



USER'S MANUAL

for HD-BSC 960 and HD-MIC 800

1999. 9

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Chapter 1 System Overview

1.1 Purpose of this document

This chapter contains description of Hyundai Micro-BTS PCS System that is operating on 800MHz and 1.9GHz frequency band, respectively.

1.2 Features of Hyundai CDMA System

There are two sub-systems in Hyundai CDMA system ; Micro-BTS and BSC. BSC interfaces with switching equipment and has roles of vocoding and call processing. Micro-BTS is functionally located between MS (Mobile Station) and BSC. Hyundai Micro-BTS has channel resource unit and radio frequency RF unit similar to the conventional 3-Sector BTS. Contrary to conventional 3-Sector BTS, Hyundai Micro-BTS is small in size, easily can be installed and maintained, and is very cheap in cost.

1.3 Overview

Hyundai Micro-BTS system can support 2FA/3Sector using 2 racks, but Micro-BTS system is composed of 1FA/3sector system for the FCC authorization. Thus this manual will describe all of the specifications based on 1FA/3sector system.

The system configuration is shown in Figure 1.1. In this configuration, there are 1 BSC and 3 Micro-BTS systems. Each Micro-BTS system is separately located in 3 sites. Micro-BTS can use 2 types of antenna subsystem, RRU (Remote RF Unit) and AAU (Active Antenna Unit). RRU is connected to Micro-BTS main system through AIU (Antenna Interface Unit) and AAU through AIDU (Active Internal Distribution Unit). In case of trunk line, we have several solutions, T1 and E1. We use T1 trunk line in USA. It means that we do not use HLEA but HLTA as trunk card.

BSM manages and maintains Micro-BTS and BSC. It communicates with each system by transmitting and receiving packets through LCIN. Its features include performance management, configuration management, fault management, etc..

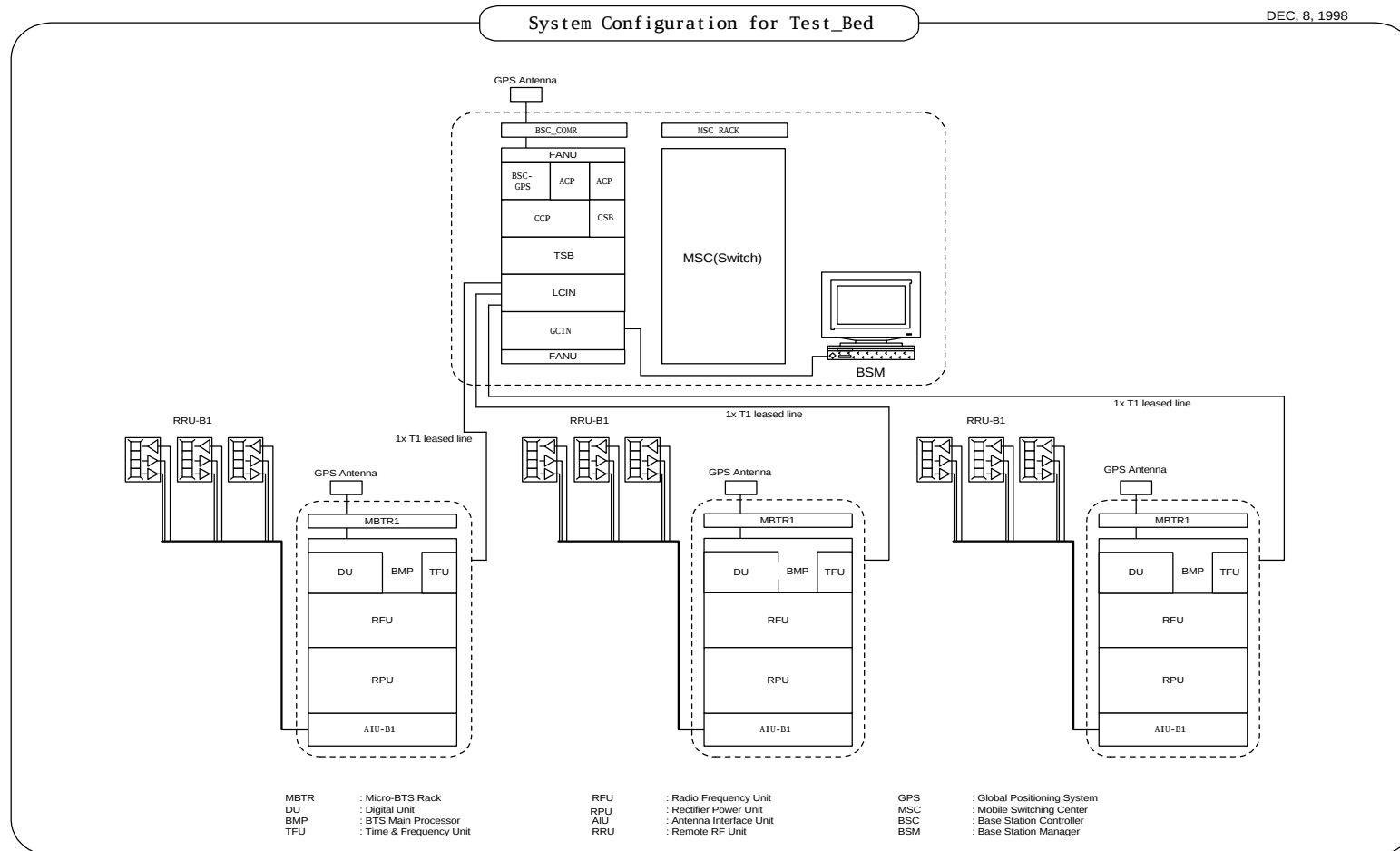


Figure 1.1 Configuration of system for field trial

Chapter 2 BSC Basics

2.1 System Overview and Specification

2.1.1 Overview

BSC is located between MSC and BTS. It carries out a wire/wireless link control function, handoff function and transcoding function. And it is made up of a LCIN, GCIN, TSB, CCP, CSB, CKD, BSC-GPS, and BSM block. [Refer to Fig.2.1].

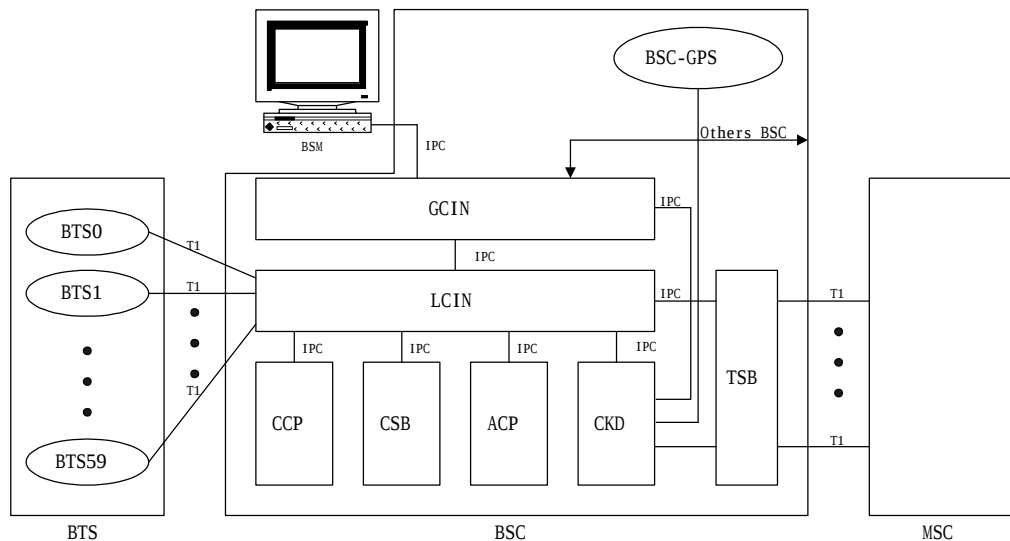


Figure 2.1 Configuration of BSC

Each block does following functions.

- BSM is a system used to operate the entire BSC and BTS, to manage their resources, status and configuration, and to execute the user interface, and maintenance. It consists of a SUN Sparc Workstation and the various types of input/output devices for enhancing user's convenience.
- LCIN is a network that provides the communication paths of packet-type data between subsystems. LCIN routes and transmits packet data within BSC and it has trunk interface function between BSC and BTS.

- GCIN is a network that provides the communication paths of packet-type data between LCINs. GCIN also provides the communication path between BSM and other processor.
- CCP is a processor system that carries out the call processing and soft-handoff processing function for entire BSC, allocates wireless resource of BSC, and controls overload of vocoders and the main processor of BSC.
- CSB converts the IPC protocol of CCP into the No.7 protocol to access to MSC through the trunk of TSB block.
- BSC-GPS is a system for providing the reference time used in the CDMA system. CKD converts the clocks received from BSC-GPS and then, distributes synchronization signals required for the system.
- ACP collects the various types of alarm status in BSC and then, reports them to BSM in order to carry out system O & M efficiently.
- TSB is connected to MSC with T1 trunk. TSB converts the PCM voice signal of 64Kbps received through this with the QCELP algorithm and it sends the converted signal to the channel unit of BTS. In addition, it carries out the reverse function of the above. Moreover, after being linked to the BTS, it executes a handoff function and power control function on radio link.

2.1.2 Specifications and Characteristics

2.1.2.1 Specifications of BSC

(1) Capacities

- Number of controlled BTS : 60BTS/BSC
- Number of voice channel : 960 CH/BSC
- Number of BSC which are inter-accessible : 12BSC/MSC
- Maximum capable subscribers : 30,000 subscribers/BSC (Br 1%, 0.03Erlang)

(2) Link protocol

- BSC-MSC Link
 - T1 for Traffic
 - SS No.7 for signaling & control (ITU-T STD)
- BTS-BSC Link
 - Un-channelized T1
- (3) Power
 - DC - 48 V
 - Integration of storage battery is possible.
- (4) Specification of LCIN
 - Up to 112 T1 Trunk to BTS
 - Function of Remote Loop-back
 - Function of transmit/receive of Remote alarm
- (5) Specification of CCP & CSB
 - Use 32bit Main Processor
 - Interface function with LCIN
 - Interface to MSC
- (6) Specification of TSB
 - Interface to MSC with T1
 - Accepts 48 Transcoding channel per TSB
 - 12 Vocoder Channels/Channel Card
- (7) Specification of GCIN
 - 4 links to a LCIN
 - Up to 12 LCIN connection capability
 - RS-422 links for LCIN links, BSM and other processors
- (8) Specification of BSM
 - Main Frame : Use commercial workstation
 - Main Processor : SPARC Processor processing rate more than 80MIPS
 - Main Memory : more than 64Mbyte
 - Hard Disk : more than 2Gbyte
 - Tape Drive : more than 150Mbyte
 - Parallel Port : Connect with High Speed Printer
 - HDLC Card : support the rate more than 2.048Mbps and functions of X.25 connection

- Audio I/O Port : supply alarm function
- Software : Motif/X11, Informix DBMS

2.1.2.2 Characteristics

- (1) Distributed control structure and duplication of main part
- (2) Using the link that is capable of high reliability and high speed data transmit
- (3) Increasing the trunk efficiency by packet transmit
- (4) Real-time processing of system by real-time OS

2.2.1 Overview

Figure 2.2 H/W Structure of BSC

2.2.2 Structure of Subsystem

2.2.2.1 LCIN (Local CDMA Interconnection Network)

LCIN receives Packet Data transmitted by each subsystem connected to BSC and routes the Packet Data to destination address that are added in overhead of Packet.

(1) Functions of LCIN

- CDMA Traffic Information Routing between BTS and TSB
- Information Routing between BTS, CCP.
- Internal information Routing among TSB, CCP, CSB, TFGA-A1 and ACP

(2) H/W Structure of LCIN

After LCIN converts Packet Data which are inputted by each subsystem in BSC to 16-bit parallel data, analyzes Packet Address and converts them again to Serial data via internal Routing and routes them to corresponding subsystem. LCIN consists of HICA-A2, HRNA-A2, HNTA-A2 and backboard CHBB-A1 card.

1) HICA-A2 (High-performance IPC Control Board Assembly-A2)

HICA-A2 performs network management functions of LCIN that is made up of nodes providing communication path between processor of BSC and BTS.

For management of communication network, LCIN have control and maintenance channel (M-BUS) responsible for fault processing and node status monitoring and communication channel (U-Link) with other processor. HICA-A2 generates BUS arbitration control signal between nodes of D-BUS and exchanges common bus for data of each node. HICA-A2 performs each PBA's status management and maintenance of LCIN block, and status management and maintenance of Link.

2) HRNA-A2 (High performance IPC Routing Node Assembly-A2)

HRNA-A2 have 8 Nodes. It is a PBA having the function of node that is basic unit of IPC (Inter Processor Communication) in LCIN. HRNA-A2 is an interface board by which each subsystem can be accessed to LCIN. After converting the packet data that are inputted through RS-422 parallel interface, it outputs the converted data on packet bus (D-BUS) of LCIN according to the routing control signal of HICA-A2. HRNA-A2 performs that extracts 3 bytes destination address of Packet Data that is loaded on D-Bus and accepts the packet only if the compared result of destination address of Packet Data with node address of itself are equal, then converts it to serial type and transmits it to each subsystem.

HRNA-A2 performs the functions that receives control command from HICA-A2 and reports the status of HRNA-A2 using dualized serial control bus (M-BUS).

HRNA-A2 has the functions that detects various fault per node and D-BUS fault occurs in operation, and reports detected faults to HICA-A2 through M-BUS.

HRNA-A2 performs fault recovery functions by initializing fault detected node and switching of D-BUS.

3) HNTA-A2 (High Performance IPC Node & T1 trunk interface Board Assembly-A2)

HNTA-A2 is used for linking T1 trunk in LCIN. BSC and BTS are accessed each other through Digital Trunk and HNTA-A2 performs link functions of T1 Trunk Line.

HNTA-A2 performs functions of Node and link of Trunks simultaneously, and have 8 node and 8 T1 digital trunk interface.

HNTA-A2 performs the functions that receives control command from HICA-A2 through M-BUS and exchanges packet between node through D-BUS.

HNTA-A2 performs the functions that tries to recover by fault detection of D-BUS and monitors and reports the status of Trunk.

(3) Structure Diagram of LCIN

- LCIN consists of Routing functions based on BSC unit.
- LCIN consists of BTS link interface functions using T1 Trunk Line.

The following Fig.2.3 describes structure diagram of LCIN

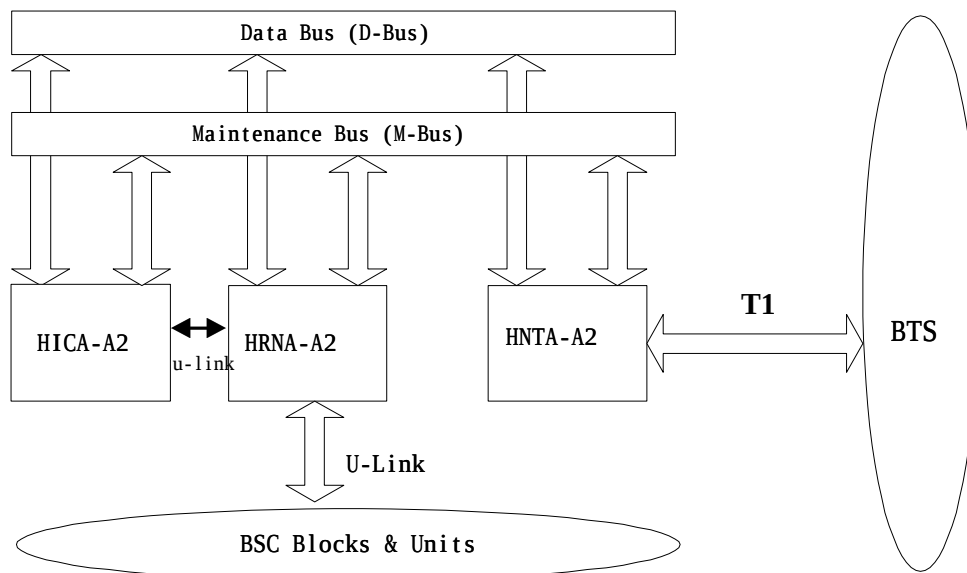


Figure 2.3 Structure Diagram of LCIN

(4) Address System

LCIN uses 3 byte address system enough to process traffic resources in BS (BTS & BSC).

2.2.2.2 TSB (Transcoding & Selector Bank)**(1) Functions of TSB**

- CCP by MSC allocates resources when call setup
- provides information about code transition by mobile and registration in the process of call processing
- removes vocoder when call releases
- corresponding Card to Channel Element of BTS
- performs vocoder functions of voice
- performs functions of Rate Adaptation of Data and Coder/Decoder
- performs function of Selection for Soft-Handoff
- performs Power Control functions (Forward Power Control & Open Loop Power Control)

(2) Hardware structure of TSB

- TSB consists of VSIA-C1 connected to LCIN and VSOA-A1 mounted with vocoder
- has 92 Transcoding Channel per TSB 1Unit (T1)
- VSIA-C1 performs functions that receives serial Packet data inputted from LCIN, converts to parallel data, transmits to VSOA-A1 mounted with vocoder, receives data vocoded in VSOA-A1 and converted to PCM type through ST-BUS, makes data multiplex and transmits to MSC.
- VSOA-A1 is mounted with 12 vocoder performs functions that converts QCELP Packet Data to PCM Voice Code and PCM Voice Code to QCELP Packet Data.

(3) Structure Diagram of TSB

The following Fig.2.4 describes structure diagram of TSB

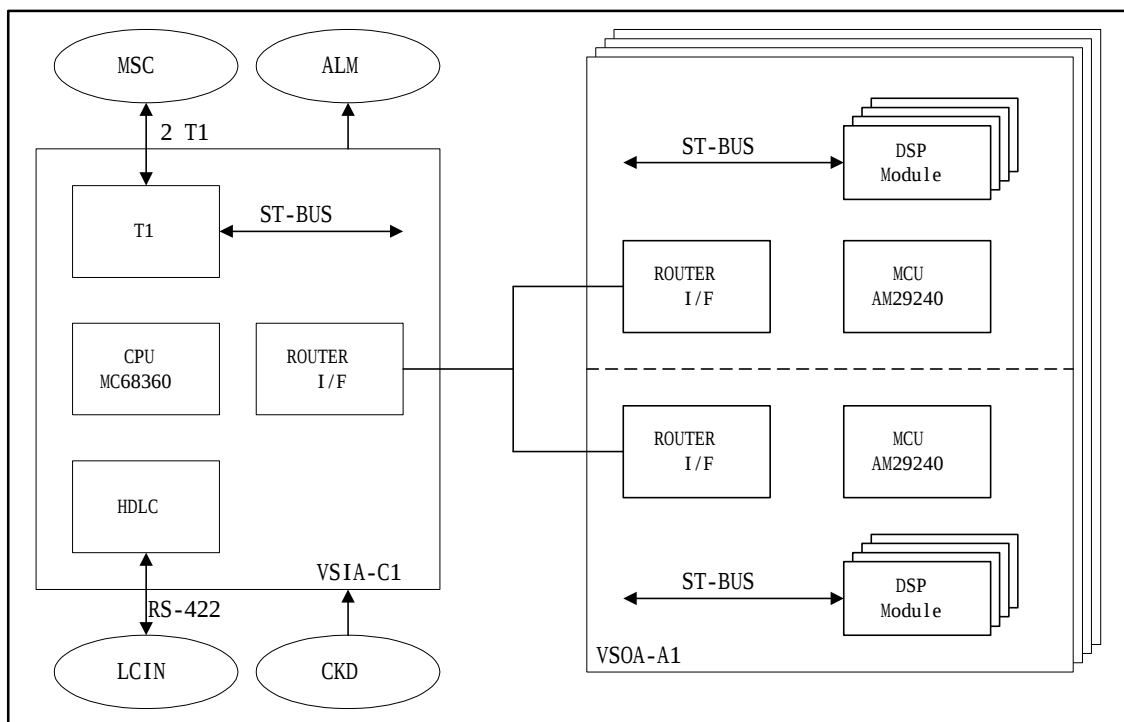


Figure 2.4 Structure Diagram of TSB

2.2.2.3 CCP (Call Control Processor)

(1) Functions of CCP

- performs all of call processing related control functions of BSC
- exchanges CDMA related information among BTS, TSB and MSC
- controls Soft-Handoff and Hard-Handoff
- supports Paging
- controls overload and manages TSB

(2) Hardware structure of CCP, CSB

CCP consists of main processor MCDA and CIFA responsible for inter-processor communication with HRNA in LCIN.

When using No.7 Signaling mode, CCP system is connected to CSB block through CIFA-A1 via LCIN block and CSB block transfers this message to MSC through Trunk after converting this message appropriate for No.7 Protocol.

1) MCDA (Main Control Duplication Assembly)

MCDA communicates with CIFA-A1 using MPS-bus. It is responsible for communication with dualized block. If Power of MCDA is ON, Booter operates, and

MCDA determines whether active or standby of itself through S channel of MFP in result of negotiation with other MCDA and requests loading. If MCDA operates normally after OS Loading, MCDA controls call processing and manages Selector.

2) CIFA-A1 (CIN Interface Board Assembly)

CIFA-A1 is an interface board responsible for communication with external and has functions of MPS-bus link and direct DATA communication with CIN block.

For connection with LCIN, CIFA-A1 transmits and receives control information using Address Decoding & Zero insertion/deletion, CRC generation and check function through HDLC Protocol.

3) Structure Diagram of CCP, CSB

The following Fig.2.5 describes structure of CCP

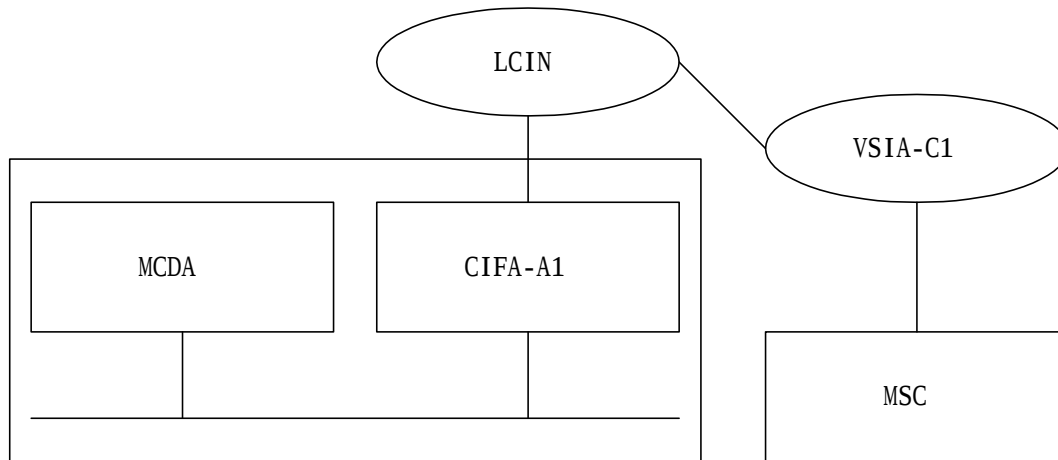


Figure 2.5 Structure of CCP

2.2.2.5 BSC-GPS/CKD (Clock Distributor)

(1) Functions of BSC-GPS/CKD

- BSC-GPS block is located in CMNR of BSC (Base Station Controller). When 1PPS and 10MHz from GBSU-A1 (GPS) are inputted to TFSA-A1, then it converts and distributes them into clock necessary in BSC, and provides them through TFDA-A1 to TSB and LCIN. Number of providing clocks is 16 in minimum and 32 clocks in maximum.
- Distributed Clock : 4.096MHz, 2.048MHz, 1.544MHz, FP (8KHz), FOI (8KHz), 50Hz, 1Hz

(2) Hardware structure of BSC-GPS/CKD

BSC-GPS/CKD consists of GPS Receiver, TFSA-A1 that receives clock, Clock

generator (TFGA-A1) and Clock distributor (TFDA-A1).

The structure Diagram of CKD is shown in Figure 2.7.

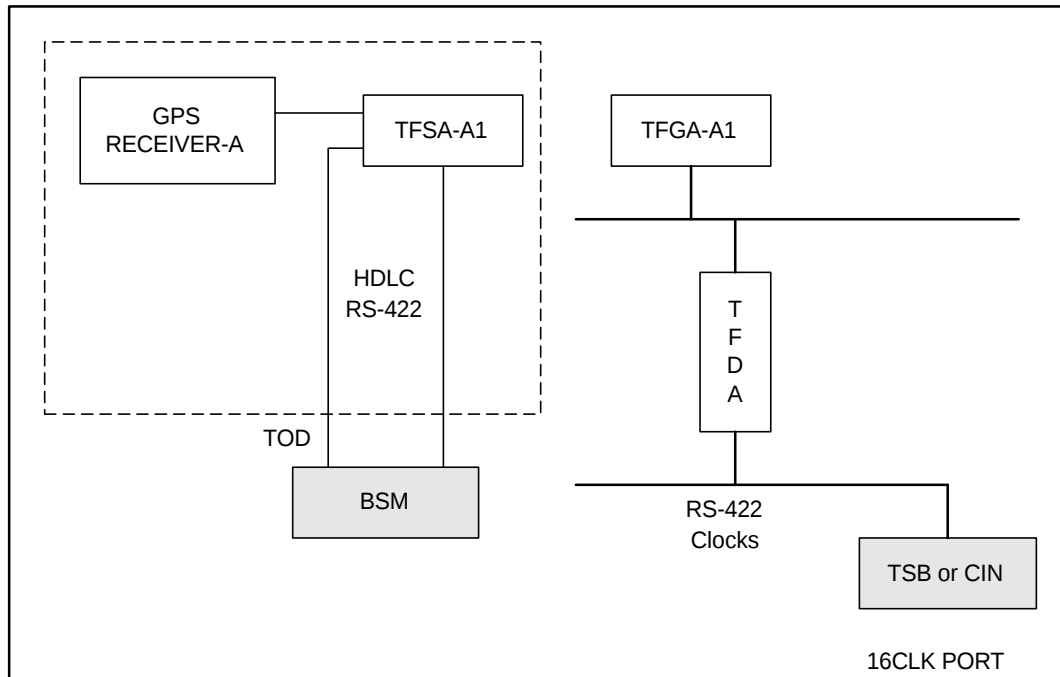


Figure 2.7 Structure Diagram of CKD

2.2.2.6 ACP (Alarm Control Processor)

(1) Structure and Functions of ACP

ACP block is located in BSC (Base Station Controller) and has functions of collecting alarm sources of each subsystem by H/W and reporting to BSM by S/W. This block is mounted one per one BSC and one ACP block is mounted on a ACPA-A1 board and can monitor 26 alarm ports in maximum. Each alarm port is connected to each subsystem of BSC more than one and monitors OFF-FAIL of important board and power module.

If system extends and number of alarm port is increased, additional ACP blocks can be mounted.

(2) Structure Diagram of ACP

The following Fig.2.8 describes structure diagram of ACP

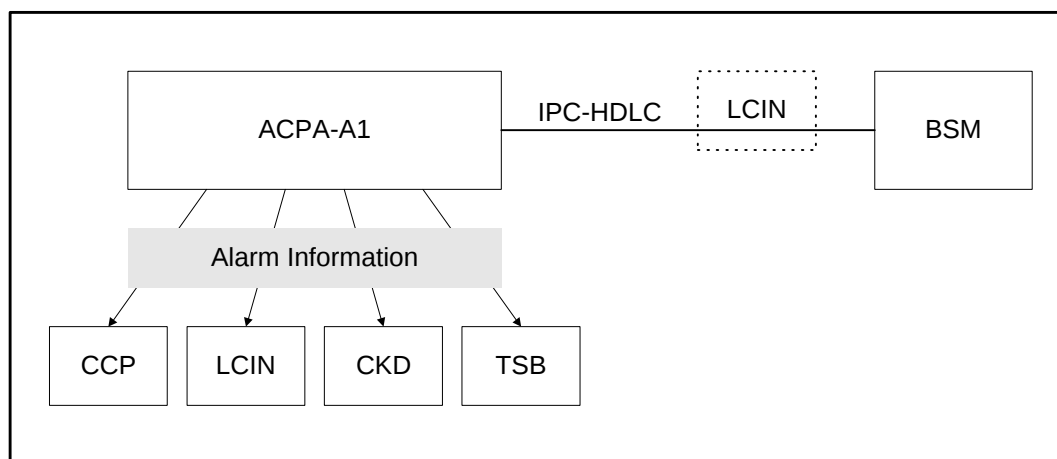


Figure 2.8 Structure Diagram of ACP

2.2.2.7 GCIN (Global CDMA Interconnection Network)

GCIN receives Packet Data transmitted by each subsystem connected to GCIN . GCIN also receives Packet Data transmitted from a LCIN to other LCIN. GCIN routes the Packet Data to destination address which are added in overhead of Packet.

(1) Functions of GCIN

- CDMA Traffic Information Routing between LCINs
- Information Routing between LCINs and BSM.

- Internal information Routing among TFSA-A1, HICA-A2 , BSM.

(2) H/W Structure of GCIN

GCIN converts Packet Data which are inputted by each link from LCIN or subsystems in GCIN to 16-bit parallel data, GCIN analyzes Packet Address and converts them again to Serial data via internal Routing and routes them to corresponding subsystem or links. GCIN consists of HICA-A2, HRNA-A2, and backboard HSBB-A1 card.

1) HICA-A2 (High-performance IPC Control Board Assembly-A2)

HICA-A2 performs network management functions of GCIN which is made up of nodes providing communication path between processor of BSC and BTS.

For management of communication network, GCIN has control and maintenance channel (M-BUS) responsible for fault processing and node status monitoring and communication channel (U-Link) with other processor. HICA-A2 generates BUS arbitration control signal between nodes of D-BUS, common bus for data exchange of each node. HICA-A2 performs each PBA's status management and maintenance of LCIN block, and status management and maintenance of Link.

2) HRNA-A2 (High performance IPC Routing Node Assembly-A2)

HRNA-A2 has 8 Nodes. It is a PBA having the function of node which is basic unit of IPC (Inter Processor Communication) in GCIN. HRNA-A2 is an interface board by which each subsystem can be accessed to GCIN. After converting the packet data which are inputted through RS-422 parallel interface, it outputs the converted data on packet bus (D-BUS) of GCIN according to the routing control signal of HICA-A2. HRNA-A2 performs that extracts 3 bytes destination address of Packet Data which are loaded on D-Bus and accepts the packet only if the compared results of destination address of Packet Data with node address of itself are equal, then converts it to serial type and transmits it to each subsystem.

HRNA-A2 performs the functions that receives control command from HICA-A2 and reports the status of HRNA-A2 using dualized serial control bus (M-BUS).

HRNA-A2 have the functions that detects various fault per node and D-BUS fault occurs in operation, and reports detected faults to HICA-A2 through M-BUS.

HRNA-A2 performs fault recovery functions by initializing fault detected node and switching of D-BUS.

(3) Structure Diagram of GCIN

- GCIN consists of Routing functions between LCINs.
- GCIN consists of Routing functions between subsystems in GCIN.

The following Fig.2.9 describes structure diagram of GCIN

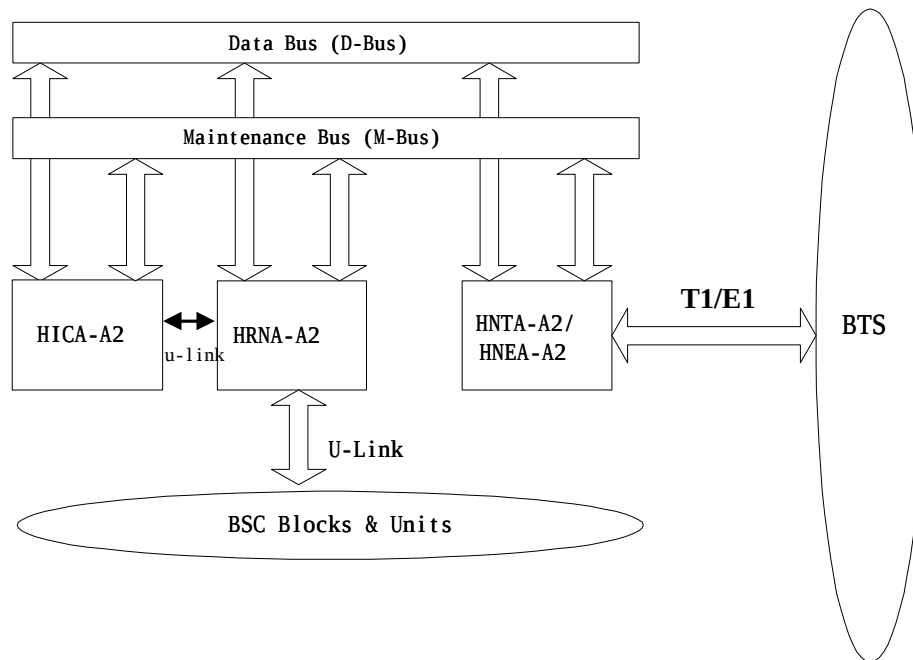


Figure 2.9 Structure Diagram of GCIN

(4) Address System

GCIN uses 3 byte address system enough to process traffic resources in BS (BTS & BSC).

2.3 S/W Structure and Function

2.3.1 Overview

Software of CCP and TSB consists of an operation and maintenance Software and a control and resource management Software of each subsystem.

Software of BSM can largely be divided into an operation function and a general function.

The operation function consists of a software taking charge of system loading, system structure management and performance management and a software taking charge of maintenance function that detects, isolates and recovers abnormally-running device.

The general function consists of software taking charge of data communication function, data management function, and manager link function.

2.3.2 Structure

2.3.2.1 CCP Software

(1) CCOX (Call Control eXecution)

- Origination and Termination call processing processed by the unit of Process CCOX registers and manages their call by the unit of Process and releases Process by Call Release function.
- Origination call processing, in case of receiving Call Request of Handset from BS, allocates selector and ensures traffic channel by using resource allocation function and requests Call Setup to MSC. If the approval from MSC is identified, Call Setup of Origination call processing is completed
- Termination call processing, in case of receiving Paging Request from MSC, allocates selector and ensures traffic channel by using resource allocation function and completes Call Setup of termination call processing
- Origination and Termination Call Release are performed in case of requesting Call Release by telephone network subscriber or Handset, and cause Call Path and wireless channel and inform it of data processing function
- also, performs designated path CALL SETUP and CALL TRACE function

(2) CDAX (CCP Database Access eXecution)

- It is a library that supplies various functions able to read, write and access the operation information in CCP and the PLD saving configuration information.

(3) CRAX (CCP Resource Allocation eXecution)

- initialization of configuration information of CCP
- statistics library supply
- available call resource library supply

(4) CMMX (CCP Measurement Manager eXecution)

This block has a function for measurement and statistics processing.

- statistics data collection & measurement
- statistics data report
- linking with call processing S/W & library call
- statistics count decision (event collection /accumulation/totalization)

(5) CDIAX (CCP DIAGnosis eXecution)

It consists of diagnostic function and performance drop prevention function by diagnosis in initialization and system operation

- diagnosis for process, Device, path
- automatic diagnosis for vocoder and link

(6) CSHX (CCP Status Handling eXecution)

It consists of functions for state management of system

- processor state checking
- management of vocoder and link state
- information supply for available resource

(7) CRMX (CCP Resource Management eXecution))

It consists of functions for resource configuration management

- configuration control of resource
- resource data processing by MMC
- common data (BCP&CCP Common Data) loading and data display

(8) CPLX (CCP Process Loader eXecution)

It consists of initial Loading and Loading function in operation.

- Start and Restart of initial system

- Start and Restart of process
- Stand-by Loading
- initialization (data initialization, process initialization and state identification)

2.3.2.2 Software Structure of CCP

The following Fig.2.10 describes S/W structure of CCP

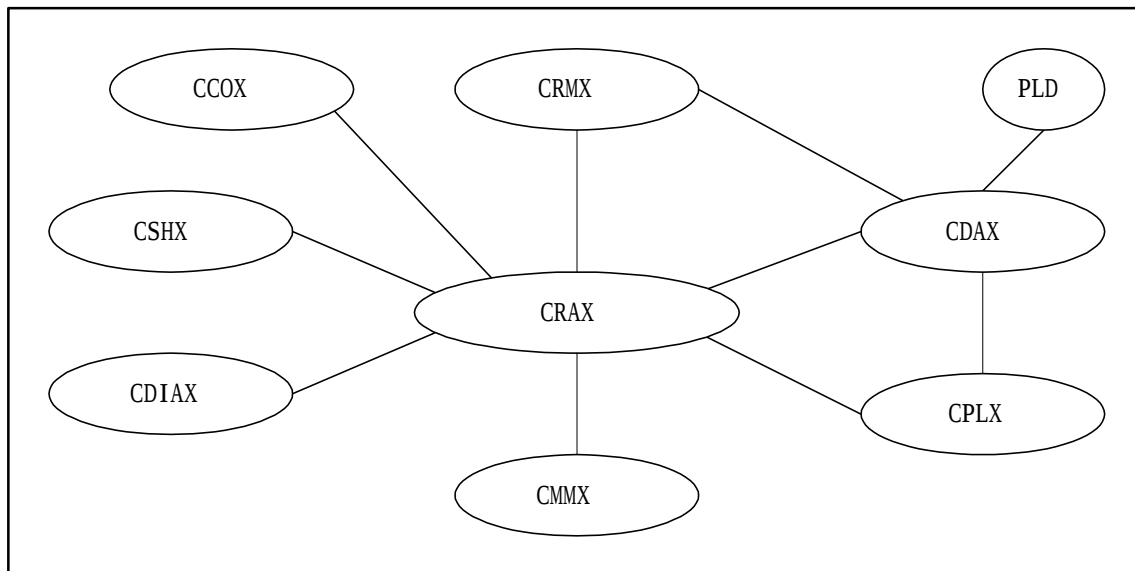


Figure 2.10 S/W Structure of CCP

2.3.2.3 TSB S/W Structure

TSB S/W (from now on, SVPX) is the S/W block driven over VSOA board, since two Processors exist in one board, each Processor process six channels. SVPX processes traffics and signals coming from Mobile, CE and CCP. SVPX consists of following Tasks.
[Refer to Fig.2.11]

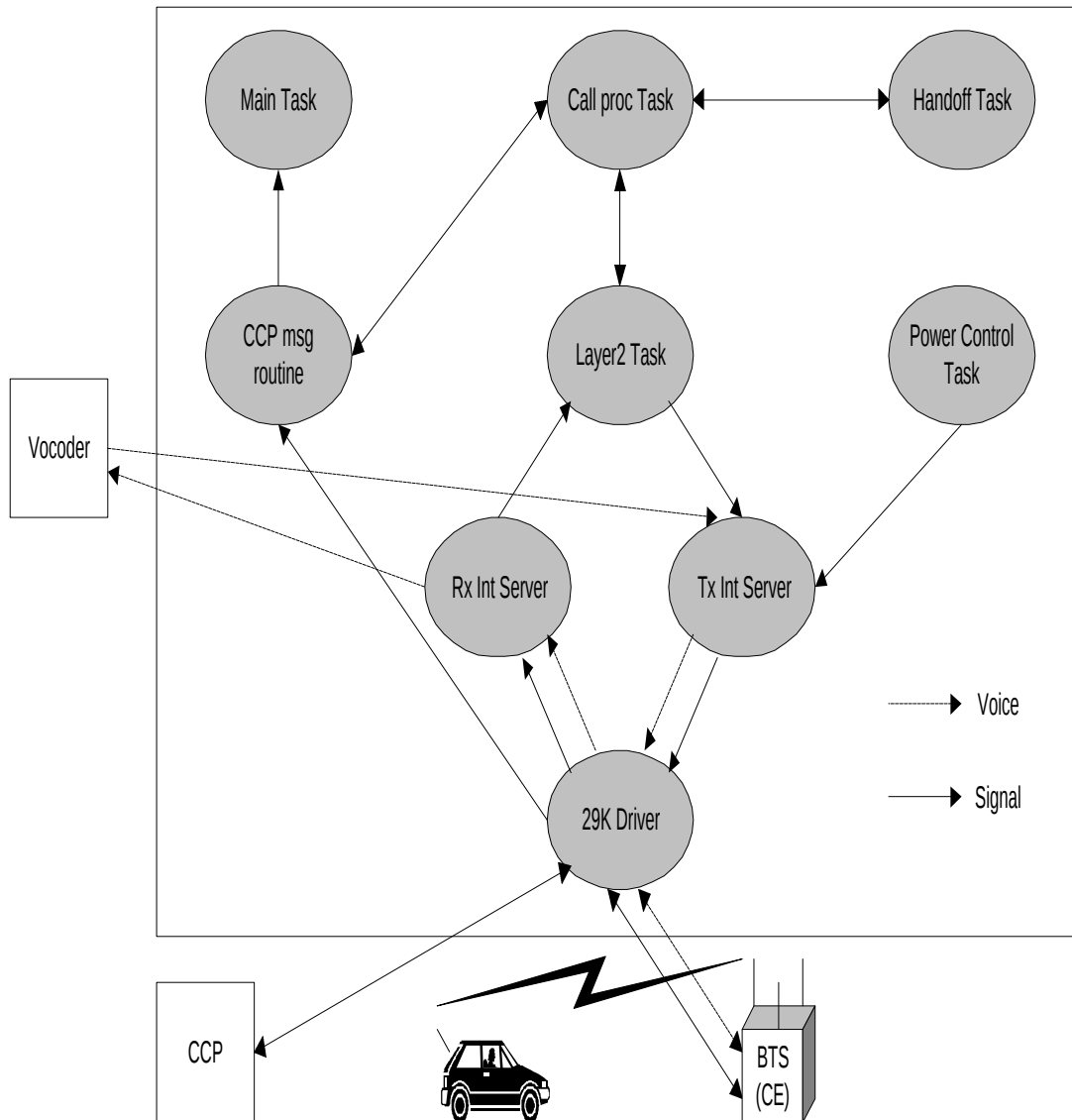


Figure 2.11 TSB S/W Structure

(1) 29K Driver

As initial Task after SVPX is loaded , it initializes processor and plays an interface role between AP and Devices. Other tasks are processed over this Driver

(2) Main Task

If main task takes over control from Driver, it initializes Queue and Vocoder state and generates task and initializes it.

(3) Rx Interrupt Server

Traffic Frame transmits and receives one frame every 20msec per call. Some of reverse frame coming from Mobile every 20msec contain a vocoded voice data and a CAI (Common Air Interface) message for call processing.

The Voice data is transmitted into Vocoder, the CAI message is transmitted into Callproc Task, and control message coming from CE is also transmitted into Callproc Task.

Rx Interrupt server estimates frame quality by Quality Metric value and transmits that into Reverse Power Control, practices Rx Frame Selection in case of handoff.

(4) Tx Interrupt Server

It makes Forward Frame every 20ms and also transmits that. In case of handoff, it multicasts to maximum three BTSs.

(5) Layer2 Task

It processes ACK_SEQ, MSG_SEQ and ACK_REQ field of respective message to accomplish reliable message exchange between Mobile, CE and BS.

It processes Ack of a receiving message and retransmits a transmitting message in case of necessity

(6) Callproc Task

It performs appropriate call processing according to signal from Mobile, CE and CCP.

(7) Handoff Task

In case of processing control message related to Handoff, it is according to handoff decision of CCP. And it performs corresponding handoff type. Handoff type is largely divided into SOFTER H/O, SOFT H/O and HARD H/O.

(8) Power Control Task

According to PMRM (Power Measurement Report Message) or Erasure Indicator Bit coming from Mobile, it performs Forward Power Control indicating Forward Traffic Channel Gain adjustment into CE every 20ms and indicates Reverse Traffic Power adjustment of Mobile through CE every 1.25ms, after checking FER of Reverse Traffic Frame

2.3.2.4 BSM Software

(1) CDMX (Configuration Data Manager eXecution)

1) Block Summary and Working Function

A CDMX block manages some data such as operation parameter requested to perform Inherent function of BTS and BSC subsystems and hardware placement information. Also, the CDMX receives a command through manager link in BSM to supply coherence of data alternation and adaptation and processes that. And the CDMX saves the processed result in database and reports it to manager.

The CDMX consists of a CDM_interface unit which makes corresponding function work by analyzing the message received from UIM (User Interface Manager), a PLD_access unit for PLD access and a Data_send unit for data transmission into subsystem. After classifying the received message, The CDMX process the command and sends the processing result to UIM

2) Block Flowchart

The following Fig.2.12 describes CDMX block flowchart.

- informs BIM that CDM is in normal state.
- sends the processing results received from UIM for manager's command for data processing.
- In case of Data Change Request, send data to the CRM and receive result.
- receives a PLD Change Request Message from the APP
- sends processing result to the APP.

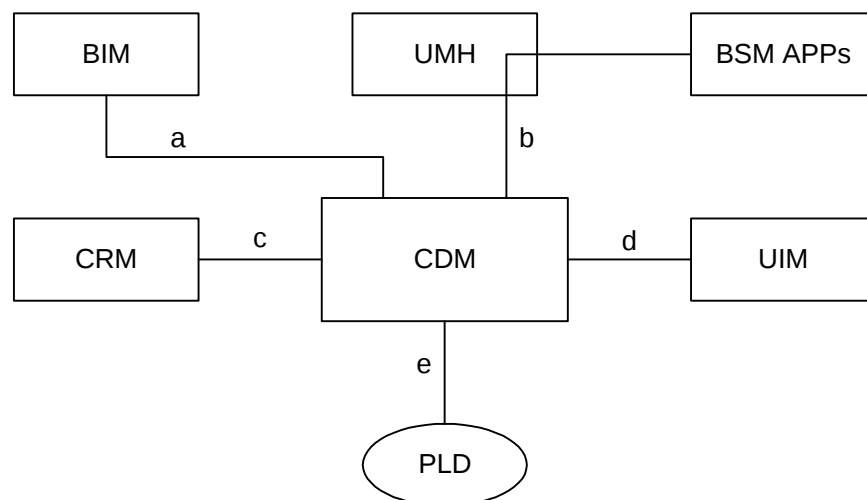


Figure 2.12 CDMX block flowchart

(2) SLX (System Loader Execution)

1) Block Summary and Working Function

During initialization of CCP and ACP subsystem, a SLX loads application blocks performed in CDMA system into CCP and ACP. The SLX renew database to manage loading history according to location information and state of system loaded in case of performing loading of each subsystem.

Function related to CCP out of Subsystem Restart and Block Switch function by MMC is processed by CPL. Function related to BCP, SIP and SVP is performed by inter-working with CPL, Booter of BCP, SIP, SVP, and PL. It supplies a loading history by MMC for manager.

Also, The SLX removes specific block out of application blocks performed in each subsystem or adds application block to specific subsystem.

2) Block Flowchart

The following Fig.2.13 describes SLX block flowchart.

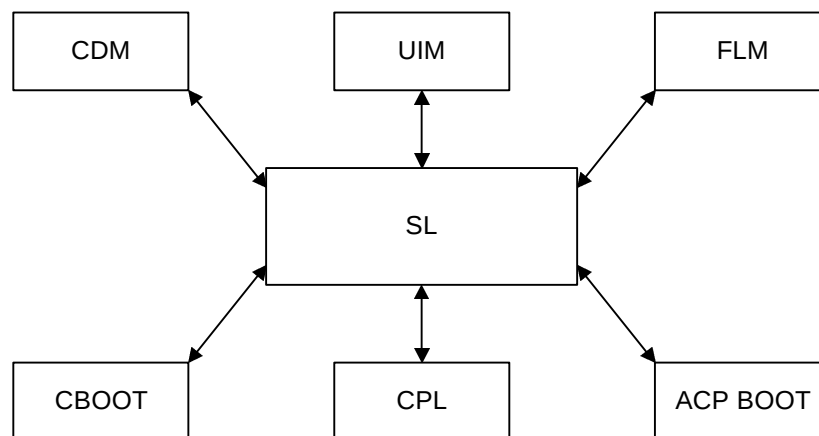


Figure 2.13 SLX Block Flowchart

(3) SMMX (Statistics Measurement Manager eXecution)

1) Block summary and working function

A SMMX block requests BSC system to measure performance data. The SMMX processes statistics of the measured data, saves it and outputs it. Also, the SMMX outputs statistics report output according to user's request by using a periodically

receiving performance data in BSC system. The SMMX can stop and start the measurement on system.

Software unit of SMM block consists of Command Processing Part, Signal Message Format Processing Part, Screen Output Format Part, and Database Processing Part. Command Processing Part processes command inputted by manager. Signal Message Format Processing Part formats the signal message which will be transmitted. Signal Message Unformatting Processing Part unformats the signal message. Screen Output Format Part outputs a statistical data on the BSM message output window. Database Processing Part manages the statistical database.

2) Block Flowchart

The following Fig.2.14 describes SMMX block flowchart.

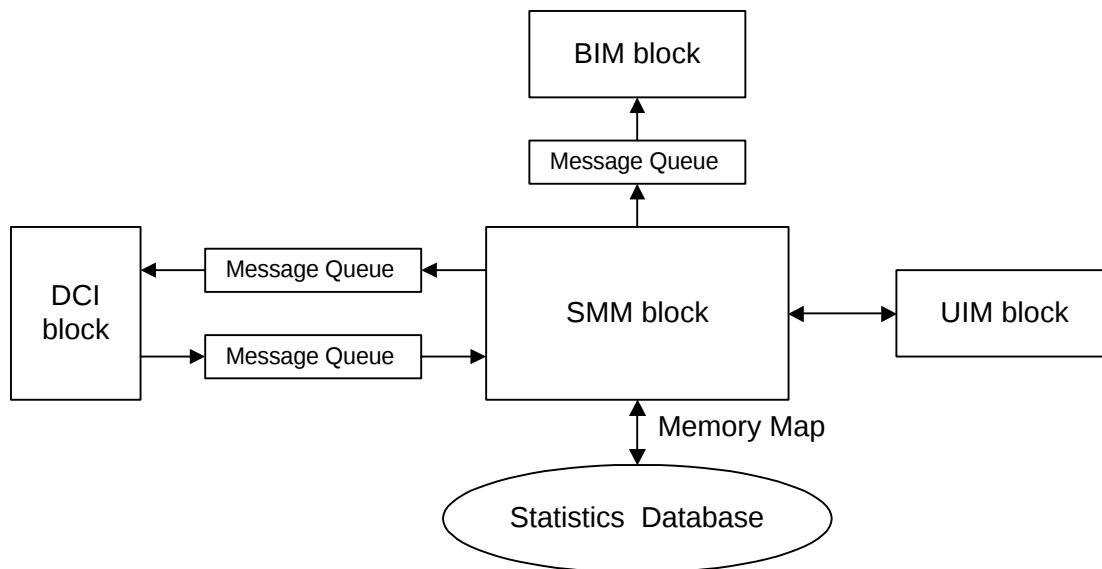


Figure 2.14 SMMX Block Flowchart

(4) FLMX (FauLt Management eXecution)**1) Block Summary and Working Function**

A FLMX block has functions which process a fault and alarm message caused at BTS and BSC system. The received fault message of the FLMX block is related to the Fault detected by test and maintenance function of BTS and BSC system. If the state of fault is serious (i.e. fault classified into alarm), the FLMX informs manager of that by driving a message and an audible and visible alarm after deciding corresponding alarm grade. If the FLMX receives a command from manager, the FLMX initializes the database that has the current state information of alarm. Also the FLMX initializes a database for visible alarm which appears at the terminal and a database for audible alarm.

2) Block Flowchart

The following Fig.2.15 describes FLMX block flowchart.

- a. receipt of manager's command from UIM block and report of result.
- b. report Alarm and Fault processing result to OFH block .
- c. send signal to STM block.
- d. receipt of GPS state alarm from the SCM block
- e. receipt of H/W alarm from ACP block
- f. receipt of alarm from CIN
- g. receipt of LCIN S/W alarm from CCP
- h. receipt of BTS S/W alarm from BMP

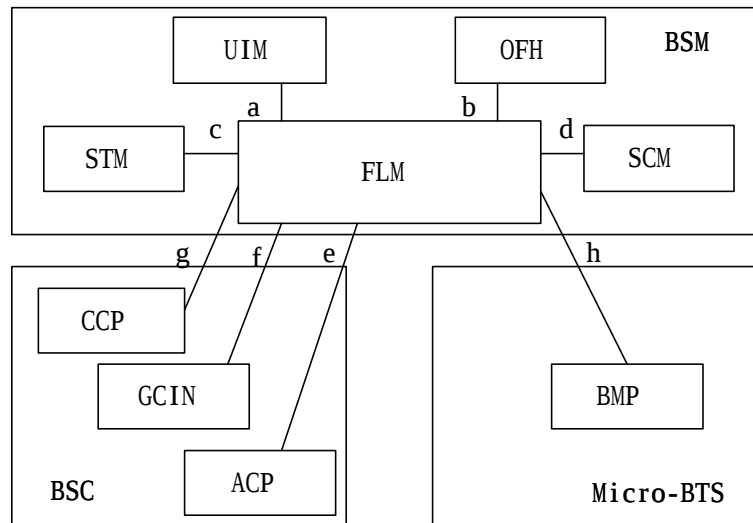


Figure 2.15 FLMX Block Flowchart

(5) TSMX (TeSt Manager eXecution)

1) Block Summary and Working Function

A TSMX block tests for the fault diagnosis of BTS and BSC system. The TSMX consists of a unit which analyzes command of manager, a unit which packs to send the analyzed message to corresponding subsystem, a unit which analyzes a execution result transmitted from subsystem and a unit for accessing database.

Also, the TSMX consists of a Temporary Processor executed by manager's request and a Permanent Processor which performs data management and processing of a receiving message.

2) Block Flowchart

The following Fig.2.16 describes TSMX block flowchart.

- a. Test Request for DEVICE
- b. Response for DEVICE Test Request
- c. Test Request for BTS LINK and Channel Element
- d. Response for BTS LINK and Channel Element Test Request
- e. Test Request for Vocoder
- f. Response for Vocoder Test Request
- g. Request for virtual call test and BTS output adjustment

- h. Virtual test and BTS output adjustment result
- i. Virtual Call Set up Request and BTS output adjustment Request
- j. Virtual Call Set up and BTS output adjustment result
- k. BTS output adjustment Request
- l. BTS output adjustment result
- m. antenna test, remote call test and test terminal operation information output Request
- n. antenna test, remote call test result and test terminal operation information

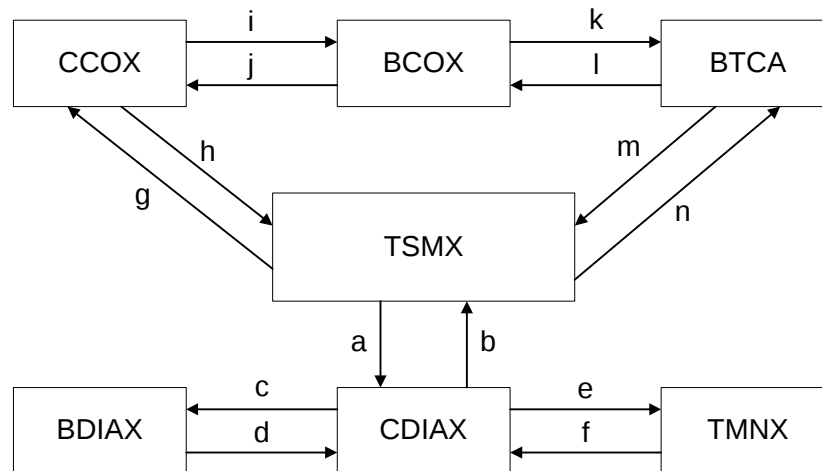


Figure 2.16 TSMX block flowchart

(6) STMX (Status Management eXecution)

1) Block Summary and Working Function

A STMX block displays the things (which result from monitoring state of main processors in BSC system and searching each processor and device state and call resource state of BSC and BTS system, in case of manager's demand) on manager's screen .

The STMX also manages and maintains BTS and BSC system or state of device with interworking with the structure management and the fault management function.

There are some functions in STMX, a monitoring function of BSC main processor

state, a processor and device state search function of BTS and BSC by manager's request, a overload Control function and a call resource state search function of GUI (Graphic User Interface) screen.

The function monitoring Processor state is to monitor action state of these subsystem by polling CCP, ACP, HICA, TSGA processor periodically. The processor and device state search function of BTS and BSC by manager's request has a responsibility for request and output for device state which each subsystem is managing now.

The overload control function is to output overload state of CCP and BCP and change overload critical value of CCP and BCP.

The call resource state search function of GUI screen is ,when manager is on call resource state screen, to reflect it on screen by searching current accurate call resource state periodically.

2) Block Flowchart

The following Fig.2.17 describes STMX block flow chart.

Figure 2.17 STMX Block Flowchart

- a Monitoring and Request of ACP Processor State
- b Report of ACP Processor State
- c Monitoring of CCP Processor State, State Request of processor and devices, Overload Control and Report of State
- d Monitoring of CCP Processor State, State Report of processor and devices, Report of Overhead State
- e Monitoring and Request of TSGA Processor State , Request of TFDA State
- f Report of TSGA Processor State , Report of TFDA State
- g Monitoring of GCIN/LCIN Processor State, Request of GCIN/LCIN/BIN Processor and Node State and Request of Active Side Switch
- h Report of GCIN/LCIN Processor State, Report of GCIN/LCIN/BIN Processor and Node State, Report of Active Side Switch

- i Request of TFSA and GPS Processor State
- j Report of TFSA and GPS Processor State
- k Request of SACA Processor State
- l Report of SACA Processor State
- m Request of BTS Processor and device State and Request of Overload Control and State
- n Report of BTS Processor and device State and Report of Overload State

(6)DCIX (Data Communication Interface eXecution)

A DCIX block supplies a path for transmitting/receiving a management information between application blocks in BSM and other subsystems in BTS and BSC system, and communicates with other system by HDLC.

Communication with other system is accomplished through RS-422 at the speed of 2.048Mbps. and a data link uses point-to-multipoint method.

The DCI block is generated by BIM block, initializes a necessary data for setting up a data link between other subsystems and must be in a standby state to set up the data link with other subsystem .

Application block in BSM (in case of establishing data link) or DCI block (in case of receiving message from other subsystem) must perform procedure which processes this message.

(7)DBHX (DataBase Handler eXecution)

1) Block Summary and Working Function

A DBHX block establishes, initializes and manages a database which application block in BSM need.

The DBHX block consists of a DBD (DataBase Definition) software unit and a DBM (DataBase Management) software unit.

The DBD function is to generate a database through setting up relation between each entities to remove overlap properties of data which each application block needs.

The DBM supplies a function which ,in case of using a database of a application in BSM, processes the data efficiently and exactly.

2) Block Flowchart

The following Fig.2.18 describes DBHX block flow chart.

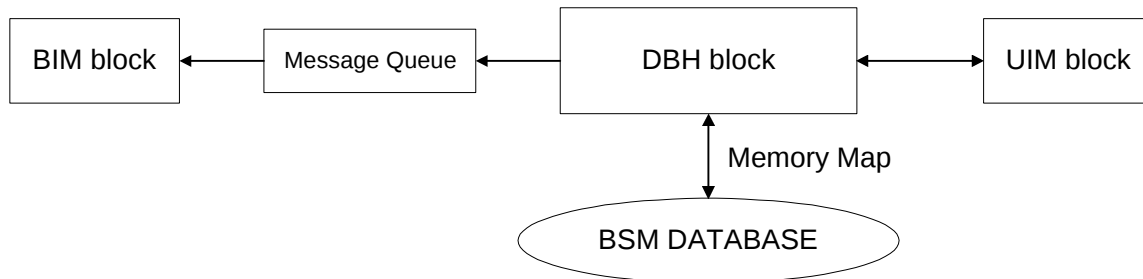


Figure 2.18 DBHX Block Flowchart

(9) UIMX (User Interface Manager eXecution)

1) Block Summary and Working Function

A UIMX block performs all functions related to window such as creation and removal of window and event processing, and supplies a function which outputs a system state and information as to alarm and statistics with simply and logically recognizable graphic type

Also, the UIMX processes events caused from manager and displays a information supplied from each application block on manager's terminal screen with text or graphic. Also, the UIMX block supplies a command input type about GUI (graphic user interface) such as menu and dialogue box .

After formatting a voluntary message received from system (i.e. fault and alarm message, state, statistics report and test result) , the UIMX block displays that on the system display window.

2) Block flowchart

The following Fig.2.19 describes UIMX block flowchart.

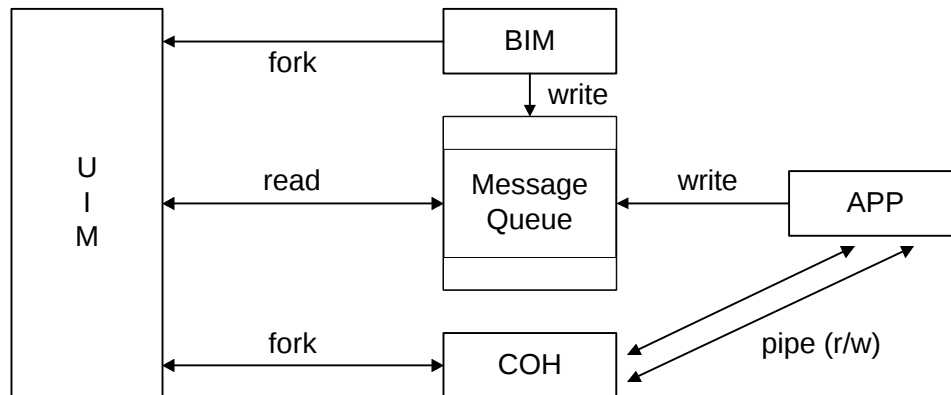


Figure 2.19 UIMX Block Flowchart

(10) COHX (COMmand Handling eXecution)

1) Block Summary and Working Function

A COHX block performs a syntax and meaning analysis function of input command and a execution control function. The Syntax analysis checks the accuracy of the grammar of a inputted command and the Meaning analysis checks the meaning of command and the range of parameter.

If format error occurs on analysis procedure, Command Analysis block supplies the location of error, the kind of error and the information for error correction.

On the other hand, if analysis result of command prove to be out of error, the command drives application function to perform the command, receives execution result from application function and displays it on display window by transmitting it into UIM block.

2) Block Flowchart

The following Fig.2.20 describes COHX block flowchart.

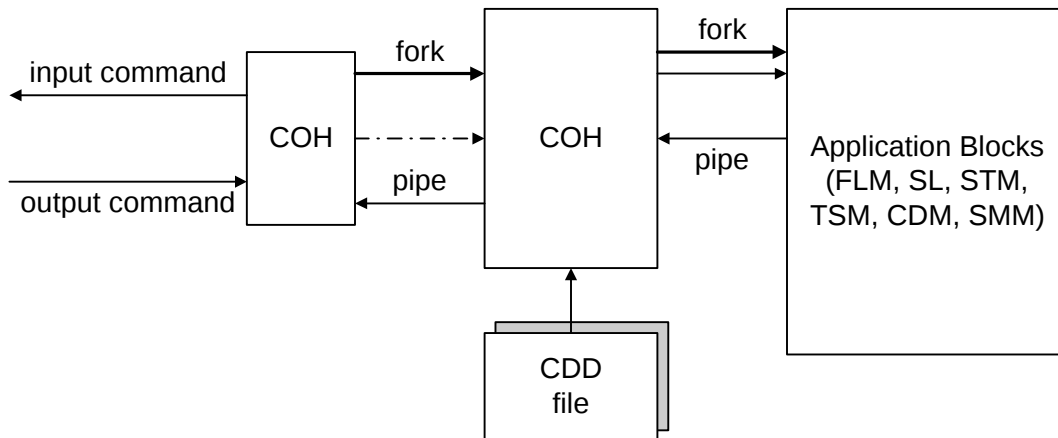


Figure 2.20 COHX Block Flowchart

(11) BIMX (BSM Initialization and Maintenance eXecution)

1) Block Summary and Working Function

A BIMX block is first initiated at the BSM software. Also, the BIMX block is initiated in case of booting of BSM system or by manager. In case of initialization of BSM, BIM initializes all necessary internal data of BSM, executes a permanent process block and initializes a necessary IPC function for data communication between blocks in BSM.

If all block is run, BIM monitors the action state of permanent process. while, If the action of these process is stopped abnormally, BIM takes an appropriate recovery procedure and reports this fact to manager.

2) Block Flowchart

The following Fig.2.21 describes BIMX block flowchart.

- a. SCM drive and state management by BIM
- b. DCI drive and state management by BIM
- c. BSM application- part drive and state management by BIM
- d. UIM drive and state management by BIM
- e. LJH drive and state management by BIM
- f. UIM drive and state management by BIM
- g. UMH drive and state management by BIM

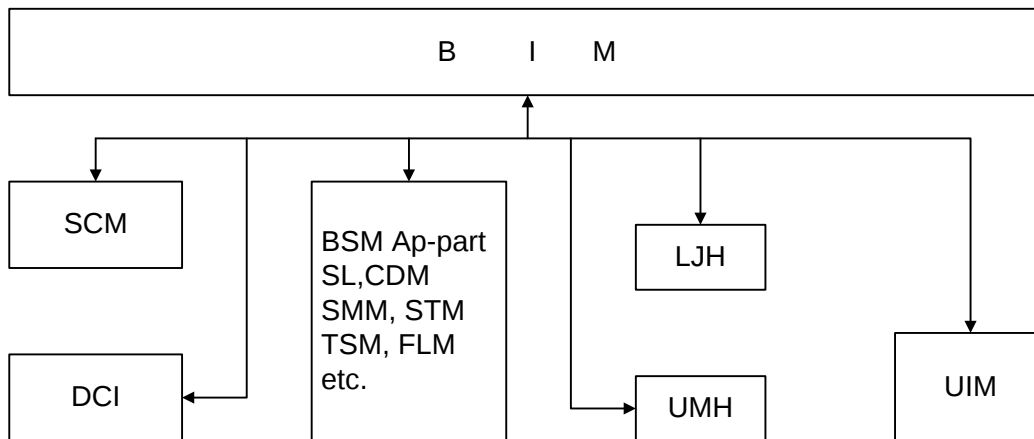


Figure 2.21 BIMX Block Flowchart

(12) UMHX (Unsolicited Message Handler eXecution)

1) Block Summary and Working Function

In case of receiving a initial message from BTS or BSC system, a UMHX block generates a corresponding application block for processing the message and let it perform the requested application function.

After adding a corresponding permanent process ID to the received message, the UMHX makes the corresponding process the message by transmitting it into a message Queue. The UIM block is driven as a permanent processor by BIM block. After reporting current state to BIM block, if UIM receives processors of STM, SMM, TSM, FLM and SL block from BIM block, before receiving a system output message corresponding to STM, SMM, TSM, FLM and SL block, after UMH block prepares for receiving the system output message of other subsystem, when a corresponding message is delivered, the UMH block analyzes Signal_id and performs a function which generates a corresponding block in BSM.

2) Block Flowchart

The following Fig.2.22 describes UMHX block flowchart.

- BIM reports UMH drive and drive state to the BIM
- receipt of unidentified initial message
- Temporary processor generation and message transmission and management

- d. permanent processor id management and corresponding message transmission
- e. transmit UMH state information into the UIM

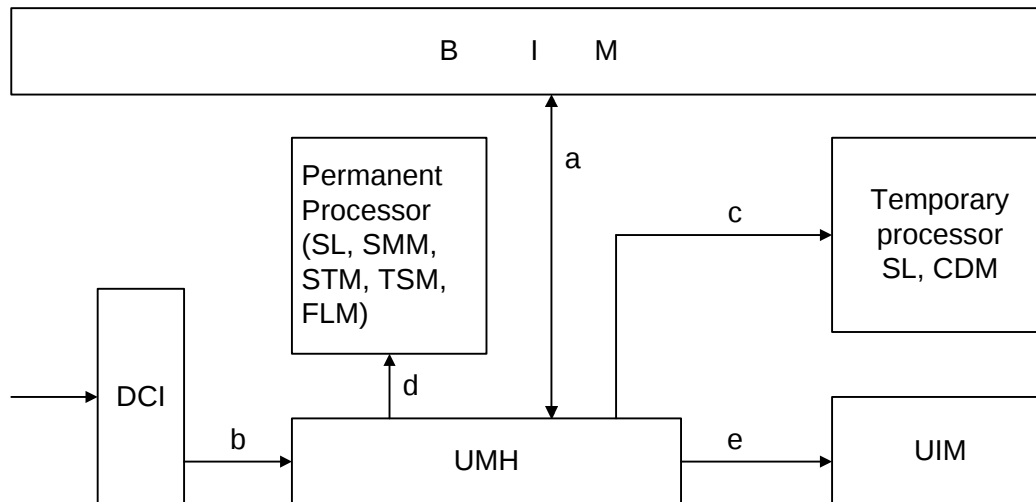


Figure 2.22 UMHX Block Flowchart

(13) LJHX (Long-term Job Handler eXecution)

1) Block Summary and Working Function

A LJHX block performs a application function by generating a application block which requires a long time requested by manager and manages the state of this.

The LJH block is driven as a permanent processor by BIM block. And after reporting current state to BIM block, the LJH block prepares for generating a processor which requires the long time requested by manager.

If the LJHX block receives a processor performed for long time by manager's request, the LJHX performs a function which generates a corresponding block in BSM by analyzing the corresponding command

2) Block Flowchart

The following Fig.2.23 describes LJHX block flowchart.

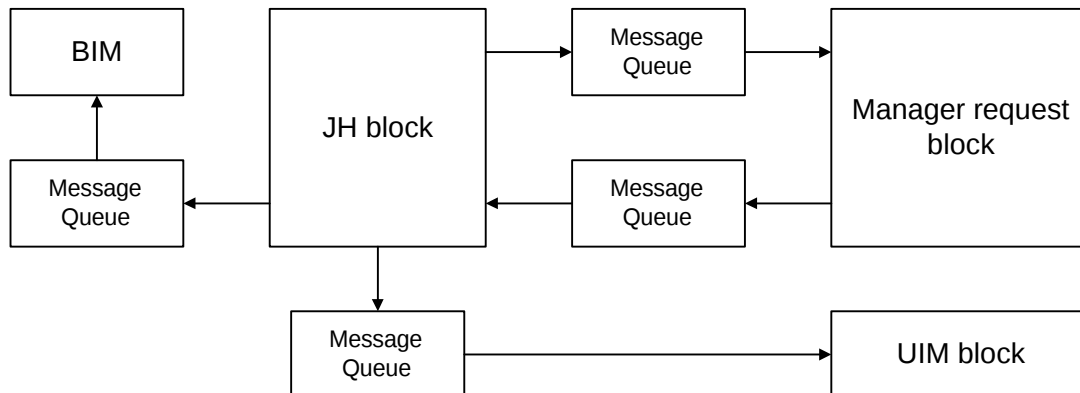


Figure 2.23 LJHX Block Flowchart

(14) SCM_X (System Clock Manager eXecution)

1) Block Summary and Working Function

A SCM_X block receives periodically TOD (Time Of Day) from GPS, sets up BSM time and reports that to application block which requires TOD. The SCM block is driven as a permanent processor by BIM block .

After reporting current state to BIM block, the SCM block prepares for receiving TOD

Clock from GPS every two seconds. In case that the receiving Clock is out of error, the SCM block compares it with current BSM System Clock.

If range of error is within 3 second, the SCM block don't reset the BSM System Clock, and If range of error is over 3 second, the SCM block resets the BSM System Clock.

2) Block Flowchart

The following Fig.2.24 describes SCM_X block flowchart.

- a. BIM control SCM drive and drive state
- b. receive TOD Clock from GPS
- c. transmit SCM state information into the FLMX

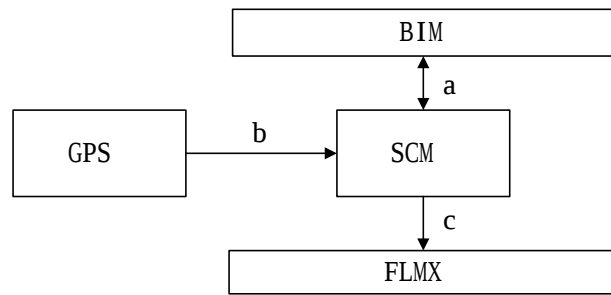


Figure 2.24 SCMX Block Flowchart

2.3.2.5 BSM Software Structure

The following Fig.2.25 describes BSM system s/w block structure

Figure 2.25 BSM System S/W Block Structure

Chapter 3 BSM Operation & Administration

3.1 BSM Operation

3.1.1 Overview

This chapter describes the operations and functions of BSM (Base Station Manager) which takes a part of system operation, administration, and maintenance of the subsystems of BSC (Base Station Controller) in the mobile communication systems.

BSM provides GUI (Graphic User Interface) for OAM (Operation, Administration, and Maintenance) which is status monitoring, performance measurement, statistics processing, configuration management, alarm handling and so on. So, operators can use and understand easily.

Figure 3.1 represents the initial display window of BSM when you start the BSM system up in the workstation with the command, "bimx" without logging in it.

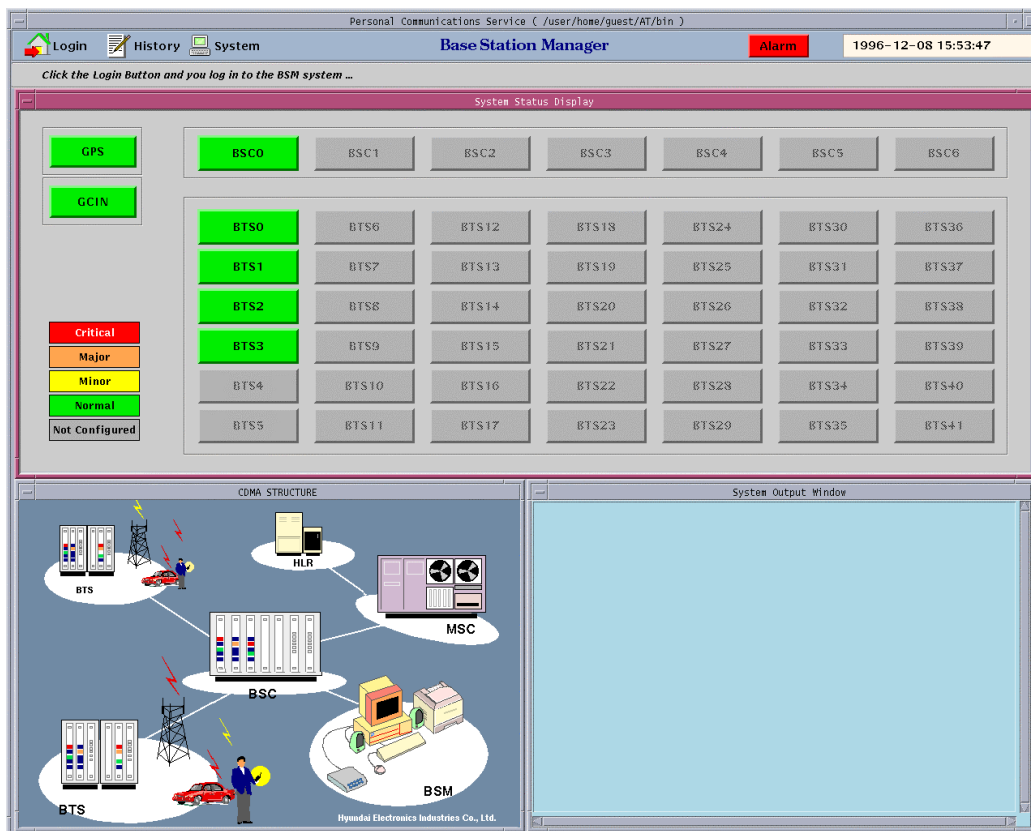


Figure 3.1 BSM Initial Display

3.1.2 Main Display Structure

When you log in BSM with the specific user ID and password, the window such as Figure 3.2 is displayed.

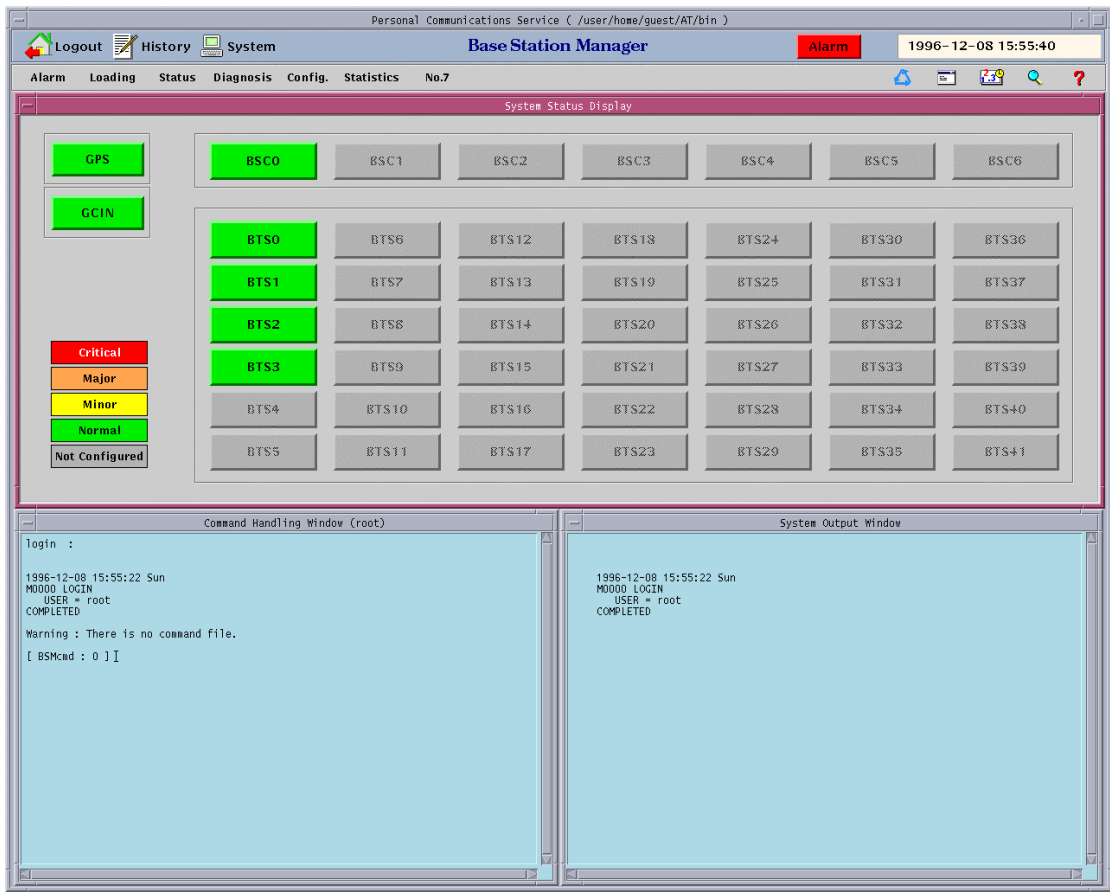


Figure 3.2 BSM Main Display

3.1.3 Main Button

3.1.3.1 Operation by “Login” Button

You can use the command for the CDMA System and service for the User by using login. Figure 3.3 represents the login dialog box in BSM.

(1) Login Procedure

- 1) If you choose the "Login" Button in the main display window, "Login Dialog" window is displayed.
- 2) You input the Login name and Password in the "Login Dialog" window and then press the "OK" Button.
- 3) When the wrong spell is inputted or the login name or password is mistyped, the login name or password, you can modify it using "Back space" key or "DEL" key.

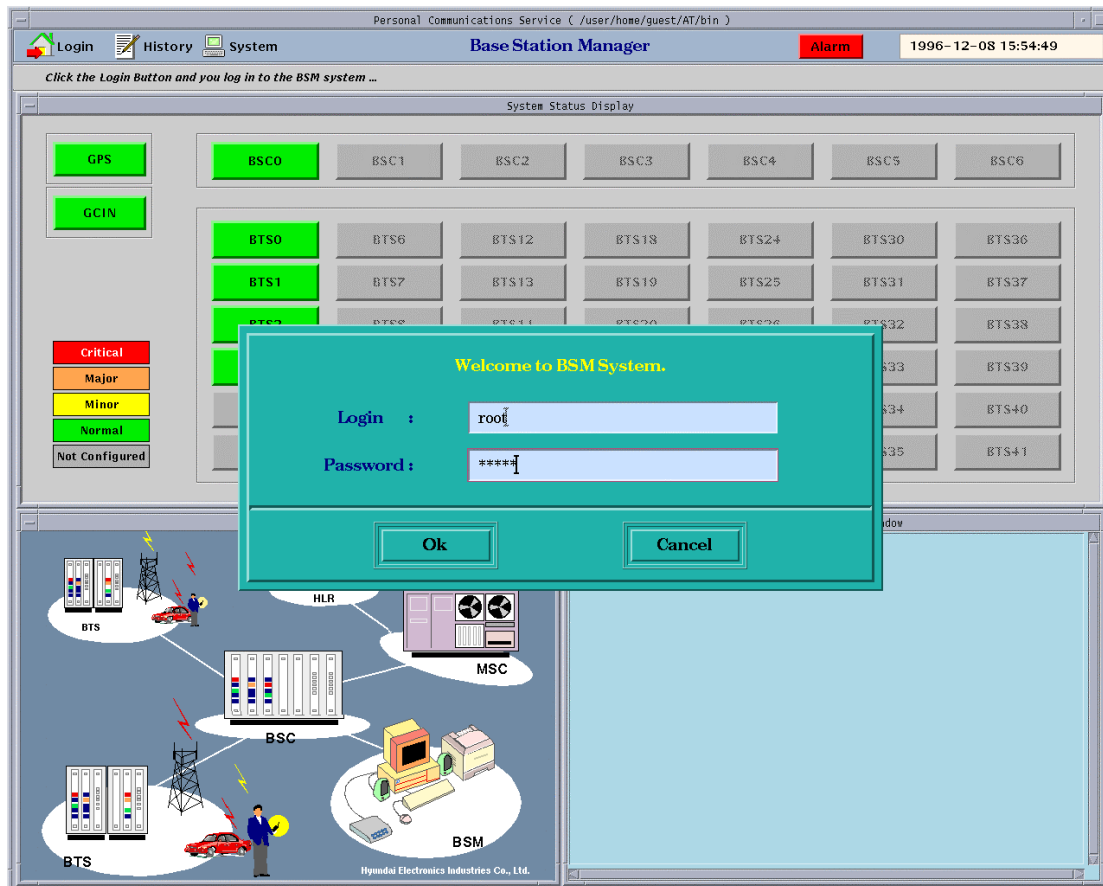


Figure 3.3 BSM Login Window

3.1.3.2 Operation by "History" Button

- (1) If you choose the "History" button such as Figure 3.4 in the BSM Tile window, "History Tool" window is displayed like Figure 3.5.



Figure 3.4 HISTORY Button

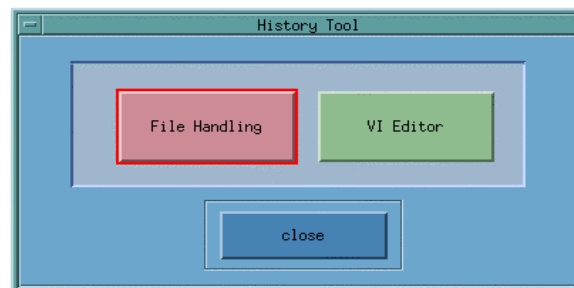


Figure 3.5 History Tool

- (2) In the "History Tool" window, "File Handling" item functions "Display", "Print", and "Delete" of the history file. The user of being good at UNIX system uses "VI Editor" item to do them. First, if you press the "File Handling" button, "File Selection Dialog" window such as Figure 3.6 displays.

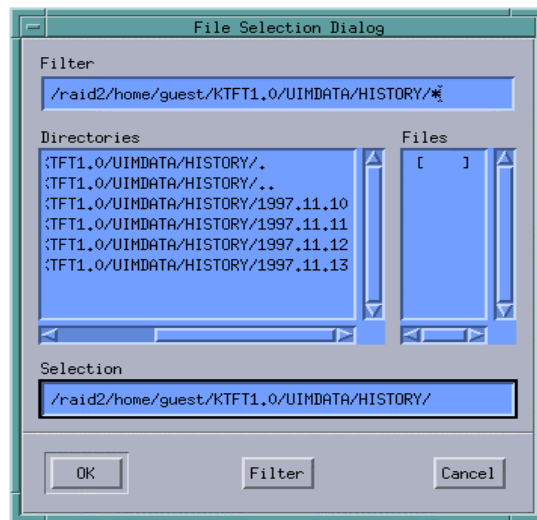


Figure 3.6 File Selection Dialog

- (3) If you choose a certain date of date list in the "Directories" field of "File Selection Dialog" window and then press the "Filter" button, "CHD" and "MHD" directories display in the "Directories" field (Because both directories are operated in the same manner, here deals with only the "CHD" directory).
- (4) If you choose "CHD" directory and then press "Filter" button, a lot of files display in the "Files" field, which is stored to command list by the elapsed time.
- (5) If you choose a file of the list in the "Files" field of "File Selection Dialog" and press "OK" button, the following window such as Figure 3.7 is represented. This list is sorted to time.

Note – You can also use this shortcut: double-click the file name in the dialog box.

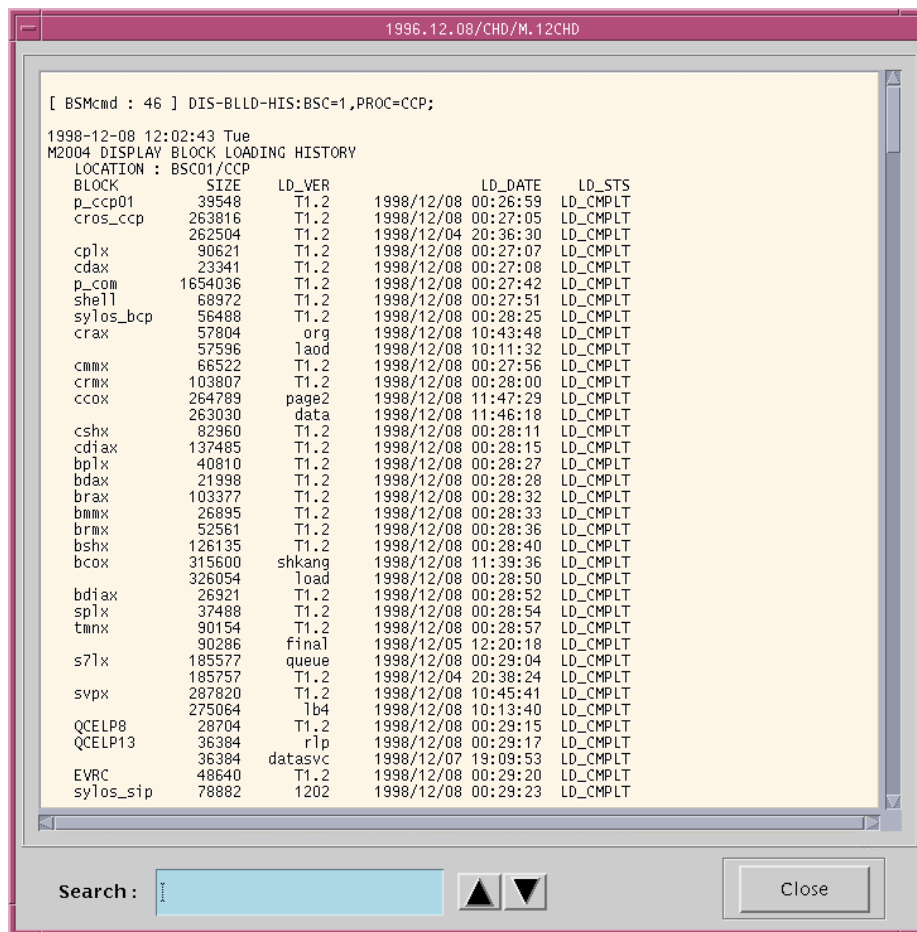
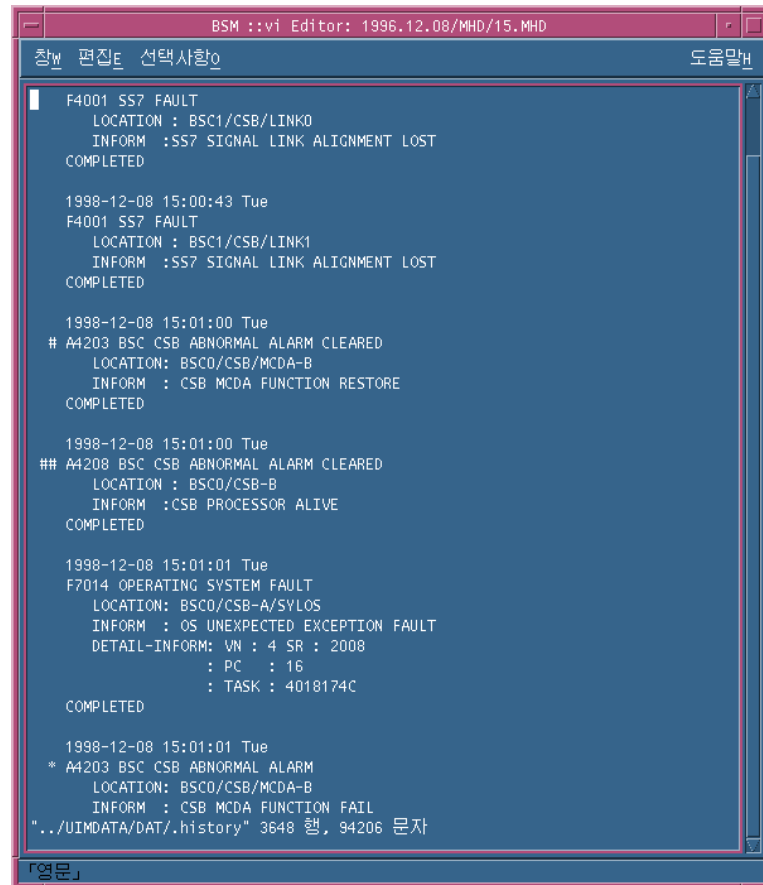


Figure 3.7 Result of "File Handling"

- (6) Figure 3.7 shows the function of searching words. If you enter the word that you want to search in the "Search : " Text Field and push the Arrow Button () (or enter the RETURN Key). Then the screen moves the location of the word to the first location you want to search. It is possible to use the Down Arrow button or Return Key if you want another locations of the word, The Up Arrow Button is used for searching the word to upper field.
- (7) If you choose the "Close" button, the window such as Figure 3.7 is closed.
- (8) If you choose "VI editor" button in the History Tool of Figure 3.5, "File Selection Dialog" window such as Figure 3.6 displays and you can select the specific file in

order to open it. After the procedures such as (3), (4), and (5) are processed, vi editor window is created.



```

BSM ::vi Editor: 1996.12.08/MHD/15.MHD
창ㅁ 편집ㅁ 선택사항ㅁ 도움말ㅁ

F4001 SS7 FAULT
LOCATION : BSC1/CSB/LINK0
INFORM :SS7 SIGNAL LINK ALIGNMENT LOST
COMPLETED

1998-12-08 15:00:43 Tue
F4001 SS7 FAULT
LOCATION : BSC1/CSB/LINK1
INFORM :SS7 SIGNAL LINK ALIGNMENT LOST
COMPLETED

1998-12-08 15:01:00 Tue
# A4203 BSC CSB ABNORMAL ALARM CLEARED
LOCATION: BSC0/CSB/MCDA-B
INFORM : CSB MCDA FUNCTION RESTORE
COMPLETED

1998-12-08 15:01:00 Tue
## A4208 BSC CSB ABNORMAL ALARM CLEARED
LOCATION : BSC0/CSB-B
INFORM :CSB PROCESSOR ALIVE
COMPLETED

1998-12-08 15:01:01 Tue
F7014 OPERATING SYSTEM FAULT
LOCATION: BSC0/CSB-A/SYLOS
INFORM : OS UNEXPECTED EXCEPTION FAULT
DETAIL-INFORM: VN : 4 SR : 2008
: PC : 16
: TASK : 4018174C
COMPLETED

1998-12-08 15:01:01 Tue
* A4203 BSC CSB ABNORMAL ALARM
LOCATION: BSC0/CSB/MCDA-B
INFORM : CSB MCDA FUNCTION FAIL
"/UIMDATA/DAT/.history" 3648 행, 94206 문자

「영문」
  
```

Figure 3.8 Result of “Vi Editor”

- VI Basic Commands

In the descriptions, CR stands for carriage return and ESC stands for the escape key.

:q!CR	quit
/textCR	search for text
(ex) /M5015 DISPLAY <enter>	
^U ^D	scroll up or down
^L	clear and redraw window

3.1.3.3 Operation by System Button

Pressing this button presented to Figure 3.9 enables the operator to control user related information, command structures, peripheral devices of BSM. When you log in to the BSM, you are limited the control authorization according to user's level or grade.



Figure 3.9 System Button

To Start BSM System Manager :

- Click the System button in the BSM main window and User Information Dialog of Fig.3.10 is displayed.

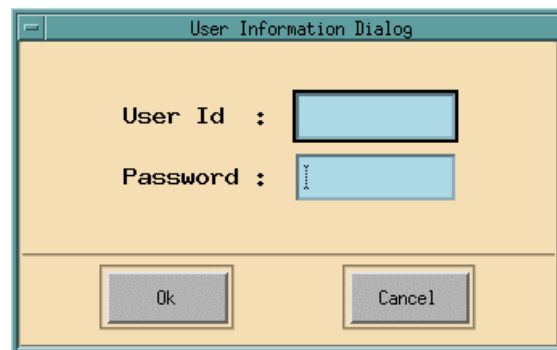


Figure 3.10 User Information Dialog

- Type the User ID and the Password in the corresponding field and then press “OK” button

3.1.3.3.1 Operations by Super-user (root)

If you type “root” and its password in the User Information Dialog of Fig. 3.10 , the window such as Figure 3.11 is displayed.

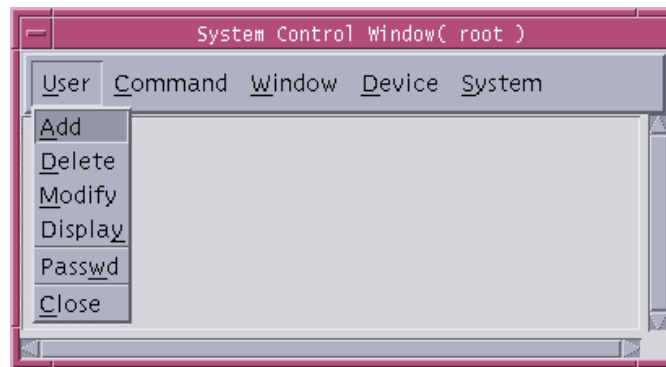
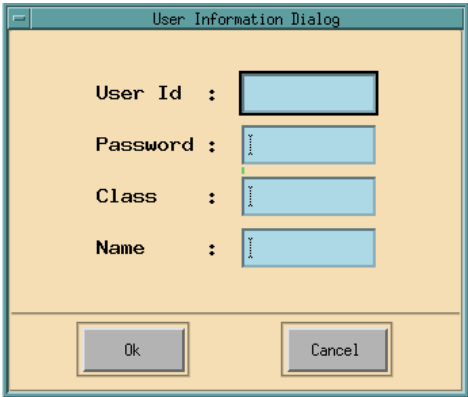


Figure 3.11 System Control Window

3.1.3.3.2 User Menu

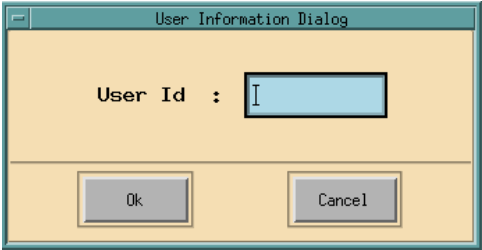
The only super-user can manage all grades of registered users. That is, the super-user can add, register, modify, and delete user.

- **ADD submenu :** Super-user uses this menu to register a new user. The default grade of user created newly is level 2. Figure 3.12 presents the input window in order to create or add a new user in BSM.
- **Delete submenu :** This menu is used to delete the registered user. If you input a specific user ID to the window such as Figure 3.13, you can delete it.
- **Modify submenu :** This menu is used to change the contents of the registered user. If you select "Modify" menu, the input window is displayed and you can modify the user ID in this window. If you input the modifying user Id and click "OK" button, the output window is represented. This output window indicates the information of "User ID", "Password", "Class" and "Name". You can edit each fields and you can modify the user information by pressing "OK" button. The window of modifying the user information is presented in Figure 3.14. Figure 3.14 represents the example of changing the user grade of authorization for the command. That is, this figure presents changing the authorization level of "test" user.



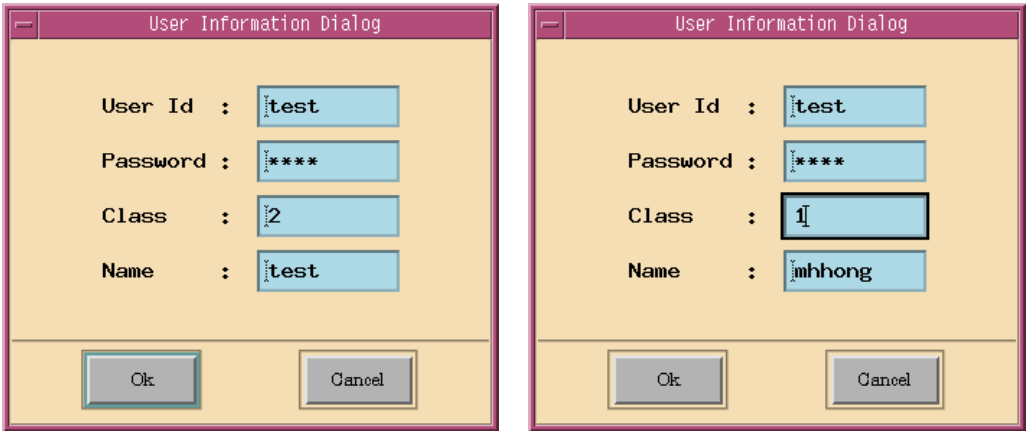
A screenshot of a 'User Information Dialog' window. It contains four input fields: 'User Id', 'Password', 'Class', and 'Name'. Each field is preceded by a label and a colon. The 'User Id' field is a standard text box. The 'Password', 'Class', and 'Name' fields are password-style boxes with vertical dashed lines on the right side. At the bottom of the dialog are two buttons: 'Ok' and 'Cancel'.

Figure 3.12 User Add



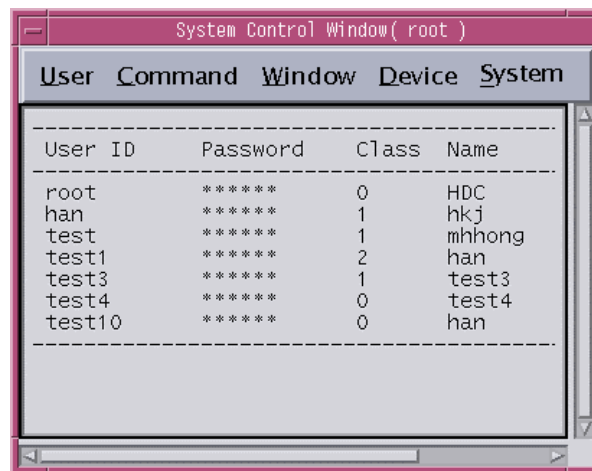
A screenshot of a 'User Information Dialog' window. It contains one input field: 'User Id'. The field is preceded by a label and a colon. At the bottom of the dialog are two buttons: 'Ok' and 'Cancel'.

Figure 3.13 User Delete



Two side-by-side screenshots of a 'User Information Dialog' window. The left screenshot shows the dialog with the following values: 'User Id' is 'test', 'Password' is '****', 'Class' is '2', and 'Name' is 'test'. The right screenshot shows the dialog with the following values: 'User Id' is 'test', 'Password' is '****', 'Class' is '1', and 'Name' is 'mhong'. Both screenshots have 'Ok' and 'Cancel' buttons at the bottom.

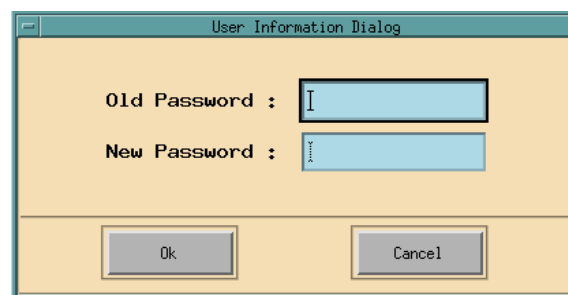
Figure 3.14 Modify a user



The image shows a window titled "System Control Window (root)" with a menu bar containing "User", "Command", "Window", "Device", and "System". Below the menu bar is a table with the following data:

User ID	Password	Class	Name
root	*****	0	HDC
han	*****	1	hkj
test	*****	1	mhhong
test1	*****	2	han
test3	*****	1	test3
test4	*****	0	test4
test10	*****	0	han

Figure 3.15 List up the user information



The image shows a dialog box titled "User Information Dialog". It contains two text input fields: "Old Password :" and "New Password :". Below the fields are two buttons: "Ok" and "Cancel".

Figure 3.16 Change user's password

- Display submenu : This button is used to output or display all the registered users. Figure 3.15 presents the output window of the user information.
- Passwd submenu : This is used to modify the password of current log-on user in BSM. In other words, this menu modifies root's password. Figure 3.16 presents the window, which changes the password of specific user.
- Close submenu : Termination of system function

3.1.3.3.3 Operations by Command menu

This menu is used to create or edit a CDD(Command Data Description) file and check the contents of CDD file that currently registered in the system.

- File submenu : This menu is used to manipulate the CDD file. It consists of these submenus: New, Open, Save, SaveAs, Print, Delete, and Quit

- Check submenu :This menu is used to check all the CDD file and then displays its result in the corresponding window.

3.1.3.3.4 Operations by Window menu

This menu is used to arrange several windows.

- Tiling submenu : It arranges and adjusts the unsettled windows.

3.1.3.3.5 "Device" menu

This menu is used to control the peripheral devices connected to the BSM workstation.

There are three submenus in this menu as follows:

- Printer submenu : This menu is set to the kind of printer, and decides the setting of the printer mode, On/Off.
- Speaker submenu : This menu is set to audio device mode, On/Off.
- Modem submenu : Not implemented

3.1.4 Command Buttons

BSM system provides dozens of commands for CDMA system. These buttons are presented in Figure 3.17.



Figure 3.17 BSM Main Screen

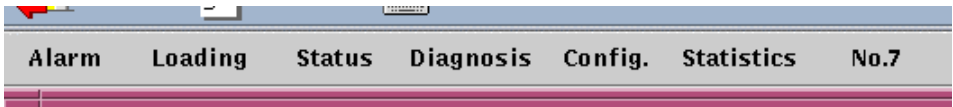


Figure 3.18 Command Panel

3.1.4.1 Operation of Alarm Command

- (1) If you select “Alarm” button in the Command Panel of Figure 3.18, “Alarm Command Dialog” window is represented. In this window, if you select the command button to process, BSM displays the window that you are able to input parameters for the corresponding command.



Figure 3.19 Alarm Command Dialog

- (2) If the window displays, which operators can input the related parameters to the system for the corresponding command in Figure 3.19, you may enter the values of parameters and then press “Run” button.

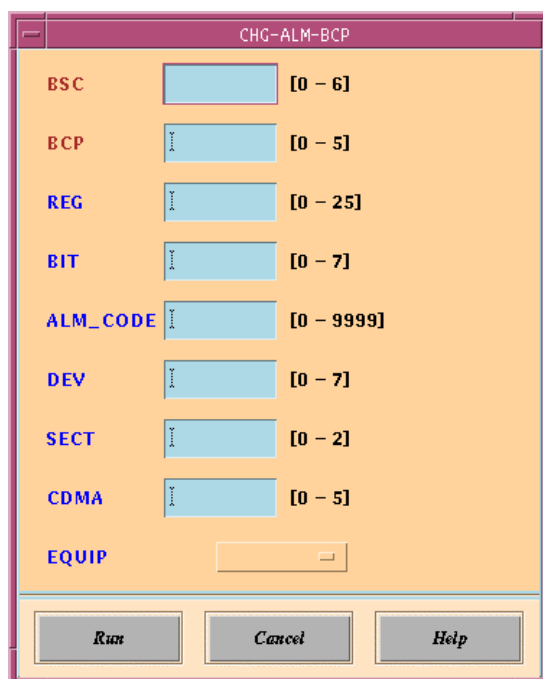


Figure 3.20 Parameter Input Window : Example of CHG-ALM-BCP

- (3) In the command window, the corresponding message for the parsed command is

represented and BSM executes it.

- (4) If you need to help for the corresponding command, you can click “Help” button and refer to help message.

3.1.4.2 Operations by Loading Command

If you select “Loading” button in the Command Panel of Figure 3.18, “Loading Command Dialog” window is represented.

Its function is same to that of the “Alarm” command.

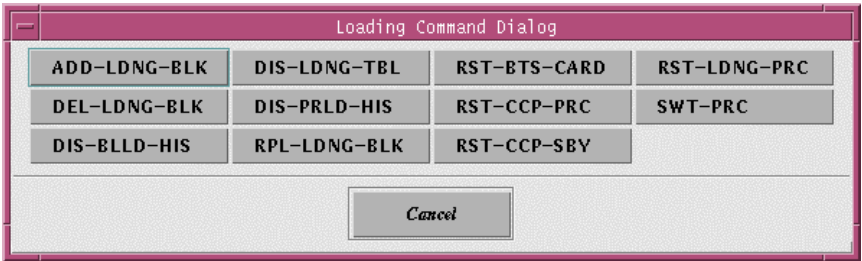


Figure 3.21 Loading Command Dialog

3.1.4.3 Operation by Status Command

If you select “Status” button in the Command Panel of Figure 3.18, the Status Command Dialog window is represented as follows.

Its function is same to that of the “Alarm” command.

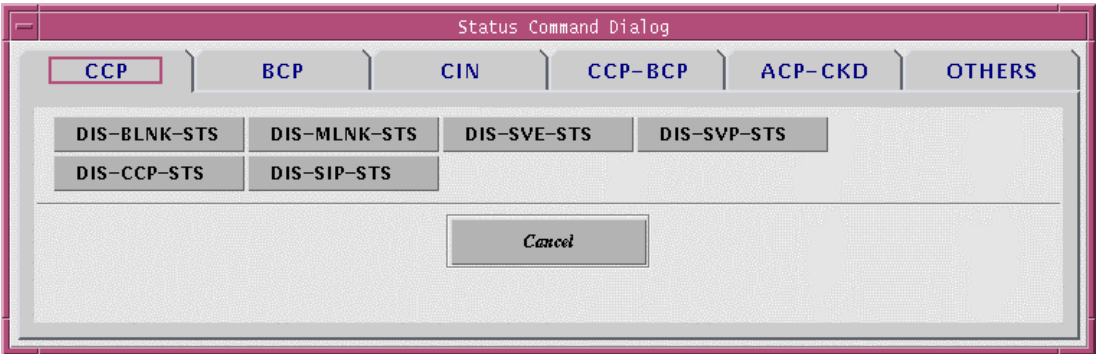


Figure 3.22 Status Command Dialog - CCP

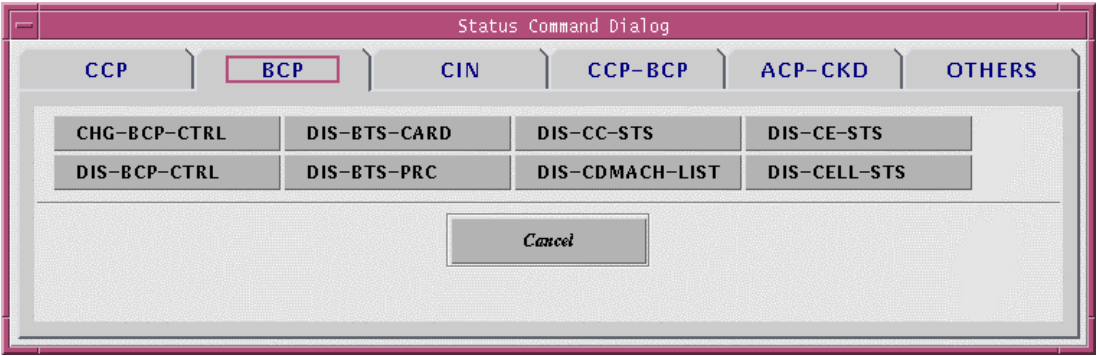


Figure 3.23 Status Command Dialog - BCP

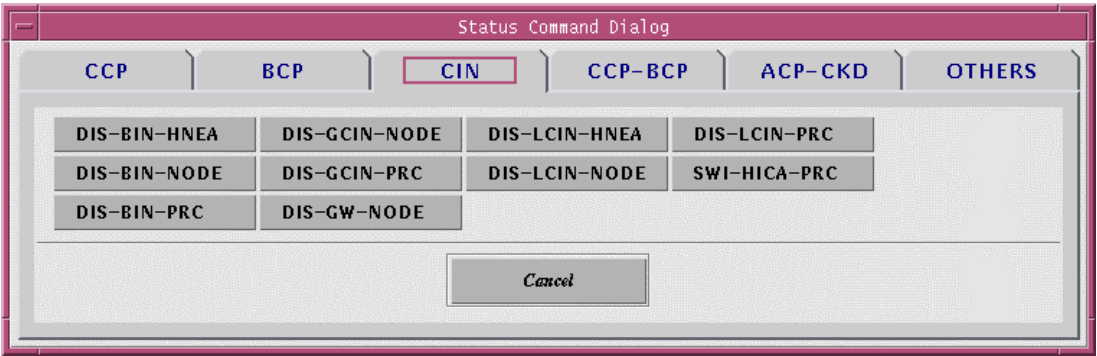


Figure 3.24 Status Command Dialog – CIN

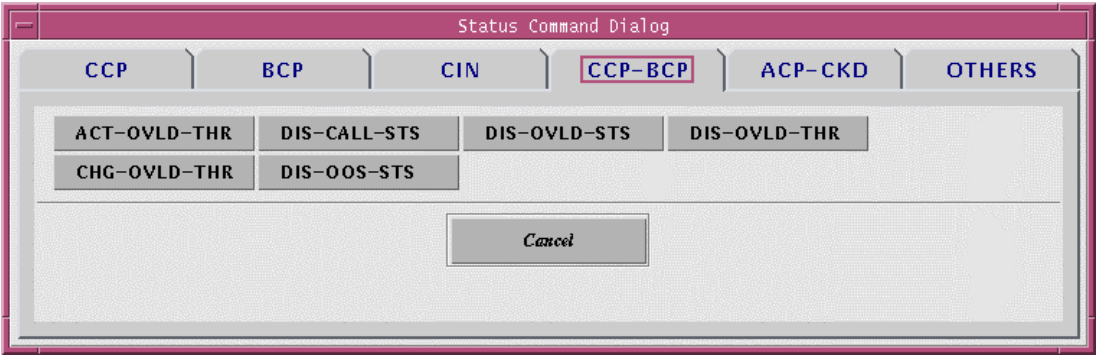


Figure 3.25 Status Command Dialog – CCP-BCP

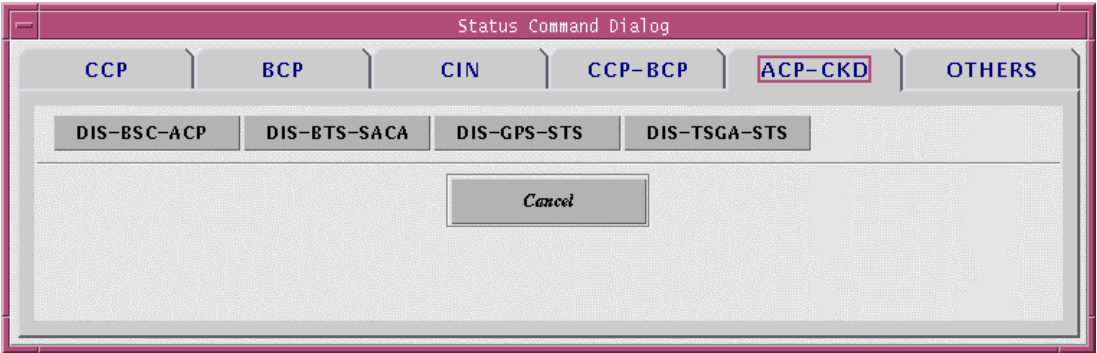


Figure 3.26 Status Command Dialog – ACP-CKD

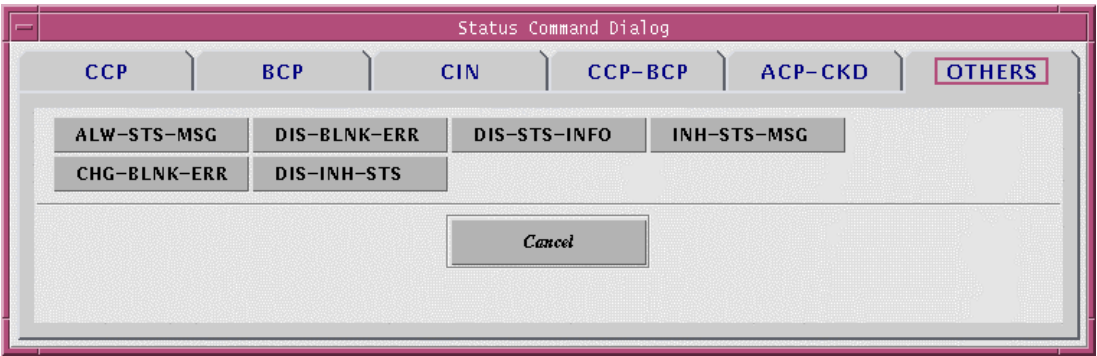


Figure 3.27 Status Command Dialog – OTHERS

3.1.4.4 Operations to Diagnosis Command

If you select “Diagnosis” button in the Command Panel of Figure 3.18, the Diagnosis Command Dialog displays as follows.
Its function is same to that of the “Alarm” command.

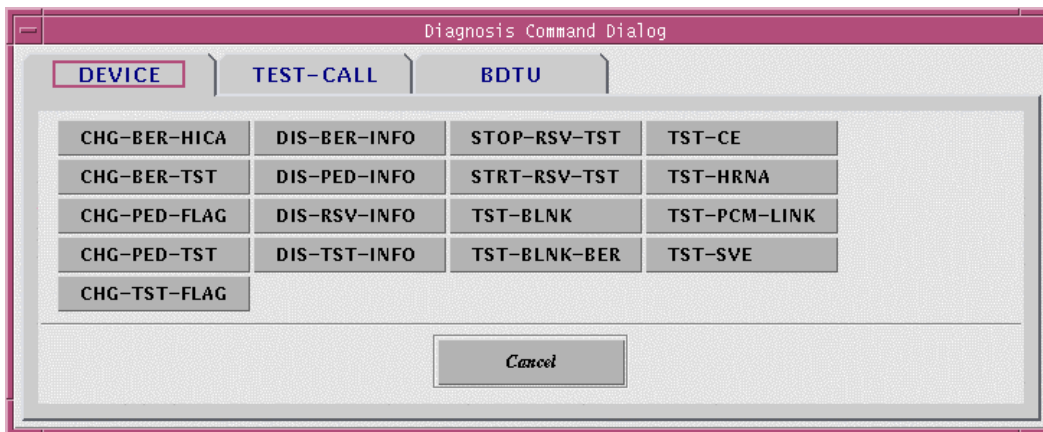


Figure 3.28 Diagnosis Command Dialog

3.1.4.5 Operations by Configuration Command

If you select “Config” button in the Command Panel of Figure 3.18, the Configuration Command Dialog is represented as follows.

Its function is same to that of the “Alarm” command.

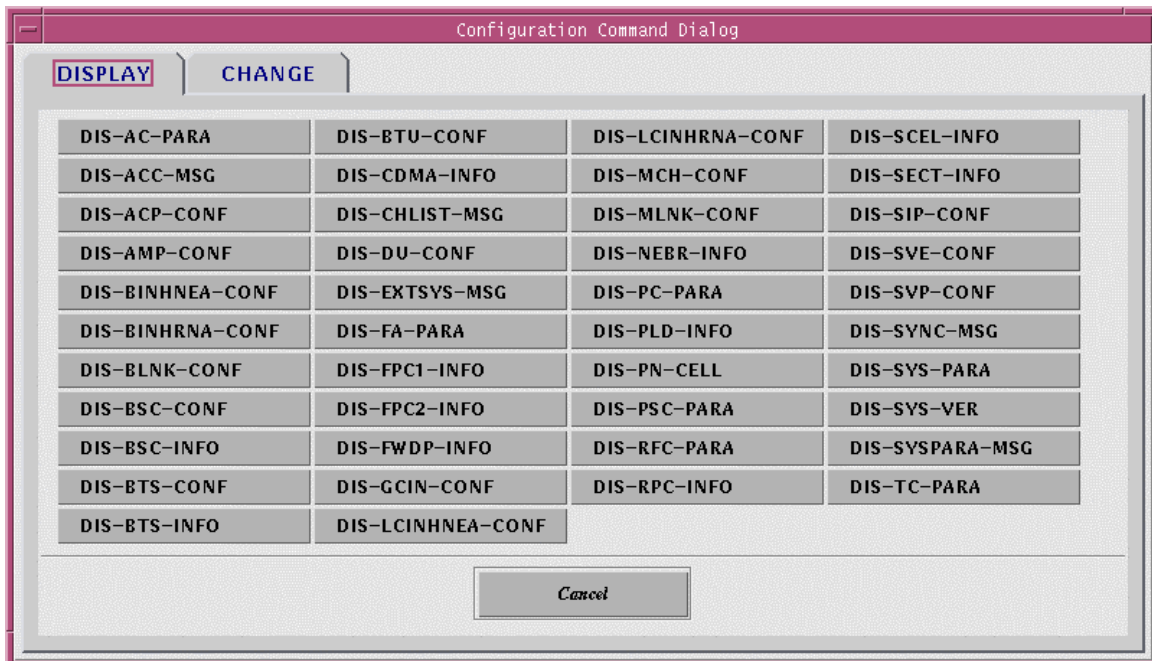


Figure 3.29 Configuration Command Dialog

3.1.4.6 Operations by Statistics Command

If you select “Statistics” button in the Command Panel of Figure 3.18, the Statistics Command Dialog is represented as follows.

Its function is same to that of the “Alarm” command.

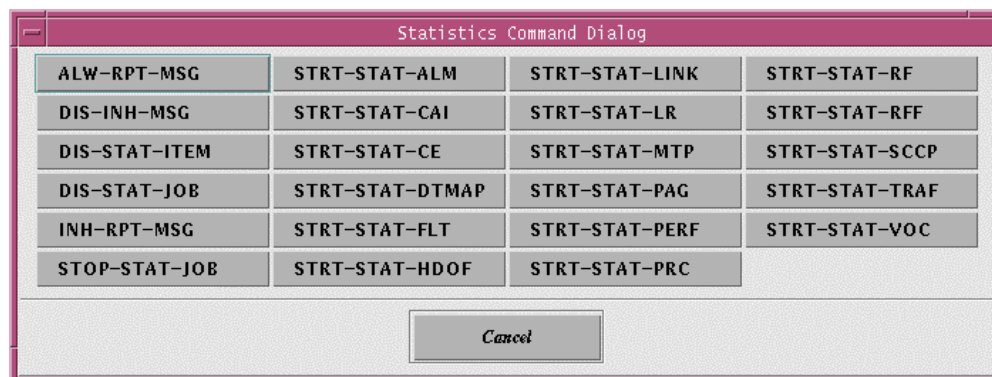


Figure 3.30 Statistics Command Dialog

3.1.4.7 Operations by No.7 Command

If you select “No.7” button in the Command Panel of Figure 3.18, the No.7 Command Dialog is represented as follows.

Its function is same to that of the “Alarm” command.



Figure 3.31 No.7 Command Dialog

3.1.5 Service Button

There are five service buttons in the Service Panel of Figure 3.32. These buttons help to the operators managing the systems efficiently or easily.

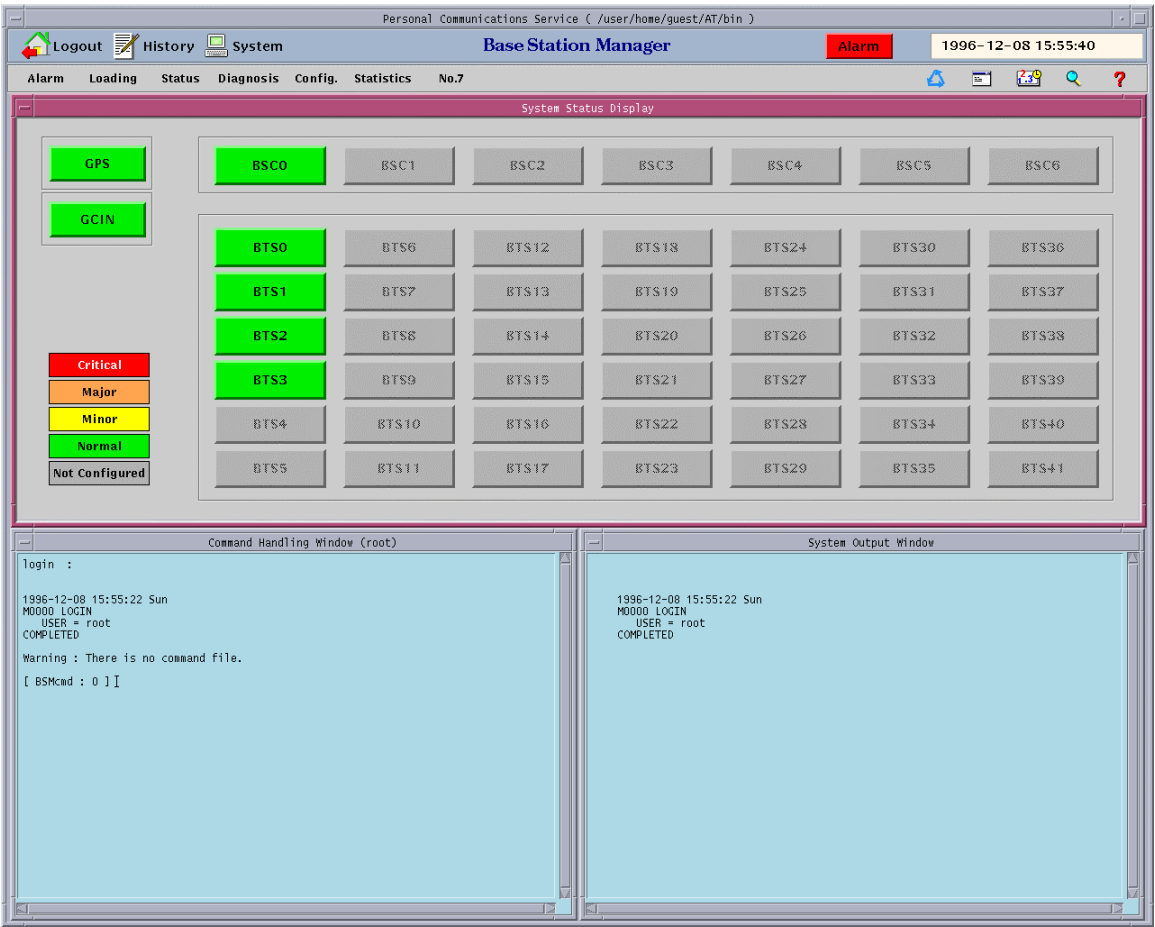


Figure 3.32 BSM Main Screen

3.1.5.1 Change the user grade of command

The function of this button in the Service Panel of Figure 3.33 is to output the command list by user grade or authorization and change the grade or authorization of the specific command. This function is used by the only super-user(root). There are three authorization grades: Super-user, First class user who is able to verify and change the parameters of

system, and Second class user who is able to use basic function and confirm the status of system. Command list is arranged by alphabet order.

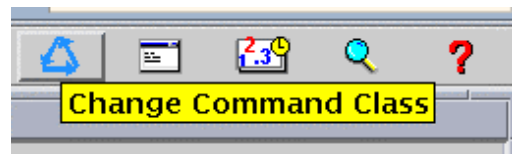


Figure 3.33 Service Panel – Change Command Class

- Pressing the button in the Service Panel of Figure 3.33 displays the screen to change the command class.

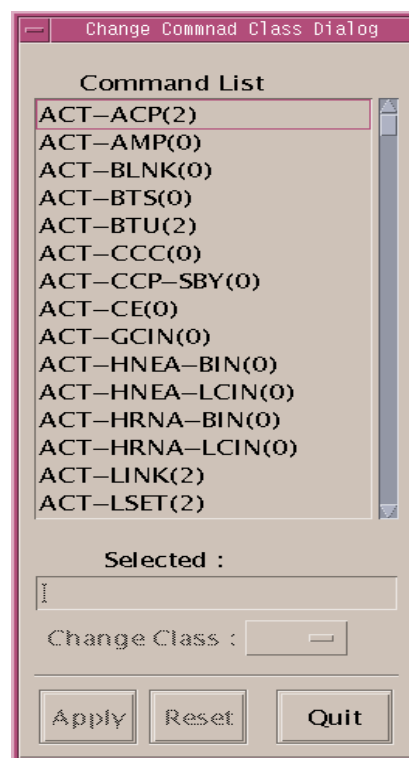


Figure 3.34. Change Command Class Window

- In the command list of the Change Command Class Window of Fig. 3.34, all the commands are listed in alphabetical order and the number in the parentheses means the class. **Double click** an item to change the class.

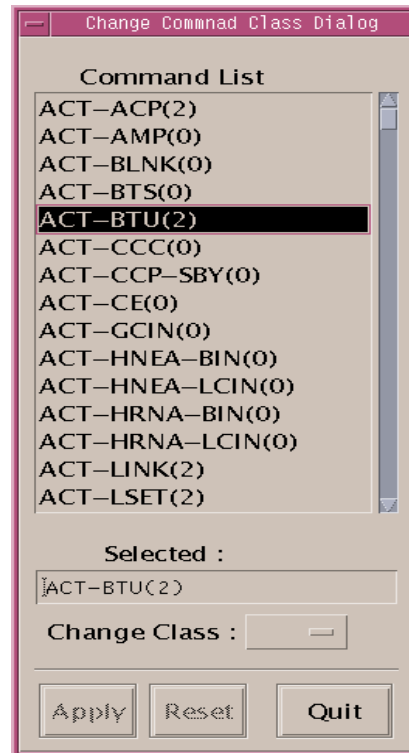


Figure 3.35 Double Click Command to Change Class

- Clicking the pop-down button of the Change Command Class Window shows as follows. Click one of these classes and press Apply button, then the changed class is applied to the command list.

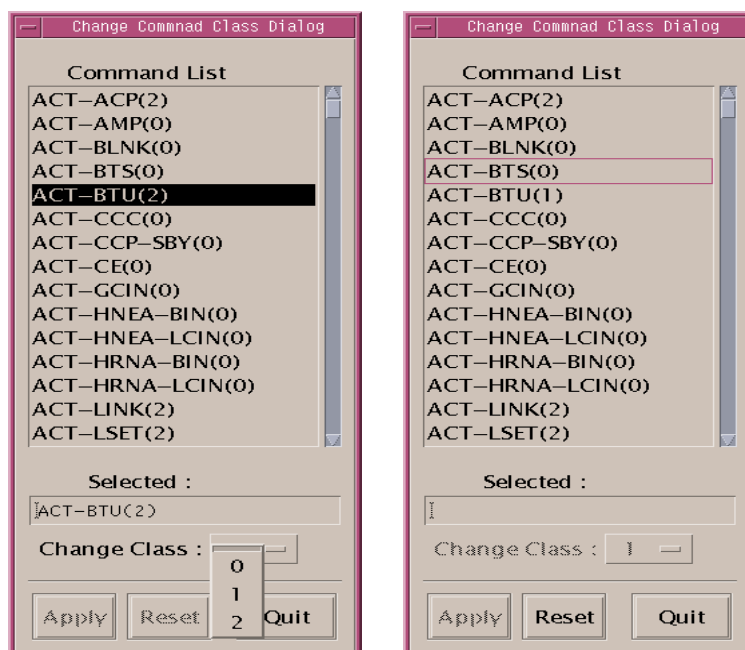


Figure 3.36. Change the Class of ACT-BDTU to Class 1

- If you want to turn it back to the original class, press Reset button.
- Pressing Quit button ends the function.

3.1.5.2 Batch

This service button in Figure 3.37 is able to write, edit, and execute the batch file. This file is composed of a series of BSM commands.



Figure 3.37 Service Panel - Batch

- If you press “Batch” button in the Service Panel, BSM displays such as Figure 3.38.
- The File menu in the Batch File Editor of Figure 3.38 has several commands as below:
 - a) New - New batch file.

- b) Open - Open and read an existing batch file.
- c) Save - Save the batch file written by operator.
- d) SaveAs - Save the batch file to another file name.
- e) Delete - Delete the batch file.
- f) Run - execute Batch in the editor window.
- g) Vi - run Vi editor
- h) Print - Print the contents of file.
- i) Quit - Quit Batch File Editor.

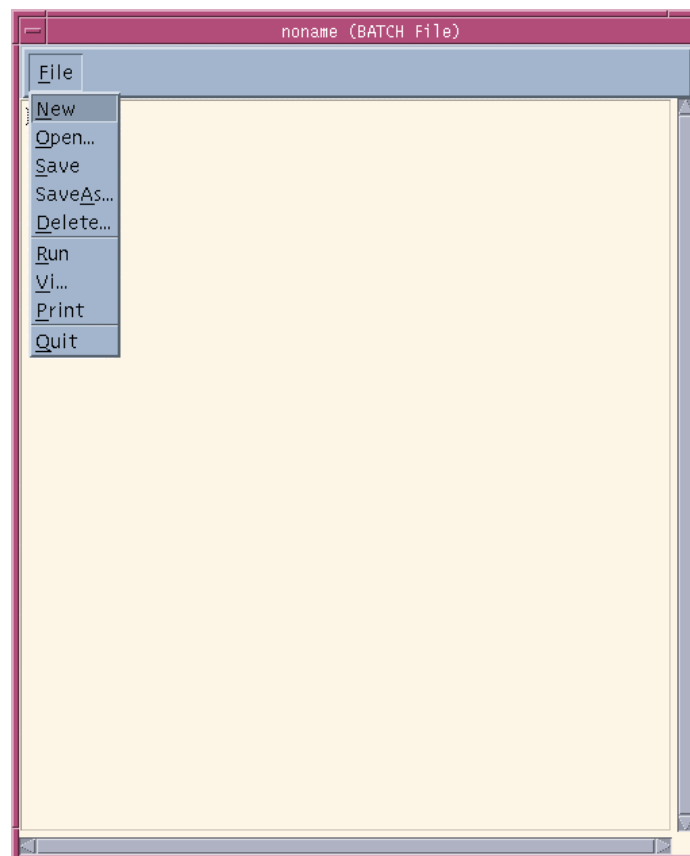


Figure 3.38 Batch File Editor

Example of Batch file :

3.1.5.3 Statistics Data Viewer

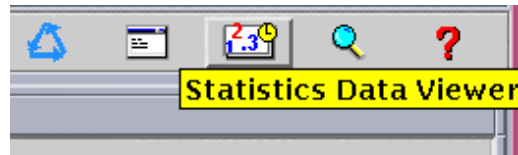


Figure 3.39 Service Panel – Statistics Data Viewer

- If you press the button “Statistics Data Viewer” in Service Panel, you can see the window such as Figure 3.40. The function of this window is that the binary statistic data occurred for 10 minute , 1 hour or 1 day is converted to the text type data.

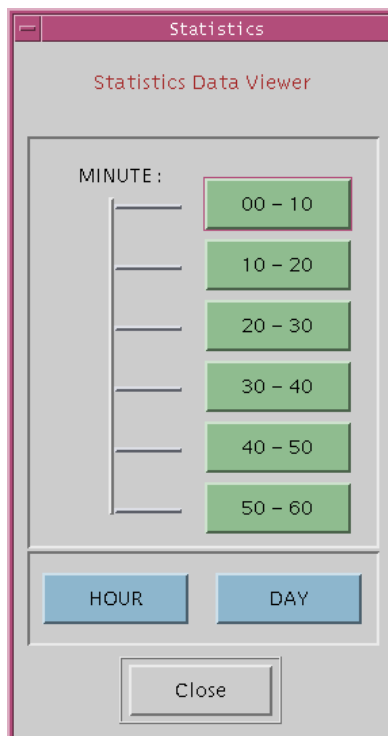


Figure 3.40 Statistics Data Viewer

- For example, if you press “00-10” button in the window of the Figure 3.40, the statistic text data for 10 minutes (00 - 10 minutes) is displayed in the following window. Scroll Bar is used for moving the screen or searching any words.
- Usage of the word searching function : If you enter the word that you want to search in the “Search : “ Text Field and push the Arrow Button () (or enter the RETURN Key). Then the screen moves the location of the word to the first location of word or string that you want to search. It is possible to use the Down Arrow button or Return Key if you

want another locations of the word, The Up Arrow Button is used for searching the word to the upper field.

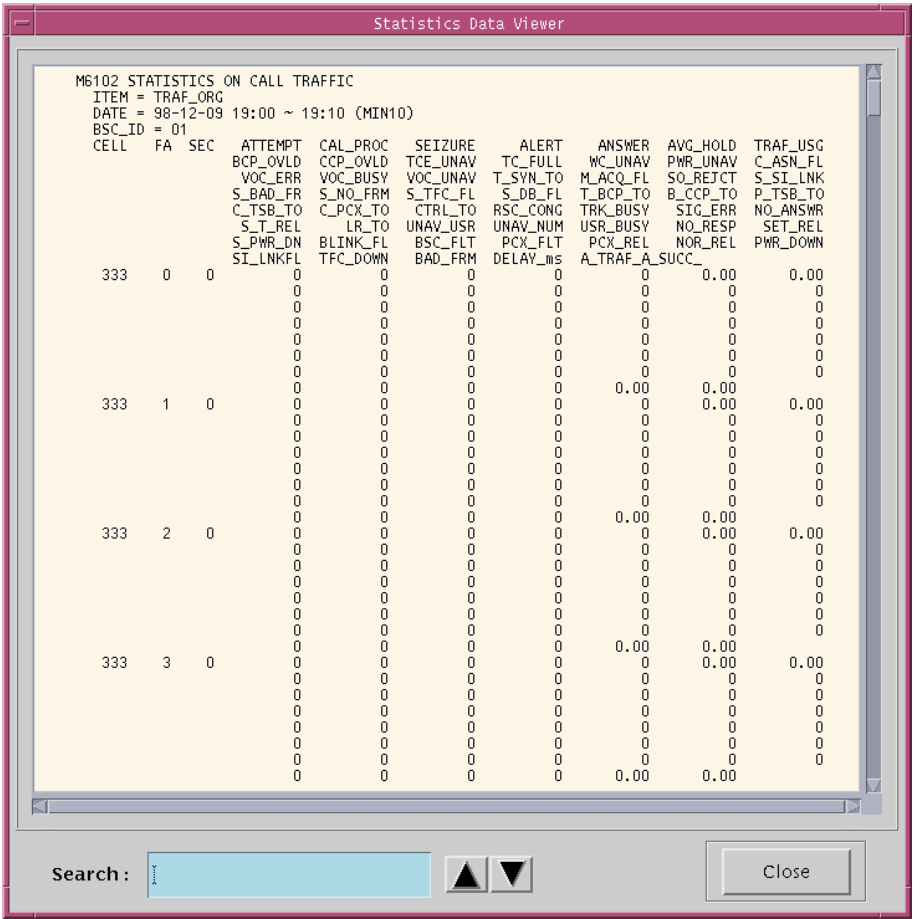


Figure 3.41 Statistics Data Viewer : 00-10

3.1.5.4 History Search

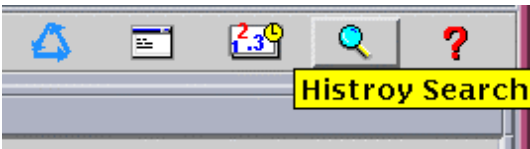


Figure 3.42 Service Panel – History Search

- The “History Search” of the Service Panel provides the fuction of “History search”, shown in Figure 3.42. It is possible to search the types of date, time, kind, and code for

command and message history in BSM.

3.1.5.4.1 Search Message History

The screenshot shows a 'History Search' window with the following elements:

- Tabs:** 'Message' (active) and 'Command'.
- DATE:** A text field containing '1996.12.09' with a dropdown arrow.
- TIME (HH:MM):** Two time selection fields. The first is '17' (hour) and '13' (minute). The second is '18' (hour) and '13' (minute). They are separated by a minus sign.
- TYPE:** A section with five checkboxes:
 - ☐ ALARM
 - ☐ FAULT
 - ☐ STATUS
 - ☐ DIAGNOSIS
 - ☐ STATISTICS
- CODE:** A text field with a light blue background. Below it is an example: 'ex) 1004, 3000, 5001'.
- Buttons:** 'OK' and 'Cancel' at the bottom.

Figure 3.43 Search Message History

- Message History Search Initial Screen is shown in Figure 3.43. The default values for DATE and TIME are current values for one hours. If You don't set the TYPE and CODE, all messages are displayed for the setting values.
- TYPE can be selected several items at one time. Also, CODE can be inputted several values by using comma(.), Among messages of selected type, the messages related to inputted CODE are displayed
- For example, in case Figure 3.44, messages related to CODE number 4207, 4209, and 4001 among alarm, fault, and status messages occurred from 17:14 to 18:14 in 09/12/1998 would be searched and displayed.

The image shows a 'History Search' dialog box with the following fields and options:

- Message** (selected tab) / **Command**
- DATE**: 1998.12.09
- TIME (HH:MM)**: 17:14 — 18:14
- TYPE**:
 - ☒ ALARM
 - ☒ FAULT
 - ☒ STATUS
 - ☐ DIAGNOSIS
 - ☐ STATISTICS
- CODE**: 4207, 4209, 4001
ex) 1004, 3000, 5001
- Buttons**: OK, Cancel

Figure 3.44 Example of Search Message History

- If “OK” button is clicked, the window like Figure 3.45 would be popped up at center of screen.

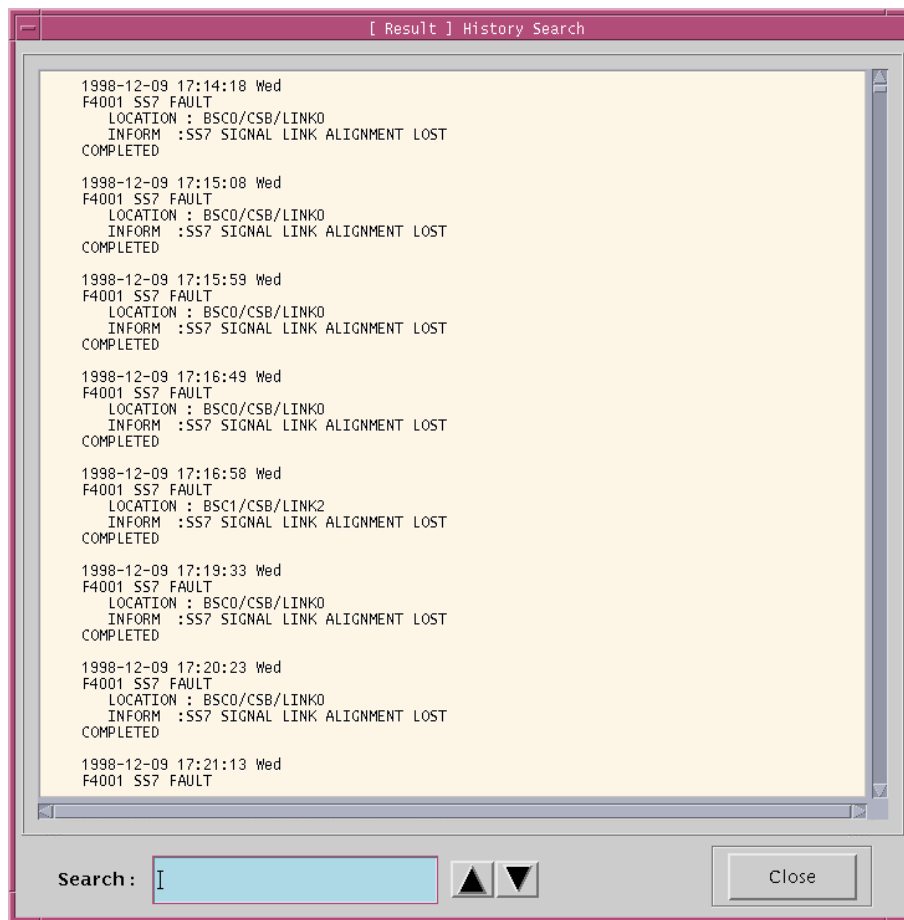


Figure 3.45 Result of Search Message History

3.1.5.4.2 Search Command History

- "Command history search initial window" is shown in Figure 3.46. Operation can be referred to "message history search".

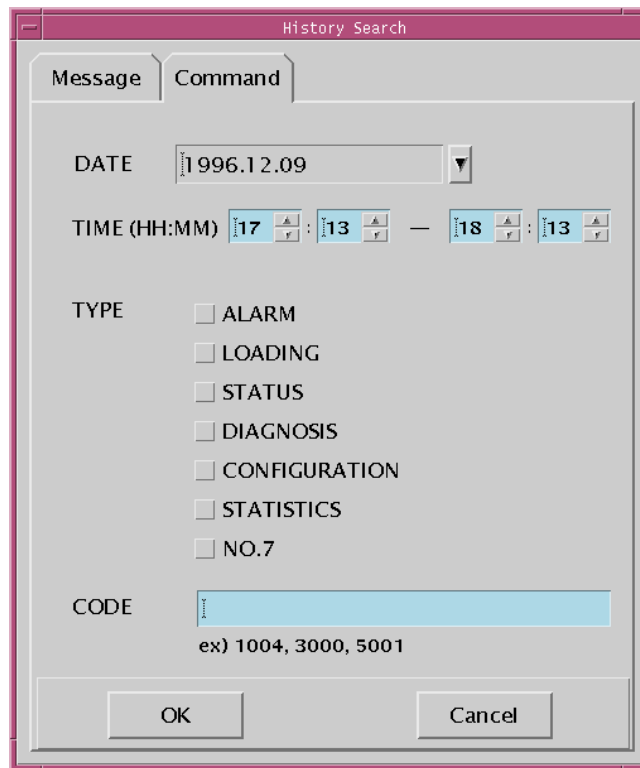


Figure 3.46 Search Command History

3.1.5.5 Help

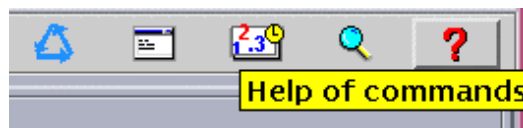


Figure 3.47 Service Panel – Help of Commands

- Press “Help” in the Service Panel of Figure 3.47, and “Help Selection Dialog” window of Figure 3.48 is represented.

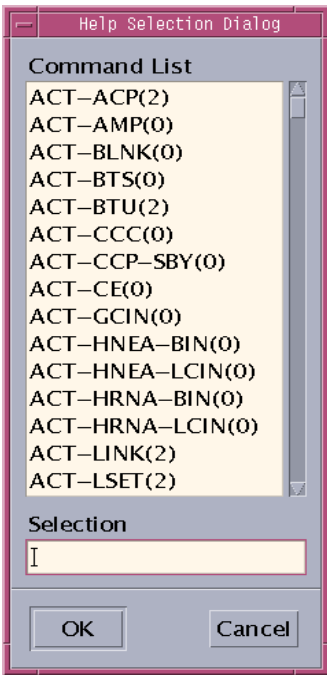


Figure 3.48 Help Selection Dialog

- Select one command in the command list and press “OK” button(or Double-click one command), and the help message for the command appears:

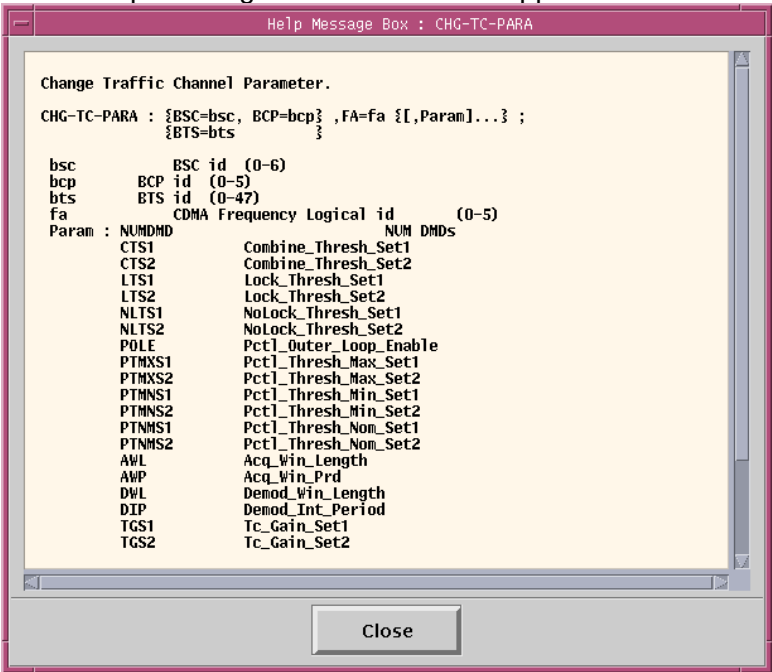


Figure 3.49 Help Message