SAMSUNG

DCS GATEWAY

DIGITAL COMMUNICATION GATEWAY SYSTEM

GENERAL DESCRIPTION

SAMSUNG

TELECOMS

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declare under our sole responsibility that the product

Digital Telephone Exchange model "DCS Gateway"

to which this declaration relates is in conformity with

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Preface

This guide provides an overview of the Samsung DCS Gateway business telephone system, including system structure and hardware, features and facilities, and specifications.

Further details on all aspects covered in this guide are included in the *Samsung DCS Gateway Installation* and *Maintenance Guides* (available to you after completion of an accredited training course) and the *Samsung DCS Gateway Feature Description Guide*.

The DCS Gateway, the latest and largest digital communication system from Samsung, employs advanced digital technology and supports additional features not included in other current models in the Samsung DCS range.

Contents

Chapter 1   System Overview

Chapter 2   System Structure

Appendix: DCS Gateway Specifications

Chapter 1
System Overview

DCS Gateway

The DCS Gateway is based on a modular design philosophy which allows system software and hardware to be added cost effectively. Furthermore, the system interface and option cards can be installed into each shelf's universal card slots to provide full optimisation and flexibility.

The DCS Gateway has capacity for up to 672 ports when equipped with three shelves (the basic shelf plus two expansion shelves). Additionally, up to three DCS Gateway systems can be connected together in a multi-node configuration to increase the capacity to 2,016 ports.

Each shelf has provision for two power supply cards, a processor card, an analogue ringer card and 10 universal card slots.

The system is non-blocking and uses a 32-bit main processor (MCPU2). The MCPU2 stores customer data in Flash RAM, incorporates eight DTMF senders/receivers and generates all tones required to manage and administer the system. A second processor card can be installed in a dedicated slot in the basic shelf to provide a back-up processor in the event that the primary processor fails. Expansion shelves each have a shelf processor (LPM3) installed to provide control functions for the cards installed on the shelf and to provide an interface with the MCPU2.

The universal card slots (10 per shelf) can have any combination of digital trunks, analogue trunks, digital extensions, analogue extensions or service cards. The first four universal card slots on each shelf are double density and have 32-port capacity, while the remaining six slots are single density with 16 ports. The first four slots are used to install "high-density" cards such as a Primary Rate ISDN card (30 channels) or a 2 Mbs digital trunk card. If high-density cards are installed in single-density slots, the slot following the card must be left vacant.

Where there are more than 80 digital extensions connected to any shelf, a second power supply card must be installed on that shelf in the dedicated slot provided. Where there are less than 80 digital extensions on the shelf, a second power supply card may be installed to provide redundancy. Where analogue extensions are installed, a ringer card (RGPS-K) is required to provide ring signals and message-wait LED power.

Features

The DCS Gateway provides almost all the features common to the DCS range of business telephone systems and utilises the same range of digital telephones. The features detailed below are those major features available that are additional to those found on the smaller DCS models. The *Samsung DCS Gateway Feature Description Guide* describes all the features of the DCS Gateway system in more detail.

■ Networking

The DCS Gateway offers many options for networking remote PABXs together. The options deliver varying degrees of feature transparency.

QSIG

QSIG is an international, open protocol that is used to integrate different manufacturers' switching equipment. It is based on the ISDN Q.931 standard. Using QSIG signalling, incoming voice calls can be routed from one PABX across a private network to a second PABX. QSIG utilises ISDN PRI interfaces with QSIG-specific EPROMs loaded. QSIG provides a greater level of feature transparency when PABXs are networked together than that provided by E & M tie lines.

E & M Tie Lines

The 4-wire E & M Tie Line feature is a well-established analogue signalling scheme that is being rapidly superseded by digital interfaces with a far higher degree of feature transparency.

Internet Gateway (Voice over IP)

The DCS Gateway, functioning as an Internet gateway, provides a voice communication service via the Internet or any IP network such as a LAN or WAN. The VoIP interface is the ITM card, which has 16 channels. The ITM uses advanced digital voice compression technology to compress voice signals down to 6 kHz.

Digital Trunk (E1) (Not used in the UK)

The DCS Gateway can be connected to remote PABXs via an E1 digital trunk. The E1 trunk has a 2 Megabit G.703 interface offering 30 voice channels and providing a simple digital trunk that is commonly supported by a variety of manufacturers. It does not support ISDN or a high level of feature transparency.

■ RMAP

This is the Windows-based Remote Maintenance & Administration Program (RMAP) package, which allows DCS Gateway systems to be interrogated and system program changes to be made remotely. The remote DCS Gateway is connected to the PC running RMAP via a modem and the PSTN.

■ ISDN

ISDN (Integrated Services Digital Network) is a digital network for public communication. It is also an integrated information network in which you can use voice communication, visual communication and data communication simultaneously. ISDN can perform high-speed data communication at a rate of 64Kbps for each channel. The DCS Gateway can provide both ISDN Primary Rate and ISDN Basic Rate services. The DCS Gateway supports both T-Bus (public network) and S-Bus (ISDN terminal) connections.

■ Hotel / Motel

The DCS Gateway has a "two way" PMS (Property Management System) interface to connect an industry-standard PMS. The PMS obtains room status information and/or details of call charges from the DCS Gateway. It interfaces with the DCS Gateway to alter guest information via data entered into the PMS, and uses data supplied by the DCS Gateway to compute guest call charges.

Features Related to the PMS Interface

- Room Check In/Out
- Room Status Change
- Room Interchange
- Room Change
- Room Messages
- Call Limiting
- Detailed Call Billing
- Visual Alarm and Wake-Up Call
- Suite Room Secretary
- Group Registration
- Fax Number Designation

Features of the DCS Gateway

- Service Phones
- Booth Phones
- Bath Alarm
- Wake-up Alarm
- House Phones

■ SMDR

The SMDR (System Monitor Detailed Recording) feature is used to manage external (local/toll/international) call information and internal call information for extensions connected to the DCS Gateway. Call information is provided by the DCS Gateway and is normally sent to a TIMS or PMS system for processing and presentation.

Call information provided by the DCS Gateway SMDR output is:

- Date of call
- Time of call
- Duration of call
- Classification of call (incoming, outgoing, tandem)
- Type of call (first/last billing, business/room, CLI, transfer, fax)
- Dial type (direct, operator assist, operator direct, LCR, collect, toll free, DISA)
- Trunk group number
- Tenant number
- Phone number of the internal line caller
- Phone number of the call recipient (internal/local)
- Number dialled
- Account code, Forced Authorisation Code

ACD (Automatic Call Distribution)

The ACD (Automatic Call Distribution) feature is used to distribute calls to Call Centre agents to allow efficient and effective processing of large volumes of incoming calls. The ACD feature uses the "first in first out" (FIFO) principle to distribute calls to agents so that the call waiting for the longest time will be connected to the first available agent. In addition, each call can be assigned a priority where the highest priority call is connected to the first available agent. Call priority overrides FIFO order.

Where an incoming call is received and there is no agent available to immediately answer the call, the caller will be served according to how the system is programmed whilst holding for the next available agent.

The ACD feature provides various agent features including:

- Up to 32 ACD groups.
- Up to 255 ACD agents.
- Five queue priority levels.
- Log In/Log Out of ACD call transactions.
- Message sending/receiving feature to request assistance from the supervisor during the ACD call transaction.
- Emergency feature to inform the supervisor of an emergency situation.
- Recording feature to record telephone conversations.
- Telephone State Change feature.
- Work function to allow agents to complete administration work prior to accepting the next call.

CTI (Computer Telephony Integration)

CTI is the technical integration of computer and telephone communications, where the computer can use switch features as computer resources and, conversely, the switch can share computer resources.

Multi-Node

The DCS Gateway can have up to three nodes connected together to expand the total capacity up to 2,016 (672 x 3) ports. Signalling between nodes is via a 2-Megabit digital tie trunk using Samsung proprietary signalling, which provides a high degree of feature transparency. The nodes can be located together or can be remote from each other.

Announcement

The Announcement function of the DCS Gateway is used mainly in conjunction with the ACD feature. The DCS Gateway has an optional Automatic Voice Announcement (AVA) card that can provide up to 15 recorded announcements for replaying to callers.

■ External Music

The DCS Gateway offers the Music On Hold (MOH) function that repeats a specific melody to callers while they are on hold. The DCS Gateway has a tone chip on the MCPU card that provides a basic melody.

In addition to the basic melody, the system can have an external music source such as a CD, cassette player or a radio connected via a trunk port to provide music or customer-specific messages.

■ Statistics

The Statistics function collects data measured during system operation. The output data provided by the statistics function can be used for diagnosis of system operation, analysis of traffic distribution and improvement of call quality and service.

The data measurement process is divided largely into collection of measurement data, data storage and processing, and display of collected data. The statistics data can be output to a printer or a file that is accessed from the MAP terminal.

The types of statistics provided include:

- Trunk Group
- Extension Group
- Function Code
- Signalling Device
- ISDN Subscriber
- Inter-node
- Paging

■ System Redundancy

The DCS Gateway has provision for the installation of a second, back-up, main processor in the basic shelf. The second processor operates in standby mode and is automatically switched to active mode if the active processor detects a fault condition.

A second power supply can also be installed on each shelf to provide a back-up power supply. Where a shelf has more than 80 digital extensions installed, both power supplies operate in active mode.

The redundant main processor card and power supply cards are installed in dedicated slots on the shelves and therefore do not alter the capacity of the DCS Gateway system.

■ Maintenance

The DCS Gateway provides various tools for efficient maintenance of the system.

Maintenance & Administration Program (MAP)

MAP is the DCS Gateway operating software, which is installed in a PC connected to the DCS Gateway. The DCS Gateway's database can be easily searched, edited and controlled using the MAP.

Remote Maintenance & Administration Program (RMAP)

RMAP provides the facility for remote diagnostics and administration of the DCS Gateway.

On-Line Card Exchange

It is possible to change circuit boards in the DCS Gateway, without the need to power down the system, by attaching an umbilical cord to the boards.

Diagnosis Function

The diagnosis function is performed continuously in the DCS Gateway so that failures in the system are notified immediately. The LPM3 card (shelf processor) constantly monitors program commands performed by the system such as call tasks, diagnostic tasks, data tasks and the database so that system abnormalities can be reported.

Chapter 2
System Structure

Cabinet Layout

Top Cover

Expansion Shelves

Power Card

Main Processor

Subscriber Cards
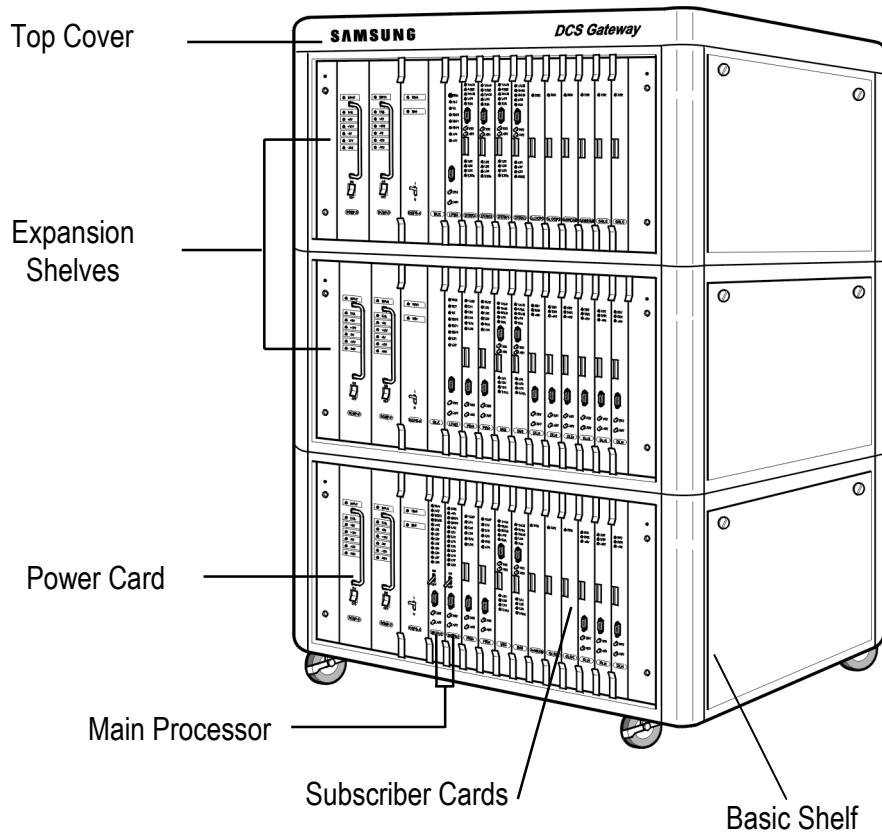
Basic Shelf

Basic Shelf

The basic shelf, situated at the bottom of the DCS Gateway cabinet, is where the main control functions which manage and control the system are located. The shelf power supply and optional ringer card for analogue telephones are also located on this shelf. In addition, 10 universal card slots are available for subscriber cards. The DCS Gateway can operate with only the basic shelf.

Expansion Shelf

If additional capacity is required, up to two expansion shelves can be added. Each expansion shelf has 10 universal slots where subscriber cards can be installed, along with a shelf processor, a power supply and an optional ringer card for analogue telephones.

Unlike the DCS model, adding expansion shelves to the DCS Gateway does not require the loss of a slot in the basic shelf.

Top Cover

The rack cover is attached to the top of the DCS Gateway to prevent dust from entering the system.

Terminal Block

The terminal block at the left side of the basic shelf provides connection points to AC power lines and battery back-up lines.

System Power Switch

The system power (on/off) switch is situated on the left of the basic shelf .

IOCB3 Card

The IOCB3 card provides ports to connect the DCS Gateway with peripherals such as PCs and printers for the MAP, PMS and SMDR. It is located on the left of the basic shelf.

PFT Card

The PFT (Power Fail Transfer) card makes direct connections between analogue extensions and analogue trunk lines in the event of power failure. One PFT card can be installed on each shelf. Each PFT card has the capacity for switching 16 analogue lines to 16 analogue telephones. When power is restored, the direct connections will be released.

System Hardware

Power Cards

RCMP-D Power Card

The RCMP-D card is installed in a dedicated slot on the extreme left of each shelf in the DCS Gateway.

The power card input is AC 240V which is converted into -5VDC, -12VDC, -56VDC, +5VDC, and +12VDC and is then provided to the cards on the shelf. Where there are more than 80 digital telephones installed on a shelf, a second RCMP-D card must be installed on the shelf. Alternatively, a second RCMP-D card can be installed on a shelf to provide redundancy in the event of power supply failure. The second power supply also occupies a dedicated slot.

RGPS-K Ringer Card

An RGPS-K (Ring Generator Power Supply) card can be installed on each shelf where it supplies the ring current and message-waiting signals to analogue extensions. The RGPS-K card is installed in a dedicated Ringer slot located on the right of the RCMP-D power card.

The RGPS-K card receives -56VDC from the power card and provides the ring signal with a 20±3Hz or 25±3Hz frequency. The RGPS-K is only required where analogue telephones are connected via the shelf.

Control Cards

MCPU2 Card

The MCPU2 (Main Control Processor Unit) card has a 32-bit processor. It controls the operation of the entire DCS Gateway system, interfacing with each shelf processor and using four types of memory.

- DRAM (Dynamic RAM)
  Stores system software in 2 x DRAMs of 32Mbyte capacity. (Total 64Mbyte)
- SRAM (Static RAM)
  The system database is saved in 2 x SRAMs of 512Kbyte capacity. (Total 1Mbyte)
- ROM (Read-Only memory)
  Contains the system boot-up program. (512Kbyte)
- Flash memory
  The system database is saved in four flash memories of 2Mbyte each. (Total 8Mbyte)

The MCPU2 card extracts the network 'sync' clock from the ISDN network to provide a synchronized clock with the DCS Gateway clock. The MCPU2 produces 16 tones for use with the system and has eight DTMF senders/receivers incorporated.

The MCPU2 card is always installed in the basic shelf of the DCS Gateway to the right of the RGPS-K card. A second MCPU2 card can be installed as a back-up central processor in the event that the main processor fails.

LPM3 Card

An LPM3 (Local Processor Module) card is installed in each expansion shelf of the DCS Gateway system. It controls the subscriber cards and processes signals by sending and receiving messages in conjunction with the MCPU2 card.

The LPM3 card is installed in LPM slot 4 or 5 of the expansion shelves.

Processor Daughterboards

The main processor (MCPU2) card can have four types of daughterboard inserted on it. These types are described below. The MCPU2 card has provision for three such daughterboards. The shelf processor (LPM3) card has provision for up to two daughterboards which can be 4SW cards, CID/R2MFC cards or a combination of both.

DTMF (4SW) Daughterboard

The 4SW can be mounted on the MCPU2 card or the LPM3 card and expands the number of DTMF channels available to the processor to 16. It provides an identical function to the MFM card (see *Service Cards*, below) but does not occupy a separate slot. The 4SW card cannot be installed where the CID/R2MFC card is installed (see next) as both cards occupy the same mounting position—in these cases, the MFM card can be used.

Calling Line ID (CID/R2MFC) Daughterboard

The R2CID can be mounted on the MCPU card or the LPM3 card and provides 16 channels for receiving the R2MFC tone (it cannot send the R2MFC tone). It is required where the analogue Calling Line ID (CID) feature is utilised. The CID/R2MFC card and the 4SW card occupy the same slot on the MCPU2 card and therefore both cards cannot be installed at the same time.

Channel Extender (TIM) Daughterboard

The TIM daughterboard can be mounted on the MCPU board and provides a time switch required whenever expansion shelves are installed. The three I/O ports, two LPM communication ports, and

HDLC communication port are supported in the TIM daughterboard, which extends the number of highway channels up to 32.

LAN Daughterboard

The LAN card is mounted on the MCPU card and is required to utilise the two LAN ports (I/O 6 – I/O 7) on the IOCB3 card.

Peripheral Connection Card (IOCB3)

The IOCB3 card is located on the left of the basic shelf. It is used to connect peripherals to the system and comprises six 25-pin serial ports, one 15-pin LAN port and an RJ-45 LAN port.

- I/O Port 0

  Used to connect the MAP PC with the DCS Gateway.

- I/O Ports 1–5

  Used to connect peripherals (such as a printer) with the DCS Gateway.

- I/O 6 – I/O 7 Ports

  Used to connect the MAP PC with the DCS Gateway through the LAN.

Subscriber Cards

Subscriber cards are installed in the 10 universal slots available on each shelf. They can be installed in any combination, although cards with more than 16 ports (PRI, DTRK, INI3 etc) must be installed in the first four slots on each shelf since the subsequent slots (the last six) only have 16 ports available.

Analogue Cards

Single Line Telephone (GSLC) Card

The GSLC (Subscriber Line Card) is used to connect analogue single line telephones (SLTs).

The functions provided by the GSLC card are:

- 16 analogue extension circuits.

- -56VDC for the connected subscriber telephone.

- RING signal that indicates the subscriber telephone is ringing.

- Reads the hook on/off status, dial pulse, ring trip and call answer status of the subscriber telephone.

- Overvoltage protection for long lines.

- Converts analogue signals into digital signals using the PCM method to send them to the control module. It also converts the digital signal into an analogue signal using the PCM method.

- Hybrid function to separate the sending path and receiving path from the analogue voice signal.

■   The message-waiting function on single line telephones.

16 PSTN Trunk (GLOOP2) Card

The GLOOP2 (Loop Start Trunk) card is the analogue trunk (PSTN) module and has the following features:

■   16 trunk circuits.

■   Interfaces with analogue ring in / loop out trunks (PSTN).

■   Uses either DTMF or Decadic signalling.

■   Supports polarity reversal sensing of trunks (PRS).

■   Can provide meter pulse detection (requires MPD modules).

■   Trunks are used to connect Music on Hold sources.

■   Can detect calling line identification (CID) signals from the network..

E&M Tie Line (G4W E&M) Card

This is the 4-wire E&M tie trunk interface card. 4-wire E&M signalling is a well-established analogue signalling scheme that is still used extensively in private networks, although it is being rapidly superseded by digital interfaces.

The features and functions of the 4W E&M card are:

■   Supports various types of E&M signalling.

■   Has six '4W E&M' ports per card.

Digital Cards

Digital Line Interface Card (DLI4)

The DLI (Digital Line Interface) card connects Samsung digital telephones to the DCS Gateway. It has the following features and functions:

■   16 ports per card.

■   Connects keysets and attendant consoles.

■   Maximum line length is 800 metres.

■   Supports keysets with a daughterboard attached to provide an additional keyset or SLT channel.

If daughterboards are used in keysets, 32 phones can be connected to this card (16 directly from the system and a further 16 via the daughterboards in the keysets). When connecting 32 keysets using daugh-

terboards, the DLI4 card must be installed in one of the first four slots on each shelf. Alternatively, 32 ports can be used (with daughterboards) in the other slots (16-port capacity) but the following slot, adjacent to the card, must be left vacant.

Multi-Node (INI3) Card

The INI3 (Inter-Node Interface) card is a 2-Megabit digital tie line interface card and is used primarily for interconnection of multiple DCS Gateway nodes. It uses 32 channels in the system and offers the following features and functions:

- 2 Megabit G.703 interface.
- Uses Samsung's proprietary D-channel signalling protocol.
- Provides a high level of feature transparency between DCS Gateway systems.
- Has up to 30 voice channels.
- Provides links between DCS Gateway systems in a multi-node network..

ISDN Cards

Basic Rate Interface (BRI) Card

The BRI is the ISDN basic rate interface card. It uses 16 channels in the system and offers the following features and functions:

- Provides ISDN basic rate interface to the network.
- Uses ISDN D-channel signalling protocol.
- Can be configured as either an S or T interface.
- Has eight BRI interfaces of two channels each.

As it can be configured as either an S or T interface, it can connect to basic rate interfaces from the network or to terminal equipment such as ISDN phones, videoconferencing equipment, data equipment and other PABXs.

Primary Rate Interface (PRI4) Card

The PRI card has 30 channels and connects to ISDN Primary Rate services. It is also used as the interface for QSIG (although it requires a special set of EPROMs for this). It offers the following features and functions:

- 2-Megabit G.703 interface.
- Uses ISDN D-channel signalling protocol.

- Provides up to 30 voice and data channels.

- Can be configured as either a User or Network interface.

- Can extract network clock signals to synchronize the system with the ISDN network.

- Provides Direct Dial Inwards (DDI) service.

Service Cards

DTMF (MFM) Card

The MFM (Multi Frequency Module) card provides 16 additional DTMF senders and receivers. It uses 16 ports (one slot) within the system.

If there are a large number of analogue telephones connected to the system and the 4SW daughter-boards cannot be installed, and there are insufficient DTMF receivers or senders, the MFM card is installed to increase the number of DTMF service ports. Unlike the 4SW daughterboard, the MFM card occupies one 16-port slot in the system; it is preferable, therefore, to use the 4SW where possible.

Automatic Voice Announcement (AVA2) Card

The AVA2 card stores voice messages for playback by the system. It uses 16 ports (one slot) in the system. The AVA2 card is primarily used to provide messages to ACD callers (when used in conjunction with the ACD Route Table feature). It can also be used for attendant queue messages and MOH. It has 15 recording ports that can each record messages of up to 32-seconds duration. If power is lost to the AVA2 card, the recorded messages will be held up for up to 72 hours.

Terminals

Single Line Telephones

Commonly available SLTs can be connected to analogue ports on the DCS Gateway.

Samsung Digital Telephones

Samsung digital phones connect to the DLI4 card. Digital phones used with the DCS Gateway are identical to those used on the entire DCS range. All phones are fully hands-free and the range comprises:

- Executive 24 Button (with display)

- Office 24 Button (no display)

- Executive 12 Button (with display)

- Office 6 Button (no display)

▪ Basic Digital Handset

Add-On Modules (AOM)

An AOM is a digital terminal that extends the number of keys and LEDs on a digital extension. It can provide facilities such as Direct Station Select (DSS) and Busy Lamp Field (BLF).

Attendant Console

The DCS Gateway has a dedicated attendant console for use by a receptionist/operator/system administrator to answer and transfer calls and access DCS Gateway features.

DCS Gateway Attendant Console

Peripherals

Modem

The PC running the RMAP is used to monitor and control the status of the system from a remote location via a modem. The modem used in the PC for RMAP should:

▪ be an internal modem.

▪ offer transmission rates of 9600–19200 bps.

▪ support a 25-pin RS232C interface.

▪ be IBM PC compatible.

Printer

The printer is used to print system errors occurring in the system, such as status change or system statistics.

The system supports KS and KSSM modes, and any printer which can be connected to an IBM-compatible PC may be used. It is recommended that a 136-column dot matrix printer be used where possible.

MAP PC

The MAP is installed on a PC connected to the DCS Gateway to facilitate program changes. The MAP PC sends/receives data through the RS232C port or LAN port of the IOCB3 card.

The MAP PC should satisfy the following specifications.

- Type : IBM PC compatible (Pentium 133 or higher)
- Memory : 32 Mbyte minimum
- Monitor : IBM PC compatible over 14" (1024 x 768 resolution, full screen)
- Hard Disk : IDE type hard disk with available capacity of approx. 400Mbyte
- Floppy Disk : 3.5"
- Network Interface Card (NIC)
- 9- or 25-pin RS232 port
- CD-ROM Drive
- Windows 95/98

Appendix
DCS Gateway Specifications

General Specifications

The DCS Gateway can support up to 672 ports. The available port capacity will vary depending on the placement of the interface cards and number of extensions and trunks installed. The following table details the maximum port capacity per configuration.

System Configuration	Maximum Ports
Basic Shelf	224 ports
Basic Shelf + 1 Expansion Shelf	448 ports
Basic Shelf + 2 Expansion Shelves	672 ports

Extension Capacity

The maximum extension capacities for digital keysets, single line telephones and ISDN extensions for each system configuration are as follows.

System Configuration	Standard Telephones	Keysets (see Note)	ISDN Extns
Basic Shelf	160	80/160	160
Basic Shelf + 1 Expansion Shelf	320	160/320	320
Basic Shelf + 2 Expansion Shelves	480	240/480	480

Note
Keyset capacity depends on the number of power (RCMP-D) cards installed in each cabinet. Each RCMP-D card supports up to 80 digital keysets.

Trunk Capacity

The maximum trunk capacity supported on the DCS Gateway is as follows.

System Configuration	Analogue		Digital
	Trunks	E&M	ISDN
Basic Shelf	160 lines	60 lines	160 lines
Basic Shelf + 1 Expansion Shelf	320 lines	120 lines	320 lines
Basic Shelf + 2 Expansion Shelves	480 lines	180 lines	480 lines

Electrical Specifications

Signalling Specifications

DTMF Push-Button Dialling

Signal Array and Frequency

	Signal Array				Lowest Cut-off Frequency
Signal Array	1	2	3	A	697Hz
	4	5	6	B	770Hz
	7	8	9	C	852Hz
	*	0	#	D	941Hz
Highest Cut-off Frequency	1209	1336	1477	1633	

Specification

		Specification
Frequency Deviation		Within ± 1.8% of the frequency
Transmission Power	Lowest Cut-off Frequency	-8 ± 2dBm
	Highest Cut-off Frequency	-6 ± 2dBm

E&M Tie Line

E&M Tie line signalling is used to connect PABX systems. Both TYPE I and TYPE II signalling are supported. All signalling specifications conform to EIA RS-464.

TYPE I can be managed in both the standard and the inverted types.

E & M Lead Signalling			
Signalling Type		**On-Hook**	**Off-Hook**
TYPE I	Standard	M Lead : GROUND	M Lead : -56Vdc
	Inverted	M Lead : OPEN	M Lead : GROUND
TYPE II		M Lead : OPEN	MA Lead : OPEN
		M Lead : CLOSED	MA Lead : CLOSED

E1 Trunk

Electrical Characteristics of E1 Trunk

The electrical characteristics of the E1 trunk conform to the ITU G.703 and G.704 specifications.

Transmission Rate	2048kbit/s ± 50ppm	
Code	HDB3 (High Density Bipolar of Order 3)	
Pulse Shape	Commonly Rectangular Wave: The indication of valid signal must conform to the mask (G.703) irrespective of the code.	
Nominal and Pulse	244ns	
Jitter in the input/output Terminal	Refer to G.823.	
Pair in Each Direction	1 Coaxial Pair	1 Symmetrical Pair
Load Impedance	75 Ohm	120 Ohm
Indication (Pulse) Nominal Peak Voltage	2.37V	3.00V
Void (Non-Pulse) Peak Voltage	0 ± 0.237V	0 ± 0.300V

Signal Specification and Signalling Method of E1 Trunk

The signal specification and signalling method of the E1 trunk conforms to the ITU G.703 and G.704 specifications.

Characteristics of ISDN Interface Transmission

Electrical Characteristics of ISDN Interface - BRI

The electrical characteristics of the ISDN (BRI) interface conform to ITU I.430 and ETS 300 012 specifications.

Transmission Rate	192kbit/s ± 100ppm
Code	AMI
Pulse Shape	Commonly Rectangular Wave: The indication of valid signal must conform to the mask (I.403) irrespective of the code.
Pair in Each Direction	1 Coaxial Cable
Load Impedance	100 Ohm
Indication (Pulse) Nominal Peak Voltage	2.75V

Electrical Characteristics of ISDN Interface - PRI

The electrical characteristics of the ISDN (PRI) interface conform to ITU I.431 and ETS 300 011 specifications.

Transmission Rate	2048kbit/s ± 50ppm	
Code	HDB3 (High Density Bipolar of Order 3)	
Pulse Shape	Commonly Rectangular Wave: The indication of available signal must conform to the mask (I.403) irrespective of the code.	
Nominal and Pulse	244ns	
Pair in Each Direction	1 Coaxial Pair	1 Symmetrical Pair
Load Impedance	75 Ohm	120 Ohm
Indication (Pulse) Nominal Peak Voltage	2.37V	3.00V
Void (Non-Pulse) Peak Voltage	0 ± 0.237V	0 ± 0.300V

Electrical Characteristics of Digital Line Interface – DLI4

The electrical characteristics of the DLI interface are as follows:

Transmission Rate	144kbit/s
Code	AMI (Alternate Mark Inversion)
Pulse Shape	Typical AMI Waveform

Tone Specifications

The DCS Gateway provides several system tones which all conform to ITU specifications.

System Tones

The digital tones are stored in ROM and can support a maximum of 15 channels. The tone on/off period is programmable. The standard on/off periods for each tone are assigned as follows:

Tone Name	Abbreviated Form	On/Off Period	Tone Frequency
Extension Line Dialling Tone	dial-tone	continuous	350 + 440
Transferring Tone	xfr-tone	0.5/0.2 0.5/0.1	440 + 480
Busy Tone	busy-tone	0.5/0.5	440 + 480
Howler Tone	hwlr-tone	continuous	941 + 1,203
Confirming Tone	cnfrm-tone	0.1/0.1	440 + 480
Camp-on Tone	camp-tone	0.2/0.1 0.1/0.1	440 + 480
Hold Tone	hold-tone	1.0/0.8 0.25/0.5	350 + 440
Error Tone	err-tone	0.5/0.2 0.2/0.2	440 + 480
Trunk Dial Tone	exdial-tone	Continuous	350 + 440
Ring Back Tone	rback-tone	2.0/4.0	440 + 480
Congestion Tone	congst-tone	0.25/0.25	440 + 480

Power Specifications

Grounding Condition

The grounding resistance between the DCS Gateway and earth should be within 80 Ohm.

Power Card

Voltage	Current Capacity	Reference
+5Vdc ± 2%	8A	
-5Vdc ± 2%	1A	
+12Vdc ± 10%	0.5A	
-12Vdc ± 10%	0.3A	
-56Vdc (R)	0.5A	*R : supply for RING SUPPLY
-56Vdc [L]	2.1A	*L : supply for subscriber's line

RGPS-K Card

The RGPS-K card supplies analogue phones with ring signal, -56Vdc power and power to message-waiting LEDs.

- Input requirement: -36Vdc – -72Vdc

- Output requirement

Ring Frequency (Hz)	Ring Voltage (Volts, Vrms)	Maximum Current (A)	Line Regulation	Maximum Power (W)
20 ± 3 or 25 ± 3	70 ± 5	0.3	±10Vrms	28

All Configurations

Card Name	MIN / MAX	Input Voltage/Current (mA)					
		+5V	-5V	+12V	-12V	-56V	-56VR
MCPU2 Bare Board	NOR	2190	-	64.3	-	-	-
MCPU2 + 1 4SW	NOR	2430	-	-	-	-	-
MCPU2 + 1 TIM	NOR	2910	-	-	-	-	-
LPM3	NOR	820	R2CID: 0.30 4SW: 0.24 LAN: 0.19 TIM: 0.72				
LPM3 + 1 4SW	NOR	1060					
LPM3 + 2 4SW	NOR	1320					
LPM3 + 1 4SW + 1 CID	NOR	1350					
LPM3 +1 R2CID	NOR	1120					
4SW	NOR	240	-	-	-	-	-
LAN	NOR	190	-	-	-	-	-
R2CID	NOR	300	-	-	-	-	-
TIM	NOR	720	-	-	-	-	-
GLOOP2	MIN	214	122	-	-	-	-
	MAX	726	202	-	-	-	-
G4W E&M	MIN	93	49	-	-	0	-
	MAX	280.5	82	-	-	24	-
PRI4	NOR	380	-	-	-	-	-
DTRK3	NOR	470	-	100	-	-	-
BRI	NOR	457	-	-	-	11	-
	MAX	457	-	-	-	91	-
INI3	NOR	470	-	100	-	-	-
ITM	NOR	770	-	100	-	-	-
ITM SUB	NOT USED						
GSLC	MIN	129	54.2	-	-	17.46	-
	MAX	623.4	188.6	-	-	442.1	-
DLI4	MIN	470	-	-	-	20	-
	MAX	470	-	-	-	452	-
MFM	MAX	214	96	-	-	-	-
AVA2	MIN	80	-	-	-	-	-
	MAX	160	-	-	-	-	-
SIM	NOR	-	-	-	-	29	-
PFT	NOR	437	-	-	-	-	-
R/G	MIN	-	-	-	-	-	78
	MAX	-	-	-	-	-	8mA/P

Equipment Dimensions

- For a rack with three shelves:
  730(W) x 1,229(H) x 466(D) mm

- For a rack with two shelves:
  730(W) x 859(H) x 466(D) mm

- For a rack with one shelf:
  730(W) x 489(H) x 466(D) mm

- The height of the wheel is 68 mm

- The height of the rack cover is 50 mm

- The height of the shelf is 370 mm

Weight & Size of Cards / Modules

Item	Card/Module Name	Weight (kg)	Size (cm)	Ref
CONTROL	MCPU2	0.85	29.067 x 27.813 x 3	RAM, T-SW
	LPM3	0.647	29.067 x 27.813 x 3	
CONTROL D'BOARD	4SW	0.0915	11.5 x 0.95 x 1.01	
	LAN	0.0625	8.0 x 12.6 x 1.1	
	R2CID	0.0905	11.5 x 0.95 x 1.1	
	TIM	0.078	12.2 x 12.5 x 0.6	
DIGITAL	DLI4	0.677	29.067 x 27.813 x 3	
DIGITAL TRUNK	PRI4	0.4685	29.067 x 27.813 x 3	
	DTRK3 (E1)	0.605	29.067 x 27.813 x 3	
	ITM (Sigate)	0.6045	29.067 x 27.813 x 3	
	ITM SUB	0.0515	8.4 x 4.8 x 1.7	
	INI3	0.605	29.067 x 27.813 x 3	
	BRI	0.7265	29.067 x 27.813 x 3	
ANALOGUE TRUNK	GSLC	0.76	29.067 x 27.813 x 3	
	GLOOP2 (A) (PRS, CID, MPD)	0.885	29.067 x 27.813 x 3	
	G4W E&M (A)	0.551	29.067 x 27.813 x 3	
ADDITIONAL MODULE	AVA2	0.7095	29.067 x 27.813 x 3	
	PVMS			
	PVMS D'board			
	MFM (A)	0.586	29.067 x 27.813 x 3	
	PFT	0.266	12.3 x 20.1 x 1.7	
AC/DC	RCMP-D	3.182	28.5 x 27 x 6.05	
RINGER	RGPS-K	1.356	28.5 x 27 x 4.5	

Items	Card/Module Name	Weight (kg)	Size (cm)	Ref
MISC	MBD_M2+	2.350	55.232 x 30.701 x 3.45	
	IOCB	0.146	15.3 x 7.9 x 3.2	
	PDB	0.053	14.8 x 7.2 x 1.65	
	DTIR	1.397	19.0 x 15.0 x 4.0	
	SIM (DATA)	0.1705	9.0 x 12.0 x 2.8	
	ATC	1.996	39.8 x 21.0 x 14.5	
	MSIM / DPIM	0.2	9.0 x 12.0 x 2.9	
RACK	A (SHELF #1)	30	73 (70) x 46.6 x 48.9	SIDE: 1.55(B)
	C (SHELF #3)	20	73 (70) x 46.6 x 37	F/R: 1.95
	3-SHELF RACK	98.15	73 (70) x 46.6 x122.9	(70): RCMP-C

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