mounted on LOC1 or LOC2 in the LP40 board and the location is indicated on the LP40 board. If the MFM board is mounted, it is available to detect DTFM signals from 12 channels simultaneously.
- R2 CID Module(RCM): RCM is an optional board that is composed of ASIC chips detecting caller identification(CID). RCM generates and detects R2 signals, which are interoffice signals. The RCM board is mounted on LOC1 or LOC2 in the LP40 board and the location is indicated on the LP40 board. If the RCM board is mounted, it is available to generate R2 signals to 30 channels, and to detect the R2 signals form eight channels and CID signals from 14 channels. The detected signals(R2/CID) are selected according to the location of the switch in the RCM board.
- Miscellaneous(MIS): MIS is an optional board that is mounted on LOC3 in the L40 board. The location is indicated on the LP40 board. MIS provides the external hold sound source input ports, external paging ports, loud bell ports and common bell ports as well as two dry ports that connects or blocks the power supply and signal transfers with external devices.
- R2 CID Module 2(RCM2): RCM2 is an optional board to detect and generate Caller Identification(CID). The RCM2 board is mounted on LOC1 or LOC2 in the LP40 board and the location is indicated on the LP40 board. If the RCM2 board is mounted, it is available to detect and generates CID signals from 14 channels. It is available to select an operation mode(detection and generated signal) as R2 or CID using the switch in the RCM2 board. Recently, the R2 function is not available and is planned to be provided in the future.
- Switch Conference Module(SCM): SCM is an option board to perform the Conference function. The SCM board is mounted on LOC1 or LOC2 in the LP40 board and the location is indicated in the LP40 board. The installation should be performed only in one place. If the SCM board is mounted, up to 12 groups can have their conversations(five persons per one group), and it is available to detect DTFM signals transmitted from 12 channels.
- Common Resource Module(CRM): The CRM board is an optional board to detect and generate DTMF signals and CID signals. The CRM board is mounted on LOC1 or LOC2 in the LP 40 board and the location is indicated on the LP40 board.

Specifications

The specification of the LP40 minor control board is as follows:

Table 2.6 LP40 Board Specifications

Category	Name	Standard
CPU	Processor	MPC852T
	System Clock	50 MHz
	Package	256P PBGA
SDRAM (For program and data storage)	Capacity	16 MB
	Data Bus Width	32 bit
Flash ROM (For data storage)	Capacity	4 MB
	Data Bus Width	16 Bit
Boot ROM (For booting)	Capacity	512 KB
	Data Bus Width	8 Bit
Rate Conversion Digital Switch	Rate	2.048 ↔ 8.192 Mb/s
	Data Bus Width	16 Bit
Others	Internal MOH Port	1 port
	External MOH Port	2 ports

Front View

The front view of the LP40 minor control board is shown in the figure below:

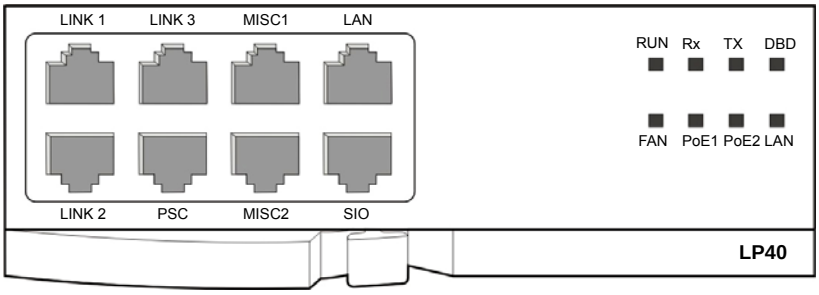


Figure 2.3 Front View of LP40

The components on the front view have the functions below:

Table 2.7 Ports and LEDs of LP40

Port, LED	Function Description
LINK1~LINK3	Ports for connecting MP40 and LP40
MISC1~MISC2	Ports for connecting external music, paging, loud bell, common bell and door bell
PSC	Connection port for PoE power status check
LAN	Port for connecting 10/100 BASE-T LAN(for tests)
SIO	UART port(for tests), CPLD JTAG port(for management)
RST	Button for resetting LP40 board
RUN	Indicating the status of LP40. - Off: No power supplied or abnormal status - Orange Blink: On booting - Green Blink: Normal status
Rx	Indicating the status related to data receipt in communication with MP40. - Off: No signal - Green Blink: Data reception in progress
TX	Indicating the status related to data transmission in communication with MP40 - Off: No signal - Green Blink: Data transmission in progress
DBD	Indicating the daughter board mount. - Off: Daughter board dismounted - Green On: One daughter board mounted
FAN	Indicating the operation of FAN. - Green On: All FANs normal - Red Blink: One FAN or more abnormal
PoE1	Indicating the status of PoE1 power supply. - Off: PoE1 power supply dismounted - Green On: Normal - Red Blink: Abnormal
PoE2	Indicating the status of PoE2 power supply. - Off: PoE2 power supply dismounted - Green On: Normal - Red Blink: Abnormal
LAN	Indicating the status of LAN. - Off: LAN disconnected - Green On: Operated in 10 Mbps - Orange On: Operated in 100 Mbps

2.3.2 Voice Trunk Line Board

This section describes the boards that offer the voice service of trunk lines.

2.3.2.1 TEPRI

The T1E1PRI(TEPRI) board provides the digital trunk line. A TEPRI board provides E1, T1, ISDN and PRI, and functions as the Q-SIG. This board transmits voice via the trunk line and a channel transmits the voice data of 64 Kbps.

Main Functions

The TEPRI voice trunk line board performs the functions below:

- Selection function for T1/E1/PRI signal process through programming
- Function of a resistance circuit that satisfies both of the T1(100 Ω) and E1(120 Ω)
- Surge protection over the standard of International Telecommunication Union(ITU)
- Output port protection for line monitors
- Jitter function that satisfies ITU-T I.431 and G.703
- Providing selectable line codecs(HDB3, AMI)
- Local/remote loop function
- Function for the HDLC or Common Associated Signaling(CAS) through the Common Channel Signaling(CCS)

Specifications

The specifications of the TEPRI voice trunk line board are as follows:

- E1: 30 channels
- T1: 24 channels
- PRI: 30 channels

Front View

The front view of the TEPRI voice trunk line board is shown in the figure below:

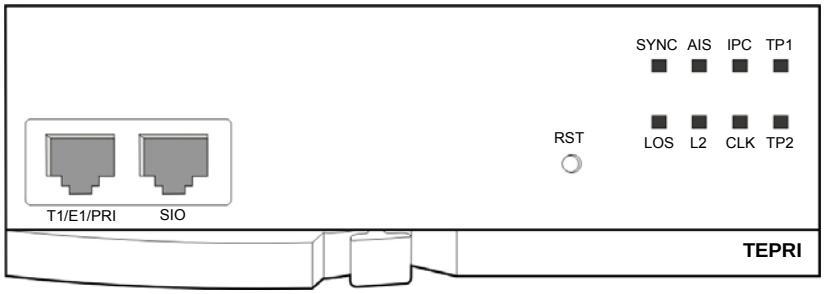


Figure 2.4 Front View of TEPRI

The components on the front panel of the TEPRI have the functions below:

Table 2.8 Ports and LEDs of TEPRI Board

Port, LED	Function Description
T1/E1/PRI	Ports for connecting T1/E1/PRI cables
SIO	UART port(for tests)
RST	Button for resetting TEPRI board
SYNC	Clock Synchronization - On: No clocks synchronized on the interface with the counterparty station - Off: Clocks synchronized on the interface with the counterparty station
LOS	Signal-loss generation - On: Signal-loss generated - Off: No signal-loss generated
AIS	T1/E1 remote alarm generation - On: Remote alarm generated - Off: No remote alarm generated
L2	Layer 2 operation - On: PRI Layer2 operation normal - Off: PRI Layer2 operation abnormal
IPC	Interface with upper module - On: Interworked with MCP/LCP - Off: Not interworked with MCP/LCP
CLK	Master/Slave - On: Receiving synchronization clocks from the counterparty station - Off: Using internal clocks for synchronization clocks
TP1	T1 connection - LED turns on when connected with T1
TP2	PRI connection - LED turns on when connected with PRI

2.3.2.2 TEPRI2

TEPRI2 provides the digital trunk line. A TEPRI2 board provides two ports for E1, T1, ISDN and PRI respectively, and functions as the Q-SIG. This board transmits voice via the trunk line and a channel transmits the voice data of 64 Kbps.

Main Functions

The TEPRI2 voice trunk line board performs the functions below:

- Selection function for T1/E1/PRI signal process through programming
- Function of a resistance circuit that satisfies both of the T1(100 Ω) and E1(120 Ω)
- Surge protection over the standard of International Telecommunication Union(ITU)
- Output port protection for line monitors
- Jitter function that satisfies ITU-T I.431 and G.703
- Providing selectable line codecs(HDB3, AMI)
- Local/remote loop function
- Function for the HDLC or Common Associated Signaling(CAS) through the Common Channel Signaling(CCS)

Specifications

The specifications of the TEPRI2 voice trunk line board are as follows:

- Two trunk line ports
- E1: 30 channels
- T1: 24 channels
- PRI: 30 channels

Front View

The front view of the TEPRI2 voice board is shown in the figure below:

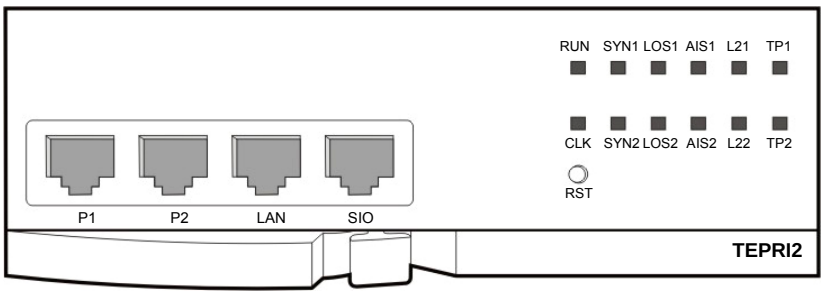


Figure 2.5 Front View of TEPRI2

The components on the front panel of the TEPRI2 have the functions below:

Table 2.9 Ports and LEDs of TEPRI2 Board

Port, LED	Function Description
P1	Port 1 for connecting T1/E1/PRI cables
P2	Port 2 for connecting T1/E1/PRI cables
LAN	Port for connecting to Ethernet
SIO	UART port(for tests)
TP1	Indicating the type of the program operated in Port 1 - On: PRI in operation - Off: T1/E1 in operation
TP2	Indicating the type of the program operated in Port 1 - On: PRI in operation - Off: T1/E1 in operation
L21 L22	Indicating the status of Layer 2 - On: Normal - Off: Abnormal
AIS1 AIS2	Indicating the reception of the alarm bit of the counterparty switch - On: Alarm bit received - Off : Alarm bit not received
LOS1 LOS2	Indicating the signal loss(LOS) of the counterparty switch - On: When signals are week or has been damaged - Off: When signals received properly
SYN1 SYN2	Indicating the status of frame synchronization with the counterparty switch - On: No frame synchronized - Off: Frame synchronized
RUN	LED turns green on: When E1 operates in normal(Blink in the cycle of 200 ms) LED turns orange on: When T1 operates in normal(Blink in the cycle of 200 ms)
CLK	LED turns on when the reference clock is used as a system clock.

2.3.2.3 4BRI

The 4BRI module provides four ports for BRI-T/S connection. It transmits voice via the trunk line and a channel transmits voice data at 64 kbps.

Main Functions

The 4BRI module performs the following functions:

- Processes T or S signals by programming.
- Processes the following signals by programming: Point to Point Normal, Point to Point DDI, Point to MultiPoint.
- Switchable Resistor Terminations (100Ω)
- Endures the ITU-recommended level of surge.
- Protects the output port by monitoring line signals.
- Crystal-less wander and jitter attenuation/compensation to TR62411.

- Attenuates/compensates jitter as recommended in ITU-T I.431 and G703.
- Performs local/remote loopback for test.

Specifications

The 4BRI module has eight line ports.

Front View

The front view of the 4BRI voice board is shown in the figure below:

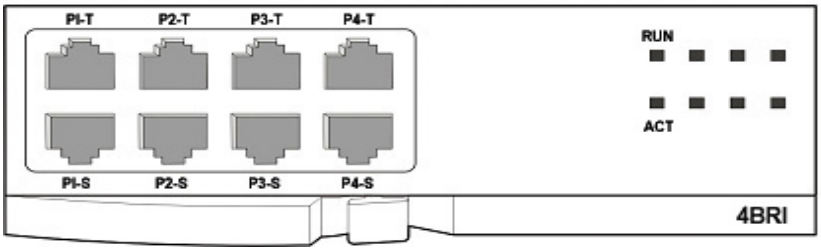


Figure 2.6 Front View of 4BRI

The components on the front panel of the 4BRI have the functions below:

Table 2.10 Ports and LEDs of 4BRI Board

Port, LED	Function Description
RUN	Circuit is connected to this port.
ACT	Circuit is in use on this port.

2.3.2.3 8TRK

The 8TRK board provides eight ports of analog trunk lines. One board has the PRS, MPD and CID paths. In addition, the board provides voice through trunk lines and transmits the voice data of 64 kbps to each channel.

Main Functions

The 8TRK voice trunk line board performs the functions below:

- Detecting ring reception
- Detecting on/off-hook
- Transmitting dial pulse
- PRS function
- MPD function(option)
- CID function
- Line monitoring function that checks if the line is connected periodically to transmit

the voice data can be transmitted.

- Function that operates as the relay paths of caller information(When caller information is entered as 8TRK, it is available to make a path that verifies the call information in the RCM board by connecting the RCM/RCM2 option board to LP40)

Specifications

The 8TRK voice trunk line board has eight trunk line ports.

Front View

The front view of the 8TRK board is shown in the figure below:

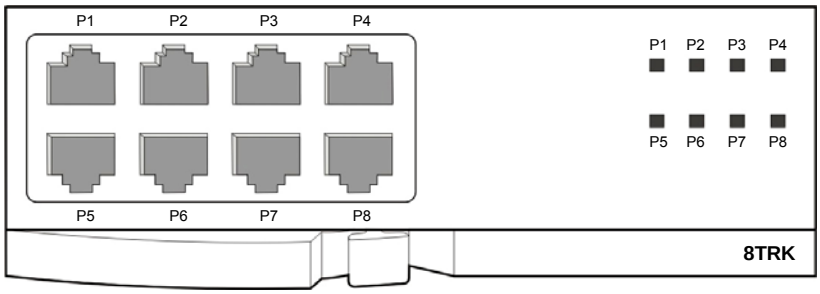


Figure 2.7 Front View of 8TRK

The components on the front panel of the 8TRK have the functions below:

Table 2.11 Ports and LEDs of 8TRK Board

Port, LED	Function Description
P1~P8	Trunk Ports
P1~P8 LED	The status of ports - Off: Not used - On: In use - Blink: On receiving a ring

2.3.3 Voice Station Board

This section describes the board that offers the station voice service.

2.3.3.1 8SLI/16SLI

The 8SLI(Single Line Interface)/16SLI board have 8-port/16-port for analog stations respectively. It interworks with regular phones via the station to provide voice communication.

Main Functions

The main functions of the 8SLI/16SLI board are as follows:

- Generating the ring of 20 Hz
- Detecting Dial Tone Multi Frequency(DTMF)/dial pulse
- Detecting on/off-hook
- Generating a tone
- Power Fail Transfer(PFT) function

Specifications

The specifications of the 8SLI/16SLI voice station board are as follows:

- 8SLI Board: Eight station ports
- 16SLI Board: 16 station ports

Front View

The front view of the 8SLI board is shown in the figure below:

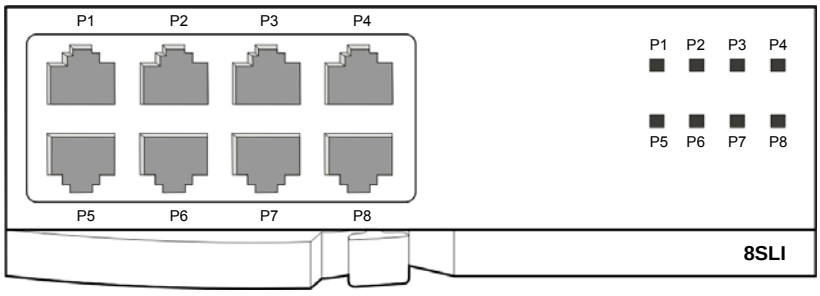


Figure 2.8 Front View of 8SLI

The components on the front panel of the 8SLI have the functions below:

Table 2.12 Ports and LEDs of the 8SLI

Port, LED	Function Description
P1~P8	Station ports of regular phones
P1~P8 LED	The status of Ports - Off: Not used - On: Station in use

Front View

The front view of the 16SLI voice station board is shown in the figure below:

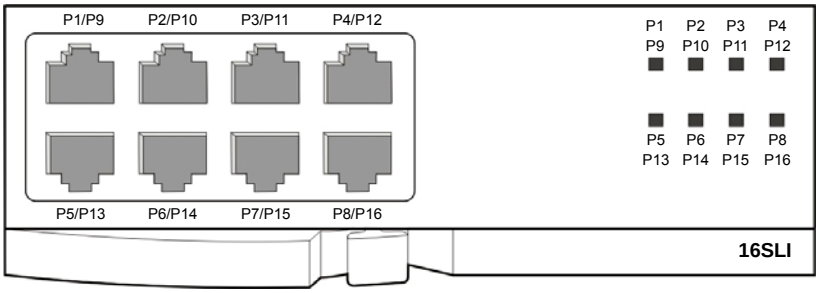


Figure 2.9 Front View of 16SLI

he components on the front panel of the 16SLI have the functions below:

Table 2.13 Ports and LEDs of 16SLI Board

Port, LED	Function Description
P1~P16	Station ports of regular phones
P1~P16 LED	The status of ports - Off: Not used - On: Station in use - Green On: P1-P8 in use - Red On: P9-P16 in use - Yellow On: Two ports in use simultaneously

2.3.3.2 8DLI/16DLI

The 8DLI(Digital Line Interface)/16DLI boards have 8-port/16-port for digital stations respectively. It interworks with Samsung digital phones via the station to provide voice communication.

Specifications

The specifications of the 8DLI/16DLI voice station boards are as follows:

- 8DLI Board: Eight station ports and 2B+D(Two voice channel and one signal channel) provided
- 16DLI Board: 16 station ports and 1B+D(One voice channel and one signal channel) provided

Front View

The front view of the 8DLI voice station board is shown in the figure below:

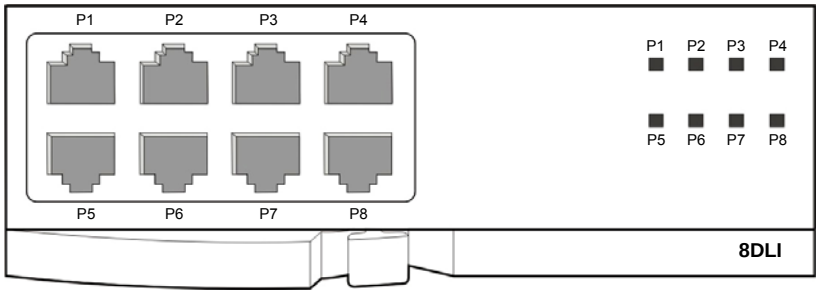


Figure 2.10 Front View of 8DLI

The components on the front panel of the 8DLI have the functions below:

Table 2.14 Ports and LEDs of 8DLI Board

Port, LED	Function Description
P1~P8	Station ports of Samsung digital phones
P1~P8 LED	The status of the ports - Off: Not used - On: Station in use

Front View

The front view of the 16DLI voice station board is shown in the figure below:

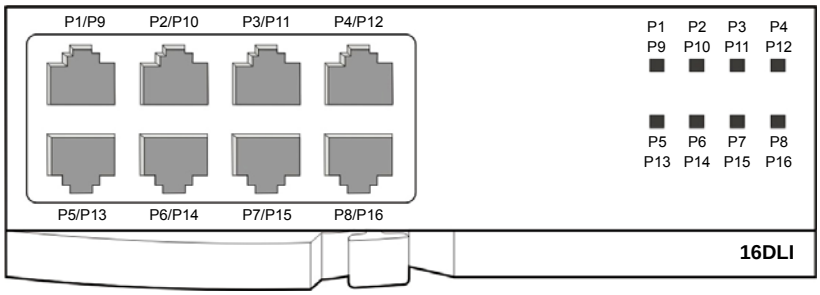


Figure 2.11 Front View of 16DLI

The components on the front panel of the 16DLI have the functions below:

Table 2.15 Ports and LEDs of 16DLI Board

Port, LED	Function Description
P1~P16	Station ports of Samsung digital phones
P1~P16 LED	The status of the ports - Off: Not used - On: Extension in use - Green On: P1-P8 in use - Red On: P9-P16 in use - Yellow On: Two ports in use simultaneously

2.3.3.3 8COMBO

The 8COMBO boards have eight ports of analog stations and eight ports of digital stations respectively. It interworks with regular phones or digital phones to provide voice communication.

Main Functions

The main functions of the 8COMBO voice station board are as follows:

- Generating the ring of 20/25 Hz
- Detecting DTMF/dial pulse
- Detecting on/off-hook
- Generating a tone

Specifications

The specifications of the 8COMBO voice station board are as follows:

- Eight analog station ports
- Eight digital station ports

Front View

The front view of the 8COMBO voice station board is shown in the figure below:

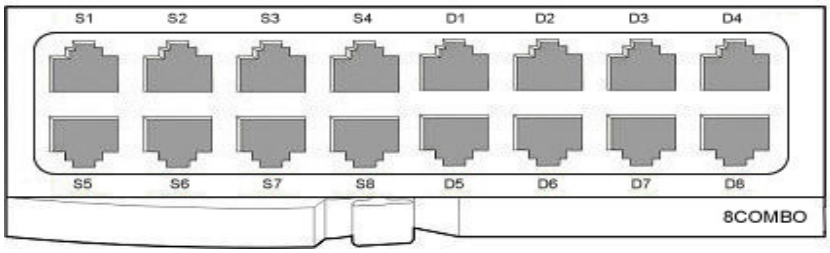


Figure 2.12 Front View of 8COMBO

The components on the front panel of the 8COMBO have the functions below:

Table 2.16 Ports and LEDs of 8COMBO Board

Port, LED	Function Description
S1~S8	Analogue station ports
D1~D8	Digital station ports

2.3.3.4 16SLI2/16MWSLI

The 16SLI2 board has 16-port for analog stations. It interworks with regular phones via the station to provide voice communication.
16MWSLI is a board that a message waiting function is added to the functions of 16SLI2.

Main Functions

The main functions of the 16SLI2 board are as follows:

- Generating the ring of 20 Hz
- Detecting Dial Tone Multi Frequency(DTMF)/dial pulse
- Detecting on/off-hook
- Generating a tone
- Power Fail Transfer(PFT)
- Message Waiting(16MWSLI)
- Transmitting Polarity Reverse Signal(PRS)

Specifications

The specifications of the 16SLI2/16MWSLI boards provides 16 station ports.

Front View

The front view of the 16SLI2/16MWSLI boards is shown as follows:

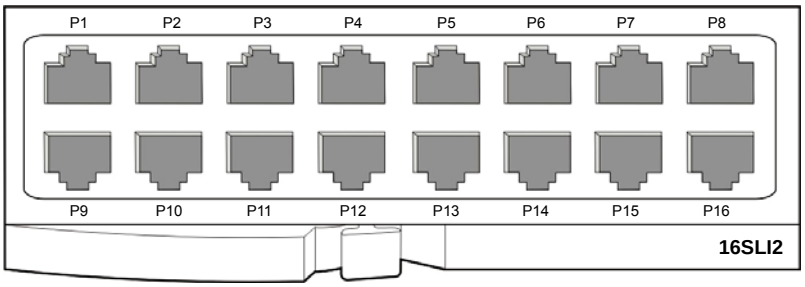


Figure 2.13 Front View of 16SLI2

The components on the front panels of the 16SLI2/16MWSLI boards have the functions below:

Table 2.17 Ports of 16SLI2 Board

Port, LED	Function Description
P1~P16	Station Ports of Regular Phones

2.3.3.5 16DLI2

The 16DLI2 board has 16-port for digital stations. It interworks with Samsung digital phones via the station line to provide voice communication.

Specifications

The specifications of the 16DLI2 voice station board as follows:

- 16 station ports provided
- 1B + D(One voice channel and one signal channel) provided

Front View of 16DLI2

The front view of the 16DLI2 board is shown in the figure below:

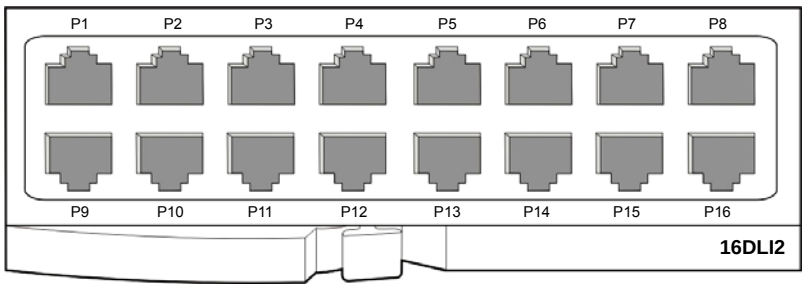


Figure 2.14 Front View of 16DLI2

The components on the front panel of the 16DLI2 have the functions below:

Table 2.18 Ports of 16DLI2 Board

Port, LED	Function Description
P1~P16	Station Ports of Samsung digital phones

2.3.4 Data Board

This section describes the data board for transmitting/receiving data to/from Internet or Intranet.

2.3.4.1 LIM

LAN Interface Module(LIM) is a board for transmitting/receiving data on Intranet.
LAN has provides the interface of 10/100 BASE-T and functions as hub for switching.

Main Functions

The main functions of the LIM board are as follows:

- 10/100 BASE-T and full/half duplex auto-sensing functions
- VLAN function for QoS
- Switching Hub function

Specifications

The LIM data board provides 16-10/100 BASE-T port.

Front View

The front view of the LIM data board is shown in the figure below:

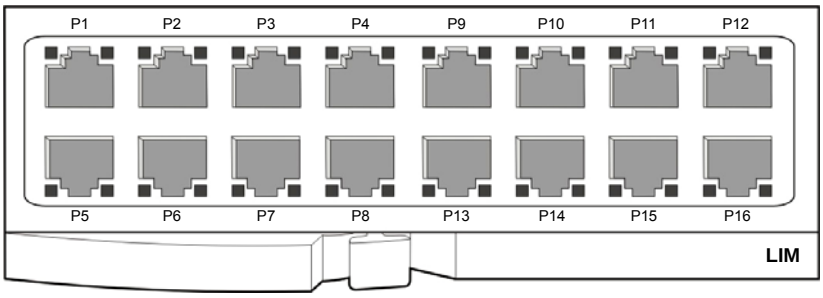


Figure 2.15 Front View of LIM

The components on the front panel of the LIM/LIM-P board functions as follows:

Table 2.19 Ports and LEDs of LIM Board

Port, LED	Function Description
P1~P16	Ports for connecting to Ethernet
Left LED of each port	Link Operation - Blink: Link in operation
Right LED of each port	10/100 BASE-T Operation - Off: Operated in 10 BASE-T - On: Operated in 100 BASE-TX

2.3.4.2 LIM-P

LAN Interface Module with PoE(LIM-P) is a board that transmits and receives data in Intranet and provides 10/100 BASE-T interface. In addition, this board functions as Power over Ethernet(PoE) that provides 48V ~54V power to outside and a hub for switching.

Main Functions

The main functions of the LIM data board are as follows:

- 10/100 BASE-T and Full/Half duplex auto-sensing functions
- VLAN function for QoS
- Switching hub function
- PoE function

> **NOTE**
>
> **Setting LIM-P Board**
> LIM-P can select the internal PSU(connecting shunt pin 1 and 2) or external rectifier(connecting shunt pin 2 and 3) using the shunt pins(J1, J2, J3). For the details for connecting the shunt pins, see 'OfficeServ 7400 Installation Manual'.

Specifications

The LIM-P data board provides 16-10/100 BASE-T ports.

Front View

The front view of the LIM-P data board is shown in the figure below:

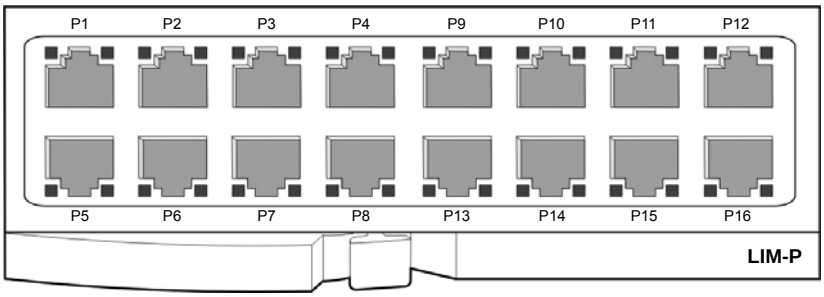


Figure 2.16 Front View of LIM-P

The components on the front panel of LIM-P is as follows:

Table 2.20 Ports and LEDs of LIM Board

Port, LED	Function Description
P1~P16	Ports for connecting to Ethernet
Left LED of each port	Link Operation - Blink: Link in operation
Right LED of each port	10/100 BASE-T Operation - Off: 10 BASE-T in operation - On: 100 BASE-TX in operation

2.3.4.3 GLIMP

Gigabit LAN Interface Module with PoE(GLIMP) is a board that transmits and receives data in Intranet. This board provides 12-10/100 BASE-T interface port and 2-1000 BASE-TX/SX/LX port as the GbE interface is added comparing to the LIM-P board.
GLIMP functions as a hub for simple switching and provides VLAN function for supporting QoS interworking with GWIM in the same board.

Main Functions

The main functions of the GLIMP data board are as follows:

- L2 Ethernet Switching
- 10/100 BASE Full/Half duplex auto-sensing
- VLAN Networking(802.1q)
- Packet Priority Control(802.1q)
- Flow Control(802.3x)
- Multi-casting(IGMP Snooping)
- IEEE 802.3af Power over Ethernet(PoE)

Specifications

The specifications of the GLIMP data board are as follows:

- 12-10/100 BASE-T interface ports
- 2-1000 BASE-SX/LX/TX interface ports
- One Serial Console port(available to P12)

Front View

The front view of the GLIMP data board is shown in the figure below:

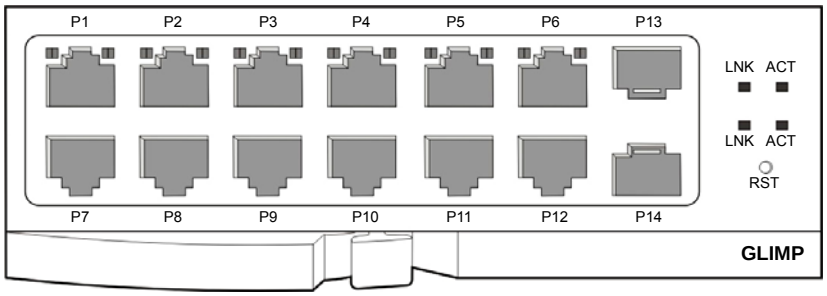


Figure 2.17 Front View of GLIMP

The components on the front panel of GLIMP functions as follows:

Table 2.21 Ports and LEDs of GLIMP Board

Ports, LED	Function Description
P1~P12	Ports for connecting to 10/100BASE-T Ethernet
P13, P14	Ports for connecting to 1000 BASE-SX/LX/TX Gigabit Ethernet(GbE)
Left LEDs of P1~P6	First LED: Link operation of P1~P6 - On: LED turns green when a link is in operation - Blink: Each port blinks on active status Second LED: 10/100 BASE-T operation of P1~P6 - Off: Operated in 10 BASE-T - On: Operated in 100 BASE-TX
Right LEDs of P1~P6	First LED: Link operation of P7~P12 - On: LED turns green when a link is in operation - Blink: Each port blinks on active status Second LED: 10/100 BASE-T operation of P7~P12 - Off: Operated in 10 BASE-T - On: Operated in 100 BASE-TX
LINK	LED turns on when P13~P14, which are giga ports, is connected
ACT	LED blinks when P13~P14, which are giga ports, is on active status
RST	Button for resetting GLIMP board

2.3.4.4 GSIM

Gigabit Switch Interface Module(GSIM) provides Gigabit LAN interfaces of layer 2 and layer 3 to support data network.

Main Functions

The main functions of the GSIM data board are as follows:

- L3 Unicasting Protocol
- L3 Multicasting Protocol
- Ethernet Switch(802.3 compatible)
- 1000 BASE-SX/LX/TX port
- Packet Priority Control(802.1p)
- VLAN Networking(802.1q)
- Diffserv
- Flow Control(802.3x)
- Multi-casting(IGMPv1/v2, PIM-SM)

Specifications

The specifications of the GSIM data board are as follows:

- 1000 BASE-SX/LX/TX interface ports

Front View

The front view of the GSIM data board is shown in the figure below:

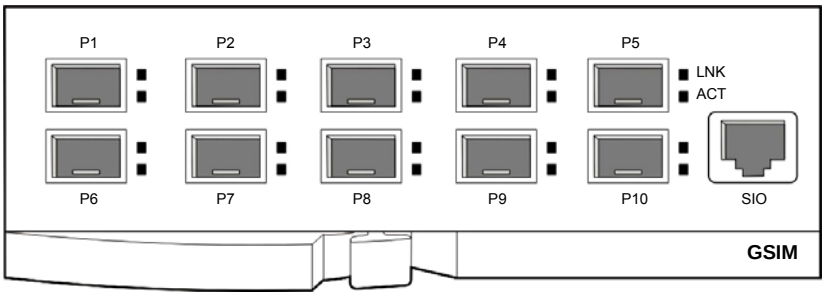


Figure 2.18 Front View of GSIM

The components on the front panel of GSIM are as follows:

Table 2.22 Ports and LEDs of GSIM Board

Port, LED	Function Description
P1~P10	Port for connecting to 1000 BASE-SX/LX/TX GbE(Gigabit Ethernet)
SIO	Port for connecting RS-232
LINK	LED turns on when P1~P10 links are connected
ACT	LED blinks when P1~P10 are on active status

2.3.4.5 GWIM

Gigabit WAN Interface Module(GWIM) provides WAN interfaces to support data network to the keyphone system. GWIM provides a leased line for data communication between the keyphone system and the Internet, supports for connecting , xDSL/cable modem interface, and performs functions for VPN, QoS and Firewall. For the leased line ports, there are a port, which is available to connect up to E1 speed, and a port, which is available to connect up to T3/E3(50 Mbps). In addition, there is an additional DMZ port that makes firewall construction easy.

Main Functions

The main functions of the GWIM data board are as follows:

- Routing between WAN and LAN
- Supporting Multi WAN ports(Leased line, xDSL/cable modem interface)
- Functions for VPN, QoS and Firewall
- Providing various external interfaces for data transmission/reception with the external Internet.
- Providing ports for connecting with the internal network
- Leased line interface using V.35/HSSI
- Functioning as 1000 BASE-FX Ethernet port interworking with xDSL or cable modem
- Functioning as 1000 BASE-TX/SX/LX for Ethernet LAN interfaces
- Providing UART ports for configuration setting
- Functioning as various applications such as firewall and VPN

Specifications

The specifications of the GWIM data board are as follows:

- 1000 BASE-SX/LX/TX ports
- One T1/E1(V.35) port
- One T3/E3(HSSI) port
- One serial console port

Front View

The front view of the GWIM data board is shown in the figure below:

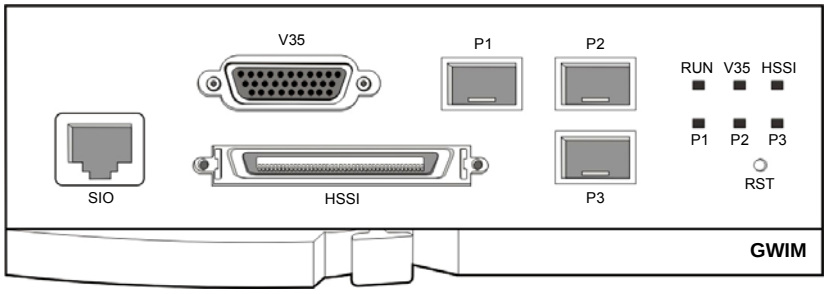


Figure 2.19 Front View of GWIM

The components on the front panel of GWIM are as follows:

Table 2.23 Ports and LEDs of GWIM Board

Port, LED	Function Description
P1~P3	Ports for connecting to 1000 BASE-SX/LX/TX GbE(Gigabit Ethernet)
V35	Ports for connecting to T1/E1 links
HSSI	Ports for connecting to T3/E3 links
SIO	Ports for connecting RS-232
RUN LED	The status of the GWIM board - Off: No power supplied or the operation in abnormal status - LED turns Green: Normal status
V.35 LED	LED turns on when T1/E1 link is connected normally
HSSI LED	LED turns on when T3/E3 link is connected normally
P1 ~ P3 LED	LED turns on when the relevant links are connected normally
RST	Button for resetting the GWIM board

2.3.4.6 4DSL

The 4DSL(Digital Subscriber Line) module uses the VDSL technology to send/receive data to/from external IP devices in Intranet.(Applied after V2.45)

Specifications

- Quadrature Amplitude Modulation(QAM) method for four VDSL ports
- Transmission distance: 1.0 km
- Up/Down Links
  - 0~300 m: Downstream 30 Mbps, Upstream 10 Mbps
  - 300 m~1 km: Downstream 20 Mbps, Upstream 3 Mbps

Front View

The front view of the 4DSL data board is shown in the figure below.

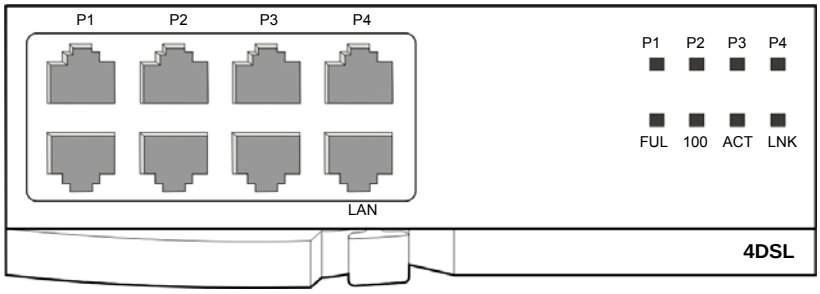


Figure 2.20 Front View of 4DSL

The components on the front panel of 4DSL are as follows:

Table 2.24 Ports and LEDs of 4DSL Board

Port, LED	Function Description
P1~P4	Ports for connecting VDSL
LAN	10/100 BASE-T Ethernet Port for connecting to the upper Intranet
P1~P4 LED	Port status - Off: No Link connected - On: Link in operation - Blink: Data are being transmitted/received
FUL	Checking Full/Half duplex operation(LED turns on at FULL operation)
100	Checking the speed of 10/100M(LED turns on at the speed of 100M)
ACT	LED blinks when data is transmitted or sent
LNK	Checking if a link is connected

2.3.5 Voice Application Board

This section describes the interface board that uses Digital Adaptor for Subscriber Loop(DASL) to send/receive voice to/from the phone system and wireless base station as well as the board that converts voice to data and then, sends/receives the data.

2.3.5.1 MGI

The Media Gateway Interface(MGI) board converts voice to data and then, sends/receives the data via the data network. The MGI offers up to 16 channels and decompresses the voices of G.729, G.723, G.726, and G.711.

Main Functions

The main functions of the MGI voice application board are as follows:

- Voice decompression: G.729, G.723, G.726, G.711
- Facsimile relay: Providing two facsimile channels and four voice channels per option board.(Two channels per board)
- Echo cancellation
- Volume adjustment(-30~+30 dBm)
- Silence suppression

Optional Board

For the option board, MGI2D is mounted on the MGI board. The MGI2D board performs a function that converts voice into packets. In the MGI board, up to four MGI2D boards are mounted. As one MGI2D board processes four channels per board, the MGI board processes 16 channels of voice signals.

Front View

The front view of the MGI voice application board is shown in the figure below:

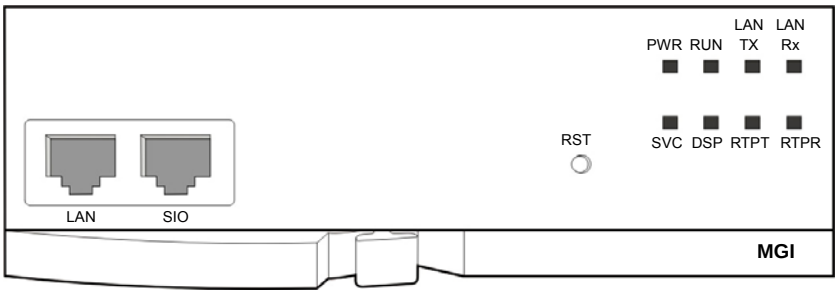


Figure 2.21 Front View of MGI

The components on the front panel of MGI are as follows:

Table 2.25 Ports and LED of MGI Board

Port, LED	Function Description
LAN	Ports for connecting Ethernet
SIO	UART port(for tests)
RST	Button for resetting MGI board
PWR LED	Power supply status - Off: Power supply blocked - On: Power supplied
RUN LED	MGI operation - Off: Power supply blocked - On: On booting - Blink: RAM program in operation
LAN TX LED	Ethernet Data Reception - Off: No data - On or Blink: On data reception
LAN Rx LED	Links and Ethernet Data Reception - Off: No data or no link connected - On or blink: On data reception
SVC LED	Service - LED blinks when the task service of the software is available
DSP LED	VoIP DSP operation - LED blinks when VoIP DSP is operated
RTPT LED	Voice packet transmission - LED turns on when transmitting voice packets
RTPR LED	Voice packet reception - LED turns on when receiving voice packets

2.3.5.2 MGI64

MGI64 is a board that transmits and receives voice via data network after converting into data. Up to 64 channels are provided and decompresses voices of G.729, G.723, G.726 and G.711. The MGI64 provides the VoIP functions to serve as both of a client and server.

Main Functions

The main functions of the MGI64 voice application board are as follows:

- Voice decompression: G.729, G.723, G.726, G.711
- Facsimile relay: One channel per 4 channels
- Echo cancellation
- Volume adjustment
- Silence suppression

Front View

The front view of the MGI64 voice application board is shown in the figure below:

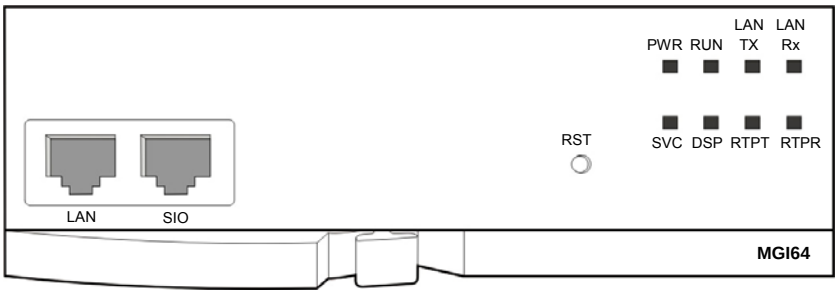


Figure 2.22 Front View of MGI64

The components on the front panel of MGI64 are as follows:

Table 2.26 Ports and LEDs of MGI64 Board

Port, LED	Function Description
LAN	Port for connecting to Ethernet
SIO	UART port(for tests)
RST	Button for resetting MGI board
PWR LED	Power supply - Off: Power supply blocked - On: Power supplied
RUN LED	MGI64 status - Off: Power supply blocked - On: On booting - Blink: RAM program in operation

Table 2.25 Ports and LED of MGI64 Board **(C**ontinued)

Port, LED	Function Description
LAN TX LED	Ethernet Data Transmission - Off: No data - On or Blink: Data are being transmitted
LAN Rx LED	Links and Ethernet Data Reception - Off: No data or no link connected - On or blink: On data reception
SVC LED	Service - LED blinks when the task service of the software is available
DSP LED	VoIP DSP operation - LED blinks when VoIP DSP is operated
RTPT LED	Voice packet transmission - LED turns on when transmitting voice packets
RTPR LED	Voice packet reception - LED turns on when receiving voice packets

2.3.5.3 4WLI

The 4WLI interface board uses the DASL to send/receive voice to/from the phone system and wireless BTS. This board decompresses the voice of G.726 and uses the wireless method of 802.11b WLAN or DECT. The 4WLI accommodates four BTSs and one BTS can accommodate four channels. One WLI platform interworks the DECT with the WLAN by software conversion to interwork with wireless BTS.

Main Functions

The main functions of the 4WLI voice application board are as follows:

- Voice decompression: G.711/G.729
- Wireless specification: 802.11b WLAN

Specifications

The specifications of the 4WLI board are as follows:

- Up to four BTSs
- Simultaneous calling through up to four channels per BTS
- The maximum number of mobile station subscribers is 120

Front View

The front view of the 4WLI board is shown in the figure below:

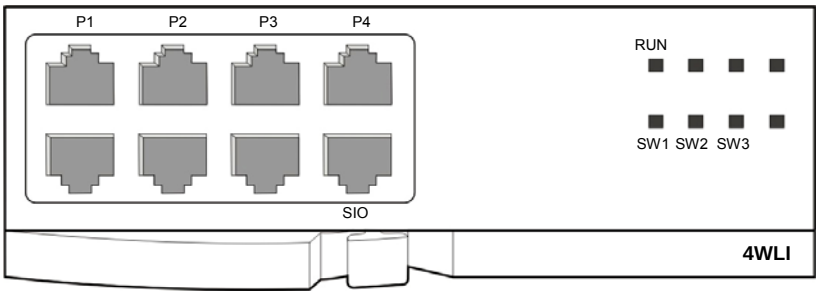


Figure 2.23 Front View of 4WLI

The components on the front panel of the 4WLI have the functions below:

Table 2.27 Ports and LEDs of 4WLI Board

Port, LED	Function Description
P1~P4	Port for connecting to WBS24 BTS
SIO	UART port(for tests)
RUN LED	LED turns on if wireless LAN service is in operation
SW1~SW3 LED	LED turns on if the software task is in operation

2.3.6 SVMi-20E

Samsung Voice Mail integrated(SVMi)-20E is a Voice Mailing System(VMS) that has its own voice mailbox and auto attendant. SVMi-20E provides all voice mailbox functions required by subscribers and it is easy to use and install.
The details for SVMi-20E, see 'SVMi-20E User's Manual'.

Main Functions

The main functions of the SVMi-20E board are as follows:

- It is available to use auto attendant and voice mailbox separately or simultaneously.
- Basically, four calls can be processed simultaneously. If upgraded, up to 12 calls can be processed at once.
- As SVMi-20E is designed in modular type, voice ports can be added easily if necessary.
- In the OfficeServ 7400 system, only one SVMi-20E can be installed and other voice mail systems cannot connect to SVMi-20E.

Specifications

The specifications of SVMi-20E are as follows:

- Maximum ports: 4~12(Default: 4)
- Maximum storage time: 0-9999 days(Default: 9999)
- Maximum subscribers: 0-99999999(Default: 1000)
- Message Holding Period: 0-9999 days(Default: 9999)
- Total Messages per Mail Box: 0-9999(Default: 9999)
- Total Message Holding Time: 0-9999 seconds(Default: 600)

Front View

The front view of the SBC board, which is the main board of SVMi-20E is shown in the figure below:

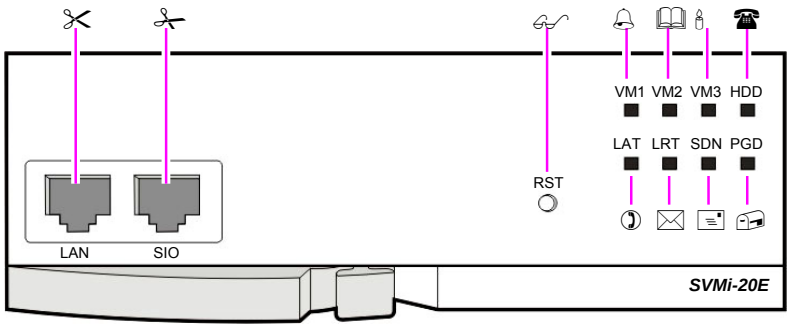


Figure 2.24 Main Board of SVMi-20E

The components on the front panel of the main board of SVMi-20E have the functions Below:

Table 2.28 Main Board of SVMi-20E

Category		Function Description
LAN Interface Connector		The LAN interface connector is used for data transmission and database backup. It is also called LAN connector and mainly used for system file transmission(backup and restoration). SVMi-20E backup or restore the data by using LAN provided by the customer or connecting to lap top computer or PC connected to this LAN connector directly.
Serial Interface Connector		Used for connecting to PC.
Reset Button(RST)		If pressing this button, the SVMi-20E system restarts and calls in process are disconnected.
LED (Light Emitting Diode)	VM1	LED blinks when one or more ports are hooked on/off from among the initial four ports(1~4).
	VM2	LED blinks when one or more ports are hooked on/off from among the second four ports(5~8).
LED (Light Emitting Diode)	VM3	LED blinks when one or more ports are hooked on/off from among the last four ports(9~12).
	HDD	LED blinks whenever contacting to hard disk driver.
	LAT	LED turns green when LAN port is operated.
	LRT	LED turns orange when transmitting data to LAN.
	SDN	Indicating the system status. LED turns red when the system driver is loaded and turns green when loading is terminated.
	PGD	LED turns green when the system power supply is normal.

NOTE

SVMi-20E

For VPM and memories of SVMi-20E, see ‘SVMi-20E User’s Manual’.

2.4 Station Phones

This section describes the types and features of analogue/digital station phones that can be connected to the OfficeServ 7400 system.

2.4.1 Regular Phones

The regular phones used for voice calls are connected to the ports of the 8SLI/16SLI/8COMBO/ 16SLI2 board mounted on the Universal slot of the OfficeServ 7400 system.

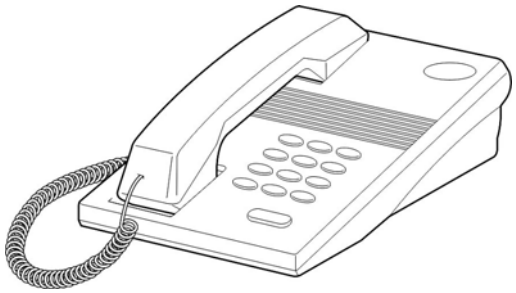


Figure 2.25 Regular Phone

2.4.2 Digital Phones

Digital phone are used for voice calls or data transmission and connected to the ports of the 8DLI/16DLI/8COMBO/16DLI2 board mounted on the Universal slot of the OfficeServ 7400 system. The digital phones can be used by connecting with devices such as Add On Module(AOM), Keyset Daughter Board(KDB)-D, and KDB-S.

The 5000 Series Digital Keysets are as follows:

14-Button 2-Line LCD Keyset (DS-5014D)

- 48-character display (2x24) LCD with three associated soft keys and scroll key
- 14 programmable keys
- Navigation keys for easy use of keyset functions
- Five fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- Eight selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

21-Button 2-Line LCD Keyset (DS-5021D)

- 48-character display (2x24) LCD with three associated soft keys and scroll key
- 21 programmable keys
- Navigation keys for easy use of keyset functions
- Five fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- Eight selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

7-Button 2-Line LCD Keyset (DS-5007S)

- 48-character display (2x24) LCD with three associated soft keys and scroll key
- 7 programmable keys
- Five fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- Eight selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

14-Button 2-Line LCD Keyset (DS-5014S)

- 48-character display (2x24) LCD with three associated soft keys and scroll key
- 14 programmable keys
- Five fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- Eight selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

38-Button 2-Line LCD Keyset (DS-5038S)

- 48-character display (2x24) LCD with three associated soft keys and scroll key
- 38 programmable keys
- Five fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- Eight selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

12-Button Large LCD Keyset (DS-5012L)

- Large LCD with 12 keys for feature selection
- Supports data transfer, handset calls and full-duplex speakerphone
- USB interface
- Navigation keys for easy use of keyset functions
- Five fixed-function keys
- Keyset Status Indicator
- Eight selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes

NOTE

Up to eight DS-5012L phones can be connected with the DLI module (8DLI/16DLI). 24 DS-5012L phones can be connected to both the basic chassis and expansion chassis (48 total).

2.4.3 IP Phones

Internet (IP) phones use IP addresses to send/receive voice and data. They use existing data network lines, so do not need normal phone lines, and can be connected to devices such as a switching hub. They are connected to other digital phones through the MGI module.

The 5000 Series IP Keysets are as follows:

12-Button Large LCD IP Keyset (ITP-5012L)

- Large LCD with 12 keys for feature selection
- Supports data and voice transfer using Internet Protocol
- Navigation keys for easy use of Keyset functions
- Five fixed-function keys
- Keyset Status Indicator
- Eight selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes

14-Button 2-Line LCD IP Keyset (ITP-5014D)

- 48-character display (2x24) LCD with three associated soft keys and scroll key
- Supports data and voice transfer using Internet Protocol
- 14 programmable keys
- Navigation keys for easy use of keyset functions
- Five fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- Eight selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

21-Button 2-Line LCD IP Keyset (ITP-5021D)

- 48-character display (2x24) LCD with three associated soft keys and scroll key
- Supports data and voice transfer using Internet Protocol
- 21 programmable keys

- Navigation keys for easy use of keyset functions
- Five fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- Eight selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

2.4.4 Add-On Module (AOM)

DS-5064B 64-Button AOM

- 64 programmable keys with red LEDs
- Up to four can be assigned to a keyset to provide additional programmable keys

2.4.5 Keyset Daughterboards

5000 Series Keyset Daughterboards

DS-5014D, DS-5021D and DS-5038S keysets support one of three different types of daughterboard installed on them to enhance operation or to provide an additional local port, depending on the type of daughterboard.

KDB-Digital Line Interface (KDB-D)

If your keyset is connected to a Digital Line Interface (DLI) port that supports 2B+D operation, you may install a daughterboard that provides a Digital Line Interface (DLI) port for connection of a digital station device such as a keyset or 64 button add-on module.

KDB-Single Line Interface (KDB-S)

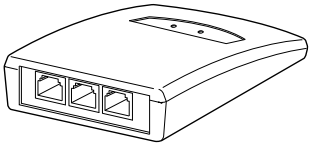
If your keyset is connected to a Digital Line Interface (DLI) port that supports 2B+D operation, you may install a daughterboard that provides a Single Line Interface (SLI) port for connection of a standard telephone device such as a cordless phone.

KDB-Full Duplex (KDB-F)

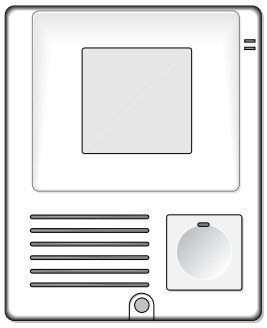
The standard speakerphone mode of operation for 2-line LCD keysets is 'half duplex'. This means that you cannot transmit and receive speech at the same time. Adding an KDB-F to your keyset will convert the speakerphone into full duplex mode, enhancing its operation. In addition, the KDB-F may have up to three external microphones attached to it for conference room type applications. These microphones require an 'EXTMIC' key programmed on the keyset to activate or deactivate them.

2.4.6 Door Phone and Door Phone Interface Module (DPIM)

The DPIM adapts any DLI circuit for use with the door phone unit. The unit is commonly used to request entry through locked doors (interior or exterior) or as a room monitoring box. It provides contact control to be used with a customer-provided electric door lock. The door phone is wall-mounted. An external weather-resistant unit is also available.



DPIM



Door Phone

2.5 Wireless LAN Device

This section describes the wireless LAN BTS and mobile stations that can be connected with the OfficeServ 7400 system.

2.5.1 Wireless LAN Base Station (Combo)

Wireless LAN base station(WBS24) of 2.4 GHz consists of wire and wireless processing blocks. The wire processing block has the DASL interface connected with the OfficeServ 7400 and IEEE 802.3 Ethernet interface connected with the LAN. The wireless processing block has the IEEE 802.11b standard and wireless LAN RF interface with the wireless frequency band of 2.4 GHz.

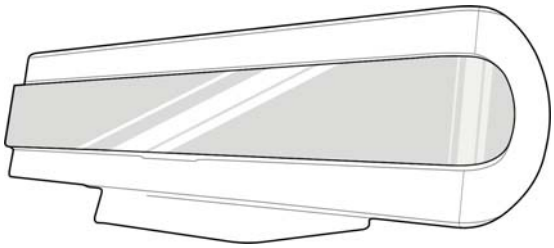


Figure 2.26 WBS24

The wire Ethernet interface is connected with the LAN based on 10/100 BASE-T and transmits/receives data(e.g., Internet access) other than voices. The wireless processing block transmits/receives voice data for wireless voice calls and accesses the wireless Internet.
The maximum transmission speed on the wireless section is 3~4 Mbps. Various people can simultaneously access the wireless Internet using a WBS24.

2.5.2 Mobile Station

Mobile station WIP-5000M (wireless IP-Phone mobile type), which is a local wireless mobile station, uses the wireless LAN of IEEE802.11b to allow the users to make voice calls. The WIP-5000M performs the wireless IP phone function that exchanges as packets that meets the wireless LAN standard by compressing voice(Voice over WLAN). The WIP-5000M supports hand-over when moving between the APs(WBS24s) and can use data terminals such as laptops that enable wireless LAN in the same place.
The WIP-5000M performs the message service functions supported by the OfficeServ 7400 system as well.

Figure 2.27 WIP-5000M

2.6 Additional Devices

This section describes the types and features of devices that can be connected optionally when the OfficeServ 7400 is installed.

2.6.1 On Hold/Background Sound Source

The OfficeServ 7400 is connected with cassettes or radios in addition to the basic tone provided by the system or internal sound source to allow subscribers to listen to melodies other than ones specified to the subscribers. The devices such as the cassettes or radios are called on hold/background sound source.
The on hold/background sound source is mainly used for on hold tone, background music, or announcement and can be used by being connected with the external sound source devices below:

- FM radio
- CD player
- Cassette tape recorder


NOTE

Output Resistance

The speaker output resistance of FM radios, CD players, or cassette recorders are normally 8 Ω or 16 Ω.

2.6.2 External Units

The OfficeServ 7400 is connected with external units such as amplifiers or speakers for consumers instead of internal speakers. The external units are connected via the MISC1 port of the MIS board, which is an optional board that can be mounted on the control board.

2.6.3 Loud Bell

The Loud Bell allows the users to listen to ring signals from outside, and amplifiers or external speakers are used for the Loud Bell.
The Loud Bell is connected via the MISC1 port of the MIS board, which is an optional board that can be mounted on the control board. Once the secondary call device is connected, a call signal rings from only a specific phone set to MMC 205 Assign Pair Station of Loud Bell.

2.6.4 Common Bell

The Common Bell is a ring that can be specified when a station group is set. Once a station in a group rings, other stations in the group ring. The Common Bell is connected via the MISC1 port of the MIS board, which is an optional board that can be mounted on the control board.

2.6.5 PCMMC

The PC Man Machine Communication(PCMMC) is software for maintaining the OfficeServ 7400. The functions for controlling the system database are implemented in the form of menus in the PCMMC; thus, the PCMMC is convenient to use when the system data are displayed or changed. Also, the users can understand and use the system operational commands easily because the commands for maintenance are unified.

2.6.6 SMDR

The Station Message Detail Recording(SMDR) manages entire calling data such as calls between station subscribers connected with the OfficeServ 7400 as well as local/long distance/international calls. The OfficeServ 7400 provides calling data. Connect the SMDR printer or SMDR computer with the OfficeServ 7400 to use the SMDR data provided by the OfficeServ 7400 system.

- The SMDR printer can display call history received from the OfficeServ 7400, however does not display data other than the call history(i.e., toll data).
- The SMDR computer displays call history received from the OfficeServ 7400 and calculates toll using the SMDR software based on the call history. Accordingly, the SMDR computer allows the users to use data more efficiently than the SMDR printer.

2.6.7 CTI

The Computer Telephony Integration(CTI) is the integrated system of computer and telephony. That is, the CTI interworks computers with PBXs so that the computers make use of the PBXs as computer resources and the PBXs share the computer resources.
The CTI provides the operator with convenience and reduced costs and the customers with enhanced services and reduced call processing time.

Particularly, the CTI call center system configures data on the customers into databases. Based on the databases, the call center can consult with the customers one to one. The CTI integrates communication, computers, and database based on phones as a basic medium to allow the users to perform marketing using computers such as customer-focused telemarketing.

The OfficeServ 7400 supports the standard Telephony Application Programming Interface(TAPI), which is implemented in a client/server environment and controls third party calls.

CHAPTER 3. Specification of OfficeServ 7400

This chapter describes the capacity of the OfficeServ 7400, various signal specification, power specification, rings and tones, compatible boards and terminals, and equipment specifications.

3.1 System Capacity

Up to 1344 lines can be installed and operated in the OfficeServ 7400 system, and the line ratio of the station and trunk line can be adjusted within the capacity depending on the users' needs. Table 3.1 below shows the maximum line capacity of the OfficeServ 7400:

Table 3.1 OfficeServ 7400 Capacity

System Configuration	Maximum Line Capacity
Basic cabinet	When using the E1: 600 When using the 8TRK: 80 When using the station: 160 When using the maximum capacity: 320(voice) When using the LAN switch: 176 When using the internal power of LIM-P: 32 When using the VDSL: 20 When using the WLAN terminal or IP phone: 640 SVMi-20E: one per 12(20) systems MFM: Two per 12 systems RCM: Up to 2(only trunk lines) per R2(8) or CID(14) system RCM2: Up to 2 per R2(8) or CID(14) system R2(4)/CID(6)(Both station and trunk lines are supported.) CRM: Up to 2 per MFM(20), R2(16), or CID(16) system

Table 3.1 OfficeServ 7400 Capacity (Continued)

System Configuration	Maximum Line Capacity
Basic cabinet + Expansion cabinet1	When using the E1: 930 When using the 8TRK: 168 When using the station: 336 When using the maximum capacity: 672(voice) When using the LAN switch: 352 When using the internal power of LIM-P: 64 When using the VDSL: 40 When using the WLAN terminal or IP phone: 992 MFM: Four per 12 systems RCM: Up to 4(only trunk lines) per R2(8) or CID(14) system RCM2: Up to 4 per R2(8) or CID(14) system R2(4)/CID(6)(Both station and trunk lines are supported.) CRM: Up to 4 per MFM(20), R2(16), or CID(16) system
Basic cabinet + Expansion cabinet1 Expansion cabinet2	When using the E1: 1260 When using the 8TRK: 256 When using the station: 512 When using the maximum capacity: 1024(voice) When using the LAN switch: 528 When using the internal power of LIM-P: 96 When using the VDSL: 60 When using the WLAN terminal or IP phone: 1344 MFM: Six per 12 systems RCM: Up to 6(only trunk lines) per R2(8) or CID(14) system RCM2: Up to 6 per R2(8) or CID(14) system R2(4)/CID(6)(Both station and trunk lines are supported.) CRM: Up to 6 per MFM(20), R2(16), or CID(16) system

3.1.1 Trunk Line Capacity

The maximum trunk line capacity of the OfficeServ 7400 based on its configuration is shown in the table below:

Table 3.2 Trunk Line Capacity

System Configuration	Analogue	Digital		
	LOOP TRK	T1 TRK	E1 TRK	PRI TRK
Basic cabinet	80	480	600	T1: 480 E1: 600
Basic cabinet + Expansion cabinet1	168	744	930	T1: 744 E1: 930
Basic cabinet + Expansion cabinet1 + Expansion cabinet2	256	1008	1260	T1: 1008 E1: 1260

3.1.2 Station (Subscriber) Line Capacity

The maximum station line capacity for regular phones and digital phones in the OfficeServ 7400 based on its configuration is shown in the table below:

Table 3.3 Station Line Capacity

System Configuration	Regular Phones	Digital Phones
Basic cabinet	160	160(DS-5012L: 73)
Basic cabinet + Expansion cabinet1	336	336(DS-5012L: 146)
Basic cabinet + Expansion cabinet1 + Expansion cabinet2	512	512(DS-5012L: 219)

3.1.3 Number of Channels

The number of channels of each slot of OfficeServ 7400 and the number of CID receivers and DTMF receivers are as follows:

Table 3.4 Channels of Each Slot

Category	Slot	Number of Channels
Basic cabinet	Slot 1, 2, 4, 5, 6, 7, 8, 9, 10, 11	64
Expansion cabinet	Slot 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	32
CID receiver	Based on basic cabinet	14
DTMF receiver	Based on basic cabinet	48

3.2 Electrical Specification

3.2.1 Signal Specification

The signal processing protocol means the methods for connecting signals between the trunk lines, stations and system, and also means the method of providing the status information.

3.2.1.1 Signaling Type of the Trunk Line

Loop Start

In processing loop start signals, the on-hook and the off-hook statuses are controlled by the flow of electric current. The loop is a closed loop trunk circuit or a standard 2500-type set loop.

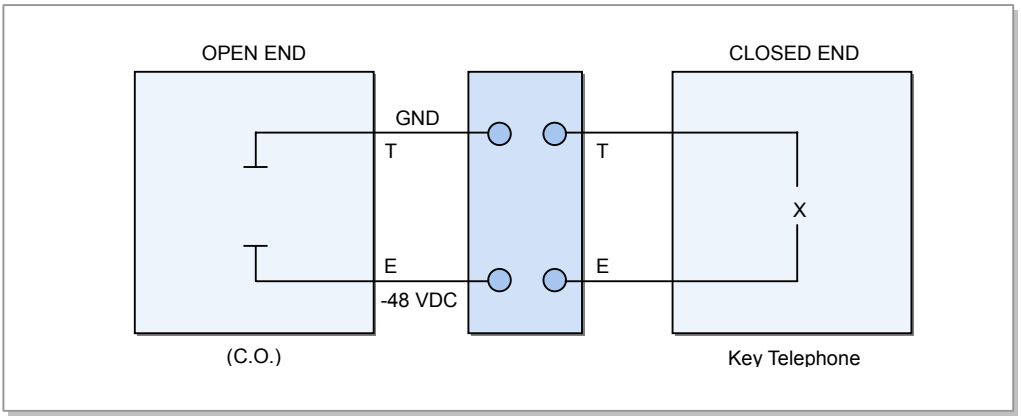


Figure 3.1 Trunk Line Loop Start Signaling

T1 Trunk Line

- The electrical characteristics of the T1 trunk line comply with the ITU G.703 and G.704 standards.

Table 3.5 Electrical Characteristics of the T1 Trunk Line

Categories		Specifications
Transmission speed		1544 kbit/s ±50 ppm
Code		AMI or B8ZS
Pulse type		Regular square wave: When indicating all valid signals, comply with the mask(G.703) regardless of the codes.
Transmission media		A pair of twisted lines
Load resistance		100 Ω
Indicated(pulse) nominal peak voltage		3.00 V
Signal Level	Power at the frequency of 772 kHz	±12~±19 dBm
	Power at the frequency of 1544 kHz	25 dB or higher when the power is less than the power at the frequency of 772 kHz

- The signaling specification and the signaling method of the T1 trunk line should comply with the ITU G.703 and G.704 standards.

E1 Trunk Line

- The electrical characteristics of the E1 trunk line comply with the ITU G.703 and the G.704 standards.

Table 3.6 Electrical Characteristics of the E1 Trunk Line

Categories	Specifications
Transmission speed	2048 kbit/s ±50 ppm
Code	High Density Bipolar of Order 3(HDB3)
Pulse type	Regular square wave: When indicating all valid signals, comply with the mask(G.703) regardless of the codes.
Nominal and pulse	244 ns
Jitter of the I/O terminal	Refer to the G.823
Transmission media	A pair of twisted lines
Load resistance	120 Ω
Indicated(pulse) nominal peak voltage	3.00 V
Blank(non-pulse) peak voltage	0 ±0.300 V

- The signaling specification and the signaling method of the E1 trunk line comply with the ITU G.703 and G.704 standards E1.

Characteristics of the ISDN Interface Transmission

The electrical characteristics of the ISDN (BRI) interface comply with the ITU I.430 and ETS 300 012 standards.

Table 3.7 Electrical Characteristics of the BRI Trunk Line

Categories	Specifications
Transmission speed	192 kbit/s ±100 ppm
Code	AMI
Pulse type	Regular square wave: When indicating all valid signals, comply with the mask (I.403) regardless of the codes.
Transmission media	Pair of twisted lines
Load resistance	120 Ω
Indicated(pulse) nominal peak voltage	2.75 V

- The electrical characteristics of the ISDN(PRI) interface comply with the ITU I.431 and ETS 300 011 standards

Table 3.8 Electrical Characteristics of the PRI Trunk Line

Categories	Specifications
Transmission speed	2048 kbits/s ±50 ppm
Code	High Density Bipolar of Order 3(HDB3)
Pulse type	Regular square wave: When indicating all valid signals, comply with the mask(I.403) regardless of the codes.
Nominal and pulse	244ns
Transmission media	A pair of twisted lines
Load resistance	120 Ω
Indicated(pulse) nominal peak voltage	3.00 V
Blank(non-pulse) peak voltage	0 ±0.300 V

- The electrical characteristics of the Digital Line Interface(DLI) are shown in the table below:

Table 3.9 Electrical Characteristics of the DLI Line

Categories	Specifications
Transmission speed	38144 kbits/s
Code	AMI(Alternate Mark Inversion)
Pulse type	Typical AMI Waveform

3.2.1.2. Signaling Type of the Dedicated Line

Electrical Characteristics of the GWIM Interface

- The electrical characteristics of the V.35 interface are shown in the table below:

Table 3.10 Electrical Characteristics of the GWIM Interface (V.35 Interface)

Categories	Specifications
Maximum transmission speed	10 Mbit/s
Transmission code	V.35 driver
Number of transmission lines	18 EA
Characteristic resistance	100 Ω
Indicated(pulse) nominal peak voltage	±2 V
Input Differential Threshold	±80 mV

- The electrical characteristics of the RS-232C(V.28) interface are shown in the table below:

Table 3.11 Electrical Characteristics of the GWIM Interface (RS-232C Interface)

Categories	Specifications
Maximum transmission speed	230 kbits/s
Transmission code	V.28 driver
Number of transmission lines	14 EA
Indicated(pulse) nominal peak voltage	±15 V
Input Threshold	+1.2, -1.7 V

- The electrical characteristics of the HSSI interface are shown in the table below:

Table 3.12 Electrical Characteristics of the GWIM Interface (HSSI Interface)

Categories	Specifications
Maximum transmission speed	50 Mbit/s
Transmission code	HSSI driver
Number of transmission lines	50
Characteristic resistance	110 Ω
Indicated(pulse) nominal peak voltage	±1 V
Input Threshold	±0.15 V

3.2.1.3. Signaling Type of the LAN

- The electrical characteristics of the 10 Base-T, which comply with the IEEE802.3 standards, are shown in the table below:

Table 3.13 Electrical Characteristics of the LAN Interface (10 Base-T)

Categories	Specifications
Transmission speed	10 Mpbs
Transmission code	Manchester coding(When the transmission data is '0', the higher level than the middle of the bit is inversed into the lower level. When the transmission data is '1', the lower level than the middle of the bit is inversed into the higher level)
Access control method	Carrier Sense Multiple Access/Collision Detect (CSMA/CD)
Transmission media	UTP(Unshielded Twisted Pair) CAT3, CAT4, CAT5, STP(Shielded Twisted Pair)
Number of the UTP pairs	2 pairs
Characteristic resistance	100 Ω
Cable thickness	Diameter: 0.51 mm(24 AWG), External diameter: 5 mm

- The electrical characteristics of the 100 Base-Tx, which comply with the IEEE802.3u standards, are shown in the table below:

Table 3.14 Electrical Characteristics of the LAN Interface (100 Base-Tx)

Categories	Specifications
Transmission speed	100 Mbps
Transmission code	4B/5B+MLT-3 - 4bit/5bit converts the data of 4bit into the data of 5bit and encodes the data on the physical layer. Multi Level Transmission-3(MLT-3) encodes transmission data into 3 levels(high, middle, and low).
Access control type	CSMA/CD
Transmission media	UTP CAT5, STP
Number of UTP pairs	2 pairs
Characteristic resistance	100 Ω
Cable thickness	Diameter: 0.51 mm(24 AWG), External diameter: 6 mm

- The electrical characteristics of the 1000 BASE-TX, which comply with the IEEE802.3ab standards, are shown in the table below:

Table 3.15 Electrical Characteristics of LAN Interface (1000 BASE-TX)

Categories	Specifications
Transmission speed	1000 Mbps
Transmission code	8B1Q4 The 8-bit transmission data are converted into 9-bit transmission signals via the additional treatment of scramble, error detection bit, and then are mapped into the transmission signals of four teams with five levels, and are randomized into each pair of transmission signal to be transmitted.
Access control method	CSMA/CD
Transmission media	UTP CAT5(Maximum transmission distance 100 m)
Number of UTP pair	4 pairs
Characteristic resistance	100 Ω
Cable thickness	Diameter 0.51 mm(24 AWG), External diameter 6 mm

- The electrical characteristics of 1000 BASE-SX/LX, which comply with the IEEE802.3z standards, are shown in the table below:

Table 3.16 Electrical Characteristics of LAN Interface(1000 BASE-FX)

Categories	Specifications
Transmission speed	1000 Mps
Transmission code	8B/10B Data Encoding The 8-bit(8B) data entered from the upper layer of MAC Part are handled in one nibble to be converted into the signals of 10-bit(10B) at the physical layer. And then each nibble of the converted data are transmitted. The transmission speed after the conversion into 8B/10B is 1250 Mbps.
Access control method	CSMA/CD
Transmission media	SX: Multimode Optical Fiber(MMF) LX: Multimode Optical Fiber/Single mode Optical Fiber(SMF)
Number of Optical Fibers	Two pairs
Maximum transmission distance	SX: Maximum 550 m LX: Maximum 5 km
Cable thickness	Diameter 0.51 mm(24 AWG), External diameter 6 mm

Table 3.17 1000 BASE-SX/LX Optical Fiber

Fiber Type	Mode Band (Short Wave/Long Wave MHz.Km)	Transmission Distance(m)	
		1000BASE-SX	1000BASE-LX
62.5uM MMF	160/500	220	550
	200/500	275	550
50uM MMF	400/400	500	550
	500/500	550	550

NOTE

Mode Band

The mode band shown in the previous table is a quality indicator of the multimode optical fiber related to the transmission speed. Its unit is generally MHz.Km, and is proportional to the value of the bit rate of the optical signal(the on-off speed) X the maximum transmission distance. The largeness of this value means the high optical signal with high bit rate can be transmitted. Each mode band is standardized also in the use of short wave and long wave laser..

NOTE

Categories of UTP Cable

UTP Cables are classified into Straight-through UTP cable and Crossover UTP cable. The Straight-through UTP cable is used for connecting the LIM module of OfficeServ 7400 system to other modules(MCP, MGI, WIM, 4DSL). The Crossover UTP cable is used for connecting only LIM(LIM-P) module to LIM(LIM-P) module.

3.2.1.4 Signaling Type of the Station

Dial Pulse Signaling Type

- Ratio-10 Pulse Per Second(PPS)
- Make/Break Ratio(M/B ratio)-33%: 66%(It can be adjusted by the software.)
- The minimum signaling time between digits-20 msec(It can be adjusted by the software.)

DTMF Push Button Dialing

The DTMF signal processing complies with the ITU standard, which enables the user to send/receive the signals of digital phones through the trunk line and to process the signals of regular phones.

3.2.1.5 Signaling Type of the VDSL

The electrical characteristics of the VDSL for using the long-distance Ethernet are shown in the table below:

Table 3.18 Electrical Characteristics of the VDSL Interface

Categories	Specifications
Transmission speed	1 M~16 Mbps
Modulation code	QAM(Quadrature Amplitude Modulation)
Error detection	Reed Solomon coding method
Transmission distance	1.0 km
Transmission media	One pair of twisted lines
Characteristic resistance	Splitter installed
Used frequency	138 kHz~12 MHz
Link speed	Down link: 30 Mbps(300 m), Up link: 10 Mbps(300 m)

3.2.2 Transmission Characteristics

- Attenuation
  Attenuation between subscribers: Less than 6 dB
  Attenuation between the subscriber and local trunk line: Less than 0.5 dB
- Characteristic resistance of the line: 600 Ω
- Weighted noise: Less than -65 dBm
- Crosstalk attenuation: Less than -68 dBm
- Frequency band: 300~3400 Hz
- Insulation resistance: More than 1 MΩ

3.2.3 Line Conditions

- Length for installation:
  Regular phones: Up to 1 km(When the AWG #24 cable is used)
  Digital phones: Up to 400 m(When the AWG #24 cable is used)
  Door phones: Up to 400m(When the AWG #24 cable is used)
  AOMs: Up to 400m(When the AWG #24 cable is used)
  Length between 4WLI and to Combo AP: Up to 600 m(When the AWG #24 cable is used)
- Leakage resistance between lines: More than 20 KΩ
- Leakage resistance between grounds: More than 20 KΩ

3.3 Power Specification

3.3.1 OfficeServ 7400 System Power

OfficeServ 7400 operates by AC input power or battery power and supplies the system cabinet with the backup power of -54 V, -5 V, +5 V, +3.3 V, +12 V, or -56 V.

Table 3.19 I/O Voltage of PSU

Power Supply Devices		Specifications
Power Supply Board(PSU)	Input power	AC 110 V, 220 V(Free Voltage)
	Input power	- DC -54 V, 6.6 A - DC +5 V, 16 A - DC -5.3 V, 2 A - DC +3.3 V, 30 A - DC +12 V, 1 A - DC -56 V, 0.4 A(for backup)
External rectifier (Model name: OfficeServ 7150)	Input power	AC 220 V(for the local use)
	Output Power	DC -54 V, 10 A

3.3.2 External Rectifier

External Rectifier is used for the power supply to IP phone or to WBS24 when LIM-P board is used in OfficeServ 7400 system.
The additional -54 V power is to be supplied to the external device as shown in the figure below for supplementing the insufficient internal power.

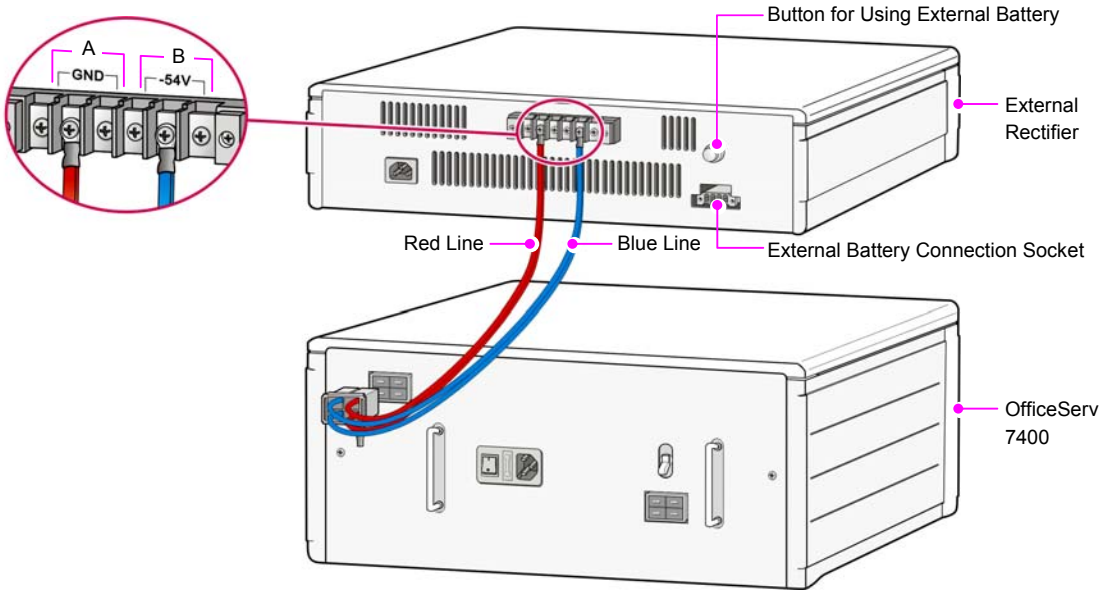


Figure 3.2 External Rectifier

NOTE

External Rectifier Installation
Refer to 'OfficeServ 7400 Installation Manual' for the description on the external rectifier installation.

3.4 Rings and Tones

3.4.1 Ring Cycles

The OfficeServ 7400 provides the trunk line rings, station rings, door rings, and alarm rings. The ON/OFF cycle of each ring is shown in the table below:

Table 3.20 System Ring Cycles

Rings	ON/OFF Cycles
Trunk line ring	400/200/400/3000 ms
Station ring	1000/2000 ms
Door ring	400/200/400/200/400/2000 ms
Alarm ring	400/200/400/200/400/200/400/1000 ms

Ring ON/OFF Cycle

The ON/OFF cycle can be adjusted by changing the values of the system database

3.4.2 Tones

The output voltage and the frequency of the ring signals in the OfficeServ 7400 are as follows:

- Output voltage: 75 V
- Frequency: 20 Hz

The OfficeServ 7400 provides the users with various tones to notify the users of the status of functional operation and give feedback to the users. The ON/OFF cycles of currently specified tones are shown in the table below:

Table 3.21 Cycles of the System Tones

Tones	ON/OFF Cycles
Dial tone	1000/250 ms
Busy Tone	500/500 ms
Do Not Disturb tone	250/250 ms
Ring Back tone	1000/2000 ms
Call Park tone	Continuous
Confirmation/Caution/Barge-In tone	50/50 ms
Call Back/Hold tone	500/3500 ms
Ring Back tone	1000/2000 ms
Error/Number Unobtainable tone	250/250 ms
Message Camp On tone	Continuous

3.5 Available Terminals

The terminals available to the OfficeServ 7400 are shown in the table below:

Table 3.22 OfficeServ 7400 Compatible Terminals

Types	Terminals
DS-5000 series digital phones	DS-5007S, DS-5014S, DS-5014D, DS-5021D, DS-5038S, DS-5012L
ITP-5000 series IP phones	ITP-5014D, ITP-5021D, ITP-5012L
Wireless LAN devices(WLAN)	WIP-5000M(Mobile terminals), WBS24(Access Point Device)
AOM	DS-5064BAOM
Others	KDB-S, KDB-D, KDB-F, DPIM, door phone,


NOTE

Compatible Terminals
All terminals compatible with the Samsung OfficeServ range of systems are available to the OfficeServ 7400.

3.6 Equipment Specification

The OfficeServ 7400 consists of one basic and two expansion cabinets as shown in the figure below:

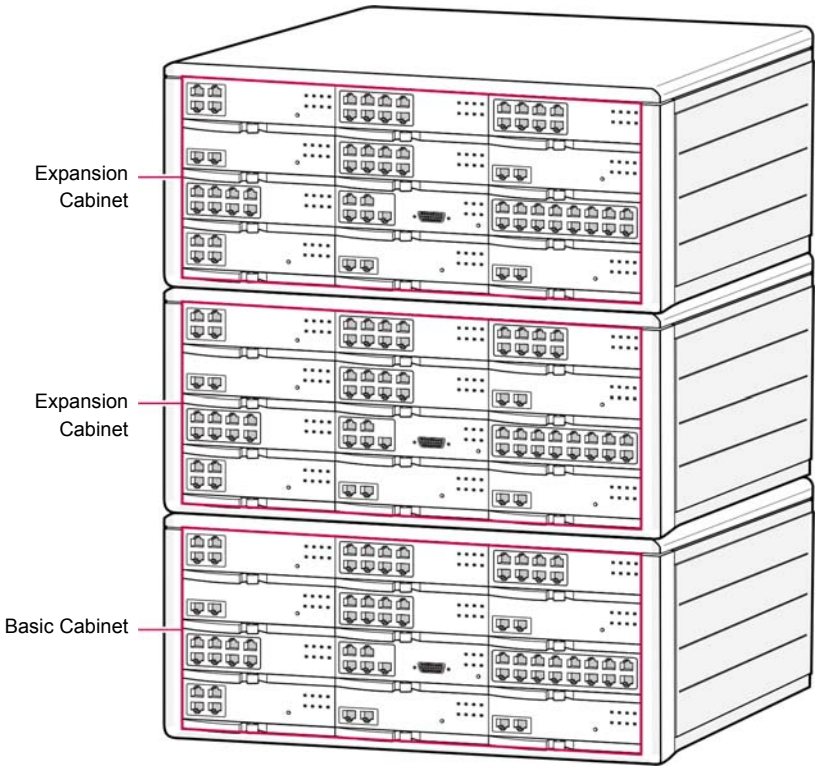


Figure 3.3 Cabinet Configuration of OfficeServ 7400

- When the OfficeServ 7400 consists of one cabinet(basic cabinet)
  440(W) × 223.8(H) × 410(D) mm
- When the OfficeServ 7400 consists of two cabinets(basic cabinet + expansion cabinet)
  440(W) × 447.6(H) × 410(D) mm
- When the OfficeServ 7400 consists of three cabinets(basic cabinet+ two expansion cabinets)
  440(W) × 671.4(H) × 410(D) mm

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CHAPTER 4. Functions of OfficeServ 7400

This chapter describes the functions of the OfficeServ 7400 related to calls, VoIP, data, UMS, and web/system management

4.1 Call Functions

The OfficeServ 7400 processes station calls, trunk line calls, application calls, or various signals through the PSTN and VoIP networking.

4.1.1 Dynamic IP Address Allocation

DHCP Client of the MP40

The MP40 is the call processing control part of the OfficeServ 7400. The MP40 uses the DHCP client function to get the IP address allocated by the data server and operate. In this case, the data server recognizes the MP40 of the call server from the host ID of the required DHCP information and allocates the IP address specified in the DHCP allocation table. The MP40 can be operated by the fixed IP address, which is not the dynamic DHCP allocation method.

MGI/MGI64 Configuration

The MGI mounted in the OfficeServ 7400 can be operated by receiving the dynamically allocated IP address from the data server rather than manually setting the IP address.

IP Phone Configuration

The IP phones or SIP(Session Initiation Protocol) phones registered to the OfficeServ 7400 also can be operated by rather receiving the dynamically allocated IP address from the data server than manually setting the IP address.

4.1.2 VoIP UMS Interface

Auto Attendant/Mail Box Interface

The OfficeServ 7400 uses the SIP and RPT that are the VoIP protocols to provide the auto attendant and mailbox functions through the UMS and IP network operating in the feature server. To interface with the VoIP UMS, the MGI board should be mounted in the cabinet slot of the OfficeServ 7400.

E-mail Notice

The OfficeServ 7400 periodically checks whether any e-mails are received in the e-mail account registered to the UMS and notifies the result to the user in voice or through the LCD screen or LED of the telephone connected to the OfficeServ 7400.
To be notified in voice, the user should set the TTS(Text-To Speech) function.

4.1.3 SIP Server Interface

Standard SIP Phone Registration

The OfficeServ 7400 registers the SIP phones, which operate through the SIP interface, to provide the call process services according to the system numbering plan. In this case, the user should install and operate the SIP server in the feature server.

Basic Call Process of the Standard SIP Phone

The OfficeServ 7400 provides the station and trunk line call services by using the standard SIP phones registered to the OfficeServ 7400.
Since standard SIP phones does not provide the various functions of the key phone system, they provide only the basic station and trunk line call services.

Additional Call Process of the Standard SIP Phone

The OfficeServ 7400 provides the additional services related to the station and trunk line call services by using the standard SIP phones registered to the OfficeServ 7400.
The additional services provided by the OfficeServ 7400 are as follows:

- Call forwarding
- UMS mailbox services
- Group Ring(Parallel Forking): This function is available to the called party.

4.1.4 Router ALG Interface

NAT Application Level Gateway(ALG)

When various functions such as the VoIP signal process function and gateway function executed through the IP network in the OfficeServ 7400 are executed in the Network Address Translation(NAT) network, the conversion between the private IP address and public IP address should be performed. In this case, the call server and the data server interface each other and share the information on the conversion between the private IP and public IP, which enables the OfficeServ 7400 to provide services smoothly. This function operates only between the call server and data server of the OfficeServ 7400.

Firewall ALG

When various functions such as the VoIP signal process function and gateway function executed through the IP network in the OfficeServ 7400 are executed in the network that has a firewall, the system should be set to prohibit the firewall from cutting off the packet not manually but automatically for the smooth firewall traversing. This function operates only between the call server and data server of the OfficeServ 7400.

VPN ALG

When various functions such as the VoIP signal process function and gateway function executed through the IP network in the OfficeServ 7400 are executed in the Virtual Private Network(VPN), the system should be set to prevent the packet blocking during the IP address conversion due to the tunneling. In this case, the call server and data server interface each other and share the tunneling conversion information for smooth services. This function operates only between the call server and data server of the OfficeServ 7400.

4.2 VoIP Functions

The VoIP functions indicate the functions executed in the SIP server. The SIP server is a software module operating in the feature server. The SIP server based on the standard SIP protocol provides the gateway function for smoothly processing signals between the existing phones and the standard SIP user equipment. It also provides an interface function through which the standard SIP user equipment can interface to the phones of the OfficeServ 7400.

4.2.1 VoIP Network

To communicate with another system through the VoIP networking, the MG/MGI64I board must be installed in OfficeServ 7400. The functions of the VoIP networking are coincided with that of the PRI/Q-SIG networking.

4.2.2 VoIP Trunk Line Interface

The OfficeServ 7400 provides the VoIP trunk line interface(H.323/SIP). The OfficeServ 7400 controls calls and the private MGI board connects speech path.

4.2.3 Proxy Server

The OfficeServ 7400 serves as the SIP equipment controller, which interfaces the standard SIP equipment(user agent) defined in the RFC3261 SIP standard with the call services of the OfficeServ 7400. The OfficeServ 7400 uses the proxy server function to perform the routing for the call process requirements such as call setting, cancel, and the call termination through the SIP, which are received from the SIP equipment. The OfficeServ 7400 also manages the SIP equipment status and performs the smooth call services between the SIP equipment.

4.2.4 User Registration

The SIP interface users are identified by the SIP address in the e-mail format. This function saves and manages the current user's IP address after giving priority to the IP address. And then, this function provides the user information according to the valid user's demand.

4.2.5 SIP Telephone Configuration

The standard SIP telephone should be configured to use like the telephone of the OfficeServ 7400. When entering the phone number and user ID of the standard SIP telephone in the call server, the configuration file corresponded to each SIP telephone is created in the IP server. If operating the SIP telephone, the required configuration data of the SIP telephone will be downloaded to the TFTP. The downloaded data includes the telephone number, user name, and the code information of the OfficeServ 7400 system, which are corresponded to the SIP telephone. This configuration data is used for setting the SIP telephone.

4.2.6 SIP Telephone Registration

After a standard SIP telephone is registered as a telephone of the OfficeServ 7400, the OfficeServ 7400 provides the call process services between the SIP telephones, between a SIP telephone and a digital telephone, and between a SIP telephone and a PSTN trunk by using the assigned telephone number of the OfficeServ 7400.

4.2.7 Call Log

Records related to the call process performed in the SIP telephone are saved into a file, transmitted and managed into the external system management package.

4.2.8 Forward Busy

The call server always monitors the SIP telephone status through the SIP server. If the 'Forward Busy' function is set, the incoming call is forwarded to the specified telephone number when a call is forwarded to a busy SIP telephone.

4.2.9 Forward No Answer

If the 'Forward No Answer' function is set, the incoming call is forwarded to the specified telephone number when a call is not answered for a specific time.

4.2.10 Parallel Forking

If multiple SIP telephones are set to be used by one user in the SIP server and the priority of the call connection is same, all assigned telephones will ring at the same time when the call is forwarded. When the call is answered on one of assigned telephones, the call will be connected and other ringing telephones will be disconnected.

4.3 Data Functions

The OfficeServ 7400 functions as routers, switches, performs security function, or serves as data network applications or data access interfaces(WAN, LAN, DMZ).

4.3.1 Switches

802.1w Rapid Spanning Tree

Rapid Spanning Tree Protocol (RSTP) provides rapid convergence of the spanning tree and provides for fast reconfiguration critical for networks carrying delay-sensitive traffic such as voice and video. The specification for RSTP is IEEE 802.1w-2001. The RSTP specification for provides compatibility with legacy STP based networks.

802.1p Packet Priority

The switch extracts the priority field from the Ethernet frame configured according to the 802.1p specification standard, and discriminatively processes the frame according to the priority of the specified operation standard.

The packets are categorized into emergent packets and non-emergent packet and are processed.

VLAN (802.1Q)

The Virtual Local Area Network(VLAN) groups the related equipment by the work group according to the LAN operational policy regardless of the location of the user equipment. The VLAN also processes switching for the work groups. The VLAN removes the effects of unnecessary broadcasting packet and configures the stable switching subnet only for the corresponding group by separating and processing the group in the virtual LAN. Accordingly, the switch can provide the differentiated QoS services and the VLAN can be configured based on the switch port and MAC address.

The system automatically configures the VLAN for the IP telephone, signal process gateway, media gateway, and UMS required for services of the OfficeServ 7400, and performs the QoS process. The OfficeServ 7400 provides 32 VLAN groups.

IGMP Snooping

L2 switch(located in the lower layer of the IP router) without the IGMP(Internet Group Management Protocol) function is located between the IP router and multicast group member(host), intercepts the IGMP message. And then the L2 switch operates in the IP router like the group member and operates in the group member like the IP router, which is referred as the IGMP Snooping.

The IP layer multicast group information included in the IGMP message is reflected in the MAC filtering database, its own switching database. The group information is processed in the MAC multicast address format mapped with the IP multicast address.

802.1x Supported

IEEE 802.1x Standards defines the formats and the operation procedures of EAP over LAN(EAPoL) frame that can send/receive the Extensible Authentication Protocol(EAP) between terminals and Access Point(AP). These standards are called the port security protocol because they can be used in the procedure permitting the network access of the terminal only by acquiring the physical port license of Bridge or wireless AP from the authentication server. This performance of the authentication procedure by ports enables the control of charging policies, usage restriction, or band allocation, etc separately by ports.

Port Trunking Function Supported

Port Trunking means Port Aggregation that collects the physical ports into the logical ones. That is, like the 100 BASE-TX securing 100M bandwidth, the function collects those many ports into the logical port for expanding the bandwidth to be used.

PoE (IEEE 802.3af) Function Supported

Power over Ethernet(PoE) is designed so that no additional power supply to the network equipments used in wireless AP or other wired LAN is necessary. PoE allows the user to send the data and the power simultaneously via one ethernet cable, which reduces the installation cost in most cases as well as provides the high flexibility in selecting the installation site of the wireless AP and the network equipments.

QoS Function Supported

OfficeServ 7400 provides the function of 802.1p Packet Priority and Level Classification Setup for supporting the Quality of Service(QoS). The 802.1p Packet Priority is the expansion of the standard MAC header in the network packet. This expansion provides the packets with priority by using 3-bit. The packet of the higher priority is treated preferentially and is processed ahead than the packet of the lower priority. The Level Classification Setup function gives the packets the levels of High/Low and processes them according to their levels, which makes the differential services possible.

GARP/GVRP Function Supported

The GARP (Generic Attribute Registration Protocol)VLAN Registration Protocol (GVRP) defines a GARP application that provides the 802.1Q-compliantVLAN pruning and dynamic VLAN creation on 802.1Q trunk ports. GVRP is an application defined in the IEEE 802.1P standard that allows for the control of 802.1Q VLANs.

4.3.2 Routers

Various Network Interface

The OfficeServ 7400 provides the E0, E1, and E2 network interfaces, which are connected to the WAN through Ethernet interface, provides the serial network interface connected through the V.35, HSSI serial interface.

Static Routing

The OfficeServ 7400 configures the fixed routing table between each network interface to process the static routing. In this case, the routing table cannot be dynamically changed by the routing protocol, and specific routing services will be provided according to the pre-set routing policy.

WAN Interface(Ethernet, PPPoE, DHCP Client)

E0, E1, E2 Ethernet WAN Interface enables the connection to internet by using the Static IP, PPPoE, DHCP client protocol.

V.35 Interface (PPP, HDLC, Frame Relay)

The OfficeServ 7400 accesses Internet through the V.35 serial interface in the transfer speed of up to 2Mbps. In this case, the OfficeServ 7400 supports various environments using the functions such as the PPP, HDLC, and Frame Relay Encapsulation.

HSSI Interface (PPP, HDLC, Frame Relay)

Internet can be connected via High Speed Serial Interface(HSSI) with the transmission speed of maximum 52Mbps. Generally, HSSI can use the equipments of tokenring and ethernet network for connecting to the equipments operating at the speed of Synchronous Optical Network(SONET) OC-1 or T3 circuit.

Routing Protocol

The OfficeServ 7400 supports the routing information-exchanging protocol to react on the network environmental change and to effectively process the routing..

- RIPv1(Routing Information Protocol version1), RIPv2
  These protocols are widely used for managing the routing information in the middle-size independent network such as a group of LANs.
- OSPFv2(Open Shortest Path First version2)
  This routing protocol is used prior to the RIP in the large-size independent network. A router detects and reports any change in the routing table or the network to other routers. In this way, all routers share the same routing information.
- Border Gateway Protocol 4(BGP4)
  AS an Exterior Gateway Protocol through which Autonomous System(AS) sends/receives the routing information between other networks, the Version 4 of BGP is currently used. BGP4 uses various matrixes when selecting the optimized path to the destination. BGP4 compares each matrix having priority and selects the optimized path.

Multicast Routing

- Internet Group Management Protocol(IGMP)
  Internet Group Management Protocol(IGMP) is a protocol that manages the multicast group operating at one Ethernet segment. It controls the segment so that a user can subscribe or secede as a member of the specific multicast group.
- Distance Vector Multicast Routing Protocol(DVMRP)
  Distance Vector Multicast Routing Protocol(DVMRP) is a protocol for supporting the transmission of the multicast data in a network. This protocol sends the multicast data in a format of unicast packet, and the packets are reassembled into multicast data at the destination. DVMRP can be operated in various formats of networks including Ethernet, and even can be operated via the routers that the multicast is not supported with.
- Protocol Independent Multicast-Sparse Mode(PIM-SM)
  PIM-SM is designed in order to route multicast packets into multicast groups and in order to construct the allocation tree efficiently at WAN, by which is optimized in the environment where the data stream occur in many places.

Routing between VLAN Groups

The communication between the VLAN groups through the routing between the VLAN groups.

HTBQ/Bandwidth on Demand (BoD)

The queuing process is differentially performed according to the level table where the routing process priority for a data server is defined.

RTP Priority

The RTP(Real-Time Transport Protocol) packet is a VoIP media packet. The queuing process for the RTP packet is prior to that for other data pack, which helps to maintain the tone quality. This function is useful when using the VoIP function in the network where the VoIP packet that should be processed in real time and other packets for the general office work are mixed processed.

IP-ToS Process

This function checks the ToS(Type of Service) field of the IP header and processes it according to priority of the corresponding routing in the data server. This function reproduces the ToS field flowing into the data server, performs the routing process first of all, and heightens the process priority in the next HOP.

4.3.3 Security

NAT/PT (In/Out/Exclusive/Redirect)

The security function supports the conversion function between the private IP address and public IP address in the network where security is required.
The Inbound, Outbound, Exclusive, and Redirect functions are supported.

- In bound: This function performs the forwarding process for the packet flowing from the WAN to the IP and port of the LAN specified in the NAT/PT conversion table.
- Outbound: This function converts the IP address of the transmitter into the global IP address according to the NAT/PT conversion table for transmitting the packet from the LAN to the WAN.
  - Exclusive: This function is used for the IP address that is not applied by the NAT/PT conversion.
  - Redirect: When the Domain Name Server(DNS) server IP in the data server management sector is changed, each IP terminal uses the pre-DNS IP and the this function changes the DNS IP by registering the post-DNS IP into the Redirect table

Firewall

- Access filtering
  This function prevents the access to disallowed IP address to control the access for the resource non-disclosed to the outside and to control the external resource for which the membership in the LAN may access.
- DMZ function
  This function is used for connecting the web server and mail server, which are firewall-protected LAN networks but need to be freely accessed from the outside, to the subnet separated from the LAN network where the firewall blocking is not applied. In this way, the access from the outside can be more smoothly with the access control service through the firewall.
- Port Forwarding
  This function is almost the same as the DMZ function but is used for connecting to specific network without the separately divided DMZ port. This function is used for the Extra network services as well as the DMZ function. The Extra network is configured for the party out of the office to access Intranet in the office through Internet. In this network, the user should take care of security on Intranet.

Intrusion Detection System (IDS)

This function monitors the packets on the network and detects the packets, which can damage the network operation, making the network more stably operate. The IDS is divided into various types from a detection type where a specific-type attack is detected to the abnormal traffic detecting type, which are based on the Snort Rule(www.snort.org) defining the intrusion pattern and types. The detected packets are sorted and processed into Close connection/port or service disable/Alarm/log based on the intrusion pattern and the level and processed. In the case of the alarm, The system will notify to the system administrator immediately.

Virtual Private Network (VPN)

- VPN function
  The system provides the private network function by using the Internet that is an open network based on the. The OfficeServ 7400 provides the VPN gateway function based on the IPSec(IPSecurity), which is useful to build the enterprise network with reduced cost and enforced security by using the public network such as Internet rather than the dedicated network.
- VPN Tunnel Mode
  This mode processes the VPN function by configuring the tunnel between the VPN gateway and the gateway in each data server of the OfficeServ 7400. Up to 100 VPN channels are available for one VPN.
- PPTP
  PPTP is a tunneling protocol for using the IP-based network. PPP encapsulates the data by wrapping the data with PPP header. PPTP is a protocol that reconfigures the packets by adding Generic Routing Encapsulation(GRE) header and IP header to this so that the packets can be transmitted via IP inter network.
- L2TP
  L2TP is a protocol that combines PPTP and Layer 2 Forwarding(L2F), which collects the strong points of PPTP and L2F. That is, it encapsulates a user PPP frame, which is a Layer 2 frame, in an additional message called L2TP and then transmits it to the device connected to the public network such as IP, X.25, frame relay, or Asynchronous Transmission Mode(ATM).

4.3.4 Data Applications Functions

DHCP

The OfficeServ 7400 can assign the IP address by operating the DHCP. When using the DHCP server in another subnet, the OfficeServ 7400 supports the DCCP relay function. The IP address of the IP equipment connected to the OfficeServ 7400 is can be easily managed.

SIP Aware ALG (SIP Application Gateway)

This function is used for re-creating packets for the smooth communication by checking

the SIP signal process packets according to the NAT/PT table in the data server. When using the data server of the OfficeServ 7400, the SIP equipment can operate regardless of the packet blocking caused by the firewall or the NAT/PT conversion.

Outside ALG Interface

This function enables the outside application to retrieve or control the information such as the NAT/PT conversion information, firewall blocking information, and the VPN tunnel information processed in the data server. This function supports the control packets, which are used for H.323, VoIP networking, and IP telephone operating in the Call server, to be smoothly serviced without any blocking.

Network Load Balancing(NLB)

Network Load Balancing (NLB) is roughly realized for two purposes, i.e. NLB and Failover. The first purpose is the NLB function to extend system bandwidth by automatically distributing the network traffic with outside to external networks if there are more than one external networks. The second purpose is the Failover function to make network communication normal via another external network with normal operation even when link fail occurs in some of external network. In other words, network communication is available until the line fail occurs in all external networks.

System Management Interface

This function allows the administrator to report and manage the alarm, event, traffic, and logging information including the IDS information of the data server into the system administrator package through the TCP/UDP. Whether to report can be optionally specified based on the management data type.

Management Function (Web/CLI/SNMP/RMON)

- CLI: This function is used for configuring the data server function by using the CLI(Command Line Interface) on the Telnet.
- Web: The user can configure and view the operation of the data server functional block by using the web browser.
- SNMP: SNMP agent collects and stores the device information according to the specification(MIB) installed and determined at each network devices. The SNMP manager existing at the place separated from the agent manages the overall network by collecting the information on SNMP gent distributed at the network.
- Remote Monitoring(RMON) : The traffic of the network can be checked and analyzed via 4RMON groups(history, statistics, alarms, events).

4.4 UMS Functions

The OfficeServ 7400 provides the Unified Messaging System(UMS) such as the auto answering, voice message, and the integrated e-mail message management functions. The VoIP-UMS of the OfficeServ 7400 processes the call signal using the VoIP module that has the SIP protocol for the interface to the voice switch, and transmits the media through the RTP protocol of the TCP/IP. Accordingly, the OfficeServ 7400 has the superior architecture for the capacity expansion and in the financial aspect since there is no need of the physical interface required for the existing UMS or VMS.

4.4.1 Auto Attendant

Announcement Replay and Auto Call Forward

- This system replays the announcement when the calling party is connected to the auto attendant. This announcement can be specified based on holiday, working hour, or non-working hour.
- The auto call forward connects the calling party to the desired subscriber's station when the calling party dials a station number in the auto attendant. In this case, the call routing function will be also provided, which detects whether the entered phone number is valid, or intellectually detects that the length of the phone number can be changed.

Announcement Auto Change Based on the Schedule

This function allows the administrator to automatically changing and replaying the announcement based on holiday, working hour, and non-working hour.

Announcement Change by Telephone

This function allows the administrator to change the announcement by interfacing the auto attendant from the remote site.

Call Forwarding to the Mailbox on the Busy Line

When a party interfaces to the auto attendant and tries to connect a call to a busy station, the called party on the busy station can use this function to forward the call to the voice mailbox.

Queuing Process on the Busy Line

When a party interfaces to the auto attendant and tries to connect a call to a busy station, the message 'Please hold up the phone in the minute since the line is busy' is played and retries to connect a call for a specific time if the 'Call Forward to the Mailbox on the Busy Line' function is not set. If the line continues busy after the maximum queuing time, a voice message is provided asking the user whether to forward the call to the voice mailbox or disconnect the call.

Direct Connection to the Mailbox

This function allows the user to access the auto attendant and directly connect the call to the mailbox of a specific user by using the prefix rather than try a call to the subscriber's station.

Time Control for the Announcement

This function allows the administrator to control the maximum input time for the announcement when the administrator directly records the announcement for the auto attendant.

Cutting off Announcements when Digits are Entered

If the user enters digits as the target station number when the voice announcement is played in the auto attendant, the system stops the announcement and processes the entered digits.

Announcement Replay

This function allows the administrator to listen to multiple voice announcements on a specific telephone which have already recorded.

4.4.2 General Functions Related to Voice Mail

Subscriber Authentication and Auto Login

- When a subscriber tries to login the mailbox, the subscriber authentication function checks the password to prohibit an invalid party from logging in a mailbox of other party. In this case, the mailbox number and password are entered and checked in the order.
- When any party directly connects a call to the mailbox with the key number of the mailbox on the station phone, the system uses the auto login function to require only the password but the mailbox number since the UMS server knows the caller's phone number. The user can enter the mailbox number and connect a call to the mailbox by using the hot key(speed key) on the telephone of other party.

Voice Message Record/Replay/Store/Delete/Re-Send/Reply

- A caller can make a call to the mailbox of the called party and leave a voice message. The caller can send the message at a specific time(Send reservation) or listen to his recorded message and record again.
- A subscriber can login his own mailbox to listen to voice messages as well as the message recording time, calling number, and caller ID. The subscriber can delete, send to another party or group, or reply to the corresponding message while listening to the message.
- The subscriber can delete all messages currently stored in the mailbox.

Voice Message Pause/Play Continue/Next Play/Previous Play/Play Again

The user can pause and replay the current message, play the next or previous messages, or play the current message again while listening to a message.

New Message Auto Replay

The user logged-in the mailbox can optionally set whether to automatically replay new voice messages.

Setting the Maximum Message Number for a Mailbox

This function is used for specifying the maximum message number for a mailbox. The number of messages in the mailbox cannot exceed the specified maximum message number. In this case, the corresponding announcement is provided.

Setting the Maximum Time for Storing Messages

The system automatically deletes the voice messages after a specific time if the user does not delete the message after listening to the voice message. In this case, the user can specify the time for auto massage deletion.

Setting the Maximum Message Length

The message length is limited. Therefore, if the user records message for a specific time, the recording is automatically completed and the voice announcement is provided saying ‘Message recording is completed’.

Announcement Change based on the Schedule

This function automatically changes and provides the announcement based on the holiday, working hour, or non-working hour.

Voice Message Notice

New voice message is notified the user on the LCD screen or by the LED of the user’s telephone.

Private Mailbox Management

The user can record/listen to/delete the name of the private voice mailbox or change the password of the private voice mailbox. The user can also record/listen to/delete the greeting of the private voice mailbox.

4.4.3 Additional Functions Related to Voice Mail

Answering Machine Emulation (AME)

This function is almost the same as that of the auto answering machine. If a called party does not receive the call, the call is forwarded to the AME. In this case, the called party can listen secretly to the forwarded call or reply to the call by using the functional key.

Call Back to the Caller ID/Call Number

This function allows the users to call back to the Caller ID or called number(a telephone number left with a voice message).

Voice Message Notification

The UMS rather directly connects the voice message to the subscriber's station than notifies the message on the LCD screen or the LED of the phone when a new voice message arrives. Therefore, the user optionally can listen to the new message by receiving the phone.

Call Record

This function allows the users to record the contents of the call in the user's voice mailbox during the call. The digital phone has a hot key through which the user can record it by just pressing the hot key. Since the analog phone does not have the hot key, the user should login the web and click the corresponding button to use this function.

Private Voice Memo

This function allows the users to memorize information such as the schedule or telephone number by voice. This function is usually the same as the general voice message function. However, this voice memo can be separately managed as if memos.

Stop the Private Mailbox Function

This function allows the users to stop the private mailbox function. If any party try to access the prohibited mailbox, the message will be displayed notifying that this mailbox cannot be used.

4.4.4 E-mail General Functions

Inbox

This function allows the users to read the stored mails..

- List View
  This function allows the users to view the list of mails stored in Inbox. This functional button is displayed only when two frames are selected as ‘mail reading frame’ in setting the environment..
- Modify
  This function allows the users to modify and forward the read mails. This functional button is displayed only in Draft Folder.
- Reply
  This function allows the users to reply to the read mail.
- Forward
  This function allows the users to forward the currently read mail to counterparty.
- Delete
  This function allows the users to forward the read mail to Deleted Folder. To permanently delete a mail, move into Deleted Folder and select the ‘Delete’ function.
- Reject Receipt
  This function allows the users to reject a mail from the sender of the currently read mail. If the Reject Receipt button is clicked, the massage will be displayed notifying that the address of the party of the currently read mail is added in Receipt Reject list.
- Transfer the Mail to Another Box
  This function allows the users to forward the read mail to another box. This functional button is not displayed in Draft Folder since the mails stored in Draft folder cannot be transferred to other boxes.

Compose

This function allows the users to write or send mails.

- To:
  Enter the address of the receiver in this field. Up to six addresses can be entered. When entering multiple addresses, enter the comma between each address.
  Ex> abcd@samsung.co.kr, efgh@samsung.co.kr
  If the address of the receiver has been registered, click the address from the address list to select the address.
- Cc:
  Enter the addresses of those who will refer to the mail. Up to six addresses can be entered. Refer to the method of entering in the ‘To’ field mentioned above for entering in this field.
- Subject
  Enter the subject of the mail. Up to 128 English mails or 64 Korean mails can be entered.

- Text
  Write the text of the mail. Up to 2 Gbyte is available for a mail.
- Original Text
  This function displays the text of the originally received mail. This is displayed only when replying to the original mail or transferring the original mail.
- Attachments
  Specify the number of files to append. Up to 10 files can be appended and the capacity is unlimited. Enter the number of files to append and click the button. And then the massage will be additionally displayed asking the user to select the appendix file.
- Attachment 1
  Enter the target file name in the empty field or click ‘Find’ button to select a file saved in his own computer.
- Copy Message to ‘Sent Folder’
  This function allows the users to store the sent mail in ‘Sent Folder’.
- Append Signature
  This function allows the users to send the mail with the composer’s signature at the end of the mail. The signature can be specified by the server administrator when making a mail account first. The account user later can change the signature. To change the signature, click the corresponding button.
- Send
  This function allows the users to send the mail after composing the mail.
- Save Draft
  This function allows the users to temporarily store the mail into Draft while composing the mail. The user can modify the contents of the mail in Draft.

Deleted Folder

This function allows the users to temporarily store the deleted mails. If the user deletes the mails stored in the Deleted Message, the mails will be permanently deleted.

Draft

This function allows the users to temporarily store a mail while writing the mail.

Mailbox List

This function allows the users to manage the private mailbox list such as Inbox, Sent Items, Deleted Items, and Draft folders.

Mailbox Creation

- Specify the name of newly created mailbox. The name should be configured with up to 32 English mails, or 16 Korean mails.
- Enter the name in the 'Create New Mailbox' field and click 'Add'. And then verify if the message notifying that the mailbox is correctly created is displayed and the name is displayed in the 'User Mailbox' list on the upper part of the screen.

Mailbox Change/Removal

This function allows the users to change or delete the existing mailbox.

8 Address List

This function allows the users to create the address list by saving the frequently used address.

- Select Group
  This function allows the users to select an address group for changing the name or deleting the address.
- Change Group Name
  This function allows the users to change a group name.
- Delete Group Name
  This function allows the users to delete a group name.
- Select All
  This function allows the users to select all addresses from the address list. If this function is enabled, all the addresses will be checked.
- Selection Cancel
  This function allows the users to cancel address selection. If this function is enabled, the checked addresses will be unchecked from the address list.
- Delete Address
  This function allows the users to delete an address. To delete an address, select the target address and click the 'Delete' button.
- Transfer Address
  This function allows the users to change the address group.
- Add Address
  This function allows the users to add new addresses. If this item is clicked, a separate window will be displayed.
- A~Z
  This function allows the users to retrieve the address staring with a specific character from the address list.

External Mail Importing

- The user can import the mails with other accounts into the mail account of the OfficeServ 7400. For instance, if the user has the mail account in a site such as 'Yahoo' or 'Naver', the user can read the mails of the corresponding site in the mail box of the OfficeServ 7400 by registering the site in the 'External Mail Management' item.
- External mail address
  Enter the external mail address to register. Ex> jjkim@yahoo.co.kr
- External mail server name
  Enter the external mail server name to register. Ex> yahoo.co.kr
- User ID
  Enter the user ID to access an external mail. Ex> jjkim
- Password
  Enter the password to access an external mail.
- Protocol
  Select the protocol type for the external mail server. To know the protocol type, access the corresponding server.
- Leaving the original message
  The user can leave the original message in the external mail account when setting an external mail to be read in the current mail account. To execute this function, Select 'Yes'.

Mail Receipt Rejection

- The user can register the corresponding mail ID to automatically cut off undesired mails such as junk mails. In this case, the system automatically rejects mail receipt.
- Enter the e-mail address for mail receipt rejection
  Ex> sagopalgo@shopping.com

Mail Filtering

- When a new mail arrives, the system sorts it according to the specific word used as the sender name, receiver name, notice, or subject and then sends it to a separate mailbox.
- Filter addition
  The user can set a mail including a specific word used as the sender name, receiver name, notice, or subject to be stored in a specific mailbox.

SMTP Sending Interface

The system supports the Simple Mail Transfer Protocol(SMTP) as an E-mail sending protocol.

POP3 Receive Interface

The system supports the Post Office Protocol 3(POP3) as an E-mail receiving protocol

IMAP4 Receive Interface

The system supports the Internet Message Access Protocol version 4(IMAP4) as an E-mail receiving protocol.

15 Web Mail Interface

The system provides the user and administrator services for e-mails by the web browser.

4.4.5 Additional Functions Related to E-mail

User Account Management

The administrator can retrieve or delete an E-mail user and register new user.

Mailbox Capacity Management

The system can restrict the storage capacity of the mailbox, and displays the alarm signal when the assigned capacity is exceeded.

Notice Management

The E-mail user can register or change the notices in his work group.

Logo Management

The user can register or change a screen from the screens in his work group for the web login screen.

4.4.6 Integrated Messaging

Notifying the Voice mail as the E-mail

When a new voice mail arrives, the system converts it into the file format such as WAV, MP3, or OGG, and then appends the converted voice mail to an e-mail.

New E-mail Notice

This function notifies a new e-mail on the LCD screen of the digital phone or by LED. The United Messaging System(UMS) optionally dials the user's station to notify that a new e-mail arrives.

Reporting and Playing New E-mails

When a new e-mail arrives, the UMS dials the user's station and reports the mail information by using the Text-To Speech(TTS) function.

- Mail information includes the number of total mails, and the number of new mails. The user can listen to the list of the mail subject or the text of a mail.
- The user can login the mailbox and listen to the mail information with the mailbox key number.
- If the e-mail is in the HTML format, the system extracts the text of the mail to reports it by using the TTS.

4.4.7 UMS Management

Database Backup and Recovery

The user can backup or recover the United Messaging System(UMS) database operating in the OfficeServ 7400.

- For the backup, the database should be compacted as a file into a specific directory. This compacted database can be downloaded to an external computer.
- The backup type is divided into two types as follows: Auto backup - The system automatically executes the backup periodically. Manual backup – The user can backup on the web when needed.

Mailbox Management

The mailbox administrator can add or delete mailboxes. This function can be executed on a telephone. The mailbox administrator can retrieve the mailbox information on the web.

Voice Text Upload/Download

The user can upload/download the audio text from/to the external computer to/from the system, which will be used as the announcement for the OfficeServ 7400.

Alarm Information Management

The user can specify the alarm level(including Major, Minor) for alarms in the UMS and view the alarm information that has occurred for a specific time.

Operational Information Management

The user can view information such as the currently busy channel status and web login history.

Voice CODEC Selection

The user can specify the CODEC format for voice files of the OfficeServ 7400.

- The user can select the voice CODEC(WAV, MP3, OGG) to be appended while sending mails.
- The user can select the voice CODEC(G.711, G.729) to be appended while creating the TTS.

4.5 Web/System Management

The OfficeServ 7400 provides the user interface that manages various functional blocks of the system on the web through the web browser. The OfficeServ 7400 performs the call server configuration management and information retrieving function through the PCMMC package. The OfficeServ 7400 also monitors and collects the operational status of the functional blocks in the system.

4.5.1 Web Management

Database Backup

The user can back up the database of the data server and feature server through the web.(However, the database of the call server cannot be back up) Since the database backup is actually executed in the feature server, the user can use regular menus only when the feature server operates.

Follow the steps below to perform the backup, download, upload, and recovery functions.

- Back up the database file in the /home/dbbackup directory of the feature server.
- A name of the back file should be in the ‘module name_date_hour.tar’ format as shown below:
  E.g. /home/dbbackup/MS_20030620_145632.tar
- Collect the MS_*.tar, US_*.tar, SS_*.tar, and DS_*.tar files in the /home/database directory in one ‘tar’ file and transmit it to the web client.
  E.g. FSDB_20030620_142310.tar
- Upload the database file of the web client into the feature server.
- Restore the database file in the /home/database directory of the feature server into the system.

User Information

The user can view user names and e-mail IDs of each station number. A mail box number is same as the corresponding station number. If any regular user forgets his password, the administrator can initialize the password.(The default of the password is the phone number.)

Server Information

The user can view the information(IP address, web port, IPC port) on each server module(call server, data server, feature server, system administrator) through this function.

VoIP Web Manager

This function displays or changes the setting status for VoIP services.

Data Web Manager

This function displays or changes the setting status for data services.

Voice-Mail Web Administrator

This function displays or changes the setting status for voice-mail services.

E-mail Web Manager

This function displays or changes the setting status for e-mail services.

4.5.2 System Management

Multi Site Management

The user can enter and manage the information(addresses, phone numbers, notes, system installation date, and administrator, etc.) on the site where the OfficeServ 7400 to be managed is installed.

Integrated System Management

The user can view the current status of(Operational status, alarm information, etc) the OfficeServ 7400 in real time. The user can collectively manage each functional block(call server, data server, or feature server) by operating the PCMMC package or connecting web servers of the corresponding server.

Configuration Management

The configuration information of the OfficeServ 7400 installed in the site can be displayed. The configuration information is as follows:

- OfficeServ 7400 unit configuration
- OfficeServ 7400 version information
- Data function setting/version information
- NAT information
- Feature server(SIP, UMS, mail) function setting/version information

Event Management

This function displays various event information such as the information on critical error or warning generated in the OfficeServ 7400. The user can group events by arranging or searching events.

Access Log Management

This function displays the access log for the OfficeServ 7400. The user can group each access log by arranging and searching logs.

Traffic Management

The user can view traffic information(Telephone usage, the amount of the data transmitting and receiving, VoIP call process, mail transmission/receive) generated in the OfficeServ 7400 for a specific time through this function. This information can be used as the statistics for a specific time.

Call Detail Record Management

The Call Detail Record(CDR) serviced in the OfficeServ 7400 can be saved and viewed.

ABBREVIATION

A

AA	Auto Attendant
AC	Alternating Current
ALG	Application Level Gateway
AME	Answering Machine Emulation
AOM	Add On Module
AP	Access Point
AS	Autonomous System
ASIC	Application Specific Integrated Circuit
AWG	American Wire Gauge

B

BRI	Basic Rate Interface
BoD	Bandwidth on Demand

C

CBQ	Class Based Queuing
CDR	Call Detail Record
CID	Caller Identification
CLI	Command Line Interface
CODEC	Coder/Decoder
CRC	Cyclic Redundancy Code
CSMA/CD	Carrier Sense Multiple Access/Collision Detect
CTI	Computer Telephony Integration

D

DASL	Digital Adaptor for Subscriber Loop
DPIM	Door Phone Interface Module
DC	Direct Current
DHCP	Dynamic Host Configuration Protocol
DID	Direct Inward Dialing
DLI	Digital Line Interface
DMZ	DeMilitarized Zone

DNS	Domain Name Server
DPIM	Door Phone Interface Module
DSL	Digital Subscriber Line
DSP	Digital Signal Processor
DTMF	Dial Tone Multi Frequency
DVMRP	Distance Vector Multicast Routing Protocol

E

EAP	Extensible Authentication Protocol
EMI	Electro-Magnetic Interference

F

FE	Fast Ethernet
FXS	Foreign Exchange Station
FXO	Foreign Exchange Office

G

GLIMP	Gigabit LAN Interface Module with PoE
GK	GateKeeper
GND	Ground
GSIM	Gigabit Switch Interface Module
GWIM	Gigabit WAN Interface Module

H

HDB3	High Density Bipolar of order 3
HDLC	High-level Data Link Control
HSSI	High Speed Serial Interface

I

IDS	Intrusion Detection System
IGMP	Internet Group Management Protocol
IMAP4	Internet Message Access Protocol version 4
IP	Internet Protocol
IPC	Inter Processor Communication
ISDN	Integrated Services Digital Network
IPSec	Internet Protocol Security
ITU	International Telecommunication Union

K

KDB	Keyset Daughter Board

L

L2TP	Layer 2 Tunneling Protocol
LAN	Local Area Network
LCD	Liquid Crystal Display
LP40	Local Control Processor 40
LCR	Least Cost Routing
LED	Light Emitting Diode
LIM	LAN Interface Module
LIM-P	LAN Interface Module-PoE

M

MP40	Main Control Processor 40
MFM	Multi-Frequency Module
MIS	Miscellaneous
MMC	Man Machine Communication(Code, Command)
MPD	Metering Pulse Detection

N

NAT	Network Address Translation

O

OSPF	Open Shortest Path First

P

PC	Personal Computer
PCM	Pulse Code Modulation
PCMMC	PC based Man Machine Communication
PFT	Power Fail Transfer
PIM-SM	Protocol Independent Multicast-Sparse Mode
PoE	Power over Ethernet
POP3	Post Office Protocol 3
PPP	Point to Point Protocol
PPPoE	PPP over Ethernet
PPS	Pulse Per Second
PPTP	Point to Point Tunneling Protocol
PRI	Primary Rate Interface
PRS	Polarity Reverse Signal
PSTN	Public Switched Telephone Network
PSU	Power Supply Unit

Q

QAM	Quadrature Amplitude Modulation
QoS	Quality of Service

R

RF	Radio Frequency
RCM	R2 Caller identification Module
RMON	Remote Monitoring
RTP	Real-time Transmission Protocol
RTPT	Real-time Transmission Protocol Transfer
RTPR	Real-time Transmission Protocol Receiver

S

SIP	Session Initiation Protocol
SLI	Single Line Interface
SMDR	Station Message Detail Recording
SME	Small Medium Enterprise
STP	Signaling Transfer Point
SMTP	Simple Mail Transfer Protocol
SONET	Synchronous Optical Network

T

TAPI	Telephony Application Programming Interface
TEPRI	T1 E1 Primary Rate Interface
ToS	Type of Service
TRK	Trunk
TTS	Text-To Speech

U

UA	User Agent
UART	Universal Asynchronous Receiver and Transmitter
UDP	User Datagram Protocol
UMS	Unified Messaging Service
USB	Universal Serial Bus
UTP	Unshielded Twisted Pair

V

VDSL	Very high bit rate Digital Subscriber Line
VLAN	Virtual Local Area Network
VMS	Voice Mailing System
VoIP	Voice over Internet Protocol
VPM	Voice Processing Module
VPN	Virtual Private Network

W

WAN	Wide Area Network
WBS	Wireless Base Station
WIM	WAN Interface Module
WIP	Wireless IP Phone
WLAN	Wireless Local Area Network
WLI	Wireless LAN Interface

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OfficeServ 7400

System Description

SAMSUNG ELECTRONICS