3000 Series

SYSTEM AND SUBSCRIBER MANAGER

OPERATING MANUAL

Multi-Net® 3000 Series Switch

System and Subscriber Manager

EFJohnson®

Part Number 002-3139-078CD
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MULTI-NET® II
3000 SERIES SWITCH
SYSTEM AND SUBSCRIBER MANAGER
OPERATOR'S MANUAL

LAND MOBILE PRODUCT WARRANTY

The manufacturer's warranty statement for this product is available from your product supplier or from the E.F. Johnson Company, 299 Johnson Avenue, Box 1249, Waseca, MN 56093-0514. Phone (507) 835-6222.

The E.F. Johnson Company, which was founded in 1923, provides wireless communication systems solutions for public safety, government, and commercial customers. The company designs, manufactures, and markets conventional and trunked radio systems, mobile and portable subscriber radios, repeaters, and Project 25 digital radio products.

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This device complies with Part 15 of the FCC rules. Operation is subject to the condition that this device does not cause harmful interference. In addition, changes or modification to this equipment not expressly approved by the E.F. Johnson Company could void the user's authority to operate this equipment (FCC rules, 47CFR Part 15.19).

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SECTION 1 GENERAL

1.1 SCOPE OF MANUAL

This manual describes the functions of the Call Processor (CP) and the System and Subscriber Manager (SSM). Refer to the Multi-Net Application Note, Part No. 009-3039-004 or later for more detailed information on Multi-Net system operation.

1.2 DEFINITIONS

The following are brief definitions of some terms as they apply to Multi-Net systems.

1.2.1 TRUNKED SYSTEM

Radio systems which pool multiple channels using automatic switching allowing all system users access to any repeater channel that is not in use. This results in a minimum waiting time to make a call.

1.2.2 LTR TRUNKED SYSTEM

LTR® (Logic Trunked Radio) systems utilize a concept called trunking which makes all repeater channels of a system automatically available to the users. A logic control module in each repeater continually monitors the system and updates the mobiles and repeaters using data messages. These data messages tell the mobiles which repeater channels are free and can be accessed if a call is to be made.

1.2.3 MULTI-NET TRUNKED SYSTEM

Multi-Net radio systems utilize channel trunking similar to an LTR system. However, Multi-Net uses a different Multi-Net signaling protocol to provide enhanced features such as Auto-Registration, Busy Queuing, Emergency Messages, and Priority Access. A Multi-Net system also allows users on Multi-Net, LTR, and Conventional channels to talk to each other.

1.2.4 CONVENTIONAL SYSTEM

Conventional systems are licensed to operate only on a single repeater channel. Operation is similar to that of a community repeater as there is no automatic access to several repeater channels.

1.2.5 3000-SERIES SWITCH

The 3000-Series Switch (see Section 2) provides the switching and interface to external equipment for a Multi-Net system. It is controlled by the Call Processor (see next section). It has up to eight shelves with 12 device slots each (96 slots total). Many different modules are available to provide interfacing with the repeaters, control consoles, public telephone systems and other functions.

1.2.6 CALL PROCESSOR (CP)

The Call Processor is a Windows NT® based computer (see Figure 1-1) which contains the database used to control the Switch. It controls and continuously monitors Switch operation, provides logging of information for billing purposes, and performs other functions such as processing certain types of calls. The Call Processor interfaces with the Switch as shown in Figure 3-1. Refer to Section 4 for more Call Processor information.

Figure 1-1 Call Processor

1.2.7 SYSTEM AND SUBSCRIBER MANAGER (SSM)

The System and Subscriber Manager (SSM) is a Windows NT® based computer (see Figure 1-2) which manages the database in the Call Processor. It also

generates reports from the information logged by the CP and sets up and initiates activities such as Dynamic Reprogramming of certain transceiver parameters (Group 11), disabling (Kill) of lost or stolen transceivers.

The local SSM and the CP functions can run on the same computer if desired. The SSM interfaces with the Call Processor via an Ethernet link as shown in Figure 3-1. Refer to Section 5 for more SSM information.

Figure 1-2 System and Subscriber Manager (SSM)

1.2.8 LOCALITY

A Locality refers to repeaters that are physically located together and connected by the same High Speed Data Bus. Multi-Net localities can have a maximum of 30 repeaters. The terms “Locality” and “Site” are sometimes used interchangeably.

1.2.9 HOME REPEATER CHANNEL

Each Multi-Net selectable system is programmed with a “home” repeater number. When standard (dispatch) calls are placed and received, the home repeater and group ID code identify the transceiver or group of transceivers that receive the call. Multiple “homes” can be assigned in large localities.

1.2.10 STATUS REPEATER

A Multi-Net repeater at a locality is designated to transmit update information for all calls occurring at that locality. This repeater is also available for voice traffic, but is not assigned as a home repeater for any transceivers because none of its transceivers would have home channel backup. Multiple status repeaters may be assigned in large localities.

1.2.11 MONITOR REPEATER CHANNEL

This is the repeater that a transceiver is currently monitoring for update messages. With Multi-Net signaling, it is usually the Status repeater but may also be the home repeater. When a transceiver is not receiving a call, it continually monitors update messages from this repeater for incoming call and free repeater information. When making a call, the transceiver may be trunked to any of the locality repeaters that are not busy.

1.2.12 DEVICE ADDRESS

Each Switch has a a variable number of shelves, each of which hold up to 12 modules. The addressing of the shelves starts with zero on the lower left of the first Switch rack (reserved for the NetNIM Network Interface Modules). Each succeeding shelf above the first starts with a number 16 higher. The next Switch rack (if applicable) continues this consecutive sequence. This device address is part of the identification used in the protocols (referred to as “Card Address”).

1.2.13 UNIQUE IDENTIFICATION (UID)

The Unique ID number (1-8163) is assigned on a locality-wide basis to each transceiver. Each selectable system of a transceiver is programmed with a UID code in addition to the Group ID codes. UIDs 8164-8191 are reserved and should not be used.

1.2.14 GROUP IDENTIFICATION NUMBER

Group IDs 1-255 are assignable on each Multi-Net Home Repeater. A “standard” Group call uses ID codes 1-225, and the call is received by a mobile if it is programmed to receive calls on the Home Repeater/ ID code of a call. “Special” Calls use Group ID codes

226-255. These calls are telephone Interconnect (Group ID = 237), Auxiliary (Group ID = 236), and others. Interconnect and Auxiliary Unique ID calls require System and Subscriber Manager/Call Processor authorization.

1.2.15 DYNAMIC REASSIGNMENT

Dynamic Reassignment feature of Multi-Net systems allows the reprogramming of Group 11 of the specified system of a particular mobile over the air. In addition, another Multi-Net feature allows the selected system/group of a particular mobile to be changed over the air, for example, to receive an important message.

1.2.16 PULSE CODE MODULATION (PCM)

PCM is used on the Switch voice buses to send voice signals between modules. These buses operate at 2.048 MHz and have 32 Time Slots.

1.2.17 ACCESS PRIORITY

Access Priority determines which mobiles have access to a busy system. The method used by Multi-Net systems is to transmit the system Priority Level in the data stream to the mobiles. The only mobiles which are allowed to access the system are those programmed with an access priority that is equal to or higher than the currently transmitted system priority. Mobiles with a lower priority do not even attempt to access the system. This prevents lower priority mobiles from loading the system when it is the most crucial, such as during busy periods.

1.2.18 REMOTE ACCESS SERVICE

Remote Access Service is not being used on the Call Processor for remote access and should not be installed in the computer. If it is in the computer, it can be removed in the Services tab by selecting Remote Access Services and click “Remove”.

LapLink should be used to answer the modem. Ensure that LapLink is setup to start before the NT Logon, not a default.

1.3 WIDE AREA CALL INFORMATION

1.3.1 WIDE AREA MODULE (WAM)

A Wide Area Module (WAM) is used in a Switch to activate Group Dispatch Calls on multiple sites, either internal (same Switch) or external (between Switches). The Call Processor in a system activates a WAM by sending it a Wide Area Call (WAC) configuration that contains Site/Home/Group combinations to be activated as a Wide Area Call.

1.3.2 WIDE AREA CALL (WAC)

A Wide Area Call (WAC) consists of a combination of participants that are brought together as a Wide Area Dispatch Call. Once activated in a WAM, the call remains in the WAM until taken over by another WAC.

1.3.3 RESOURCE ALLOCATION

Wide Area Calls are activated by Group Dispatch Calls. When a Call Processor identifies a call on the Switch as being a Wide Area Call, it attempts to allocate a resource for that call if necessary. After validating the Group and User to see if it is permitted on the Switch, the call is identified as either Internal or External. If there are Groups on other Switches that need to be included in the call, it is marked as External. If the converse is true, the call is marked as Internal.

The Call Processor then determines if there is a resource available to handle that call. If there is a WAM available that matches the type (Internal or External) and also matches the Routing Group number, the call is assigned to the WAM and configured appropriately.

1.3.4 WAC ALARM MESSAGES

There are two alarm messages that appear in the Alarm Log that are helpful in solving fleet mapping issues with Wide Area Calls:

Alarm 46 Not All Channels Active In WAM - This indicates a WAM was unable to acquire channels for all the Groups (participants) that were programmed.

Possible Causes:

- Channels are all busy at the Site and the WAM could not activate its Group.
- More participants were programmed for a Site than the number of available channels.
- Channels at a Site were not functional.

Possible Solutions:

- Mark participants as temporary. This allows only the necessary participants in all calls to be using channels. Permanent participants will always be brought up on channels where available.
- Reduce the number of participants in a Wide Area Call that use the same Site.
- Increase the number of channels at a Site or fix any channels that are malfunctioning.

Alarm 268 No Available WAMs - This indicates that the criteria for WAM take over was not met and therefore a call that needed a WAM could not get one.

Possible Causes:

- All WAMs have been in use within the Maximum Inactive Time window. This essentially means that all WAMs are being used simultaneously.
- All WACs have a higher priority than the one attempting to come active and the Maximum Inactive Time has not expired on any WAMs.

Possible Solutions:

- Decrease the Maximum Inactive Time. Keep in mind that the lower the number, the higher the probability of interrupting conversations. It is recommended that no less than 5 seconds be used.
- For more important WACs, increase the WAC priority to allow the higher priority WACs to ignore the Maximum Inactive Time.

1.4 SYSTEM MANAGEMENT

1.4.1 SYSTEM ADMINISTRATOR

The System Administrator configures the System and Subscriber Managers to allow selection of Networks and User Privileges for the System Operators. The System Administrator also performs the following required administrative procedures:

Periodic Reboot

A feature of the Call Processor application is the automatic creation and maintenance of a backup set of tables. This action is performed at start-up. To ensure that this backup is usable, the system needs to be rebooted after major configuration changes occur.

For instance, after the cards are initially configured, reboot to allow this information to be copied to the backup set of tables. Also, the resource management of Windows NT® may cause the slow loss of available resources. To recover them, it is necessary to reboot. The frequency of service depends on the type and amount of activity on the system.

Database Backup

Since the operational characteristics of the system depend on the information in the configuration tables, it is recommended that a backup copy be kept of the current information on a separate medium (tape, CD-RW, multiple floppies, a different hard drive, etc.). When the Call Processor is not operating, copy the entire contents of the RunTimeModel directory. Regular backup of the full drive contents is the preferred course of action.

1.4.2 SYSTEM OPERATORS

System Operators are assigned User Privileges by the System Administrator. These privileges determine what the operator is allowed to do using the System and Subscriber Manager.

1.5 CP AND SSM OPTIONAL FEATURES

1.5.1 GENERAL

Various Call Processor and System and Subscriber Manager features are optional and available only if unlocked by a special encryption key available from the E.F. Johnson Company.

The latest software includes all of the following optional features. They can be selectively unlocked by an encryption key which activates them for use. A key consists of a string of letters and numbers that are unique to a specific serial number of CP/SSM software.

The SSM encryption key is entered using the File > Enter New Key menu function of the SSM (see Section 5.2.4). Likewise, the Call Processor key is entered by clicking the “Enter Key” button in the Switch Configuration Manager Switch Properties screen (see Section 6.3.15).

1.5.2 CALL PROCESSOR OPTIONS

The Call Processor can support the following modes. This determines the types of subscribers that can be programmed by the SSM.

- Multi-Net
- LTR-Net
- Wide Area LTR

Repeater Alarms - If this option is enabled, repeater alarms are logged by the Call Processor and reported to the SSM. Refer to Section 6.2 for more alarm information.

1.5.3 SSM OPTIONS

Demo Mode - Restricts the SSM to a Demonstration Mode only. In this mode, sample tables are used to display and change the various parameters which can be programmed by the SSM. Actual data in a Call Processor cannot be viewed or edited in this mode.

When installing the SSM to operate in this mode, be sure the Call Processor Tables are installed. To do this, select “Custom Installation” and make sure that “Call Processor Tables” is checked.

Wide Area Calling - Allows the wide area group calls described in Section 1.3.

3rd Level WAM Routing - Allows routing groups to be set up so that certain wide area calls can be routed to specific localities. Without this option, routing groups are not available and wide area calls are always routed to the same localities.

Priority 1 Emergency - Allows emergency calls to be routed as wide area calls.

SECTION 2 3000-SERIES SWITCH

Figure 2-1 3000 Series Switch (8-Shelf)

2.1 INTRODUCTION

A Multi-Net radio system is a combination of several key elements that together make up a communication system. By using the basic elements of a Multi-Net system as building blocks, a system can be designed to meet the communication needs of almost any type of user. The basic elements of a Multi-Net system are as follows:

Backbone - This consists of repeater Locality equipment including the links to the Switch.

Control Consoles - Used for dispatch operators.

Switch - Provides the interface between the Backbone and Control Consoles.

RF Equipment - Consists of mobile, control station, and portable transceivers.

Each Multi-Net Locality is an independent trunking system that processes calls between RF units, maintains fleet partitioning, and provides priority access control. The backbone elements are interconnected by either microwave, fiber optics, RF links, or private telephone lines equivalent to a 4-Wire voice grade phone circuit.

A Switch contains a Channel Interface Module (CIM) for each repeater it controls, a Telephone Interconnect Module (TIM) for each telephone line used for interconnect calls, an Intelligent Dispatch Module (IDM) or Multi-Net Console Module (MCM) for each dispatch console and others described in this section. A single Switch can control up to 30 repeater channels all at one Locality or divided among a combination of Localities. The Switch provides interface between the Locality equipment and the control consoles and directs all activity in Multi-Net Locality applications.

RF units in the coverage area of one repeater Locality can communicate with RF units in the coverage area of other repeater Localities through the Switch. Where more than 30 channels are required, multiple Switches can be used with communication between them to direct calls. Wide area radio coverage is provided to allow a mobile to talk to another mobile using a repeater hundreds of miles away. That repeater may be part of the same Multi-Net system or another Multi-Net system with phone lines or some other type of link that provides the communication path.

One or more dispatch consoles can be connected to the Switch using direct connection, phone lines, or some other type of link. Depending on the capabilities of the particular console, the dispatcher can perform functions such as place calls to specific mobiles, place calls to other dispatchers, and make a patch between two mobiles.

2.2 SWITCH MODULES

The Switch contains various modules that provide the interface between the Switch and external devices. The exact modules used depend on the application. The available modules are as follows.

Shelves in the Switch are designated as Channel or Terminal shelves. A Channel shelf can contain only CIM and CCM modules, and a Terminal shelf can contain any of the other modules. This is necessary for proper routing of the audio signals on the PCM bus.

CCM - Conventional Channel Module
CIM - Channel Interface Module
CPM - Conventional Patch Module
DCM - Dispatch Channel Module
DIM - Dispatch Interface Module
IDM - Intelligent Dispatch Module
LEM - Logging Encoder Module
MAM - Multi-Net Acquisition Module
MCM - Multi-Net Console Module
NetNIM - Network Interface Module
PTM - Power Termination Module
SNM - System Network Module
TIM - Telephone Interface Module
VDM - Voter Diagnostics Module
VTM - Voice Tone Module
WAM - Wide Area Module

Call Processor - The computer which contains the data base used by the Switch. This data base is programmed by the System and Subscriber Manager.

CCM (Conventional Channel Module) - A Channel shelf module that controls a Conventional repeater.

CIM (Channel Interface Module) - A Channel shelf module that controls a Multi-Net or LTR repeater.

CPM (Conventional Patch Module) - Patches a single Conventional channel to a single trunked Group. It connects to a 4-Wire interface or to an external 4-Wire E&M interface. An associated MCM is required.

DCM (Dispatch Channel Module) - A Terminal shelf module that controls a Conventional repeater.

DIM (Dispatch Interface Module) - Interface from the Switch to the Dispatch Consoles.

IDM (Intelligent Dispatch Module) - Controls the Multi-Net Dispatch Console.

LEM (Logging Encoder Module) - Provides system usage information to a logging recorder.

MAM (Multi-Net Acquisition Module) - Interface from the Switch to the ORBACOM Dispatch Consoles for Tone Paging.

MCM (Multi-Net Console Module) - Interfaces the Switch to a computer controlled (VRCM-50 Series) Dispatch Console.

NetNIM (Network Interface Module) - Primary Switch interface to the Call Processor. The NetIDB and NetCSB interface the Call Processor to this card in the Switch.

PTM (Power Termination Module) - Provides fusing of power and termination for a shelf.

SNM (System Network Module) - Controls other SNMs and Switches. This allows Unique ID calls by mobiles.

TIM (Telephone Interface Module) - Connects the Switch to telephone lines and handles telephone line protocol to the PSTN or a PABX.

VTM (Voice Tone Module) - Provides voice and tone messages to the System.

VDM (Voter Diagnostics Module) - Interfaces the Switch to the Voter system.

WAM (Wide Area Module) - Used to make wide area calls to multiple Localities within a System or across multiple Switches.

Figure 2-2 Two-Shelf Switch With CP/SSM

Figure 2-3 Four-Shelf Switch With CP/SSM

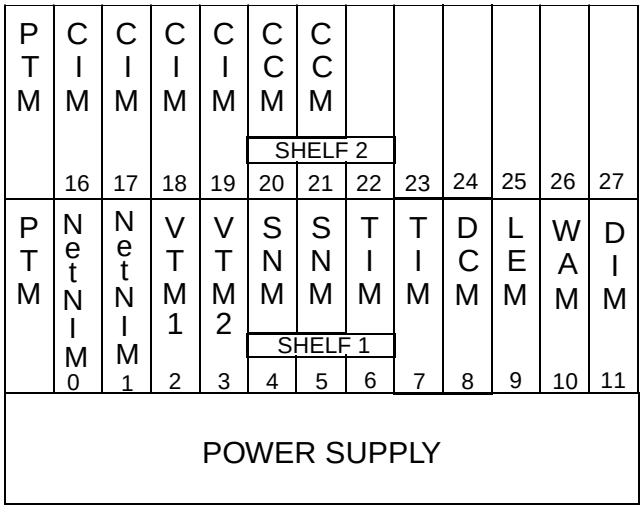

Figure 2-4 Sample 2-Shelf Switch Rack Setup

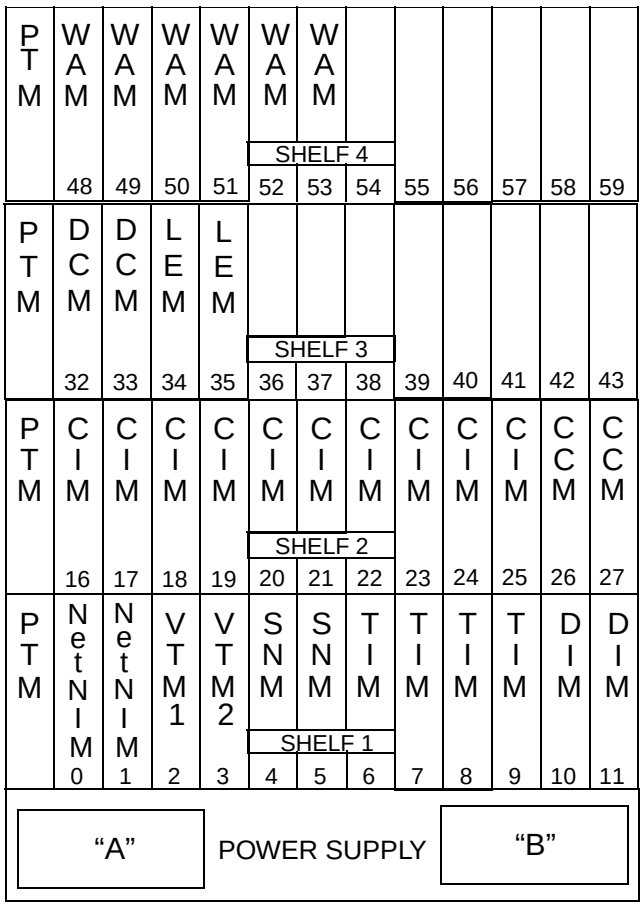

Figure 2-5 Sample 4-Shelf Switch Rack Setup

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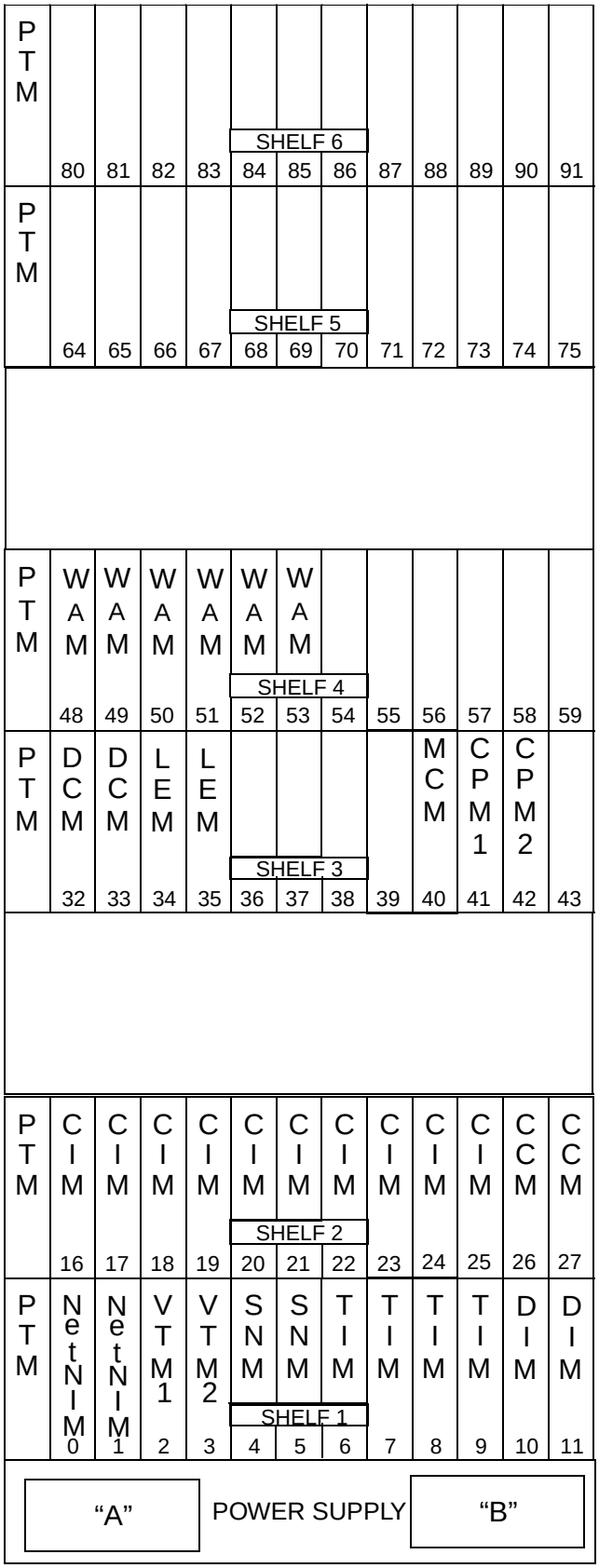

Figure 2-6 Sample 6-Shelf Switch Rack Setup

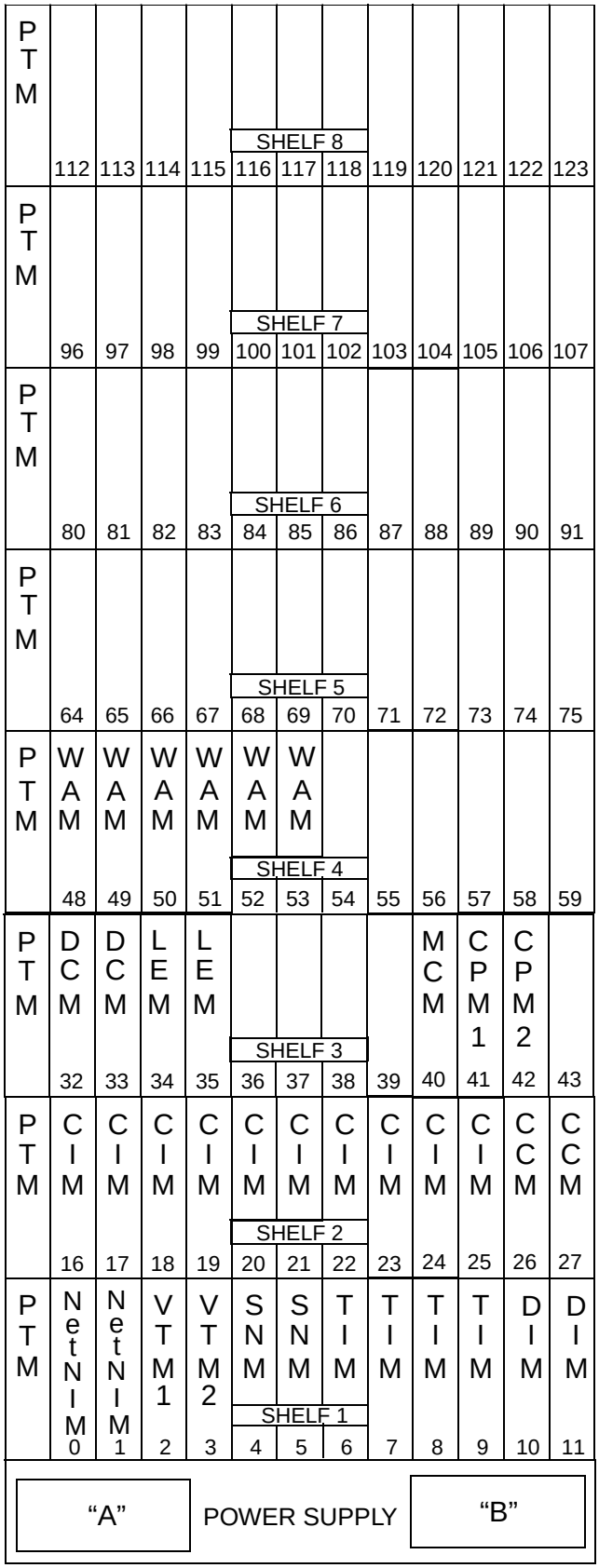

Figure 2-7 Sample 8-Shelf Switch Rack Setup

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SECTION 3 ARCHITECTURE

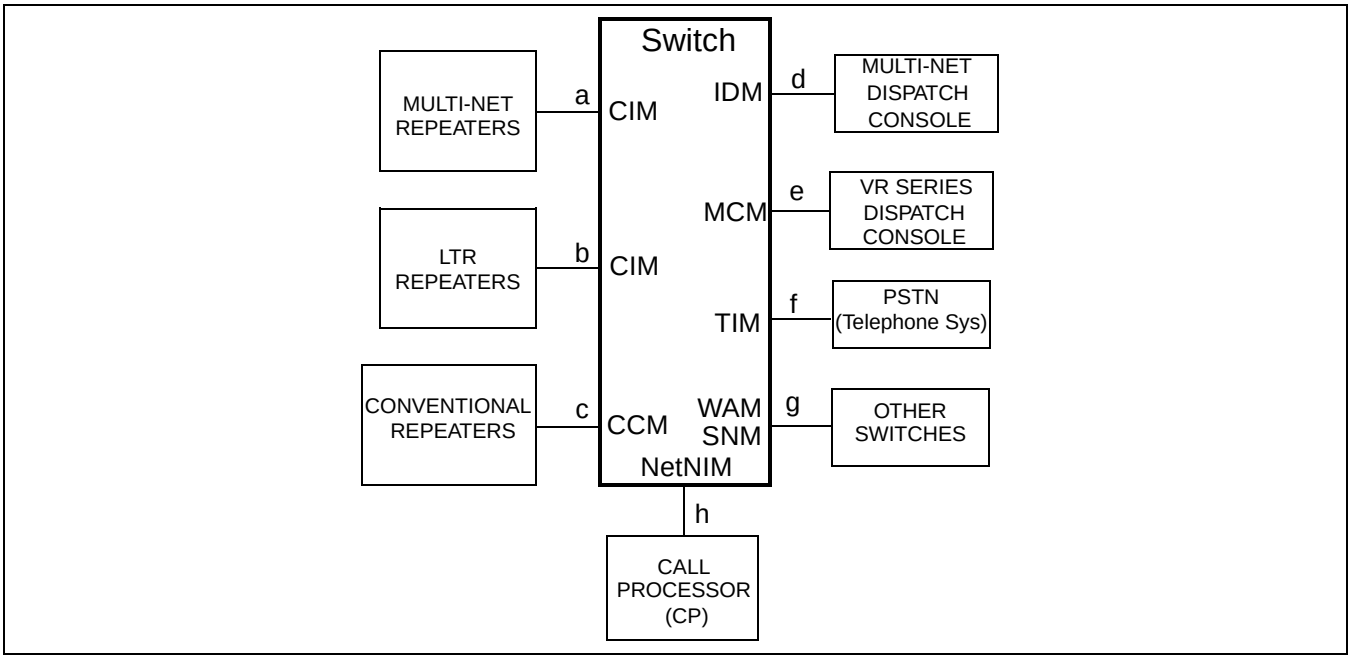

Figure 3-1 Multi-Net System Diagram

3.1 INTRODUCTION

The architecture of the Switch refers to the modules or elements that make up the physical portions of the Switch and the buses that carry data, control, and voice information.

3.2 SWITCH INTERFACES

The main Switch interfaces are as follows (see Figures 3-1, 3-5, and 3-6).

a. Interface to Multi-Net repeaters

b. Interface to LTR repeaters

c. Interface to Conventional repeaters

d. Interface to Multi-Net Dispatch Consoles

e. Interface with VR-series Dispatch Consoles

f. Interface with the Public Switched Telephone Network

g. Interface to other Switches

h. Interface to the Call Processor and System and Subscriber Manager

3.3 BUS STRUCTURE

3.3.1 INTRODUCTION

The modules in the Switch are connected by Data, Control, and Voice buses. Refer to the sections which follow for more information.

3.3.2 DATA BUSES

The following are descriptions of the data buses shown in Figure 3-2.

Ethernet

Ethernet is a LAN (Local Area Network) protocol that is used to pass information between multiple Call Processors and System and Subscriber Managers using TCP/IP communication. Several different physical

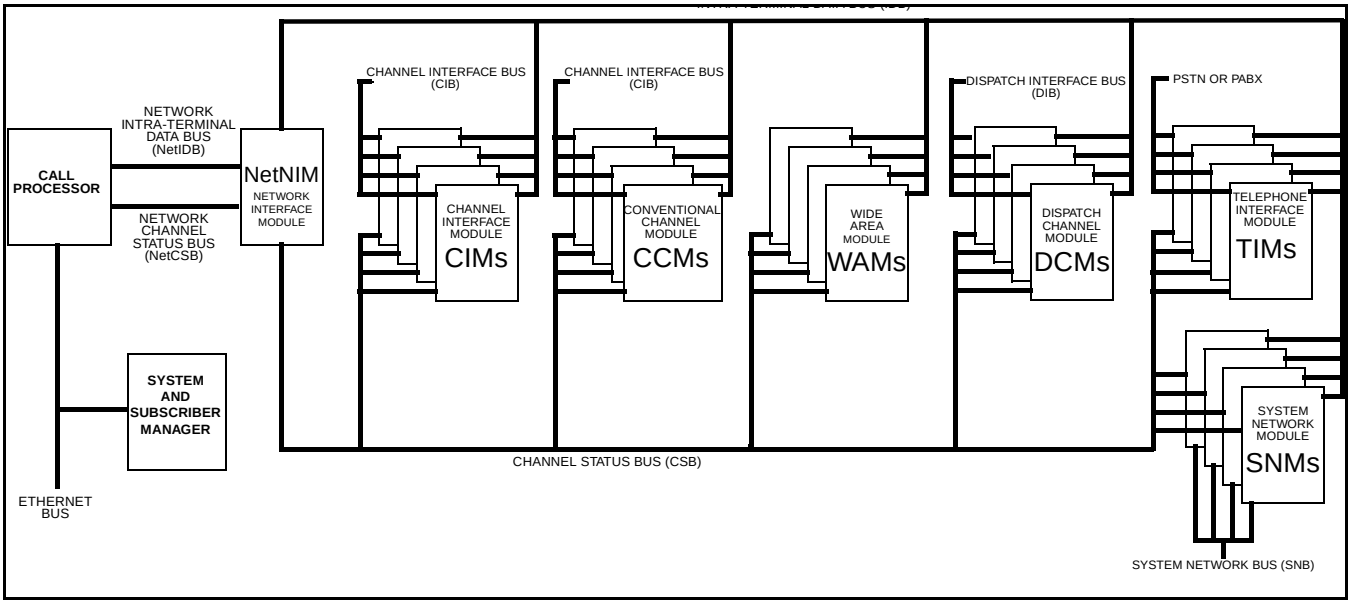

Figure 3-2 Data Buses

media may be used including twisted-pair cable and coaxial cable. The Ethernet link is used to pass information between the SSM and CP even if they are located on the same computer.

TCP/IP is the abbreviation for Transmission Control Protocol/Internet Protocol which is a suite of communication protocols used to connect hosts on the Internet. It is the de facto standard for transmitting data over networks.

Network Intra-Terminal Data Bus (NetIDB)

The NetIDB is 19,200 baud sync-escape protocol bus that passes information from the Call Processor to and from other modules via the NetNIM.

Network Channel Status Bus (NETCSB)

The NetCSB is a 19,200 baud Sync-escape protocol bus that passes the CSB (Channel Status Bus) data to the Call Processor or external peripheral equipment via the NetNIM.

Intra-Terminal Data Bus (IDB)

The IDB is a 19,200 baud sync-escape protocol bus that modules communicate on to pass control information to each other using high speed CSMA (Carrier Sense Multiple Access).

Channel Status Bus (CSB)

The CSB is a 19,200 baud sync-escape protocol bus that passes channel status from channel modules to other system modules using high speed CSMA.

Channel Interface Bus (CIB)

The CIB is a 1200 or 9600 baud sync-escape protocol bus that passes system channel control and status to and from the CIMs, CCMs, and repeaters.

Dispatch Interface Bus (DIB)

The DIB is a 1200 or 9600 baud sync-escape protocol bus that passes DIM control and status to and from the Dispatch consoles.

Dispatch Tone Protocol (DTP)

The DTP passes industry standard tone remote push-to-talk tone and DTMF for DIM control and status to and from the dispatch consoles.

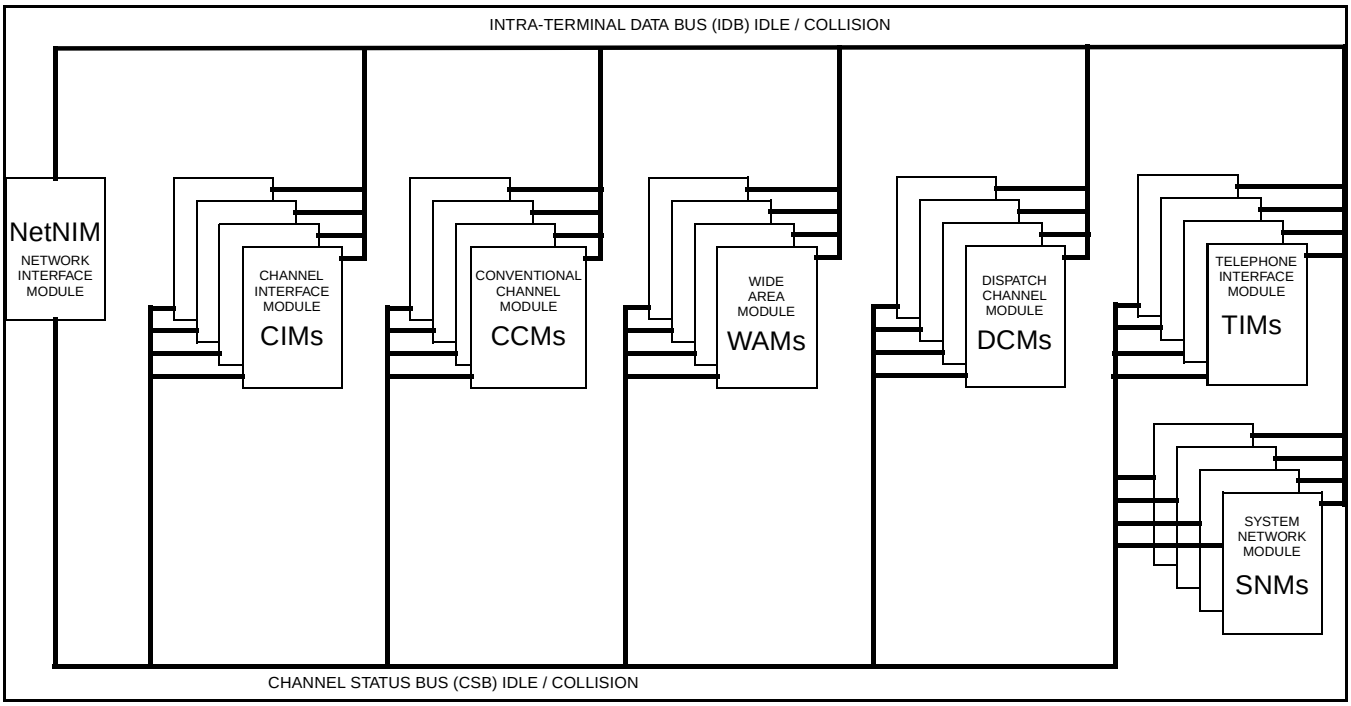

Figure 3-3 Control Buses

System Network Bus (SNB)

The SNB is a 1200 baud sync-escape protocol bus that passes control and status between SNMs.

PSTN or PABX

This connects to a PSTN (Public Switch Telephone Network) or a PABX (Private Automatic Branch Exchange) for outgoing and incoming telephone calls.

3.3.3 CONTROL BUS

The following are descriptions of the control buses shown in Figure 3-3.

IDB Idle/Collision Line

This is a three level line that indicates if the line is idle or busy or a collision occurred for the IDB communication process. This provides for high speed CSMA of the IDB.

CSB Idle/Collision Line

This is a three level line that indicates if the line is idle or busy or a collision occurred for the CSB communication process. This provides high speed CSMA of the CSB.

3.3.4 VOICE BUS

The following are descriptions of voice buses. shown in Figure 3-4.

VTM Bus

The VTM Bus is a 2.048 MHz Pulse Code Modulated (PCM) bus containing 32 slots of tones or voice the modules use to indicate call progress to an end user by means of audio information.

Tx PCM Bus

This is a 2.048 MHz Pulse Code Modulated (PCM) bus containing 32 slots. Audio received from the RF channel is transmitted on these slots by the channel modules and received by the other system modules.

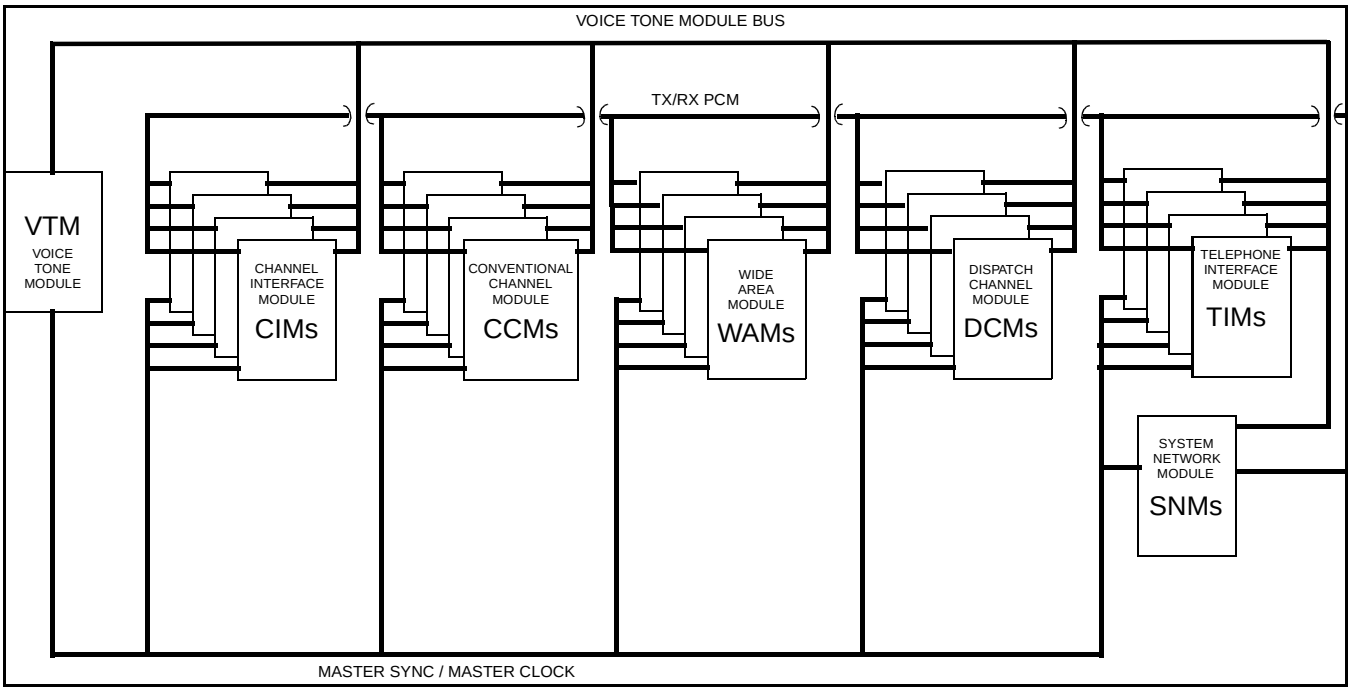

Figure 3-4 Voice Buses

Rx PCM Bus

This is a 2.048 MHz Pulse Code Modulated (PCM) bus contains 32 slots. Audio is transmitted from the other system modules to these slots and received by the channel modules to be transmitted on the RF channel.

Master Sync

Master Sync provides the synchronization signal for the PCM bus communication to begin the frame of 32 PCM slots.

Master Clock

The Master Clock provides the 2.048 MHz clocking signal for the PCM buses.

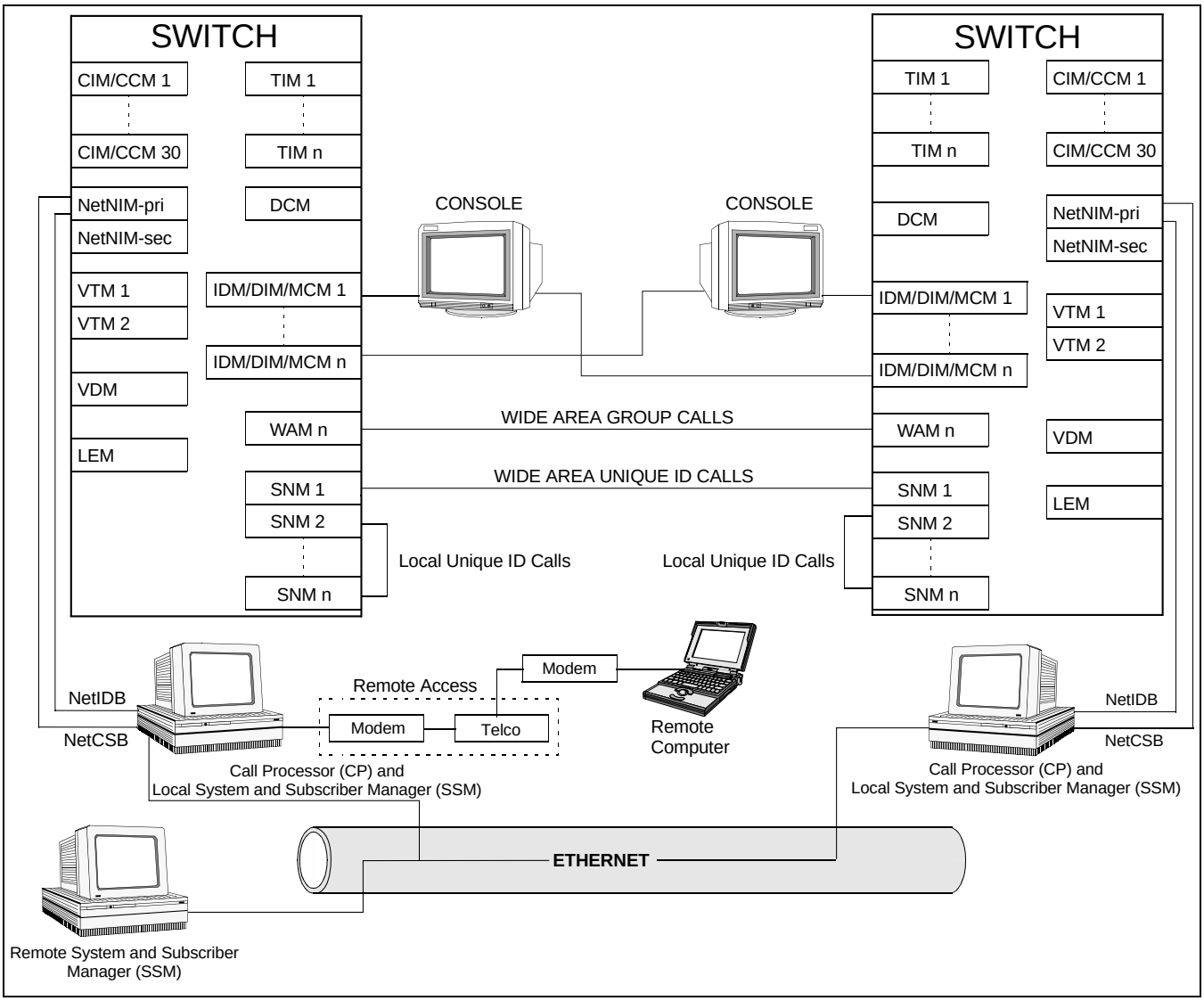

Figure 3-5 Switch Components Block Diagram

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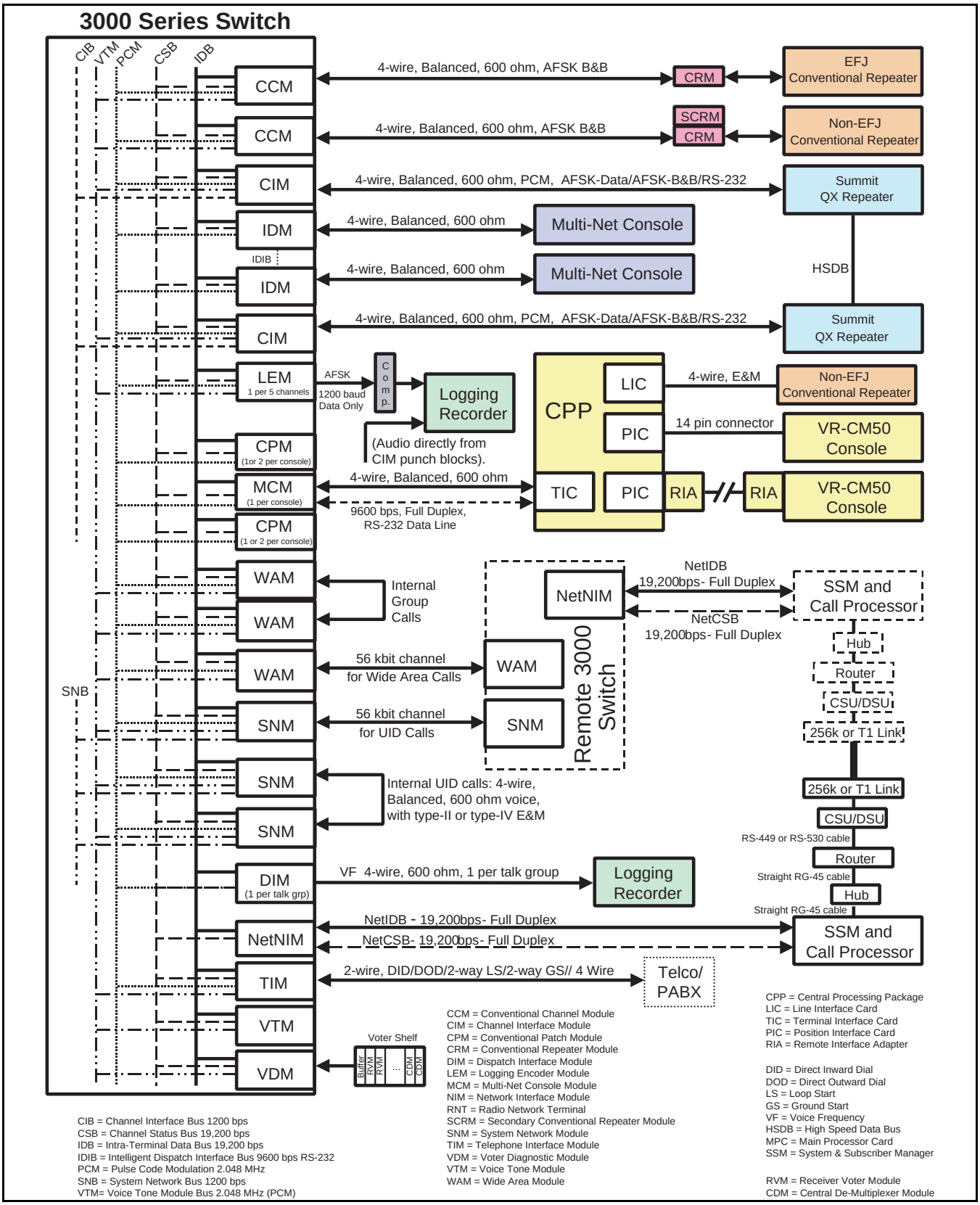


Figure 3-6 Switch Audio and Data Links

SECTION 4 CALL PROCESSOR (CP)

4.1 INTRODUCTION

The Call Processor (CP) controls the Multi-Net System. These components interface with the Switch as shown in Figure 3-5.

The Call Processor controls and continuously monitors Switch operation, provides logging of information for billing purposes, and performs other functions such as processing certain types of calls. The Call Processor program runs on a computer that has a Windows NT® 4.0 operating system and a Pentium® 233 or better microprocessor.

One Call Processor is required for each Switch, and it must be co-located with the Switch. The Call Processor program must be running for the Switch to function. If desired, the local Call Processor and Subscriber Management Module can run on the same computer. The following information describes the data buses utilized by the Call Processor and some of the main functions the Call Processor performs.

4.2 DATA BUSES

The NetIDB and NetCSB connect the Call Processor to the Switch via the NetNIM (Network Interface Module). The Ethernet port connects the Call Processor to other Call Processors and System and Subscriber Managers. Refer to Section 3 for more information.

NetIDB (Net Intra-Terminal Data Bus)

The NetIDB is a 19,200 baud full duplex port connected to the NetNIM (Network Interface Module). The NetNIM buffers the Call Processor data to the IDB (Intra-Terminal Data Bus). The Call Processor communicates with the rest of the Switch modules on the IDB via the NetNIM.

NetCSB (Net Channel Status Bus)

The NetCSB is a 19,200 baud full duplex port connected to the NetNIM. The NetNIM buffers the data from the CSB (Channel Status Bus) to the Call Processor. The Call Processor communicates with the rest of the Switch modules on the CSB via the NetNIM.

4.3 SYSTEM CONFIGURATION

System configuration provides initialization of modules and database management. When a module sends an initialization request to the Call Processor, the Call Processor searches the configuration database and sends initialization information to the module. If the module number is not found, the Call Processor creates an alarm and places the module in standby mode.

4.4 STANDARD GROUP CALL

A Standard Group Call is a call originated by a mobile which is destined for a Group of mobiles in a given Locality. If the Group Call does not exist in a WAC (Wide Area Call) configuration, the call processing is handled by modules external to the Call Processor/Switch. If the Group Call does exist in a WAC configuration, the Call Processor initiates Wide Area Call Processing.

The Call Processor creates a Usage Accounting record containing the Initiation Time/Ending Time of the Standard Group Call.

4.5 WIDE AREA CALL

NOTE: Refer to Section 1.3 for more information on wide area calls.

The Call Processor looks at each CSB (Channel Status Bus) message and determines if Group Call data is contained in a WAC (Wide Area Call) configuration. If the Group Call Data does exist in a WAC configuration, the Call Processor determines if there is an existing WAM (Wide Area Module) configuration containing the Group Call Data. If there is, the Call Processor updates the Last Used Time in the WAM configuration. If there is not an existing WAM configuration, the Call Processor creates a new WAM configuration based on the Registration Database and

acquires a free internal and/or external WAM resource and sends a WAM Configuration Order to the WAM resource.

If the WAC required an external (to the Switch) WAM resource, the Call Processor sends a WAC Active Message to other Call Processors over the network connection. After sending the WAC Active Message to the other Call Processors, the originating Call Processor waits for positive WAM Active Ack Messages from each Call Processor. Once the Call Processor has received each of the acknowledges, the originating Call Processor sends an Active E&M Lead Order to the WAM resource with the E-Lead and M-Lead bits set.

If the Call Processor receives a “nak” from any of the other Call Processors, it does not send the Activate E&M Lead Order. If the Call Processor receives a WAC Active Message from another Call Processor and the message contains any of the following, the Call Processor sends a WAM Active Ack Message with an “acknowledge” to the other Call Processors.

- An active WAM Port Number and the message has a Higher Priority
- An equal priority and lower WAC ID
- The WAC active timers are within 5 seconds of expiring

It also sends a WAM Configuration Order to the associated WAM with that WAM Port Number. It then sends an Activate E&M Lead Order with the E-Lead bit set. Any other condition, the Call Processor sends a WAM Active Ack Message with a “no acknowledge”.

If the Call Processor receives a WAC Active Message from another Call Processor and the WAM Port Number is not active, the Call Processor sends a WAM Active Ack Message with an acknowledge to the other Call Processors. It also sends a WAM Configuration Order to the associated WAM with that WAM Port Number. It then sends an Activate E&M Lead Order with the E-Lead bit set.

If the WAC Active Message from another Call processor contains a Unique ID that is different than the one sent to a previously configured WAM, the Call Processor sends a WAC UID Update Order to an active WAM. There are response time-out periods, expected acknowledges, and retries on the orders and messages to an active WAM.

The Call Processor creates a Usage Accounting record for the initiation and completion of a Wide Area Call.

4.6 REGISTRATION

If the Call Processor is configured for PTT Registration or auto-registration, it monitors the CSB for Registration of Unique IDs. The Call Processor updates the Locality information for the Unique ID in the Registration Database. The Call Processor sends a Registration Message to the other Call Processors over the network connection (Ethernet).

When a Registration Request message on the IDB is received from a CIM (Channel Interface Module) the Call Processor formats and sends a Registration Acknowledge Order back to the CIM with the appropriate acknowledge information. The Call Processor updates the Registered Locality, Home, and User Status of the Unique ID. The Call Processor sends a Registration Request message to the other Call Processors within the system network via the Ethernet.

These messages are acknowledged using the low level network communication with a response time out period. If there is no acknowledgment from a given Call Processor, an error record is written to the alarm log containing the Unique ID, “no ack on network registration” indication, Originating Call Processor, Destination Call Processor that did not respond, and a Date/Time Stamp.

When a Registration Request message is received from another Call Processor, it is acknowledged via a Registration Ack Message back to the Originating Call Processor. The received Registration Request message is then processed by the Call Processor. If the message contains Non-Zero Home/Locality information, the Call Processor updates the registered Locality/Home and User Status for the given Unique ID associated with the message.

If the message contains Zero or Non-Zero Home/ Locality information, the Call Processor uses the information for Wide Area Call Management. If the message contains Zero for Locality/Home it is used to de-register the unit from a Wide Area Call Configuration. If the information changes the Wide Area Call to add or delete a Locality/Home/Group combination for any or all Wide Area Calls the Call processor updates the associated Wide Area Calls accordingly. This includes Wide Area Calls that are presently configured in a WAM within the Switch and re-configuring the associated WAMs.

4.7 INTERROGATE

Interrogation is determining the Registered Locality/Home and last User Status of a Unique ID. There are two forms of interrogation: Static Request from a console position, and Dynamic Function in which the Call Processor tries to communicate with the given subscriber unit (a ping).

When a console position requests an interrogate, the Call Processor sends a response back to the console position with the Registered Locality/Home and Last User Status. The console then uses the information to request a CIM (Channel Interface Module) in the Registered Locality (if it is within the Call Processor/Switch combination) to interrogate the unit if it is a mobile.

To interrogate a mobile the System Operator enters the desired Locality and Home repeater numbers to use. All Call Processors receive the interrogate request message, but only the one with the requested mobile responds. Otherwise, the Call Processor selects a free channel from the desired Locality and sends an Interrogate Request to a free CIM.

If the CIM accepts the request, the Call Processor waits for a response. If the request is denied, the Call Processor selects a new free channel on the desired Locality and tries again. If there are no free channels or all channels have been requested with no positive acknowledge, the System and Subscriber Manager displays “All Channels Busy” or times out to the requesting function. The Call Processor waits for a response from the acknowledged requested CIM. If there is no response in 10 seconds, the System and Subscriber Manager displays “no mobile response”.

If the CIM responds, the System and Subscriber Manager displays the information from the CIM Interrogate Response. The System Operator is able to exit the interrogate unit function, otherwise the System and Subscriber Manager remains in the function.

The interrogate is used by the Call Processor for de-registration of subscriber units that are being tracked for Wide Area Calls. If the Unique ID last registration timer expires, then the Call Processor determines if the unit is still active.

The Call Processor performs an interrogation on the unit if the last Registered Locality is within the given Call Processor/Switch. If the unit is last registered on a Locality outside of the given Call Processor/Switch then the Call Processor does not perform the interrogation. The Call Processor selects a free channel on the last Registered Locality, if within the Call Processor/Switch, to interrogate the unit. If there are no free channels or all channels deny the request, then the Call Processor queues the unit to be de-registered.

If a CIM accepts the Interrogate Request and the CIM responds with an Interrogate Response, then the Call Processor updates the last registered time of the Unique ID and continues to the next task. If there is no response from the CIM in 3 seconds, the Call Processor assumes the mobile unit is no longer active in the Locality and sends a registration order with Locality 0 (zero), Home 0 (zero) on the Registration Bus (Ethernet). This does not update the Registered Locality to zero but must be used by Wide Area Calls to update the mobile information and which Localities to use in the Wide Area Calls. The Call Processor continues after the Interrogate Response or the time out.

The Call Processor searches the CSB information and determines if the Unique ID to be interrogated is active on a channel. If the unit is active on a channel and is in the Locality/Home it is registered on, the Call Processor may not send an interrogate request to a free CIM.

4.8 DYNAMIC REASSIGNMENT

Dynamic Reassignment sends a command to a subscriber unit to reprogram the transmit/receive Group ID and user priority level of Group 11 of the desired selectable system. It is also used to automatically switch a transceiver to a specific system/group selection. This function is also used in the execution of a Reassignment Plan.

When a system operator is permitted to initiate a Dynamic Reassignment, the following information can be entered:

OTAR (Over-The-Air Reprogramming) of Group 11

- Unique ID of the subscriber unit to be reassigned
- The locality/home on which the reassignment is to be attempted (the last known registered locality/home is the default)
- System position to program
- Priority level
- Receive Group ID (GID)
- Transmit Group ID (GID)

Move To New System/Group

- Unique ID of the subscriber unit to be moved
- The locality/home on which the move is to be attempted (the last known registered locality/home is the default)
- System and Group to select

The System and Subscriber Manager asks for verification (Yes or Cancel). Once verification is confirmed, the System and Subscriber Manager/Call Processor perform the Dynamic Reassignment. The System and Subscriber Manager then displays the following information:

- Request completed successfully
- Not acknowledged by the subscriber unit
- No response (time out)
- No channels were available, try again

Dynamic Selection is also used by the Call Processor when executing Reassignment Plans. The Call Processor attempts the Dynamic Selection and responds back to the Reassignment Plan indicating the status of the Dynamic Selection for a given Unique ID.

The Call Processor attempts the Dynamic Selection on the desired Locality/Home. The Call Processor attempts to find a free channel on the desired Locality, starting with the Home channel. If the Dynamic Reassignment Order is sent to the free CIM and the order is not acknowledged by a Module Response Message from the CIM, the CIM is marked as busy and another attempt is made to find a new free channel.

If a time out of 2 seconds is reached the Dynamic Reassignment Order is tried once more to find a free channel. If a free channel is not available, a “no channel available” status is indicated to the requesting function and the dynamic Reassignment Order is exited.

If the Dynamic Reassignment Order is acknowledged, a delay of 5 minutes is allowed for an Execute Dynamic Reassignment Message. If no message is received from the CIM in the time out period there is a “request not performed” indication. When the Execute Dynamic Reassignment Message is received, it is acknowledged by a Call Processor Response Order and waits for 3 seconds for a Dynamic Reassignment Response Message from the CIM.

If there is no response in the time out period from the CIM a “no performed status to the requesting function” is displayed. If the CIM responds with a Dynamic Reassignment Response Message, the response is indicated to the requesting function when:

- Successful
- No Acknowledge, then times out (No RF Response, Mobile No Acknowledge then Subscriber No Acknowledge).

This execution is the same as for a Dynamic Reassignment.

4.9 REASSIGNMENT PLAN EXECUTION

A Reassignment Plan is initiated for execution by a System Operator using the System and Subscriber Manager. The chosen Reassignment Plan to execute is configured again by a System Operator using the System and Subscriber Manager. When a Reassignment Plan is executing, it uses the Dynamic Reassignment and Dynamic Selection functions.

A Reassignment Plan is a Dynamic Reassignment or a Dynamic Selection for a given subscriber unit Unique ID. When a Reassignment Plan is initiated, a Reassignment Plan Log is opened and a Log Record indicating which Reassignment Plan is initiated and the Date/Time. A retry indicator is cleared. The Reassignment Plan executes by looking at the Unique ID of a transaction and the information in a transaction. The information indicates a Dynamic Reassignment or a Dynamic Selection must be performed. The Reassignment Plan uses the Registered Locality and Home of the Unique ID to perform the transaction.

The Call Processor uses only the allowed number of channels in the given Reassignment Plan Configuration for simultaneous transactions. If there are multiple transactions for a given Unique ID, these are performed second after there is a response to the first. Other simultaneous transactions are performed on other Unique IDs while the first transaction is being executed. If a transaction is responded to with a “no RF response” (mobile time out) or not performed (no available channels), then an indication for a retry is set.

When all transactions of a plan are attempted, the Call Processor determines if the retry indication was set. If the retry indication is active, the Call Processor determines if the Reassignment Plan has retries and if the number of retries was met. If the number of retries was not met, the Reassignment Plan is executed for those transactions not marked for successful or no acknowledge from the mobile. Once all retries have been attempted, the Reassignment Plan is complete. A log record is written indicating the plan is complete with the associated Date/Time.

The response to a transaction is written to a History Log for the given executing Reassignment Plan. The log record includes the Unique ID, Transaction Data, Response and Time. The response is:

- Successful
- No RF response (mobile time out)
- No acknowledge from the mobile
- Not performed (no available channels).

4.10 USAGE ACCOUNTING

4.10.1 GENERAL

The Usage Accounting process is impacted by the following log database tables or files:

- Call Usage
  - Reassignment Messages
  - Auxiliary Calls
  - Telco Calls
  - Queued Calls
- CSB Usage (all PTTs)
- Reassignment Plan Logging
- Registration Logging

4.10.2 ERROR MESSAGES AND INTERNAL ERRORS

The Call Processor receives error messages from modules and also failures during other processes. The Call Processor generates an Error Record written to the Alarm Log that contains a Running Alarm Sequence Number (see Appendix A for a list of error numbers and definitions).

4.10.3 CALL USAGE LOGGING

Call Processing generates certain types of records and writes them to the Activity Log or Call Usage Log. Types of Usage Records are as follows:

Reassignment Messages - Whenever a Reassignment Rx Message, Reassignment Tx Message or Reassignment Clear Message is received from a module the Call Processor writes a Reassignment record to the Call Usage Log.

Directed Call (UID Call) - A Directed type (using special Group ID 236) Call Record is generated by the Call Processor and written to the Call Usage Log.

Telco Call - A Telco type (using special Group ID 237) Call Record generated by the Call Processor and written to the Call Usage Log.

Queued Call - Certain mobile originated Directed or telco calls may be Queued Calls. The Call Processor

writes either an SNM or TIM Queue Record to the Queued Call Log.

4.10.4 CSB USAGE

Call information is derived from the CSB (Channel Status Bus). The Call Processor notes a change of usage state when the Locality/Home/Group ID/Unique ID for a given Switch channel number changes.

The Start Date/Time is determined when the information goes from idle to active or from one Locality/Home/Group ID/Unique ID combination to another. The End Date/Time is determined when the information goes from active to idle or from one Locality/Home/Group ID/Unique ID combination to another.

When the CSB changes from one Locality/Home/Group ID/Unique ID combination to another, it is the end of one call and the beginning of another call for CSB Usage. This is a birth/death process and the Call Processor writes a CSB Usage Record to the CSB Usage Log at the end of the CSB call.

CSB calls can be divided into these three categories:

1. Group Dispatch Calls. They have a Group ID between 1-225 and a Home between 1-30

2. Special Calls are “Directed” which uses Group ID 236 and “Telephone” which uses Group ID 237.

3. Other calls which use Group IDs between 226-255.

For Special and Other calls, the Home value represents the channel that was being used instead of the radio’s registered Home. Occasionally a Home value of zero is used when the infrastructure cannot resolve the Channel or Home.

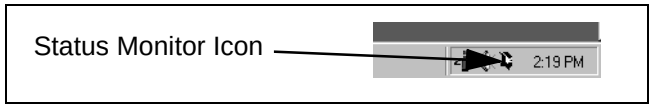
4.10.5 REGISTRATION LOGGING

Registration information is logged to a Registration Log. When Registration request messages are received from channel modules, the Call Processor creates a record in the Registration Log.

4.11 STATUS MONITOR

4.11.1 INTRODUCTION

The Status Monitor program shows log and message entries that have occurred on the Call Processor. It is totally independent of the Call Processor program. Clearing a status or deleting a message has no affect on the Call Processor. The main Status Monitor screen is shown in Figure 4-1. To display this screen, simply click the Viking logo in the system tray area of the screen (see below).



The face color of the Viking icon changes to indicate the most severe of the following conditions:

Color	Condition
White	Normal
Yellow	Warning
Red	Errors

The upper pane of the main screen indicates Call Processor messages as they occur. The bar graph in the lower pane indicates the percentage of Normal, Warning, and Error messages currently being displayed.

Right clicking the Viking icon in the system tray displays a menu which can be used to Exit the program, Hide/Show the display, and Reset Status (see following). If the Status Monitor program is not running, it is usually restarted by selecting Start > Programs > Startup > Status Monitor.

4.11.2 LOCAL SERVICE MENU

The following functions are selected by the Local Service menu shown above:

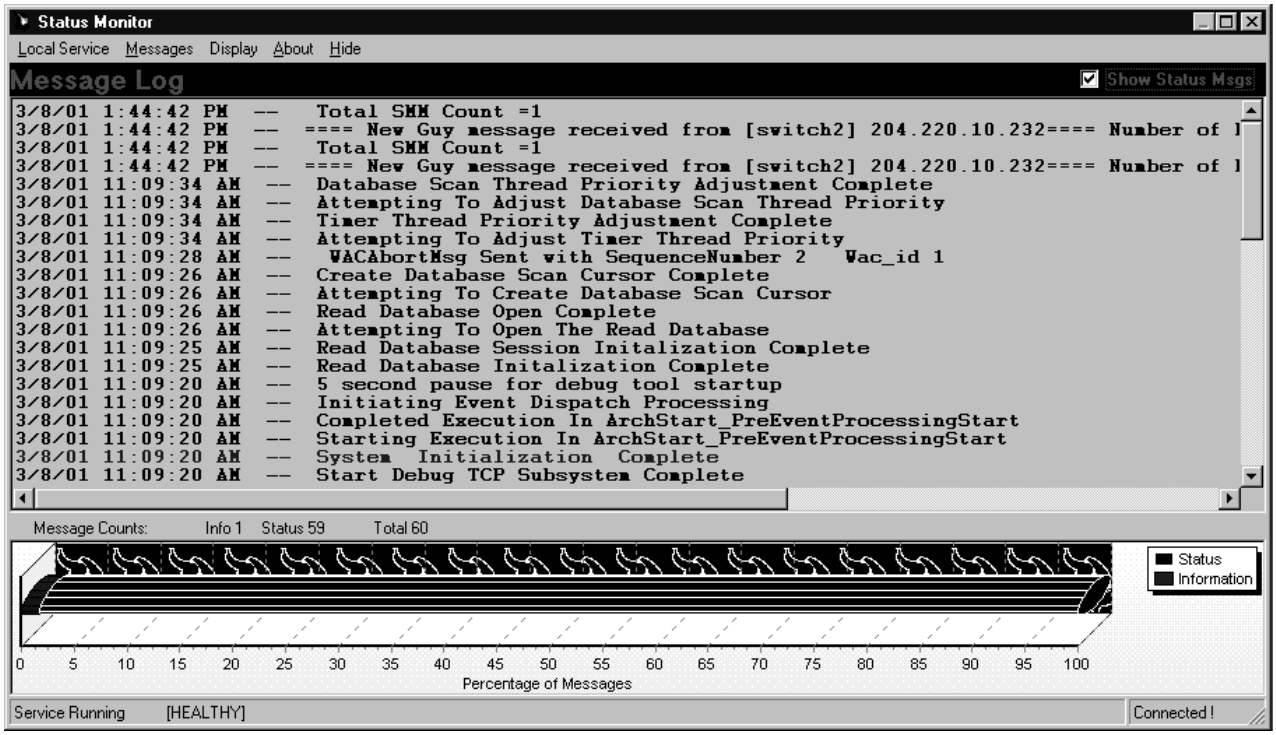


Figure 4-1 Call Processor Status Monitor Main Screen

Shutdown - Stops the Call Processor program.

Restart - Restarts the Call Processor program.

Show Console/Hide Console - Shows or Hides the following DOS window that also indicates Call Processor messages.

CAUTION

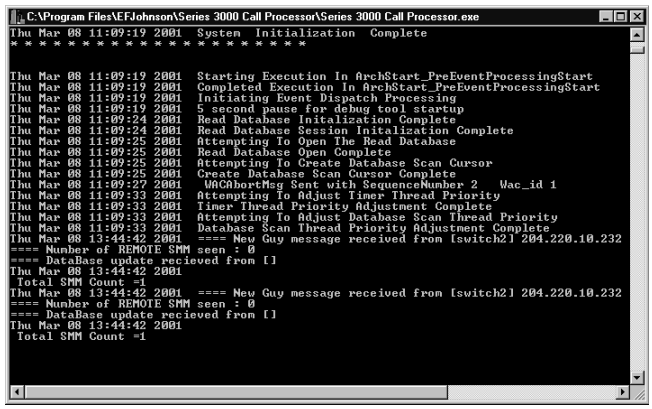
Selecting the close icon (X) in the Console window shown below Shuts Down the Call Processor program (a confirmation window is not displayed). Therefore, ***DO NOT*** *close this window unless this is what you want to do.*

4.11.3 MESSAGES MENU

The following functions are selected by the Messages menu shown above:

Reset Status - Clears only the status entries and the Viking head changes to white.

Clear All - Erases all messages, clears all the Status entries, clears the graph, and the Viking head changes to white.



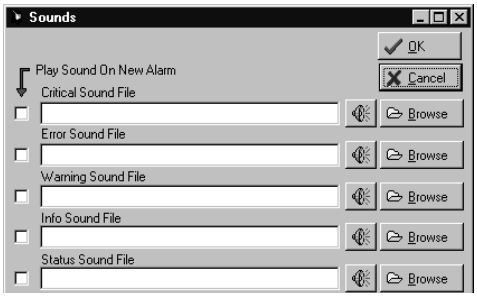
Call Processor DOS Window

Save To Disk - Saves the Status messages to a file in an RTF format.

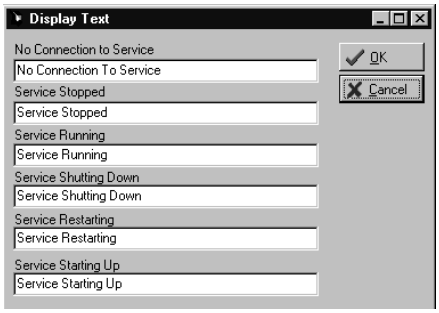
Limit . . . - Sets the maximum number of entries in the log. When the number of entries reaches this set number, a new entry is entered at the top of the log and the last entry drops off from the log.

4.11.4 DISPLAY MENU

Sounds - Displays the following screen which is used to program the sounds that occur when various events take place.



Status - Displays the following screen which is used to program the messages that are displayed when various events occur.



4.11.5 ABOUT MENU

About - Displays the following screen containing information about the Status Monitor program.

SECTION 5 SYSTEM AND SUBSCRIBER MANAGER (SSM)

SSM Main Screen Menu Bar

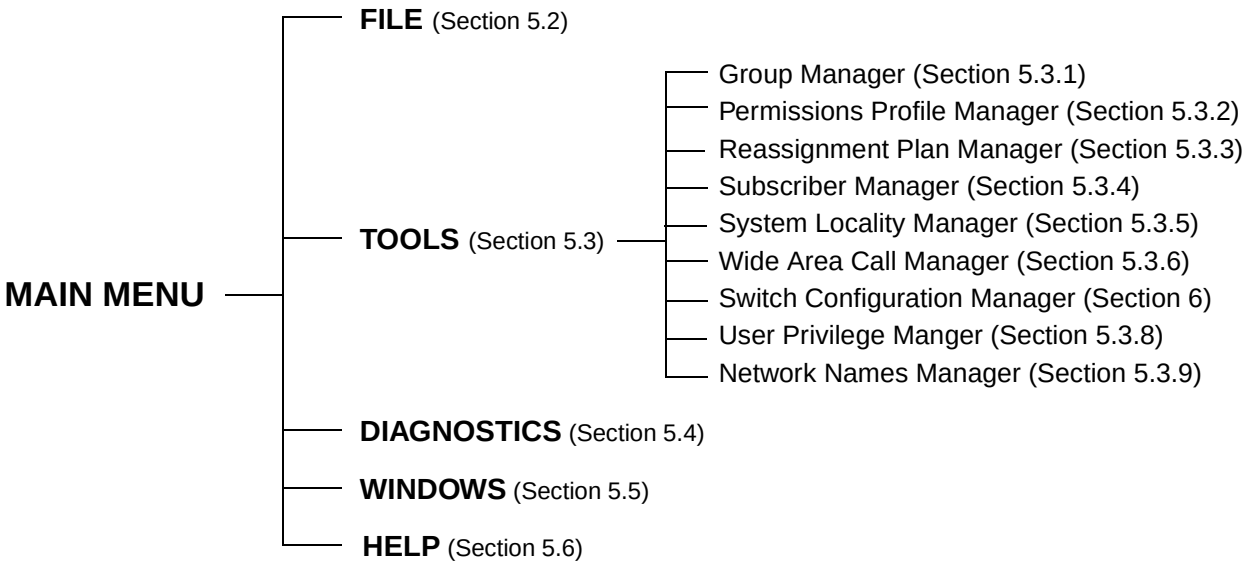


Figure 5-1 Main Screen Menu Structure

5.1 GENERAL

5.1.1 INTRODUCTION

The System and Subscriber Manager (SSM) administers the Multi-Net System. The Call Processor (CP) and SSM connect to the Switch as shown in Figure 3-5. The CP is described in Section 4. Some of the functions the SSM performs are as follows:

- Manage the database used by the Call Processor. This includes viewing, setting, or modifying the Locality/Home/Group ID and the Unique ID permissions.
- Monitor Switch operation and provide logging of information for billing purposes.
- Display alarm and current system configuration via a menu-driven display format.
- Generate reports from the information logged by the Call Processor.
- Disable, reprogram, interrogate, and reassign individual subscriber units.
- Enable and disable the modules of any Switch in the network.

The SSM program runs on the desktop (work station) of a personal computer that is equipped with the Windows NT® 4.0 operating system and a Pentium® 233 or better microprocessor. The CP and local SSM functions may run on the same computer if desired. The SSM program does not need to be continuously running for the Switches to operate, unlike the Call Processor program.

The information which follows describes the parameters that are programmed in the various SSM

screens. The main SSM menu and a flowchart of the menu structure are shown in Figure 5-1. Also shown is the section of this manual in which each function is described. The various SSM program functions are also summarized in Table 5-1.

Table 5-1 Main Menu Functions

Menu	Sub-Menu	Description
NOTE: The Window Title is user configurable using the Windows Menu described in Section 5.5.		
File	Select Network	Network Numbers refer to the network of Call Processors to which the SSM is linked. Network Names can be used along with numbers to make identification and selection easier.
	Reload Distributed Tables	Retrieves the latest table settings shared by all Switches.
	Properties	Selects the sounds from a Sounds file that play when an alarm is activated.
	Enter New Key	Enters a new encryption key when required for such things as enabling updated software or converting demonstration software to a fully operational program.
	Import From File	This allows previously exported text (.txt) files to be updated after external modification.
	Export To File	This function allows the current data to be written to a text file as tab Delimited Text (for importing to a spreadsheet program, for example) or in Formatted Text (for importing into a word processor program).
	Print	This function displays the current data on pages which can then be printed if desired.
	Exit	Closes the System and Subscriber Manager program.
Tools	Group Manager	Creates and maintains a Group ID list.
	Permissions Profile Manager	Configures Unique ID and telephone permission for Subscribers and Dispatcher Consoles.
	Reassignment Plan Manager	Allows Dynamic Reassignments (Reprogram) or Dynamic Selections (Move) to be entered and saved in a plan that can be executed at any time.
	Subscriber Manager	Allows the Unique IDs to be viewed and modified and subscriber units to be interrogated, disabled, etc.
	System Locality Manager	Programs the Switch ID number and the associated Locality IDs.
	Wide Area Call Manager	Configures Wide Area Calls using Home/Group ID/Locality data.
	Switch Configuration Manager	Global Switch Locality configuration of shelves, modules and Telco call logs and System monitor functions (see Section 6).
	User Privilege Manager	Used by the System Administrator to set which SSM functions are available to Subscriber Managers.
	Network Names	User defined name assigned to system components on a Logical Network to aid in the identification of other components on the Logical Network. There may be multiple Logical Networks on a single Physical Network.
Diagnostics	Call Processor List	Shows all active Call Processors on the current Logical Network .
	Receiver Buffer	Shows Switch specific Network traffic.
	Send Who's There	Issues a broadcast message to all Call Processors on the Network. Responses to the broadcast can be viewed using the preceding Receiver Buffer window.
Windows	Cascade or Tile	Arranges all open windows in either a "block" or "overlay" format.
	Set Title	Allows the System Administrator to change the name of the main window.
Current User	See Section 5.3.8 on page 5-15	Network name of the user logged in to the computer running the SSM.
Current Network		Name of the Network in which the SSM is operating (see Section 5.3.9 on page 5-17).

5.1.2 SETTING UP NEW SYSTEMS

When setting up a new Multi-Net system, certain parameters must be programmed before others. Therefore, it is recommended that the following programming order be followed:

Local Switch

1. Installation Properties (Section 6.3)
2. Configure Switch Cards (Sections 6.1.3 and 6.4)

Distributed Tables

3. System Locality Manager (Section 5.3.5)
4. Permissions Profile Manager (Section 5.3.2)
5. Group Manager (Section 5.3.1)
6. Subscriber Manager (Section 5.3.4)
7. Wide Area Call Manager (Section 5.3.6)
8. Reassignment Plan Manager (Section 5.3.3)

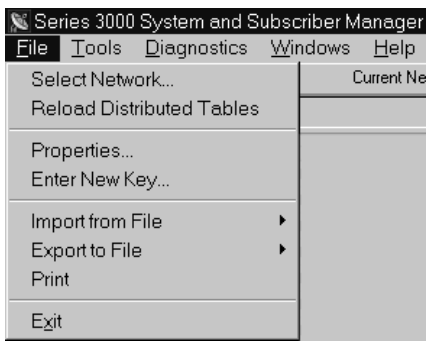
Local PC

9. User Privilege Manager (Section 5.3.8)
10. Network Names Manager (Section 5.3.9)

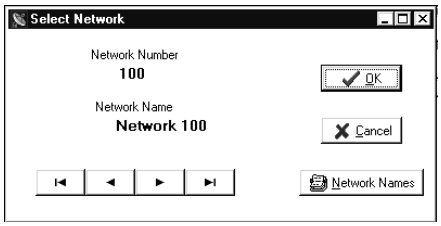
Some of the information required to program a system is as follows:

- Name of switch
- Number of localities
- Name of each locality
- Number of repeaters at each locality
- Conventional repeaters (if any)
- Number of CIMs required in switch (one per rptr)
- What talk groups will be set up and which locality will be the home of each.
- What unique IDs will be assigned to each home repeater

5.2 FILE MENU



5.2.1 SELECT NETWORK



The File Menu “Select Network” parameter selects the Network of Call Processors to which the System and Subscriber Manager is attached.The Network(s) in which a particular System and Subscriber Manager can operate is determined by the System Administrator.

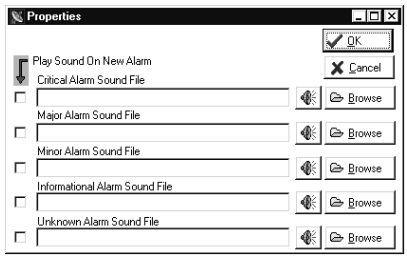
The Networks can be given names to make identification and selection easier. Network names are entered using the Tools > Network Names menu described in Section 5.3.9.

5.2.2 RELOAD DISTRIBUTED TABLES

The File Menu “Reload Distributed Tables” parameter reloads distributed tables by retrieving the latest table settings shared by all Switches.

5.2.3 PROPERTIES

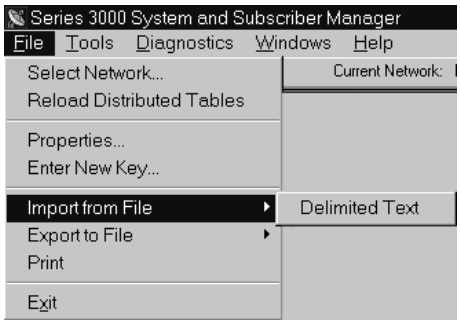
The Files > Properties screen which follows selects the sound that plays when specific alarms are activated.



5.2.4 ENTER NEW KEY

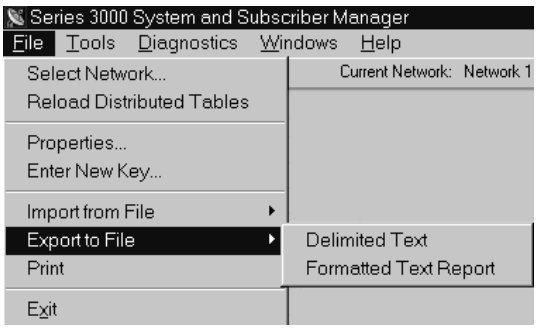
This screen is used to enter a new encryption key when required for such things as enabling updated software or converting demonstration software to a fully operational program.

5.2.5 IMPORT FROM FILE



This function allows previously exported text (.txt) files to be read back in. Do not attempt any external modification of a text file that is to be imported because improper operation may result.

5.2.6 EXPORT TO FILE



This function writes the current table to a text file. The Delimited Text function formats the text in tab delimited columns for spreadsheet programs, and the Formatted Text Report function formats the text for viewing using word processor programs.

5.2.7 PRINT

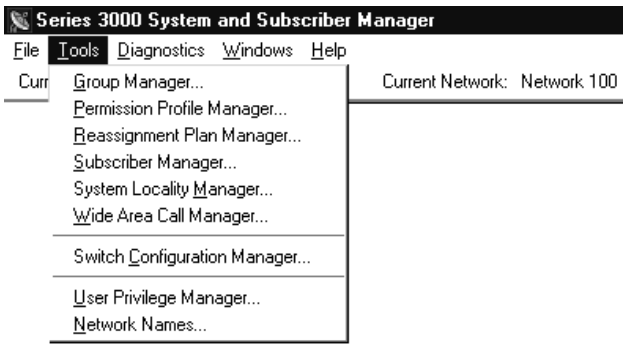
This function displays the current log, table, or data as it will look when printed. The displayed pages can then be printed if desired by clicking the printer icon on the top. The report can also be viewed, saved to a file, or another loaded by clicking other icons on top.

The print choices that are available depend on what table or log is currently being displayed. For example, if the Usage Log described in Section 6.3.8 is displayed, there are several different reports that can be selected.

5.2.8 EXIT

Exits the System and Subscriber Manager program.

5.3 TOOLS MENU



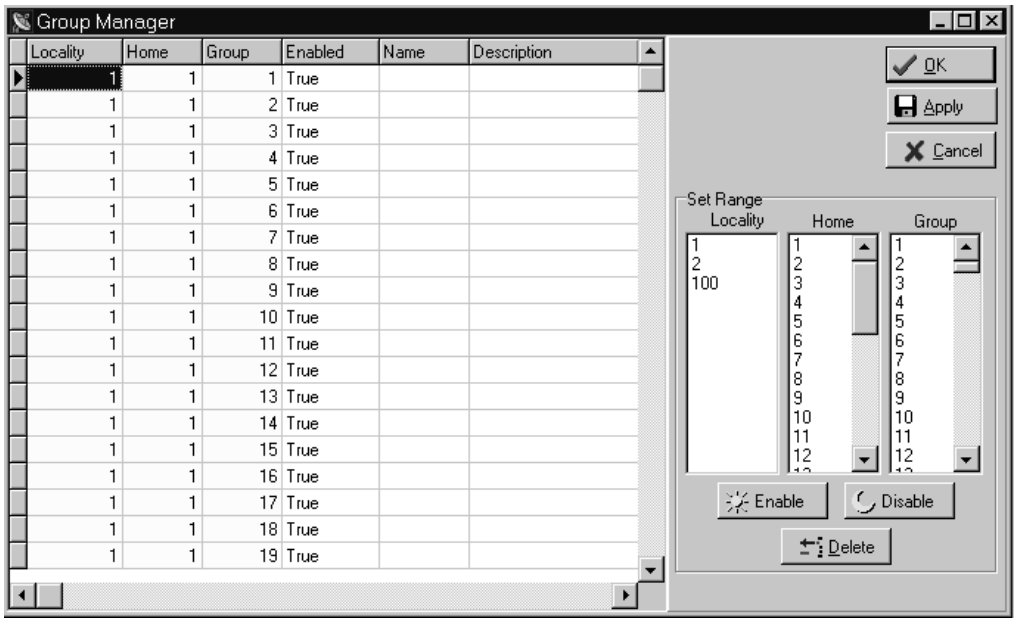
The preceding tools menu is used to select the screens for the program functions that are common to all Switches on the network. Parameters unique to individual Switches are programmed by the Switch Configuration Manager described in Section 6. The Tools screens and the section of this manual in which they are described are as follows:

5.3.1 GROUP MANAGER

The Group Manager screen shown in Table 5-2 creates and maintains the Group ID list. The Permission of Group IDs is set on a Locality/Home/Group basis. Up to 30 Home channels can be declared per Locality, and deletions and allocations are done per Locality/Home/Group.

The Locality/Home/Group combination to be programmed is selected in the right pane and then the applicable button (Enable/Disable/Delete) is clicked. The status of all groups in the network is indicated in the left pane. A name and description can be entered for each group to help identify it.

Table 5-2 Group Manager Screen

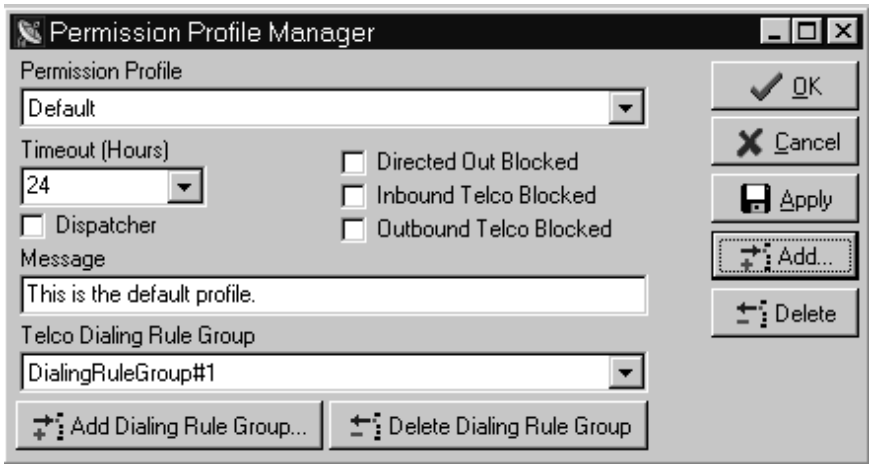


Function	Parameter	Description
Locality	1-255	Selects the Locality number.
Set Home	1-30	Selects the home repeater number.
Set Group	1-225	Selects the ID code of the group.
Enable	-	Activates Locality/Home/Group selection.
Disabled	-	Deactivates Locality/Home/Group selection.
OK	-	Saves the current data and closes screen.
Apply	-	Saves the current data without closing the screen.
Cancel	-	Closes the screen without saving the current data.
Delete	-	Deletes the selected Locality/Home/Group.

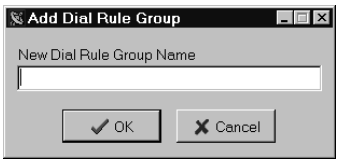
5.3.2 PERMISSIONS PROFILE MANAGER

The Permission Profile Manager screen is shown in Table 5-3. This screen is used to set up the permission profiles that are assigned to subscriber units and dispatch consoles. The assigned profile determines the unique ID and Telephone call rights of the unit.

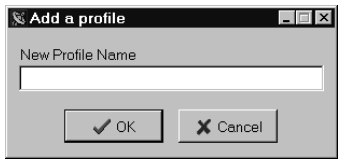
Table 5-3 Permission Profile Manager Screen



Permission Profile Screen



Add Dialing Rule Group Screen



Add Profile Screen

Function	Description
Permission Profile	Selects the Profile name to edit or click the “Add” button to create a new Permission Profile. The above Add Profile screen is displayed to enter the name of the new profile. The new name then appears in the Permission Profile drop down list.
Time Out	Registration Time-Out in hours. If a subscriber unit has not registered for this amount of time, an interrogate message is sent and de-registration occurs if no response is received.
Dispatcher	This is selected for consoles and not selected for mobiles/portables.
Directed Out Blocked	When checked, directed out (directed group/unique ID) calls are not permitted by the selected UID.
Inbound Telco Blocked	When checked, incoming Telco calls are not allowed.
Outbound Telco Blocked	When checked, outgoing Telco calls are not allowed.
Message	A note for the System Operator that provides more information about the Profile.
Telco Dialing Rule Group	Selects the desired Dialing Rule from a list. Refer to the Switch Configuration Manager description in Section 6 for more information.
Add Dialing Rule Group	Adds a new Dialing Rule Group to the existing list. The new group must then be set up as described in 6.3.10.
Delete Dialing Rule Group	Deletes the selected Dialing Rule Group from the existing list.
Save	Causes Permission Profile data to be immediately stored and used by the Call Processor.
Cancel	Unsaved changes to the Permission Profile are disregarded and the screen is closed.
Add	Adds a new Profile Name.
Delete	Deletes the selected Profile from the Profile List.

5.3.3 REASSIGNMENT PLAN MANAGER

NOTE: Refer to Sections 4.8 and 4.9 for more information on this feature.

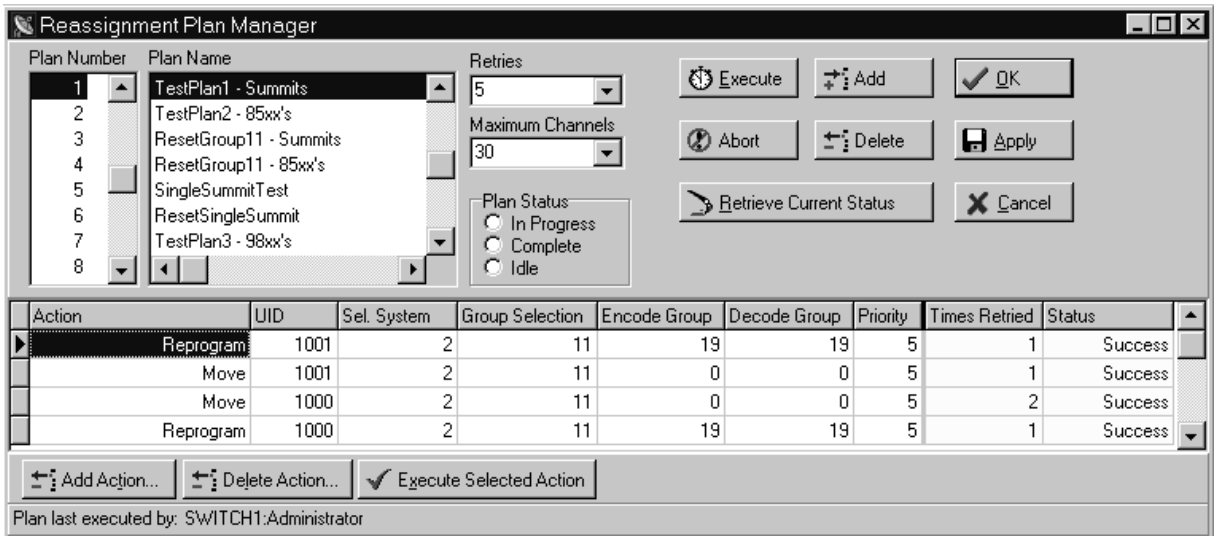
The Reassignment Plan Manager screen is shown in Table 5-4. This screen allows Dynamic Reassignments and Selections to be entered and saved in a plan that can be executed at any time. Dynamic Reassignments reprogram Group 11 of the specified selectable system in specified subscriber units with new encode and decode IDs and access priority. Dynamic Selections automatically move the specified subscriber units to another selected system/group (for example, to receive an important message).

The System and Subscriber Manager configures and manages the operation of Reassignment Plans and displays which Reassignment Plan is active. Only one plan in the entire system (including all System and Subscriber Managers) can be active at any one time.

If no plan is active, the System Manager has the ability to select a plan from a list and initiate the execution of the selected plan. Once a plan is initiated for execution, the Call Processor maintains a history of the successes and failures of the Reassignment Plan's transactions. Each success or failure records the transaction, and a time stamp. When a plan is complete or is aborted (stopped) the history is written to non-volatile storage on the Call Processor at the time of each transaction. A System Manager (verified with an abort Yes/No question that must be explicitly answered) can abort an executing plan.

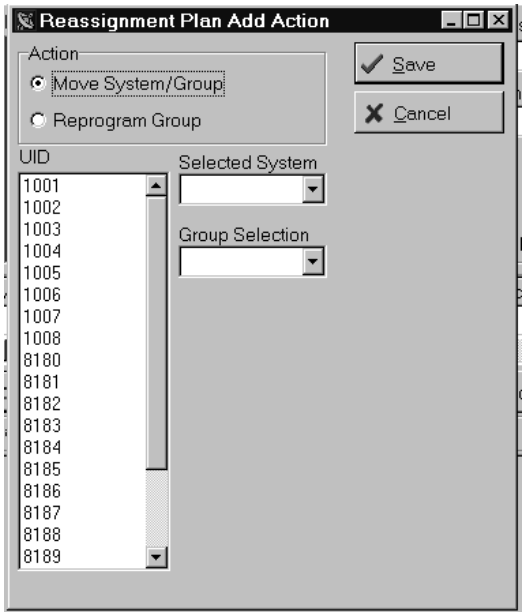
The System and Subscriber Manager can display a selected plan history to view from a list of Reassignment Plans executed. Once a plan is initiated for execution the Call Processor writes a log record indicating a Reassignment Plan execution was initiated, which plan was initiated, the System Manager ID logged in at the initiation and a time stamp. The System and Subscriber Manager displays a Reassignment Plan is executing and which plan is active.

Table 5-4 Reassignment Plan Manager Screen

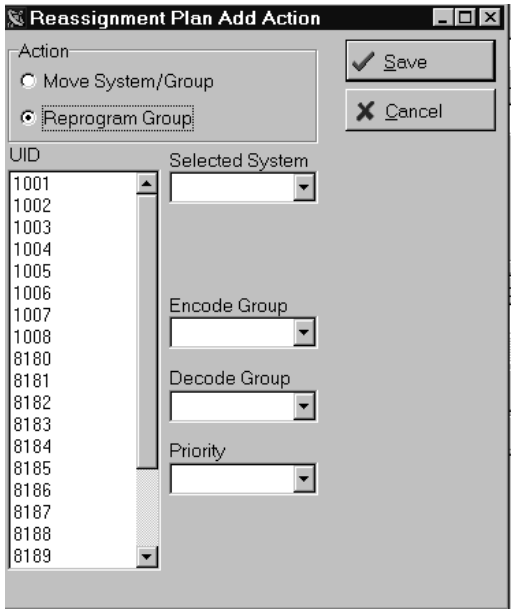


Function	Parameter	Description
Plan Number		A unique number assigned to a Reassignment Plan.
Plan Name		Reference name assigned to the plan number.
Retries		Maximum number of times an attempt should be made to reach a mobile upon initialization of a Reassignment Plan.
Maximum Channels		The maximum number of channels this Plan is allowed.
Plan Status	In Progress, Complete, Idle	The result of attempts made to contact the mobiles.
Execute		Starts implementing the selected plan.
New		Sets up the screen to create a new Reassignment Plan.
OK		Saves current data shown and closes dialog.
Abort		Halts the currently executing Reassignment Plan.
Delete		Deletes the selected Reassignment Plan.
Apply		Saves the current configuration and leaves dialog open.
Retrieve Current Status		Displays the current Reassignment Plan information.
Cancel		Deletes data entered for a new Reassignment Plan.
Execute Selected Action		Executes only the individual action selected by the cursor.
Delete Action		Deletes only the individual action selected by the cursor.
Add Action		Includes a new individual action to the plan.
Action	Move, Reprogram, Group Tag	Move mobile to a different System/Group, Reprogram mobile to Group 11 or Reassign a new Group Tag.
Decode Group	0-225	Group ID programmed into Group 11 associated with the Home repeater to identify the Group to receive from.
Encode Group	0-225	Group ID programmed into Group 11 associated with the Home repeater to identify the Group to transmit with.
Group Selection	0-99	Group to use to move to in the selected System.
UID	1-8163 (8164-8191 reserved)	Unique ID assigned the mobile unit.
Priority	1=highest, 5=lowest	Priority Access number.
Select System	1-16	Select new system number for Dynamic Reassignment/Selection.
Times Retried		The number of times attempted to contact an individual mobile.
Status		Result of the attempts made for the individual mobile.
Plan List executed by		This is the Computer name and User's NT login name.
NOTE: To print a Reassignment Plan report, select File > Print from the main menu bar.		

Table 5-5 Multi-Net Reassignment Plan Add Action Screens



Action: Move System/Group



Action: Reprogram Group 11

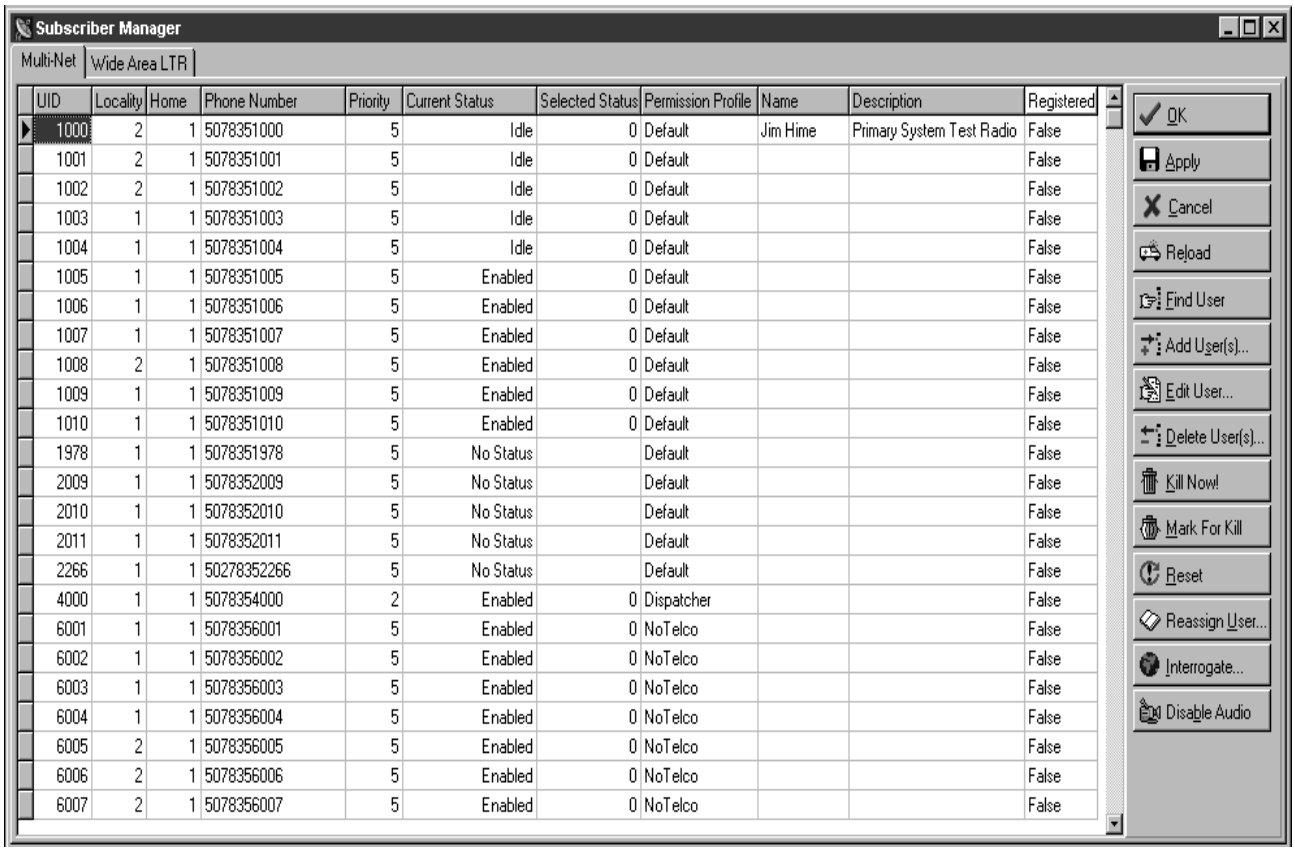
Function	Parameter	Description
Action	**Move System/Group**	Assigns different System/Group Numbers.
Unique ID	1-8163 (8164-8191 reserved)	Unique ID assigned the Mobile unit.
Selected System	1-16	Select a new System number for Dynamic Reassignment.
Group Selection	0-225	Group ID to send Dynamic Reassignment to.
Action	**Reprogram Group 11**	A Unique ID is reprogrammed over-the-air with a new System/Group.
Encode Group	0-225	This is a "Transmit To" Group ID that is associated with the Home repeater programmed into Group 11.
Decode Group	0-225	This is a "Receive From" Group ID that is associated with the Home repeater, programmed into Group 11.
Priority	1=highest, 5=lowest	Priority Access number.

5.3.4 SUBSCRIBER MANAGER

The Subscriber Manager screen is shown in Table 5-6. This screen allows the configuration of Unique IDs to be viewed or modified. It can also Suspend Audio, Terminate/Kill a Unique ID (immediately or wait until the next activation), Reassign a User, and Interrogate a mobile. Responses to these requests are displayed by a special User Message screen. This screen can also be displayed by selecting Diagnostics > User Messages as described in Section 5.4.4.

New Users can also be added or edited and Permission Profiles added or edited. The status of the selected user is indicated. A User's Telephone Number, Priority, and Permission profile may be changed directly in this screen.

Table 5-6 Subscriber Manager Screen



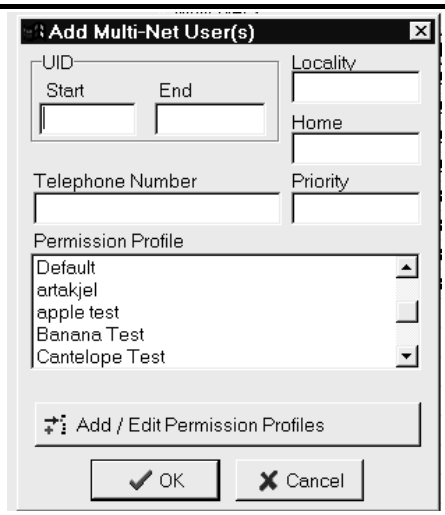
UID	Locality	Home	Phone Number	Priority	Current Status	Selected Status	Permission Profile	Name	Description	Registered
1000	2	1	5078351000	5	Idle	0	Default	Jim Hime	Primary System Test Radio	False
1001	2	1	5078351001	5	Idle	0	Default			False
1002	2	1	5078351002	5	Idle	0	Default			False
1003	1	1	5078351003	5	Idle	0	Default			False
1004	1	1	5078351004	5	Idle	0	Default			False
1005	1	1	5078351005	5	Enabled	0	Default			False
1006	1	1	5078351006	5	Enabled	0	Default			False
1007	1	1	5078351007	5	Enabled	0	Default			False
1008	2	1	5078351008	5	Enabled	0	Default			False
1009	1	1	5078351009	5	Enabled	0	Default			False
1010	1	1	5078351010	5	Enabled	0	Default			False
1978	1	1	5078351978	5	No Status		Default			False
2009	1	1	5078352009	5	No Status		Default			False
2010	1	1	5078352010	5	No Status		Default			False
2011	1	1	5078352011	5	No Status		Default			False
2266	1	1	50278352266	5	No Status		Default			False
4000	1	1	5078354000	2	Enabled	0	Dispatcher			False
6001	1	1	5078356001	5	Enabled	0	NoTelco			False
6002	1	1	5078356002	5	Enabled	0	NoTelco			False
6003	1	1	5078356003	5	Enabled	0	NoTelco			False
6004	1	1	5078356004	5	Enabled	0	NoTelco			False
6005	2	1	5078356005	5	Enabled	0	NoTelco			False
6006	2	1	5078356006	5	Enabled	0	NoTelco			False
6007	2	1	5078356007	5	Enabled	0	NoTelco			False

Function	Parameter	Description
UID	1-8163 (8164-8191 reserved)	Unique ID assigned to a subscriber mobile unit. Select a UID and update the telephone number and priority.
Locality	1-255	Locality the UID is currently registered in.
Home	1-30	UID's Home repeater with in the registered Locality.
Phone Number	10-numerical digits	Unique 10-digit number associated with the UID.
Priority	1-5	There are 5 levels of access priority ranging from priority 5 as the lowest to priority 1 as the highest.
Current Status	Information Only	The System Level status of the user (Active, Idle, Timed Out, Marked For Kill, Killed, Audio Disabled).
Selected Status	Information Only	Last reported status of the selected user.
Permission Profile	See Section 5.3.2	Dialing permissions of the selected user.
Name	Text Field	A text string to identify the user.
Description	Text Field	A text string to define the user.
Registered		Indicates the current registration on the System.
OK		Saves the current configuration shown and closes dialog.
Apply		Loads the Subscriber Manager data for immediate storage and use by the Call Processor.
Cancel		Disregards unsaved changes to the Subscriber Manager list.
Reload		Reloads data from the Call Processor.
Find User		Enter the Unique ID of the User.
Add Users	See Table 5-7	Adds Users to the Management List.

Table 5-6 Subscriber Manager Screen (Continued)

Function	Parameter	Description
Edit User		Select a User and make required changes.
Delete Users		Eliminates the selected UID from the list.
Kill Now	Brings up dialog box	Disables the mobile with which the UID is associated.
Mark for Kill	Brings up dialog box	Disables the mobile upon incoming request to use the system.
Reset		Reactivates a UID killed or enables audio.
Reassign User		Programs Group 11 Group ID or Moves to a different System/Group.
Interrogate		A special interrogate message is sent that contains the UID code of the affected mobile.
Disable Audio		Disables the receive audio to a mobile selected by its UID.

Table 5-7 Add Multi-Net Users Screen

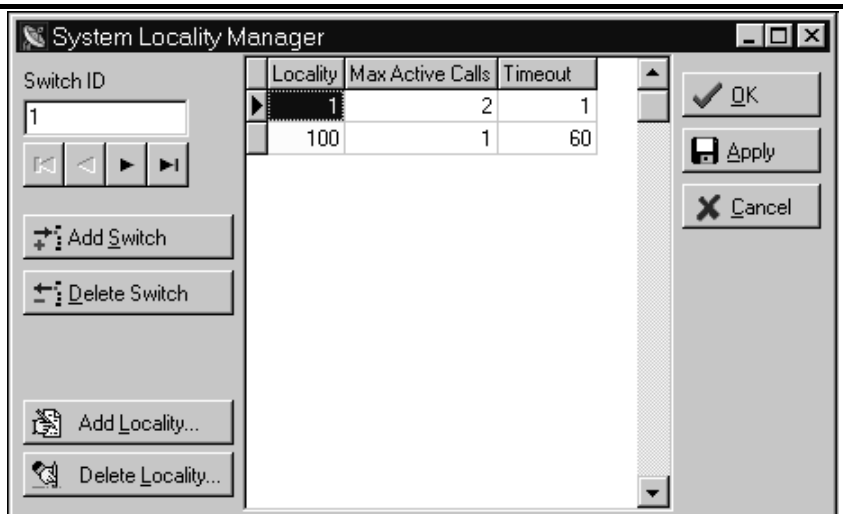


Function	Parameter	Description
UID Start/End	1-8163 (8164-8191 reserved)	Start and Ending Unique ID for this block of UIDs.
Locality	1-255	Locality the repeater is in.
Home	1-30	Relates to Home repeater number for this block of IDs.
Phone Number	10-numerical digits	Used when adding only one user. Unique number associated with UID.
Priority	1-5	There are 5 levels of access priority ranging from priority 5 as the lowest to priority 1 as the highest.
Permissions Profile		List of selected Permission Profiles for this User.
Add/Edit Permission Profile	See Section 5.3.2	Select a Permission Profile (created in Section 5.3.2) from the list to include or change.

5.3.5 SYSTEM LOCALITY MANAGER

The System Locality Manager screen is shown in Table 5-8. This screen sets the Switch ID number and the Locality IDs associated with that Switch. It also sets the maximum number of active calls permitted by the Switch, and wide area call group time-out per Locality.

Table 5-8 System Locality Manager Screen



Function	Parameter	Description
Switch ID	1-255	The Switch number used in this Locality.
Locality ID	1-255	The Locality number associated with the Switch.
Maximum Active Calls	0-16	The limit set for simultaneous active special calls (both UID and Telco).
WAC Group Time-Out	0-65,535 minutes	Group Time-Out for Wide Area Group tracking (see page 5-13).
Add Switch		Includes an entry to the Switch list.
Delete Switch		Removes a Switch from the list.
Add Locality		Includes a Locality ID to the Locality Manager list.
Delete Locality		Eliminates a Locality ID from the Locality Manager list.
Ok		Accepts the data entered and programs the changes into the Call Processor memory.
Cancel		Disregards unsaved changes to the Locality Manager List.

5.3.6 WIDE AREA CALL MANAGER

NOTE: Refer to Sections 1.3 and 4.5 for more information on wide area calls.

The Wide Area Call Manager screen is shown in Table 5-9. A Wide Area Call is a combination of Participants (Locality/Home/Group ID) that are brought together as a Wide Area Dispatch Call. Once activated in a WAM, it remains in the WAM until it is taken over by another Wide Area Call.

A Wide Area Call configuration contains a Wide Area Call Unique Identification number (WAC ID) that identifies the configuration to all Call Processors in the system. A Wide Area Call can track units by their Unique ID across multiple Localities, or by their Locality/Home/Group ID combination.

The Wide Area Call configuration contains multiple sets of single Home/Group ID/Locality data and multiple Home/Group ID/UID List/Locality List data sets. The Call Processor sends only the necessary Home/Group ID/Locality data to the WAM within the Call Processor's Switch.

A WAM can be given a maximum of 30 Home/Group ID/Locality data sets. A Switch can handle a maximum of 30 channels. If each channel was a single channel Locality, the maximum configuration becomes 30 data sets. The Default Tx UID is the only UID information given to a WAM.

The following is additional information on the parameter programmed in the Wide Area Call Manager screen.

Participant - Locality/Home/Group entry in a Wide Area Call.

Time-Out Behavior

Temporary - When a participant is marked "temporary", it is not loaded into a WAM until an actual radio has transmitted on that Locality/Home/Group. The participant then remains active for the WAC Group Time-Out duration (in minutes). This time-out timer is reset with each PTT on that Locality/Home/Group. The timer value can be changed for each Locality (default is 60 minutes) and is located in the System Manager under the Tools menu in the SSM (see Section 5.3.5).

Permanent - When a participant is marked "permanent", it is loaded into a WAM regardless of whether or not traffic has been seen for that particular Locality/Home/Group. When the WAC is loaded into a WAM, all participants that are marked as permanent are loaded into the WAM and channels are brought up accordingly.

By Unique ID (pull-down) - The time-out is from the Permission Profile of the Unique ID. Permission Profiles are described in Section 5.3.2, and they are assigned to Unique IDs as described in Section 5.3.4.

Default Transmit UID - In the event that the WAM does not have a UID available, the Default Unique ID (loaded in the WAM) is used. The default is 8180 and it is not recommended that it be changed as it ensures that a UID is in the data base.

Default Priority - This is a take-over priority that is used for allocating WAMs. When a call attempt is made and the WAC has not yet been programmed into a WAM, the Call Processor uses this priority to determine if a WAM is available. If the priority of the WAC being taken over is equal or greater, then the Maximum Inactive Time must have expired.

Maximum Inactive Time - The time (in seconds, default is 10 seconds) that a Wide Area Call remains reserved after a PTT and cannot be taken over by a WAC of equal or lesser priority.

If the priority of the WAC being taken over is less, then the Maximum Inactive Time does not matter. However, there can be no active call (PTT) on the WAM. Default priority is 5, with 1 being the highest. Priority level 1 is reserved for emergency use only and can be used to take over WACs regardless of whether or not someone is talking on the WAM. Use of priority level 1 as the default is not recommended and should be reserved for emergency use only.

Hang Time - This is a time in seconds that the channels can be ordered to hang for a Group in the Wide Area Call. This can be set from 0 - 7 seconds with the default set to 0.

WAC Group Time-Out - This parameter is programmed in the System Locality Manager screen described in Section 5.3.5. It is a value in minutes that a Temporary WAC participant remains active on a Locality between PTTs. The Temporary participant is not activated until a PTT is seen from that Group on that Locality. The default is 60 minutes.

Routing Group - The Routing Group number corresponds to the number assigned to WAMs (see Routing Group in Section 6.4.13). *NOTE: Do not use Routing Group 0 because it is reserved for internal WAM use*. When configuring Wide Area Calls, it is important to understand that by assigning a Routing Group to the call, the scope of the call may be limited.

For example: In a four-switch system, if a call is configured to use Routing Group 1 and the WAMs for this Group only connect Switches 1 and 2, then the call can never be activated in Switches 3 and 4 without reconfiguration of the Routing Group.

Examples:

WAC with Permanent Participants

WAC ID 1 is set up with 3 participants. All default values are chosen for WAC parameters.

Participant	Locality	Home	Group	Time-Out Behavior
1	1	1	1	Permanent
2	2	1	1	Permanent
3	3	1	1	Permanent

When activated in a WAM, this call brings up all three Localities if channels are available.

WAC with Temporary Participants

WAC ID 2 is set up with 3 participants. All default values are chosen for WAC parameters.

Participant	Locality	Home Group	Time-Out Behavior
1	1	1 2	Temporary
2	2	1 2	Temporary
3	3	1 2	Temporary

When activated in a WAM, this call brings up only the Localities that have had Group traffic.

Example:

If participant 1 keys up the radio, the WAC is loaded into a WAM. If there has been no traffic seen from participants 2 and 3, then only Locality 1 comes up. Once a user keys up on participant 2, then that Locality is added into the call. Each participant is active as long as the WAC Group Time-out has not expired (default is 60 minutes). The timer is reset each time there is a PTT for the participant.

WAC with Mixed Participants

WAC ID 3 is set up with 3 participants. All default values are chosen for WAC parameters.

Participant	Locality	Home Group	Time-Out Behavior
1	1	1 3	Permanent
2	2	1 3	Temporary
3	3	1 3	Temporary

When activated in a WAM, this call always brings up Locality 1 for participant 1. The other Localities come up if they have had Group traffic.

Example:

If participant 1 keys up the radio, the WAC is loaded into a WAM. If there has been no traffic seen from participants 2 and 3, then only Locality 1 comes up. Once a user keys up on participant 2, then that Locality is added into the call. Each participant is active as long as the WAC Group Time-out has not expired (default is 60 minutes). The timer is reset each time there is a PTT for the participant. Participant 1 is always activated regardless of PTTs seen on that Locality.

Takeovers

- System with one WAM
- Current WAC in WAM is WAC ID 1 with Default Priority set to 5
- Maximum Inactive Time set to 10 seconds

Default Priority = 5

- The WAC ID 1 User has just ended a conversation.
- The Maximum Inactive Timer is reset to 10 seconds.
- A User from WAC ID 2 with Default Priority 5 and Maximum Inactive Time set to 10 seconds keys up.
- The timer for WAC ID 1 has not expired, therefore, WAC ID 2 does not get the WAM.
- The User keys up a second time and the 10 second timer for WAC ID 1 has expired and WAC ID 2 gets the WAM.
- The WAM is now active for WAC ID 2.

Default Priority = 4

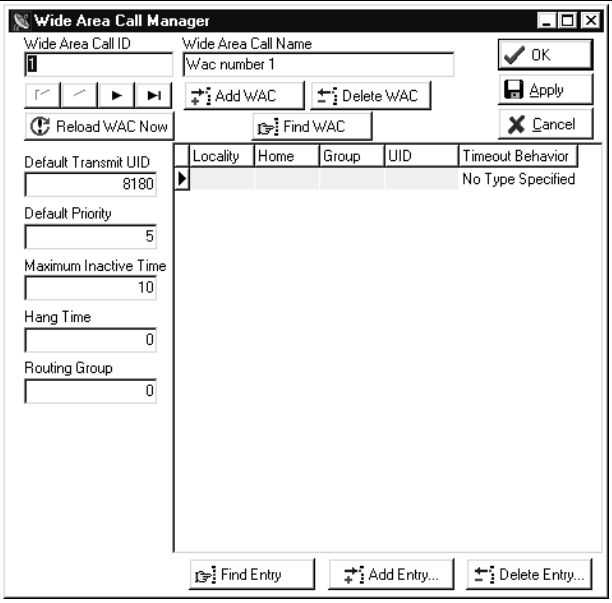
- The User for WAC ID 3 with Default Priority set to 4 and Maximum Inactive Time set to 10 seconds keys up just as WAC ID 2 is finished with a conversation.
- Even though the 10 second timer is active for WAC ID 2, WAC ID 3 has higher priority and therefore takes over the WAM card.

As demonstrated, by changing the values for Default Priority and Maximum Inactive Time, the utilization of the System can be changed. For more important WACs it may be necessary to increase the priority and also lengthen the Maximum inactive Time. This allows them to remain programmed into a WAM for a greater length of time between PTTs. If the system utilization is high, it may be necessary to reduce the Maximum Inactive Time on all WACs to allow more takeovers by all WACs.

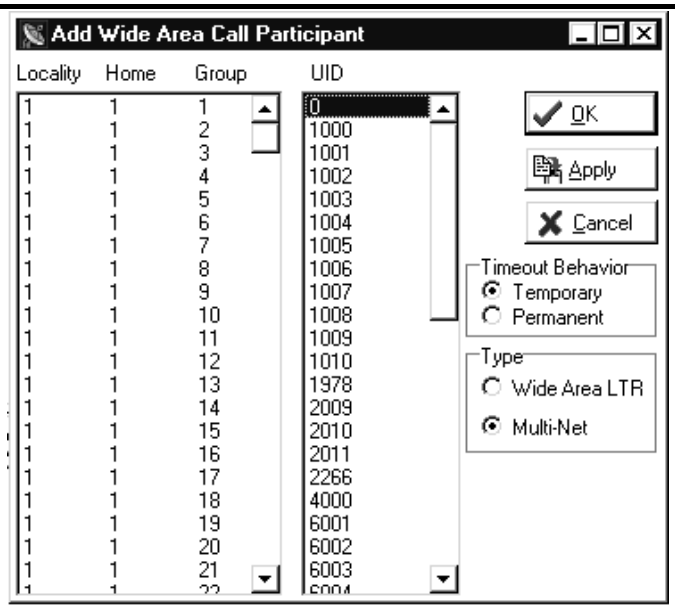
5.3.7 SWITCH CONFIGURATION MANAGER

Refer to Section 6 for information on the Switch Configuration Manager.

Table 5-9 Wide Area Call Screen



Wide Area Call Manager Screen



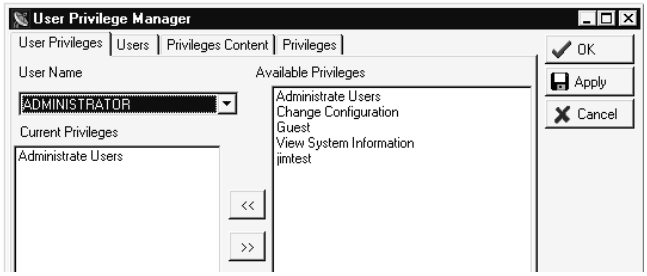
Wide Area Call Add Participant Screen

Function	Parameter	Description
Wide Area Call ID		Identification number for this Wide Area Call configuration.
Wide Area Call Name		Name assigned as a reference to the Wide Area Call ID.
Add WAC		Creates a new WAC configuration.
Delete WAC		Removes the selected WAC configuration.
Find WAC		Quickly displays the desired WAC by simply entering its number.
NOTE: For additional information on the following parameters, refer to Section 5.3.6.		
Default Transmit UID	8180	If an ID is not specified, this ensures that one is provided.
Default Priority	5	If a Priority Level is not specified this ensures that one is provided.
Maximum Inactive Time	1-255 sec (default = 10 sec)	The time (in seconds) that a WAC remains reserved after a PTT and cannot be taken over by a WAC of equal or less priority.
Hang Time	0-7 sec. (default = 0)	The length of time (in seconds) that the channels can be ordered to Hang for a Group in the WAC. Hang is when a repeater delays after a transmission until the repeater stops transmitting. For hang time to be active, it must also be enabled in the repeater by repeater programming.
Routing Group	(Do not use "0")	Assigns a routing group to the WAC (see Section 6.4.13).
Locality	1-255, 0=all	30 entries maximum, 2 entries minimum.
Home	1-30	Home repeater numbers of the units in the call list.
Group	1-225	Group ID numbers of the units in the call list.
UID	1-8163, 0=don't track	Unique IDs of the units in the call list. (UIDs 8164-8191 are reserved)
Add Entry		Allows adding a Locality/Home/Group/UID to the WAC list.
Delete Entry		Removes a selected Locality/Home/Group/UID from the WAC list.

5.3.8 USER PRIVILEGE MANAGER

The User Privilege Manager is used by the System Administrator to assign what portions of the SSM program will be available to each Subscriber Manager. The four different User Privilege screens that can be displayed by clicking the tab at the top are as follows:

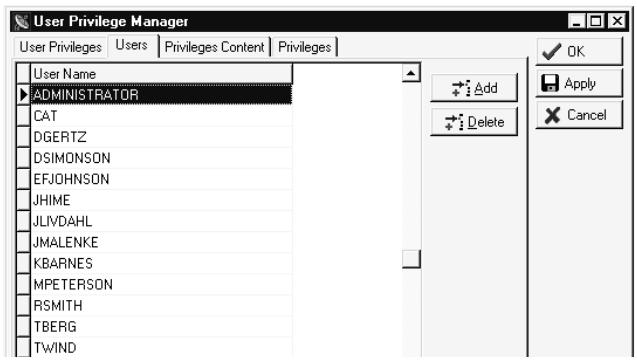
User Privilege Screen



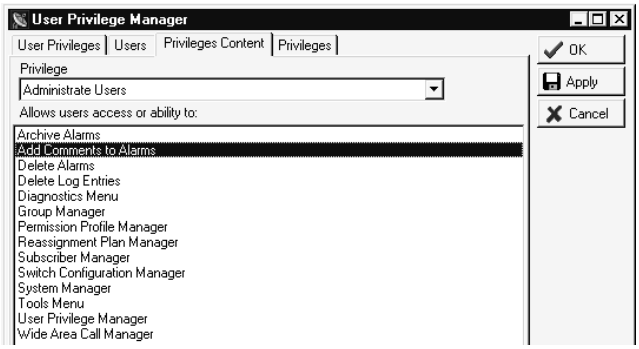
The User Privileges screen shown above is used to assign which user privileges are available to the user name selected by the drop down list.

Users Screen

The Users screen shown above is used to create and maintain the list of users. These are the NT login names used by Subscriber Managers.

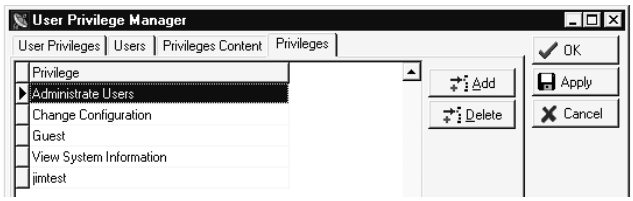


Privileges Content Screen



The Privilege Content screen shown above is used to program which privileges are included in each Privilege category. Privilege categories are added and deleted by the Privileges screen described next. Programming privilege categories makes assigning privileges more convenient when several users are assigned the same group of privileges. Table 5-10 lists the privileges that are assignable and the section of this manual in which it is described.

Privileges Screen



The Privileges screen shown above is used to add and delete Privilege categories that are programmed in the preceding Privilege Content screen.

Table 5-10 Assignable Privileges

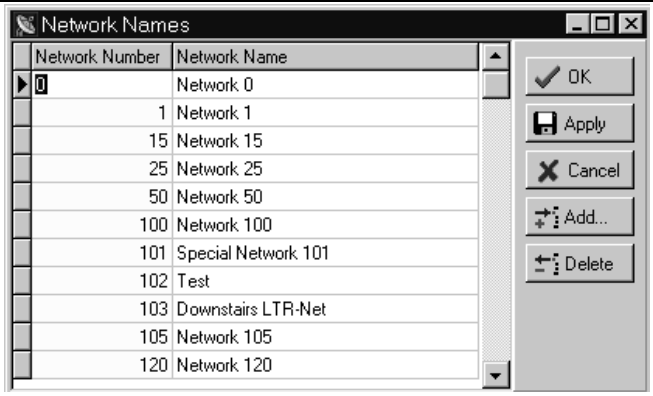
Privilege	Sect. No.
Alarms	6.2
Add Comments to	6.2
Archive	6.2
Delete	6.2
Tools Menu	5.3
Diagnostics Menu	5.4
Delete Log Entries	6
Change or View Dialing Rules	6.3.10
Change or View Groups	5.3.1
Change or View Permission Profiles	5.3.2
Change or View Reassignment Plans	5.3.3
Change or View Subscribers	5.3.4
Change or View Systems	5.3.5
Change or View Wide Area Calls	5.3.6
Change or View Switch Configuration	6
Change or View User Privileges	5.3.8
Change or View Network Names	5.3.9

5.3.9 NETWORK NAMES MANAGER

The Network Names Manager screen is shown in Table 5-11. This screen assigns names to the various Networks (Switches) that are controlled by the SSM.

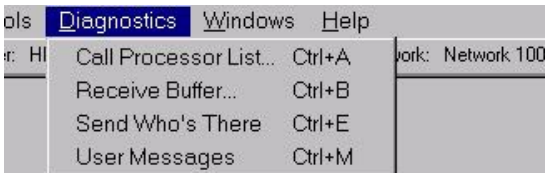
A Network Name is a user defined name assigned to system components on a Logical Network used to aid in the identification of other components on the Logical Network. There may be multiple Logical networks on a single Physical Network.

Table 5-11 Network Names Screen



Function	Description
Network Number	A unique number used to identify a Logical Network.
Network Name	A "human friendly" reference name associated with a specific Network Number.
Apply	Saves the current data without exiting the window.
Cancel	Exits the Network Name window without changing the Network Name data.
Add	Creates a new network number and name.
Delete	Removes the selected Network Number and Network Name from the list.

5.4 DIAGNOSTICS MENU



5.4.1 CALL PROCESSOR LIST

This window displays all Call Processors that are active on the current Logical Network.

5.4.2 RECEIVER BUFFER

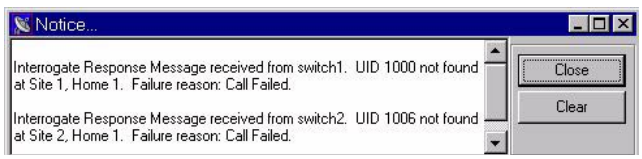
This window displays the Switch specific Network traffic.

5.4.3 SEND WHO'S THERE

This command issues a broadcast message to all Call Processors on the Network. Responses to the broadcast can be viewed using the Receiver Buffer window.

5.4.4 USER MESSAGES

This command displays a screen similar to the following which indicates responses to requests initiated from the Subscriber Manager screen such as Kill and Interrogate (see Section 5.3.4). Old messages continue to be displayed until the Clear button is clicked. Clicking the Close button simply closes the screen.



5.5 WINDOWS MENU

5.5.1 TILE

Displays all open windows in a “block” format.

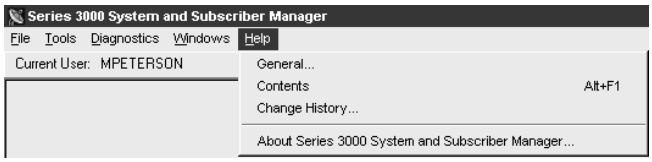
5.5.2 CASCADE

Displays all open windows overlayed, one on top of another.

5.5.3 SET TITLE

This screen follows, and it allows the System Administrator to change the name of the main window.

5.6 HELP MENU



5.6.1 GENERAL

This menu selection displays the Help window.

5.6.2 CONTENTS

This menu selection displays the Help Table of Contents window.

5.6.3 CHANGE HISTORY

This displays a text file describing the various changes that have occurred to the SSM software. The date and reason for each change are listed with the most recent change first.

5.6.4 ABOUT

Displays the screen shown above which indicates the version number of the software and other information.

SECTION 6 SWITCH CONFIGURATION MANAGER

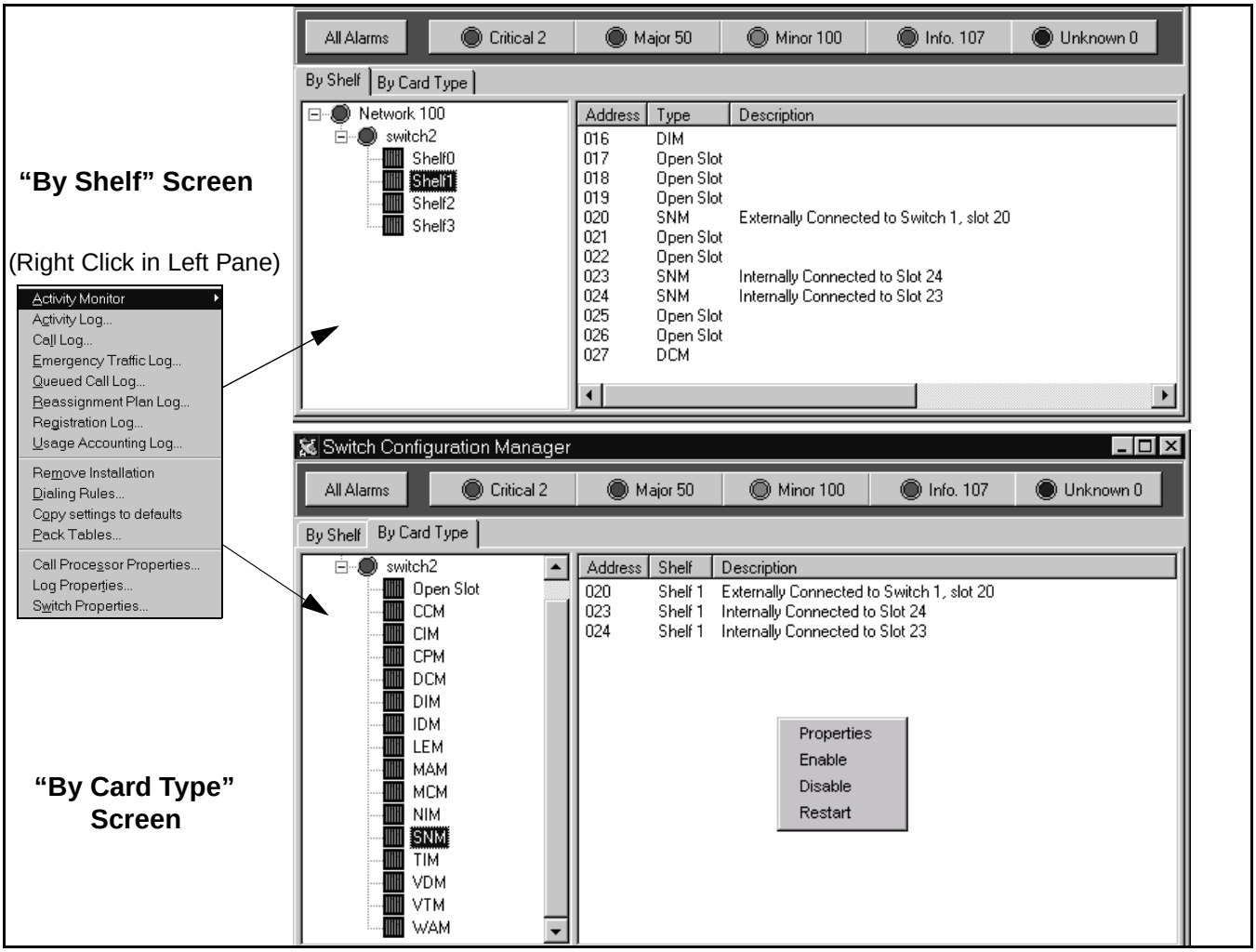


Figure 6-1 Switch Configuration Manager Screens

6.1 INTRODUCTION

6.1.1 GENERAL

The Switch Configuration Manager described in the following information is selected by the Tools > Switch Configuration Manager screen of the SSM as described in Section 5.3.

The Switch Configuration Manager programs individual Switch parameters such as Switch number, number of shelves, and the configuration of individual cards. It also displays various logs and other information for a switch. The other Tools menu functions program parameters common to all Switches in the Network.

6.1.2 DISPLAYING INSTALLED CARDS

The main Switch Configuration Manager screen is shown in Figure 6-1. Clicking the "By Shelf" tab displays what cards are in each shelf and what slots are empty. Then clicking the "By Card Type" tab displays a listing of the available cards. Then clicking a particular card displays the slot and shelf in which those cards are installed (if applicable).

6.1.3 SELECTING CARD TO CONFIGURE

To select a card to configure, double click the address of the card or right click the mouse in the right pane and select "Properties" in the pop up screen that is displayed (see Figure 6-1). The card configuration

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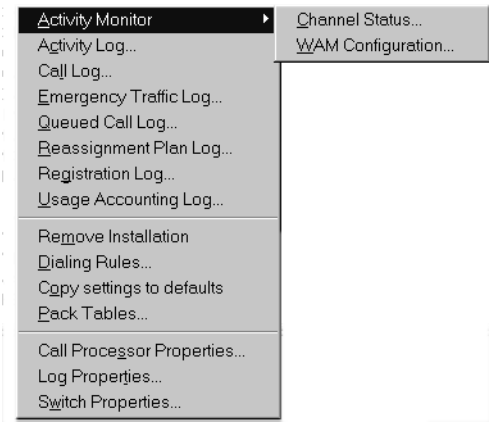
screen is then displayed which defines the attributes of the particular card that was selected. Refer to the following sections for more information on card programming:

Card	Section
Global Card Properties	6.4.1
CCM	6.4.2
CIM	6.4.3
DCM	6.4.4
DIM	6.4.5
IDM	6.4.6
LEM	6.4.7
MAM	6.4.8
MCM	6.4.9
SNM	6.4.10
TIM	6.4.11
VDM	6.4.12
WAM	6.4.13

6.1.4 SELECTING ACTIVITY MONITOR, LOGS, AND PROPERTIES

To display the submenu used to display switch activity monitors, logs, and properties, select the desired Switch if applicable and then right click the mouse in the left pane of the main screen shown in Figure 6-1. The pop-up menu shown below is then displayed.



The functions in this menu are described in following sections:

Function	Section
Activity Monitor	6.3.1
Activity Log	6.3.2
Call Log	6.3.3
Emergency Traffic Log	6.3.4
Queued Call Log	6.3.5
Reassignment Plan Log	6.3.6
Registration Log	6.3.7
Usage Accounting Log	6.3.8
Remove Installation	6.3.9
Dialing Rules	6.3.10
Copy Settings To Defaults	6.3.11
Pack Tables	6.3.12
Call Processor Properties	6.3.13
Log Properties	6.3.14
Switch Properties	6.3.15

NOTE: Displayed windows can be resized by dragging an edge or corner, a table column can be temporarily resized by dragging it in the heading, and columns can be sorted by clicking the column heading.

6.1.5 SELECTING OTHER INSTALLATION

To display a Call Processor that is not running or is being added to the Network, right click on the network name in the Switch Configuration Manager main screen. Then click the “Other Installation” pop-up screen that is displayed. The following dialog box is then displayed to enter the name of the desired Call Processor.

6.2 ALARMS

6.2.1 GENERAL

NOTE: An alarm listing is located in Table A-1 in Appendix A in the back of this manual.

When errors occur on either the Intra-Terminal Data Bus (IDB) or the Call Processor they are displayed by the Switch Manager in one of the five

Alarm categories listed below. Note that the Critical, Major, and Minor alarms report a failure that requires action to fix it. However, Informational Alarms do not indicate a failure. They are intended only as a tool to provide the system operator with information on system performance.

Informational messages indicate such normal occurrences as the successful completion of a task, not enough channels to include everyone in a wide area call, and no free WAMs available at the time a call was placed. These messages are one information source that a system administrator can use to determine when additional channels or switch modules may be needed. If desired, these messages can be suppressed by entering "0" for the Information Alarm Limit on the Log Properties screen. However, it is recommended that these messages not be suppressed.

Critical: The device is unavailable and it may have stopped operating.

Major: A problem has been reported that is causing some degradation in operation.

Minor: A condition has been reported that may be causing some degradation in operation.

Informational: A condition has been reported that may be normal or undesirable.

Unknown: The event that caused this alarm is not known to the System, so no severity can be assigned.

If an alarm condition exists on a Network or Switch, a colored dot is displayed to the left of the Network or Switch on the main Switch Configuration Manager screen (see Figure 6-1). This dot indicates the most important alarm that has been detected. For example, if a red dot is indicated to the left of Switch1, a critical alarm has been detected on that Switch.

The severity assigned to alarms can be changed in the Log Properties screen described in Section 6.3.14. Simply click the Alarm Severity button and then click the right side of the severity box of the alarm to be changed. This displays a drop-down list which is used to select the desired severity.

6.2.2 DISPLAYING ACTIVE AND ARCHIVED ALARMS

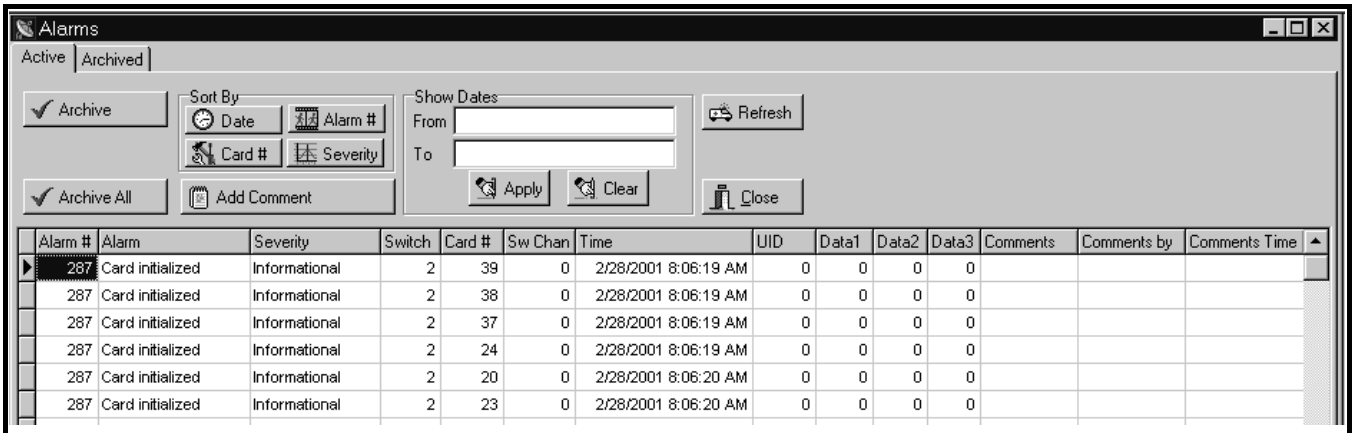
To display the alarms which have been detected on a Switch, click on the switch and then click the applicable button at the top. For example, to display any Major alarms on Switch1, click Switch1 and then the Major button on the top. To display all alarms on a Switch, click the All Alarms button instead.

The Active/Archive Alarm screen described in Tables 6-1 and 6-2 is then displayed. An alarm condition is cleared by moving all Active Alarms in a category to the Archived Alarms table. The alarms in a screen can be sorted by Date, Number, Card, or Severity. Alarms can be archived individually by selecting the alarm and clicking the Archive button or all alarms in the screen can be archived by clicking the Archive All button. Alarms can also be displayed by date. Appendix A lists the various alarm conditions that may be displayed.

6.2.3 REPEATER ALARMS

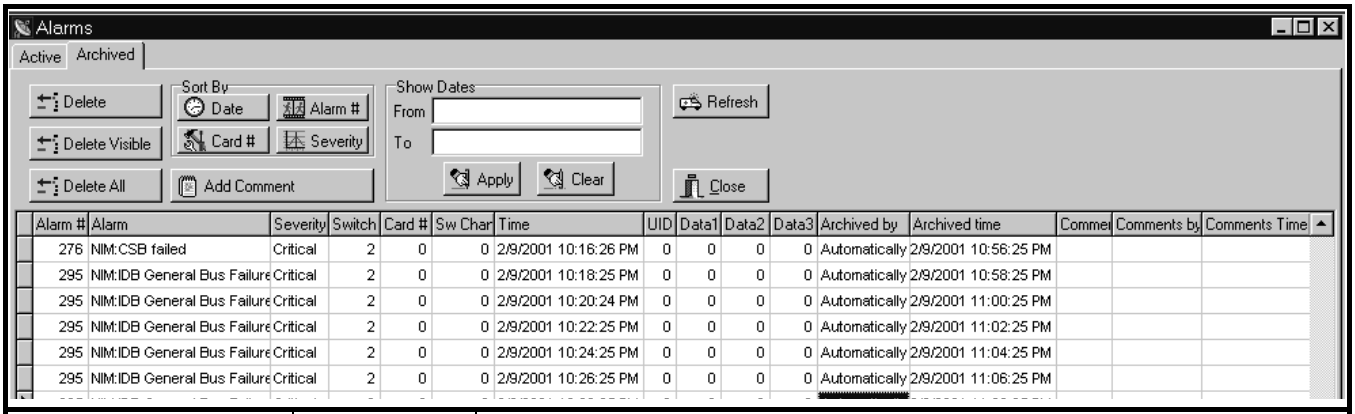
Repeater alarm reporting is optional (see Section 1.5.2). The repeater alarms are numbers 324-358 and 402 shown in Appendix A. The external repeater alarms are 327-330 (IAC 1-IAC 4). These alarms can be given a unique description which identifies the repeater and the actual alarm that is occurring. These descriptions are programmed by the Log Properties screen described in Section 6.3.14. Click the Alarm Severity button and then in the screen that is displayed, click the Define IAC button (see Table 6-8).

Table 6-1 Active Alarm Screen

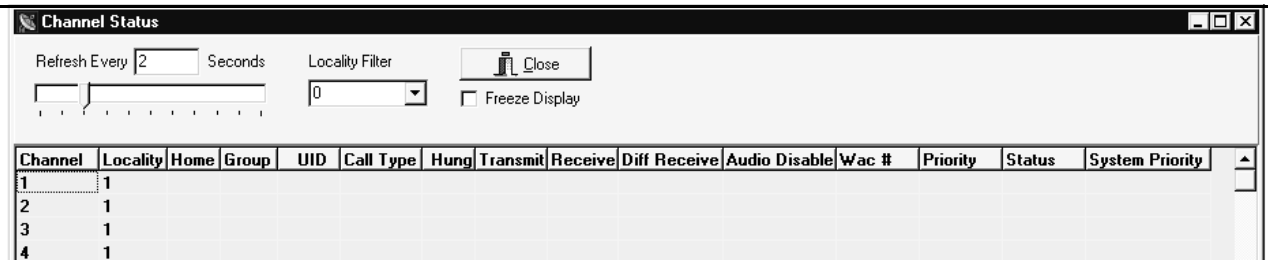


Function	Parameter	Description
Archive		Stores the selected alarm in the archive file.
Archive All		Stores all alarms in the archive file.
Sort By	Date	Lists alarms by Date/Time.
	Error	Lists alarms by severity.
	Device	Lists alarms created by individual module, data bus, etc.
	Severity	Lists alarms by degree of importance.
Add Comment		Reference to the operator about the alarm.
Show Dates	From - To	The Start-End date limits to display.
	Apply	Uses the entered date/time to retrieve data.
	Clear	Ignores entered dates and empties the field.
Refresh		Updates the displayed data with the most current entries.
Print		Sends the data displayed to a printer.
Close		Exits the window.
Alarm Number	Displays the Alarm Number (see Appendix A).	
Alarm	Displays the Alarm Name (see Appendix A).	
Severity	Displays the severity of the alarm (see Section 6.2.1).	
Switch ID	The number of the Switch where this alarm is registered.	
Card Address (1-288)	Displays the card (Module) slot number in the Switch.	
Switch Channel Number	Displays the channel number (1-30) for this Switch.	
Time	Displays the time stamp for the Alarm.	
UID	Displays the Unique ID of the Switch.	
Data 1-3	These are parameters assigned to the Alarms.	
Comments	Reference to the operator about the alarm.	
Comments By	Identifies the person that entered the comment.	
Comments Time	Indicates the time the comment was entered.	

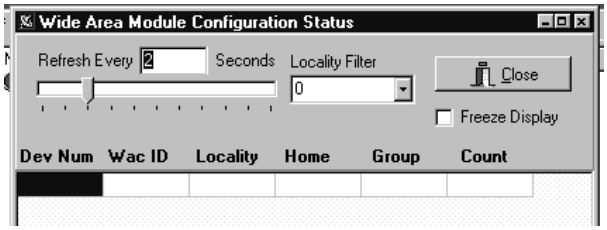
Table 6-2 Archived Alarms Screen



Function	Parameter	Description
Delete		Erases the selected alarm.
Delete Visible		Erases all alarms visible on the screen.
Delete All		Erases all archived alarms.
Sort By	Date	Arranges the order of alarms by Date/Time.
	Error	Arranges the order of alarms by error name.
	Device	Arranges the order of alarms by individual module, data bus, etc.
	Severity	Arranges the order of alarms by degree of importance.
Add Comment		Reference to the operator about the alarm.
Show Dates	From - To	The start-end date limits to display.
	Apply	Uses the entered dates to retrieve data.
	Clear	Ignores entered dates and empties the field.
Refresh		Updates the displayed data with the most current entries.
Print		Sends the data displayed to a printer.
Close		Exits the window.
Alarm Number	Displays the Alarm Number (see Appendix A).	
Alarm	Displays the Alarm Name (see Appendix A).	
Severity	Displays the severity of the alarm (see Section 6.2.1).	
Switch ID	The number of the Switch where this alarm is registered.	
Card Address (1-288)	Displays the card (Module) slot number in the Switch.	
Switch Channel Number	Displays the channel number (1-30) for this Switch.	
Time	Displays the time stamp for the Alarm.	
UID	Displays the Unique ID of the Switch.	
Data 1-3	These are parameters assigned to the Alarms.	
Acknowledged By	Identifies the person that acknowledged the alarm.	
Acknowledged Time	Indicates the date/time the alarm was acknowledged.	
Comments	Reference to the operator about the alarm.	
Comments By	Identifies the person that entered the comment.	
Comments Time	Indicates the date/time the comment was entered.	



Channel Status Screen



WAM Configuration Status Screen

Figure 6-2 Activity Monitor Screens

6.3 PROGRAMMING COMMON SWITCH PROPERTIES

NOTE: The menu which selects the screens described in the section is displayed by right clicking the mouse in the left pane of the main Switch Configuration screen (see Section 6.1.4).

6.3.1 ACTIVITY MONITOR

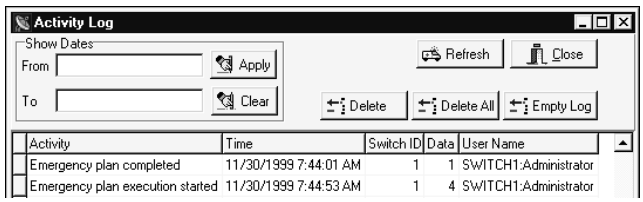
Channel Status Screen

The Channel Status screen shown in Figure 6-2 provides either a Periodical or On Demand update of the System. The user selects how often the display is refreshed and can choose to include all Localities or select a specific Locality with the filter. A freeze display is provided to view the display without updates changing the data on the screen. The refresh rate may be from 1-10 seconds on Periodic updates. A refresh rate of 0 enables a Manual Refresh button which can be used to view information On Demand.

WAM Configuration Status Screen

The WAM Configuration Status screen shown in Figure 6-2 is a Periodical or On Demand update of Wide Area Modules. The user selects how often the display is refreshed and can choose to include all Localities or select a specific Locality with the filter. A freeze display is provided to view the display without updates changing the data on the screen.The refresh rate may be from 1-10 seconds on Periodic updates. A refresh rate of 0 enables a Manual Refresh button which can be used to view information On Demand.

6.3.2 ACTIVITY LOG



The Activity Log screen is shown above. Whenever a Reassignment Plan is started or completed, it is recorded in the Activity Log. The Activity Log contains the activity name, a time stamp, the Switch ID, Data, and the User name. To print this log select File > Print.

6.3.3 CALL LOG

Telco Calls Log

The Telco Calls screen shown in Figure 6-3 displays a Telco Call record. When a Telco call request is received, the Call Processor begins the

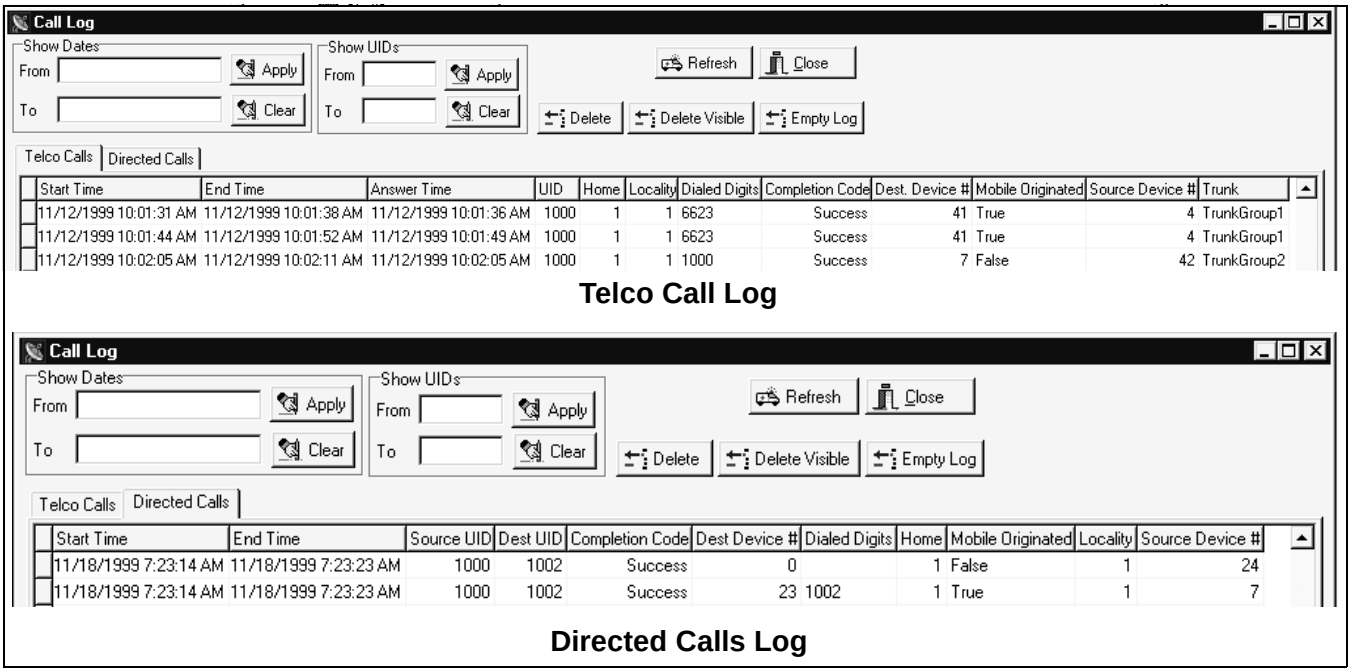


Figure 6-3 Call Log Screens

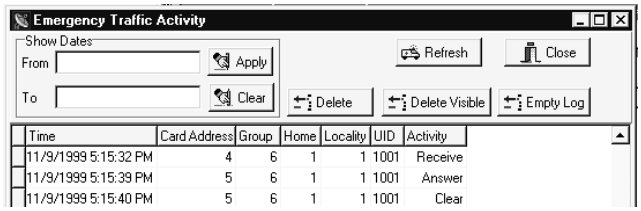
Telco Call Record. This record includes the Start Date/ Time, Originating Unique ID (if generated from a mobile), Dialed Digits, and Locality/Home used in the call. This type of call is typically a full-duplex call and uses a destination module (i.e. CIM/SNM/IDM/TIM etc.). The Call Processor is informed if the destination answers and the Date/Time it occurred. The originating unit notifies the Call Processor when the call is terminated and the End Date/Time is noted. To print this log, select File > Print.

Directed Calls Log

The Directed Calls Log screen shown in Figure 6-3 displays Directed Group and Unique ID Calls. When a Directed Call request is received, the Call Processor begins the Directed Call record. The Log displays the Start Date/Time, Originating Unique ID, Dialed Digits (if generated from a mobile), Destination Unique ID requested (if trunk side generated), and the Locality/Home used in the call.

This type of call typically uses a destination module (i.e. CIM/SNM/IDM etc.). The Call Processor is informed if the destination module answers and this is noted. The originating unit notifies the Call Processor when the call is terminated and the End Date/Time is noted. To print this log select File > Print.

6.3.4 EMERGENCY TRAFFIC ACTIVITY LOG



The Call Processor writes an Emergency record to Emergency Traffic Activity Log screen shown above whenever an Emergency Rx Message, Emergency Tx Message, or an Emergency Clear Message is received from a module. To print this log, select File > Print.

NOTE: The above screens are displayed by right clicking the mouse in the left pane of the main Switch Configuration Manager screen.

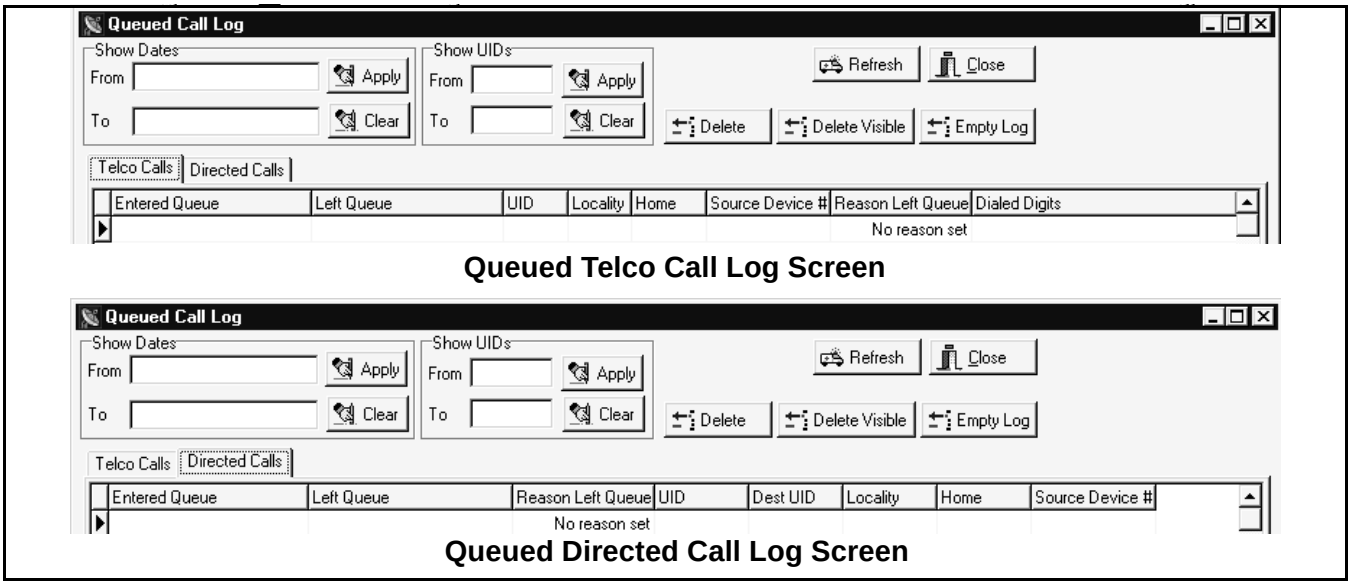


Figure 6-4 Queued Call Log Screens

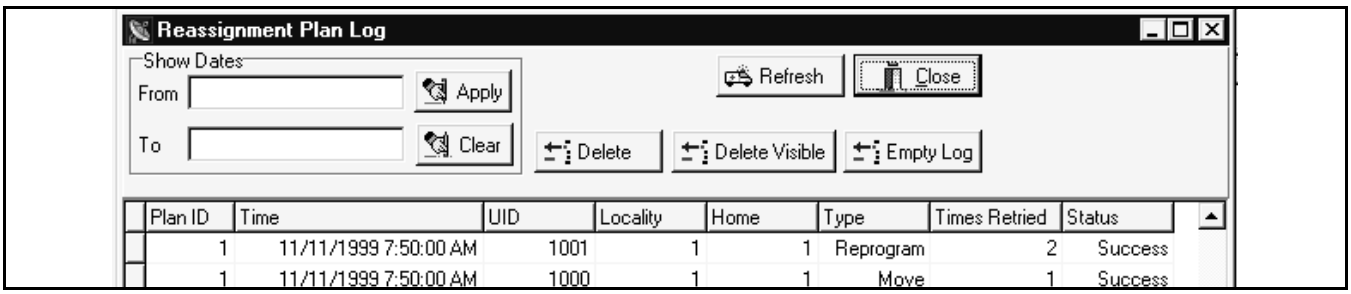


Figure 6-5 Reassignment Plan Log

6.3.5 QUEUED CALL LOG

Queued Telco Calls

The Queued Telco Call Log screen shown in Figure 6-4 indicates all Telco Calls that are waiting to be completed. Once a call is completed, it is displayed in the Call Log described in Section 6.3.3. To print the Telco Call log, select File > Print.

Queued Directed Calls

The Queued Directed Call Log screen shown in Figure 6-4 displays the Directed Calls waiting to be completed. Once a call is completed, it is displayed in the Call Log described in Section 6.3.3. To print the Directed Call log, select File > Print.

6.3.6 REASSIGNMENT PLAN LOG

Reassignment Plan information is logged to the Reassignment Plan Log screen shown in Figure 6-5. This log displays when a Reassignment Plan is started and ended, and the associated transactions.

The Call Processor begins the record with the Reassignment Call Name, Start Date/Time, Locality/ Home for Dynamic Reassignment/Selection, Unique ID number of the originating caller, and Type (Reprogram, Move). The Log also displays the number of attempts made (Times Retried) to activate the plan and the results (Status) of the attempts that were made. To print this log, select File > Print.

NOTE: The above screens are displayed by right clicking the mouse in the left pane of the main Switch Configuration Manager screen.

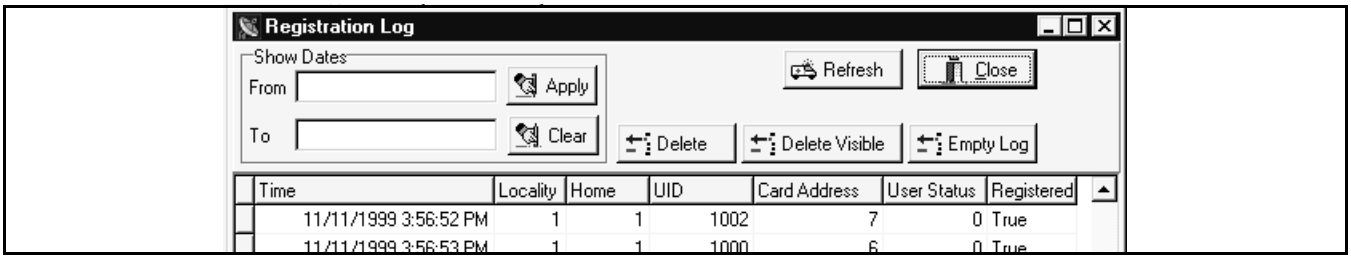


Figure 6-6 Registration Plan Log Screen

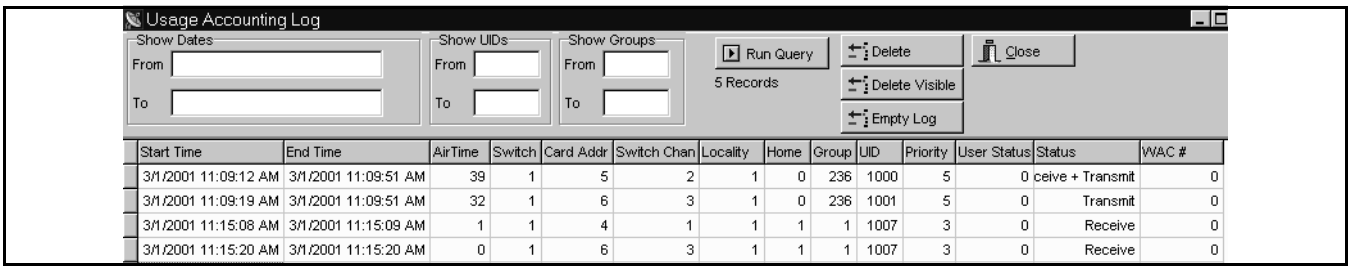


Figure 6-7 Usage Accounting Log Screen

6.3.7 REGISTRATION LOG

Registration information is logged to the Registration Log screen shown in Figure 6-6. When registration request messages are received from channel modules, the Call Processor creates a record in the Registration Log. To print this log, select File > Print.

6.3.8 USAGE ACCOUNTING LOG

General

The Usage Accounting Log screen shown in Figure 6-7 displays the various usage information that is generated and stored as calls are processed. The following functions can be selected in this screen:

Show Dates/UIDs/Groups - If information is entered in these boxes, only records in the selected range are displayed. For example, if a beginning and ending date is entered, only calls made on those dates are displayed. If a Show box is left blank, no Date/UID/Group restriction occurs (for example, leaving all Show boxes blank displays all records in the log).

Run Query - Updates the log with the records in the ranges selected in the Show boxes (if applicable).

Delete - Permanently deletes the currently selected record.

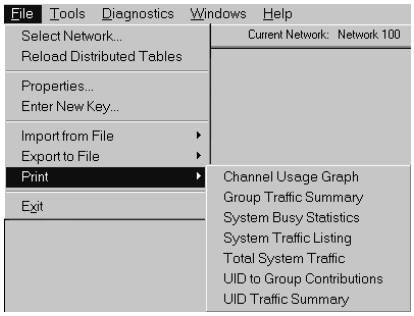
Delete Visible - Permanently deletes all records in the current screen (even those that have scrolled out of the screen).

Empty Log - Permanently deletes all records in the log.

Close - Exits the screen and returns to the main screen.

Printing Reports

Several different reports can be printed from the currently displayed usage log information. To display the following menu which selects the report to be printed, select File > Print.



Only information contained in a displayed log can be printed. Some report menus allow further restrictions to be added to records displayed in a report. The reports that can be selected are as follows:

NOTE: The above screens are displayed by right clicking the mouse in the left pane of the main Switch Configuration Manager screen.

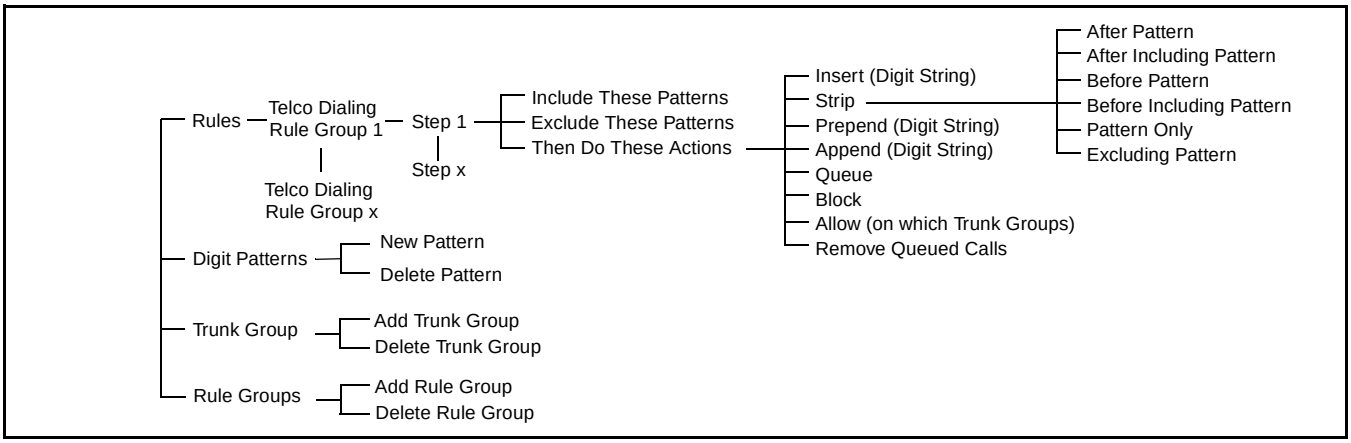


Figure 6-8 Dialing Rules Screen Command Structure

Channel Usage Graph - Displays in graph form, the percentage utilization of each channel (repeater) connected to the Switch. Various types of graphs can be selected.

Group Traffic Summary - This summary includes the total number of times push-to-talk was initiated and the total call length and average length of each transmission for the specified Group.

System Busy Statistics - This report indicates, for the date specified, the percentage of time all repeaters were busy, the percentage of possible airtime that was used, the actual time that all repeaters were busy, the total time that the repeaters were used, and the number of times that all repeaters were busy.

System Traffic Listing - This report displays the binary data from the System Status Bus. A time period and Unique ID code range is specified and then the time of every transmission for each Unique ID code is indicated.

Total System Traffic - This summary includes the total number of times a push-to-talk was initiated and the total call length and average length of each transmission.

UID to Group Contributions - This report indicates, for the specified time period and Home/Group range, the calls made to each Group. The total number and time of calls made by each Unique ID code is displayed.

UID Traffic Summary - This report summarizes for each UID, the total times push-to-talk was initiated, the total call length, and the average length of each transmission.

6.3.9 REMOVE INSTALLATION

This menu selection removes a non-operating switch from the configuration. If the switch is operating, the connection is automatically re-established.

6.3.10 DIALING RULES

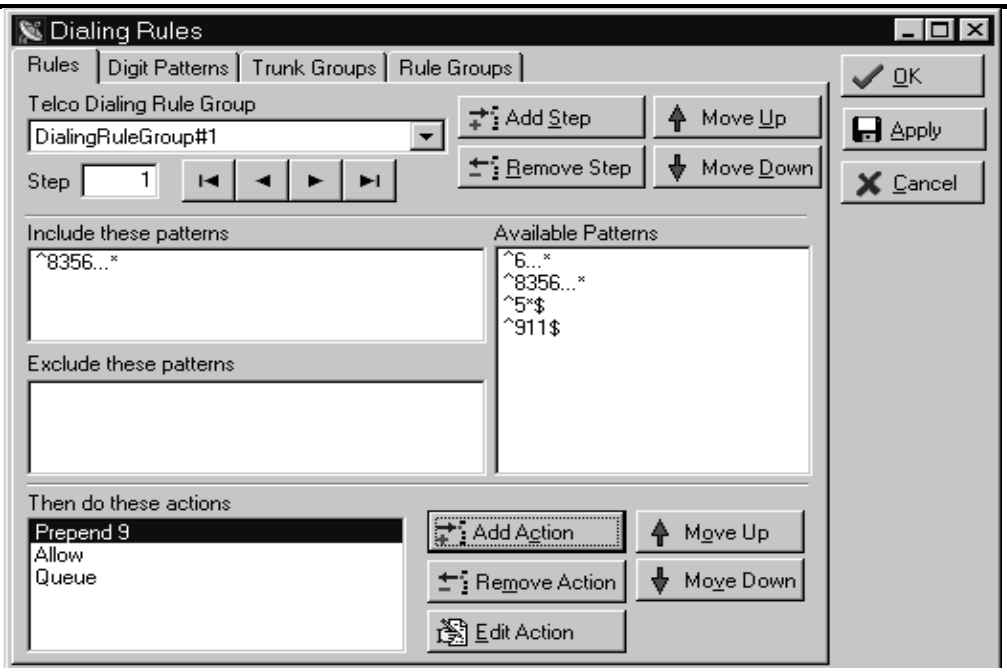
Introduction

The main Dialing Rules screen is shown in Table 6-3. The structure of the various screens that are selected from this screen is shown in Figure 6-8 above. Dialing rules determine what telephone number patterns a user is permitted to dial and also which patterns are not permitted (if applicable). Dialing Rules also establish a link to telephone company trunk lines.

NOTE: If telephone toll charges are passed to customers in an area regulated by a local Public Service Commission, or like entity, it is important that the exact toll charges be closely approximated when developing call dialing rules. Be sure to charge the customer an amount equal to or less than the amount charged by the long distance carrier. E.F. Johnson has no responsibility for any penalty or fine levied for overcharging toll rates in those regulated areas.

NOTE: The above screens are displayed by right clicking the mouse in the left pane of the main Switch Configuration Manager screen.

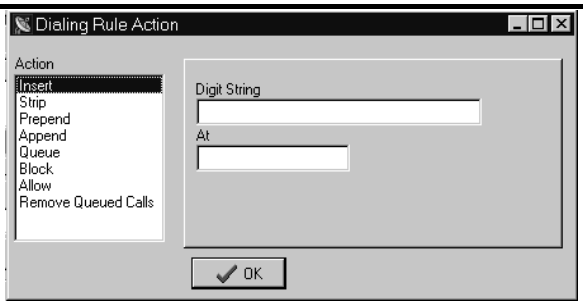
Table 6-3 Rules Screen



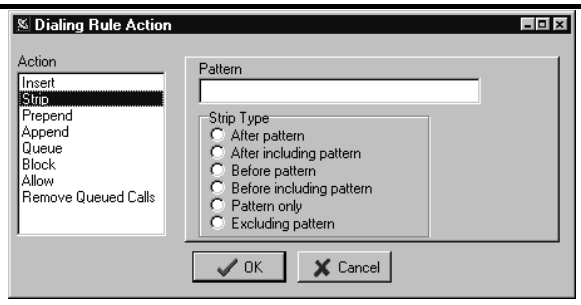
Function	Description
Telco Dialing Rule Group	Name representing the complete set of patterns and actions.
Step	Number representing one set of patterns under the Telco Dialing Rule Group name.
Add Step	Creates a new Step for additional patterns under the Telco Dialing Rule Group name.
Remove Step	Removes the selected Step under the Telco Dialing Rule Group name.
Move Up	Moves a pattern up a Step in the selected pane (to execute earlier).
Move Down	Moves a pattern down a Step in the selected pane (to execute later).
Available Patterns	The patterns created in the Digit Patterns screen.
Include These Patterns	Patterns that must be met for the call to be accepted. Patterns are dragged between panes using the mouse.
Exclude These Patterns	Patterns to be excluded from an Included pattern. Patterns are dragged between panes using the mouse.
Then Do These Actions	If the call has met the criteria in the Include pane and does not meet the criteria in the exclude pane, then these actions determine the call routing to a Trunk Group.
Add Action	Adds an action to the actions pane. These screens are shown in Table 6-4.
Remove Action	Removes the selected action from the actions pane.
Edit Action	Allows the selected action in the action pane to be changed.
Move Up	Moves up the list of actions in the action pane.
Move Down	Moves down the list of actions in the action pane.
OK	Saves the current Dialing Rules shown and closes dialog.
Apply	Saves the current Dialing Rules shown.
Cancel	Disregards unsaved changes to the Dialing Rules.

NOTE: The above screens are displayed by right clicking the mouse in the left pane of the main Switch Configuration Manager screen.

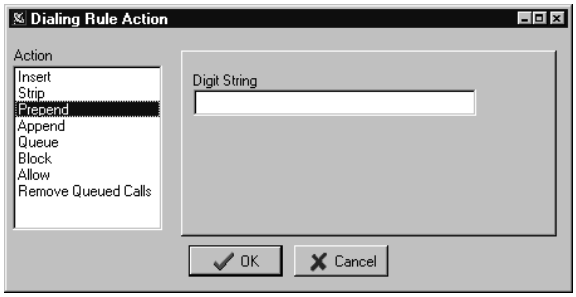
Table 6-4 Rules Screen Add/Edit Actions Screens



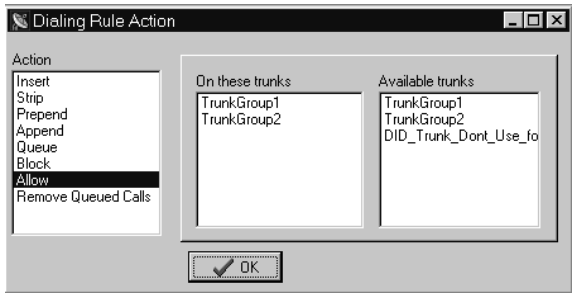
Insert



Strip



Prepend/Append



Allow

Action	Description
Insert	The insert pattern includes numbers that are needed to complete a call but do not have to be dialed by the user. The “at” string is where the insert pattern is to be placed in the original pattern.
Strip	The strip action removes part of a pattern and a replacement can be inserted. For example if 1-507-555-1212 was dialed for directory assistance, the 555-1212 could be stripped and the number of another service could be inserted.
Prepend/Append	This allows digits to be placed at the beginning or the end of the digit string.
Queue	Allows calls to be stored until a trunk is available.
Block	Does not allow this type of call to be placed.
Allow	A trunk group from the Available Trunks is dragged to the On These Trunks to allow calls on that trunk.
Remove Queued Calls	Empties the stored calls waiting for an available trunk.

Dialing Rules Programming Screens

Rules Screen - The Rules screen shown in Table 6-4 sets up the dial patterns in each Telco Dialing Rule Group. Rule Groups are added and deleted by the Rule Group screen (see description which follows).

NOTE: Additional information on setting up Dialing Rules is located on the pages which follow.

Digit Patterns Screen - The Digit Patterns screen shown in Table 6-5 sets up the digit patterns that are Included or Excluded in the preceding Rules screen. Dialing patterns consist of numbers and symbols.

Trunk Group Screen - The Trunk Rule Group screen shown in Table 6-6 adds and deletes the Trunk Groups that are associated with each TIM (Telephone Interface Module) in the Switch (see Section xx). A Trunk Group is a logical subgroup of the different types of telephone lines that are available.

Rule Group Screen - This following Rule Group screen adds and deletes Telco Dialing Rule Groups that are programmed by the Rules screen in Table 6-3.

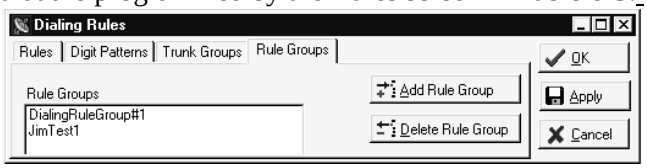


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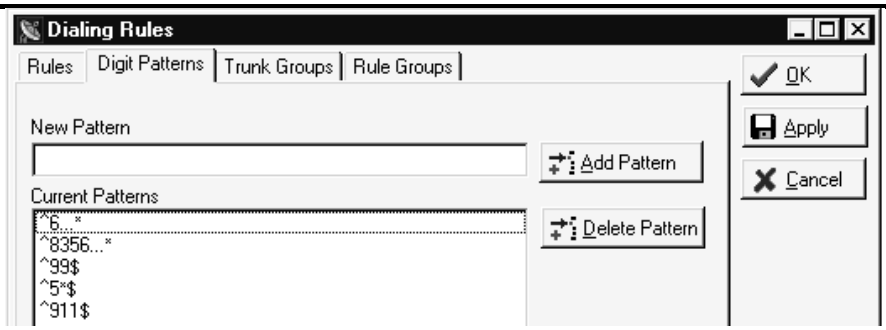
Table 6-5 Digit Patterns Screen



Pattern	Description
New Pattern	Create a dialing pattern to be added to the Current Patterns.
Current Patterns	A list of dialing patterns already created.
Add Pattern	Adds the New Pattern to the Current Pattern list.
Delete Pattern	Deletes the selected pattern from the Current Pattern list.
OK	Saves the current patterns shown and closes dialog.
Apply	Saves the current patterns shown.
Cancel	Disregards unsaved changes to the current patterns.
Digit Pattern Symbols (see "Patterns" description on page 6-14)	
^	Signifies the pattern must be at the beginning. If inside the string in [ ] brackets, it means "not".
.	Allows any single digit dialed to be accepted (wild card).
$	Signifies the pattern must be at the end.
*	Matches zero or more digits that are dialed before this symbol. Example: ^1800.*, any 1-800 numbers are allowed.
+	Matches 1 or more digits that are dialed before this symbol. The digit preceding the + must be dialed to be accepted. Example: 1+, the 1 must be dialed first.
?	Signifies the digit immediately following the ? is an optional digit. Example: ?1507, either 1-507 or 507 can be dialed, the 1 is optional
[ ]	Binds acceptable matches for this digit. Examples: 1[135]6 matches 116, 136 and 156 1[1-4]6 matches 116, 126, 136 and 146 1[^2-8]6 matches 106, 116 and 196 (not 2-8)
-	Specifies a range (used in conjunction with brackets).

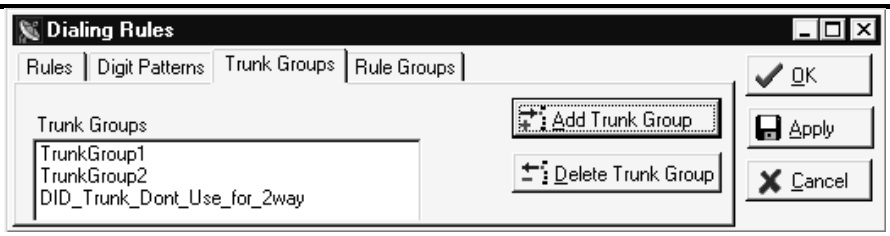
What Call Routing Does

Call Routing routes all outbound interconnect calls through particular calling resources such as an SLIC (Subscriber Line Interface Circuit) line, DID (Direct Inward Dialing) device, FX (Foreign Exchange) line, or OPX (Off Premises Exchange) line. *Call Routing only deals with interconnect calls.*

The Call Processor routes calls by matching the number dialed and the service of a call against a table of dialing rules to determine which rule (and therefore which calling resource) applies to this call, and also if the call is allowed. This function is performed automatically when Dialing Rules and associated Trunk Groups have been set up.

Call Routing selectively routes calls by checking the area codes and any other considerations that are in the Dialing Rules. This permits the System Operator to disallow certain types of calls or intercept calls and route them to another trunk or line.

Table 6-6 Trunk Groups Screen



Function	Description
Add Trunk Group	Creates a trunk group by name associated with a TIM.
Delete Trunk Group	Removes the selected Trunk Group from the Trunk Group list.
OK	Saves the current Trunk Groups shown and closes dialog.
Apply	Saves the current Trunk Groups shown.
Cancel	Disregards unsaved changes to the Trunk Groups.

The Dialing Rules can block certain calls altogether such as “976-xxxx” numbers. Call Routing allows variable routing based on exchanges or area codes. It can also allow certain users to access certain resources while not allowing others to use them.

Call Routing also lets the System Operator define numbers for special uses, such as “611” to get the service number (rather than telephone repair) or “1” to get time and temperature service. It can also redirect numbers like “411” to free commercial directory assistance services, if available. When a rule matches a call, the resources (repeaters, phone lines) assigned to the rule are made available to that call.

Users are assigned a Permission Profile and Permission Profiles are assigned a Dialing Rule Group that is a collection of Dialing Rules. The phone number the User dialed must meet the Dialing Rules in the Dialing Rule Group specified by the Permission Profile. Many users may have the same Permission Profile and several Permission Profiles may use the same Dialing Rule Group.

Patterns

The user must dial a call that matches the pattern exactly. In most cases, the pattern is shorter than the phone number. A matching call is the same length as the pattern, and matches as many digits as are defined in the pattern. These are the first digits that must have been dialed by the radio if this pattern is to be selected. If the digits dialed by the radio do not start with this pattern, then this pattern does not match.

The ^ signifies the beginning of a pattern or line. Example: ^1 indicates all phone numbers beginning with the number 1. If it is inside the string in brackets [^], it means “not”. Example: ^1507[^8][^3][^5]$ indicates 1-507 is acceptable but “not” with the 835 exchange.

The $ causes a pattern to match only if it is at the end of a line. Example: 5000$ matches any pattern ending in 5000.

A single digit may be replaced by a (.) period to show that any digit in that position is an acceptable match. Example: If the rule is to match all direct-dialed calls to long distance information, the pattern is ^1...5551212$ for this rule.

A pattern must contain at least one digit or a period. Any sequence of one or more periods at the end of a pattern can be replaced with one period and an asterisk (.*) The asterisk matches zero or more of any preceding digits.

A plus sign (+) signifies that whatever digit precedes it, may be duplicated. Example: ^1507+.+ matches 1-507 followed by any number of the numeral seven and one or more additional digits.

A ? signifies the number that follows is optional. Example: ^?1507 indicates the 1 is optional and either 1-507 or 507 are acceptable.

Numerals in brackets [ ] indicates these numbers must be matched. [135] matches a 1, 3, or 5, while [1-5] matches numbers 1, 2, 3, 4, 5.

How Call Routing Works

Call Routing works by matching the number dialed by a radio and the Dialing Rules. The Dialing Rules should be in descending sequence order, i.e. from the most restrictive to the least restrictive.

When a call is made, the number dialed is matched against the patterns of the first Dialing Rule. If the number dialed matches an “include pattern” and does not match an “exclude pattern”, then the actions associated with that Step are applied. If the patterns do not match, then the next Dialing Rule is applied. This continues until a terminating action is encountered or all of the Dialing Rules have been tested. Terminating actions are those which make a determination as to whether or not to allow the call to complete. These actions are Allow (where a trunk is available), Block and Queue. If a call is allowed on a Trunk Group with no available lines, the rule processing will continue to see if the call can be completed in accordance with another Dialing Rule Step.

Planning The Pattern List

Because of the complexity of setting up a good Pattern list, planning a list of Digit Patterns, Trunk Groups, and Rules is suggested.

- Begin by listing all the calls to be Included and then list the calls to be Excluded.
- Arrange the Include list in order from the most restrictive to the least restrictive.
- Plan a Pattern that accomplishes what is required for each type of call.
- Put these Patterns in order so they do not cancel each other out.
- Plan the Action Form of any calls to allow.
- Finally, enter the Digit Patterns into the Dialing Rules Form.

Types Of Rules

The Dialing Rules in a Call Processor either permit a call to be completed (Include), or prevent a call from being completed (Exclude).

There are two ways to block a call in a Call Processor. The first way to block a call is not to describe the call in any of the rules. When the call is placed, it fails to match any of the rules, and so is not made. Use this method when a potentially large group of calls is to be blocked, such as all 1-digit calls only, or all 8-digit calls. Define rules and assign trunks to calls to allow any of the remaining calls to be made.

The second way to block a call is to describe the call so that it matches a pattern and use the Block for the action.

Entering and Changing Rules

Before entering or changing a rule, make a plan. New rules have call canceling implications.

- Decide if this dialing rule is to apply to all radios or to radios that use a particular permission table.
- Decide if the set of numbers this new or revised rule covers is also covered by other dialing rules already in the table, for the same radios.
- If both new and existing rules cover the same set of numbers, decide if the existing rules should have priority over the new rule, or vice versa.
- Decide if this new rule interferes with dialing rules for radios other than those to be affected.

Remember that when the system searches for a match, it starts at the first rule in the sequence and goes through them to find a match. Once it finds a match, it stops looking. Because the system tries to find a match in this order, it is important to place rules in an order that makes sense.

For example, suppose that a certain area code has thirty exchanges. All calls to that area are to be allowed, but use a different Trunk Group for ten of the exchanges.

If the first rule accepts a match with any number in that area code, and the second through ninth rules define the exchanges, any calls to the selected exchanges are allowed on the same Trunk Groups for the rest of that area code. When the area code matched, the system stopped looking at the rules. To set this up, enter the detailed rules "first", so that if a call matches one of those exchanges two through nine, the system stops looking and uses its Trunk Group. Then add the general rule for the rest of the area code.

North American Number Plan Example

The dialing rules for the North American Numbering Plan can be fully implemented. The complexity of the dialing rules depends upon the amount of restriction the system operator wishes to implement.

The following is an example of the North American Numbering Plan. The example assumes that a single type of telephone line or trunk is available. The trunk type is a standard two-way telephone line that can handle the North American Numbering Plan. The telephone line is assumed not to be a PBX or PABX line. The assumed area code is 507 with two local exchanges of 835 and 837.

The following is the list of possible digit patterns for dialing rule usage.

^0$ To be used to restrict single digit dialing of "0". Typically disallowed since international direct and international operator assisted cannot be distinguished, the full number is unknown.

^1$ To be used to restrict single digit dialing of "1", any long distance call would be allowed to pass through since the subscriber unit could then dial any digits after the initial dialing.

^011$ To be used to restrict 3 digit dialing of "011" direct dialed international calling. Any international calls would be allowed to pass through since the subscriber unit could then dial any digits after the initial dialing. This is typically disallowed since the full number that is dialed is unknown.

^[1-8]11$ This is used to restrict the 3 digit dialing other than "911". The other service numbers of 411 or 611 are typically not usable by the end subscriber units.

^1900 To be used to restrict any number of digits with "1-900" dialing, typically disallowed since calling party is billed at typically significant charges.

^1976 To be used to restrict any number of digits with "1-976" dialing, typically disallowed since calling party is billed at typically significant charges. Add in any other 1-9xx calls you wish to disallow. There are 9xx area codes that have to be allowed.

^001…… To be used to allow "001" dialing for international operator assisted calling. This is used if one allows international calls that are billed to the called party. This is to allow any operator assisted international calls if 12 or more total digits are dialed; notice there are 9 periods. If one wishes to allow less digits, then reduce the number of periods.

^011…… To be used to allow "011" direct dialed international calling. This is to allow any international calls if 12 or more total digits are dialed (notice there are 9 periods).

^911$ This is to be used to allow the 3 digit dialing of the public safety emergency number.

^18 To be used for all 1-8xx-xxxx calls. This is typically allowed for all toll free 1-8xx type calls and for direct long distance calls to area codes beginning with 8. If the toll free 1-8xx numbers are to be restricted then those patterns should be placed before the allowed pattern set.

^1507835….$ This pattern is used to allow the stripping of the 1507 since the 835 is a local exchange.

^1507837….$ This pattern is used to allow the stripping of the 1507 since the 837 is a local exchange.

**^1…….$** This pattern is used to allow any 11 digit direct long distance dialing. Since the ^1507835….$ and the ^1507837….$ patterns come before this pattern, they are used to intercept and perform the stripping of the digits. Previous patterns are used to restrict the long distance dialing.

^1800 The 18xx toll free call patterns are included here to be allowed.

^1888
^1877
^1866

^835….$This pattern is used to allow 7 digit dialing of the 835 local exchange (notice the 4 periods).

^837….$This pattern is used to allow 7 digit dialing of the 837 local exchange. Any other 7 digit dialing will be disallowed since there is no other pattern match.

^$ This is the no digits dialed pattern match that is used to remove a subscriber from the queue.

The following procedure would be used to set up the proper trunk group, digit patterns, and dialing rules for the above North American Dialing Plan usage.

1. Establish a trunk group by "Trunk Groups/Add Trunk Group" function with the name Default_2Way.

2. Establish the "Telco Dialing Rule Groups" under the Permission Profiles form or the Dialing Rules Form. Set up three telco dialing rule groups.

   a.Name a group DRG_Local that will be used for users that will have local only dialing, it will also allow 1-800 number dialing but restrict direct long distance to 8xx area codes.

   b.Name a group DRG_Local_LD that will be used for users that will have local and direct long distance dialing.

   c.Name a group DRG_Local_LD_Intl that will be used for users that will have local, direct long distance, and international dialing.

3. Establish all of the above digit patterns by the "Digit Patterns/Add Pattern" function.

NOTE: It is advisable to keep the patterns in the desired order when configuring the dialing rules.

DRG_Local_LD_Intl

Select the DRG_Local_LD_Intl group in the "Telco Dialing Rule Group" selection box under the "Rules" tab.

Step 1

1. Under the "Include these patterns" box, place the following patterns:

   ^0$
   ^1$
   ^011$
   ^[1-8]11$
   ^1900
   ^1976

2. Under the "Then do these actions" box, select the "Block" function.

3. Select the "Add Step" function to add Step 2.

Step 2

1. Under the "Include these patterns" box, place the following patterns:

   ^1507835….$
   ^1507837….$

2. Under the "Then do these actions" box, select the "Strip" function.

3. Under the "Strip" function, insert the "1507" for the pattern and select the "Pattern Only" radio button.

4. Under the "Then do these actions" box, select the "Allow" function as the next function.

5. Under the "Allow" function, select the Default_2Way trunk group name under the "Available Trunks" and place it in the "On these trunks" box.

6. Under the “Then do these actions” box, select the “Queue” action. This will queue the call if there are no lines available for the given trunk group name.

7. Select the “Add Step” function to add Step 3.

Step 3

1. Under the “Include these patterns” box, place the following patterns:

   ^001……
   ^011……
   ^911$
   ^1…….$This will allow direct long distance dialing when the previous steps blocked the long distance calls that are not allowed.
   ^835….$
   ^837….$

2. Under the “Then do these actions” box, select the “Allow” function.

3. Under the “Allow” function, select the Default_2Way trunk group name under the “Available Trunks” and place it in the “On these trunks” box.

4. Under the “Then do these actions” box, select the “Queue” action. This will queue the call if there are no lines available for the given trunk group name.

5. Select the “Add Step” function to add Step 4.

Step 4

1. Under the “Include these patterns” box, place the following patterns:

   ^$

2. Under the “Then do these actions” box, select the “Remove Queued Calls” function. This is the pattern for no dialed digits. If a user starts a call but does not enter any digits they will be removed from the queue if they were previously queued.

DRG_Local_LD:

Select the DRG_Local_LD_Intl group in the “Telco Dialing Rule Group” selection box under the “Rules” tab.

Step 1

1. Under the “Include these patterns” box, place the following patterns:

   ^0$
   ^1$
   ^011$
   ^[1-8]11$
   ^1900
   ^1976
   ^001……
   ^011……

2. Under the “Then do these actions” box, select the “Block” function.

3. Select the “Add Step” function to add Step 2.

Step 2

1. Under the “Include these patterns” box, place the following patterns:

   ^1507835….$
   ^1507837….$

2. Under the “Then do these actions” box, select the “Strip” function.

3. Under the “Strip” function, insert the “1507” for the pattern and select the “Pattern Only” radio button.

4. Under the “Then do these actions” box, select the “Allow” function as the next function.

5. Under the “Allow” function, select the Default_2Way trunk group name under the “Available Trunks” and place it in the “On these trunks” box.

6. Under the “Then do these actions” box, select the “Queue” action. This will queue the call if there are no lines available for the given trunk group name.

7. Select the “Add Step” function to add Step 3.

Step 3

1. Under the “Include these patterns” box place the following patterns:

   ^911$
   ^1…….$This will allow direct long distance dialing when the previous steps blocked the long distance calls that are not allowed.
   ^835….$
   ^837….$

2. Under the “Then do these actions” box, select the “Allow” function.

3. Under the “Allow” function, select the Default_2Way trunk group name under the “Available Trunks” and place it in the “On these trunks” box.

4. Under the “Then do these actions” box, select the “Queue” action. This will queue the call if there are no lines available for the given trunk group name.

5. Select the “Add Step” function to add Step 4.

Step 4

1. Under the “Include these patterns” box place the following patterns:

   ^$

2. Under the “Then do these actions” box select the “Remove Queued Calls” function. This is the pattern for no dialed digits. If a user starts a call but does not enter any digits they will be removed from the queue if they were previously queued.

DRG_Local:

Select the DRG_Local group in the “Telco Dialing Rule Group” selection box under the “Rules” tab.

Step 1

1. Under the “Include these patterns” box, place the following patterns:
   ^0$
   ^1$
   ^011$
   ^[1-8]11$
   ^1900
   ^1976
   ^001……
   ^011……
   ^1…….$This is used to block long distance calls except for the exclude patterns.

2. Under the “Exclude these patterns” box, place the following patterns:

   ^1800 These patterns will be excluded from being blocked under the ^1…….$ pattern to be allowed in step 4.
   ^1888
   ^1877
   ^1866

3. Under the “Then do these actions” box, select the “Block” function.

4. Select the “Add Step” function to add Step 2.

Step 2

1. Under the “Include these patterns” box, place the following patterns:

   ^1507835….$
   ^1507837….$

2. Under the “Then do these actions” box, select the “Strip” function.

3. Under the “Strip” function, insert the “1507” for the pattern and select the “Pattern Only” radio button.

4. Under the “Then do these actions” box, select the “Allow” function as the next function.

5. Under the “Allow” function, select the Default_2Way trunk group name under the “Available Trunks” and place it in the “On these trunks” box.

6. Under the “Then do these actions” box, select the “Queue” action. This will queue the call if there are no lines available for the given trunk group name.

7. Select the “Add Step” function to add Step 3.

Step 3

1. Under the “Include these patterns” box place the following patterns:

   ^835….$
   ^837….$
   ^911$
   ^1800 The 18xx toll-free call patterns are included here to be allowed.
   ^1888
   ^1877
   ^1866

2. Under the “Then do these actions” box, select the “Allow” function.

3. Under the “Allow” function, select the Default 2Way trunk group name under the “Available Trunks” and place it in the “On these trunks” box.

4. Under the “Then do these actions” box, select the “Queue” action. This will queue the call if there are no lines available for the given trunk group name.

5. Select the “Add Step” function to add Step 4.

Step 4

1. Under the “Include these patterns” box, place the following patterns:

   ^$

2. Under the “Then do these actions” box, select the “Remove Queued Calls” function. This is the pattern for no dialed digits. If a user starts a call but does not enter any digits, they will be removed from the queue if they were previously queued.

6.3.11 COPY SETTINGS TO DEFAULTS

This function copies the data entered for the Switch Configuration as defaults in the Call Processor so they are used on startup by the Call Processor.

The Call Processor maintains separate Default settings which are loaded when the Call Processor is restarted. Switch Configuration Manager changes affect current Switch operation, but are not automatically made to the Call Processor default settings. Therefore, any changes made by the Switch Configuration Manager are lost when the Call Processor is restarted if they have not been saved to the defaults.

6.3.12 PACK TABLES

When records are deleted, they are only marked as deleted and continue to occupy space on the hard drive. This function completely removes deleted records from a table so that hard disk space is recovered. Use the Pack Tables command only when absolutely necessary to recover disk space because this function significantly slows down program execution. It should be used only if a very large number of records are to be deleted from a table.

6.3.13 CALL PROCESSOR PROPERTIES

The Call Processor Properties screen and descriptions are shown in Table 6-7.

6.3.14 LOG PROPERTIES

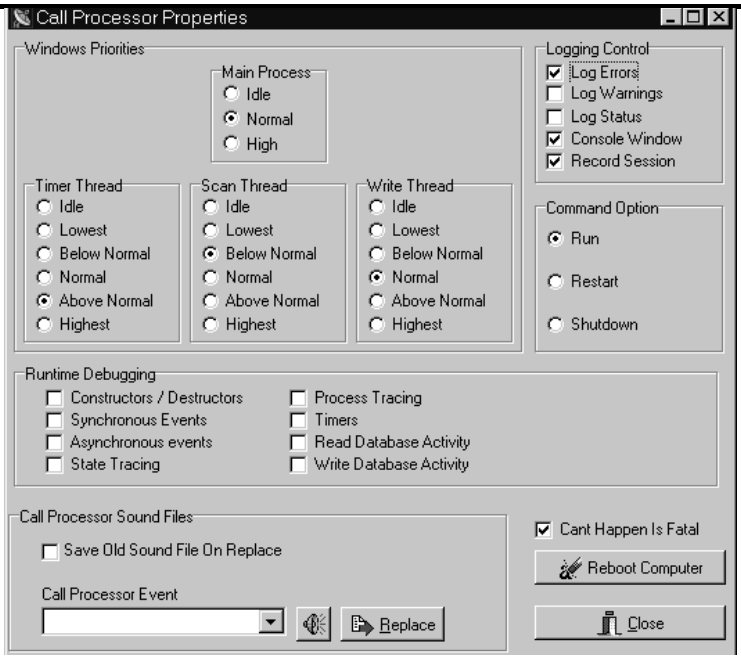
The Log Properties screen and descriptions are shown in Table 6-8.

6.3.15 SWITCH PROPERTIES

The Switch Properties screen and descriptions are shown in Table 6-9.

NOTE: The above screens are displayed by right clicking the mouse in the left pane of the main Switch Configuration Manager screen.

Table 6-7 Call Processor Properties Screen

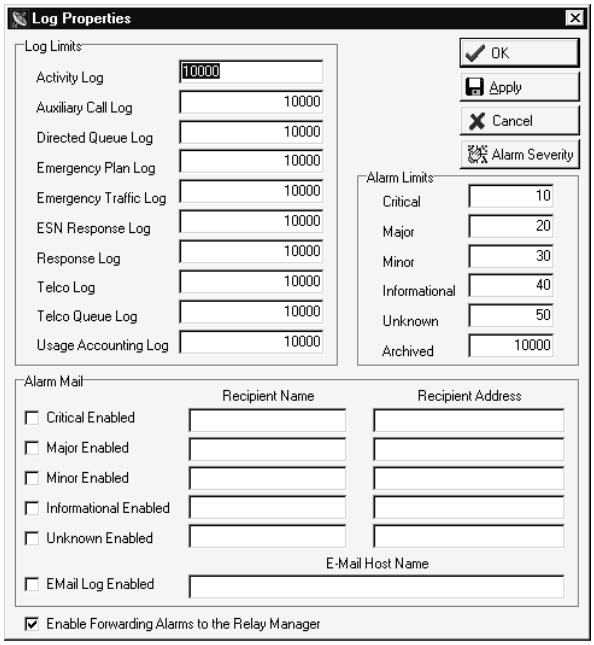


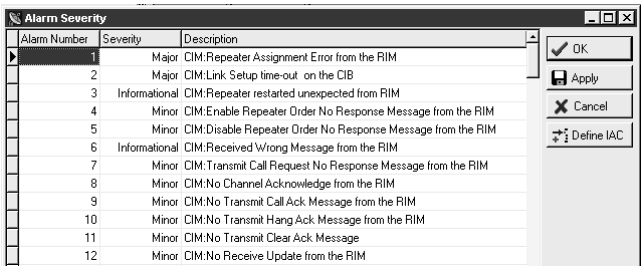
WINDOWS PRIORITIES	
Main Process	Call Processor application Priority. Normal = default, Idle = Used only if nothing else is operating, High = Runs before anything else.
Timer Thread	Priority of the clock that determines when things happen in the program.
Scan Thread	Priority of data retrieval from the Data Base.
Write Thread	Priority of the writing to the data base.
LOGGING CONTROL	
Log Errors	Includes program errors in the NT (Administrative Tools) Event Viewer and console window (if displayed).
Log Warnings	Includes program warnings in the NT Event Viewer and console window (if displayed).
Log Status	Includes program status in the NT Event Viewer and console window (if displayed).
Console Window	Displays log messages in a window as they occur.
Record Session	Copies the logging record to a text file.
COMMAND OPTION	
Run	Keeps the program running.
Restart	Shuts down the Call Processor program (not the computer) and restarts it from the beginning when the window is closed.
Shutdown	Stops the Call Processor program. It must then be manually restarted or the computer rebooted.
Can’t Happen Is Fatal	If an event in the application occurs in a state marked as “cannot happen”, it is treated as a critical error that causes the Call Processor to restart.
Reboot Computer	Shuts down the Call Processor computer and restarts it from the beginning.
Exit	Closes the window and applies the settings to the Call Processor.

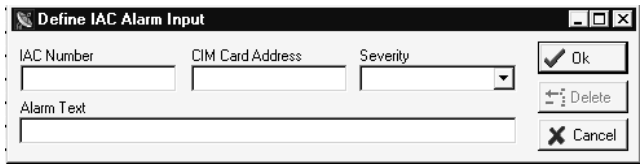
Table 6-7 Call Processor Properties Screen (Continued)

RUNTIME DEBUGGING (Direction required from support personnel to use these functions)	
Constructors/Destructors	These functions send debugging information to a text file. All these settings are normally OFF.
Synchronous Events	
Asynchronous Events	
State Tracing	
Process Tracing	
Timers	
Read Database Activity	
Write Database Activity	
CALL PROCESSOR SOUND FILES	
Save Old Sound Files On Replace	Saves the old sound file when replacing it with another file.
Call Processor Event	Selects the event for which the sound is being programmed. Call Processor events which can be programmed to play a sound include Crash, Initialize, Shutdown, and Startup.
 Button	Plays the selected sound.
Replace	Displays a window which allows a new sound to be selected to replace the current sound.

Table 6-8 Log Properties Screen

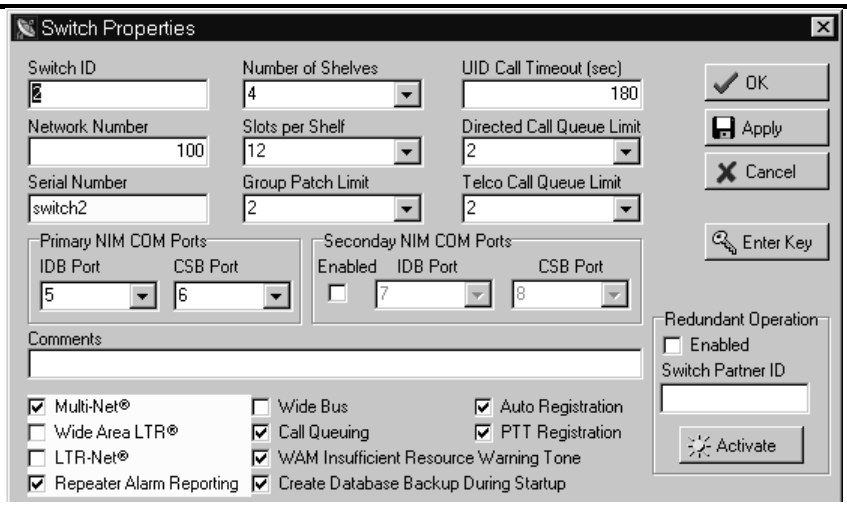






Function	Description	
Log Limits	The number entered is the maximum number of entries allowed in the log. Any further entries will cause the oldest entry to be deleted.	
Alarm Limits	The number entered is the maximum number of alarms allowed in the active alarm file. Any further entries will go into the alarm archive (see Section 6.2.2).	
	Archived	This is the maximum number of alarms allowed in the archive, any further entries will cause the oldest entry to be deleted.
Alarm Mail	Checked boxes enable that severity to be sent via E-mail.	
	E-mail Log Enabled	When checked, enables the entire E-mail option.
	Recipient Name	This is the name of the E-mail recipient. This can be used to send E-mail if the server knows the recipient by this name.
	Recipient Address	This is the E-mail address of the recipient. This address always works for sending E-mail, but is not needed if the server knows the recipient by name.
E-mail Host Name	Name of the E-mail server (typically POP3).	
OK	Saves the current data shown and closes dialog.	
Cancel	Disregards unsaved changes to the current patterns.	
Alarm Severity	This is a scroll list of all Alarm Numbers, Severity, and Description that allows the user to customize the severity assigned to an alarm for the system. To change the severity of an alarm, simply click the right side of the applicable Severity box to display a drop-down list. Then select the desired severity from this list.	
	Define IAC Alarm Input (Defines specific external repeater alarms)	
	IAC Number	This is the number of the Alarm Input (1-4) of the repeater Interface Alarm Card.
	CIM Card Address	This is the address of the CIM card in the Switch (defines which repeater it is from).
	Severity	The degree of severity of the alarm (see Section 6.2).
	Alarm Text	This is the description that is displayed when the alarm occurs.

Table 6-9 Switch Properties Screen



Function	Parameter	Description
Switch ID	1-255	ID number assigned to this Switch.
Number of Shelves	1-18	Total number of shelves in this Switch at this Locality.
UID Call Time Out	0-255 sec	Maximum UID Call time limit.
Network Number	1-255	Network number to which this Switch is attached.
Slots per Shelf	12 or 16	There are 11 slots for modules and one slot for the PTM.
Directed Call Queue Limit	0-16	Maximum number of Auxiliary calls to hold in queue.
Serial Number		Unique alphanumeric string (verified and enforced by the CP).
Group Patch Limit	0-16	Controls the maximum number of Console-configured Group Patches in the Switch at any one time.
Telco Call Queue Limit	0-16	Maximum number of Telco calls to hold in queue for a line.
Primary NIM COM Ports	IDB 1-256 CSB 1-256	This is the COM port used for the master clock on the bus serial cable to the Switch (defaults are 5-6).
Secondary NIM COM Ports	IDB 1-256 CSB 1-256	This is the redundant COM port used for the master clock on the bus serial cable to the Switch (defaults are 7-8).
Comments		Short note pad to help in the identification of the Switch.
Multi-Net/Wide Area LTR/LTR-Net/ Repeater Alarm Reporting		Displays only the type of System in which this Switch is operating. For Repeater Alarms reported see Log Properties screen, Table 6-8.
Wide Bus		Sets the protocol words for running an LTR-Net Switch.
Call Queuing		Allows calls to be placed in queue until a line becomes available.
WAM Insufficient Resource Warning Tone		Sounds an warning tone if a WAC was initiated and there are not enough WAMs or channels available.
Create Database Backup During Startup		This copies the database tables to the runtime directory. Should be checked if changes have been made to ensure a good backup copy.
Auto Registration		Automatically registers mobile when it becomes a roamer.
PTT Registration		Enables registration to occur on PTT if the mobile is a roamer.
OK		The parameters are acceptable, save the settings.
Apply		Saves the current Switch Properties shown.
Cancel		Ignores entries and exits the Switch Properties screen.
Enter Key		To change Switch type (i.e. Multi-Net to LTR-Net), a serial number is required from Customer Service and must be entered here.
Redundant Operation		This is the ID number of a Hot Standby Switch.

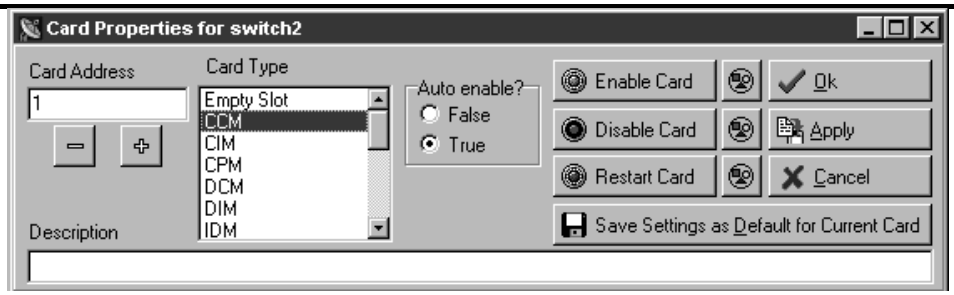
6.4 CARD PROPERTIES

NOTE: The procedure for selecting the card to configure is described in Section 6.1.3.

6.4.1 GLOBAL CARD PROPERTIES

The properties in Table 6-10 are common to all card types. The following sections define the attributes of the cards in the Switch. The CPM (Conventional Patch Module), NetNIM (Network Interface Module), and VTM (Voice Tone Module) have no attributes. These cards are required to be a place holder for the Call Processor to know and display the actual configuration of the Switch and the modules that are defined. This screen also shows the slots available to be used by other modules.

Table 6-10 Global Card Properties



Function	Parameters	Description
Card Address	1-288	Card slot number.
Auto Enable*	False, True	Automatically initiates the operation of the card on restart.
Enable Card		Manually initiates the operation of the card.
Disable Card		Renders the card inoperable and denies access by the Call Processor.
Restart Card		Manually returns the card to operation and re-initiates the card with the Call Processor.
OK		Saves current settings and closes form.
Cancel		Ignores entries and exits the card properties screen.
Button		Allows a group of cards to be updated. A window is displayed to enter the start and end address of cards to Enable, Disable, or Restart.
Save Settings as Default for Current Card		Saves current card configuration as start up default values (see Section 6.3.11).
* ***WARNING*** - See CIM Card Properties, Section 6.4.3.		

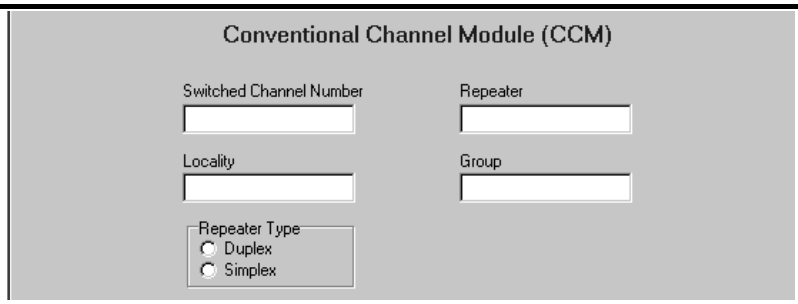
6.4.2 CCM (CONVENTIONAL CHANNEL MODULE)

The CCM (Conventional Channel Module) screen is shown in Table 6-11. This module connects the Switch to a Conventional Repeater. Each repeater has a CCM that controls the repeater through logic signaling. The CCM exchanges control information with the Conventional Repeater Module (CRM) via AFSK (Audio Frequency Shift Keying) data in a Blank-Burst (B&B) mode on the Voice Audio Path. The CCM monitors and controls the repeater transmit, receives confirmation on all requests made to the repeater and sends information the repeater received.

The CCM provides a 4-Wire 600 ohm balanced voice connection to the repeater, converts audio to and from PCM (Pulse Code Modulation), transmits and receives on the PCM bus, and controls voice audio gating to and from the repeater. The CCM uses the IDB (Intra-Terminal Data Bus) to communicate with other modules, and send messages to and receives messages from the Call Processor via the NetNIM that controls its actions.

The other modules determine the status of the CCM/CRM/Repeater combination by what the CCM transmits on the CSB (Channel Status Bus). The other modules monitor the CSB and determine if a CCM has the appropriate Group and Status for the type of communication the module requires.

Table 6-11 Conventional Channel Module Screen



Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Switched Channel Number	1-30	A unique CCM number (a PCM time slot number).
Repeater Number	1-30	The Home Repeater channel used for calls.
Locality Number	1-255	The Locality Number that the repeater is in. Each conventional channel must be in a unique Locality.
Group Number	1-225	The Group ID used with the Home Repeater channel.
Repeater Type	Simplex, Duplex	Selects the type of repeater used.

6.4.3 CIM (CHANNEL INTERFACE MODULE)

IMPORTANT

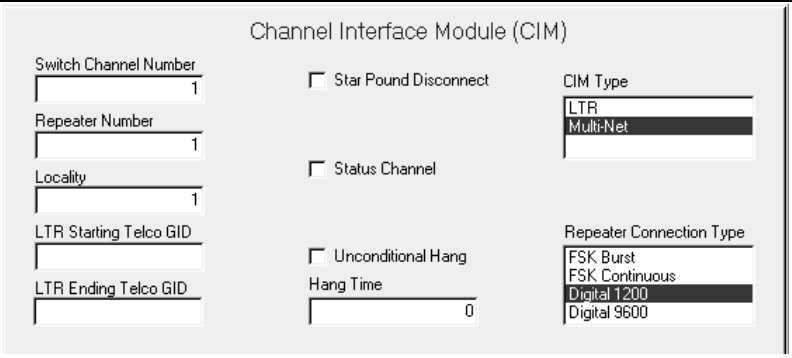
If more than one CIM is used as a Floating Channel, DO NOT have more than one channel with Auto Enable selected as TRUE (see Table 6-10).

The CIM (Channel Interface Module) screen is shown in Table 6-12. This module connects the Switch to the Multi-Net and LTR Repeaters. Each repeater has a CIM that monitors and controls the repeater through logic signaling. The CIM uses one of three methods to exchange control information with its repeater: RS-232 lines, AFSK (Audio Frequency Shift Keying) data on a Separate Audio Path, or by AFSK data in a Blank-Burst (B&B) mode on the Voice Audio Path.

The CIM controls the repeater with Restart-Enable-Disable, executes requests to Read-Write to the repeater's memory, and tells the repeater transmit code to Hang or Send Turn-Off. The CIM receives confirmation of all requests made to the repeater and sends information the repeater receives.

The CIM provides 4-Wire 600 ohm balanced voice connection to the repeater, converts audio to and from PCM (Pulse Code Modulation), transmits and receives on the PCM buses, and controls voice audio gating to and from the repeater. The CIM uses the IDB (Intra-Terminal Data Bus) to communicate with other modules, and send messages to and receives messages from the Call Processor that controls its actions via the NetNIM. The other modules determine the status of the CIM/Repeater combination by what the CIM transmits on the CSB (Channel Status Bus). The other modules monitor the CSB and determine if a CIM has the appropriate Group and Status for the type of communication the module requires.

Table 6-12 Channel Interface Module Screen



Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Switch Channel Number	1-30	A unique CIM number (a PCM time slot number).
Repeater Number	1-30	The Home Repeater channel used for calls.
Locality Number	1-255	The Locality Number of the repeater.
LTR Starting GID	1-255	LTR Telco starting Group ID of the block.
LTR Ending GID	Start to 255	LTR Telco ending Group ID of the block.
Star Pound Disconnect	Yes, No	Both * and # must be used to disconnect a Telco/Aux call.
Status Channel	Yes, No	Marked for documentation. Indicates that this card is connected to the Locality Status Channel.
NOTE: Do not program hang time of any type in the CIM if wide area calls are used because improper operation will result. However, hang time works properly if it is set as a wide area call parameter and not in the CIM card properties.		
Unconditional Hang	Yes, No	Conditional is selected to hang when there is a Busy System condition. Unconditional selects hang for all calls.
Hang Time	0=None 1-15 sec.	The length of time a repeater delays after a transmission until the repeater stops transmitting. For hang time to be active, it must also be enabled in the repeater by repeater programming.
CIM Type	LTR, Multi-Net	Communication channel if Multi-Net or LTR compatible.
Repeater Connection Type	FSK Burst FSK Continuous Digital 1200/9600	Communication Data signaling type for CIM-to-repeater logic. Communication uses Blank-and-Burst mode when FSK is to be used on the main audio line.

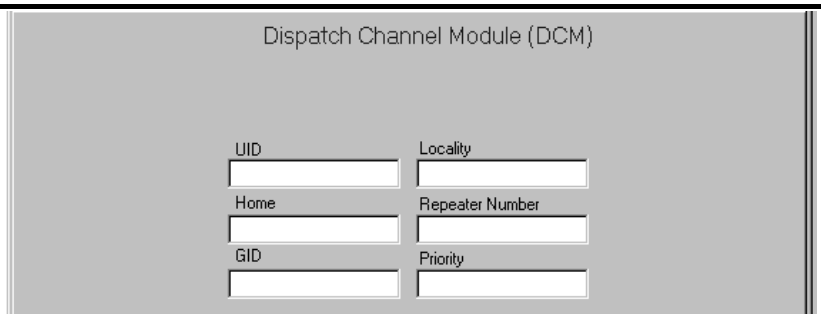
6.4.4 DCM (DISPATCH CHANNEL MODULE)

The DCM (Dispatch Channel Module) screen is shown in Table 6-13. This module connects the Switch to a Conventional Repeater. Each repeater has a DCM that controls the repeater through logic signaling. The DCM exchanges control information with the CRM via AFSK (Audio Frequency Shift Keying) data in a Blank-Burst mode on the voice audio path.

The DCM monitors and controls the repeater transmit, receives confirmation of all requests made to the repeater, and sends information the repeater received. The DCM provides a 4-Wire 600 ohm balanced voice connection to the repeater, converts audio to and from PCM (Pulse Code Modulation), transmits and receives on the PCM buses, and controls voice audio gating to and from the repeater.

The DCM uses the IDB (Intra-Terminal Data Bus) to communicate to other modules and send messages to and receive messages from the Call Processor that controls its actions via the NetNIM. The DCM monitors the CSB to determine if a DCM is active with the appropriate Group.

Table 6-13 Dispatch Channel Module Screen



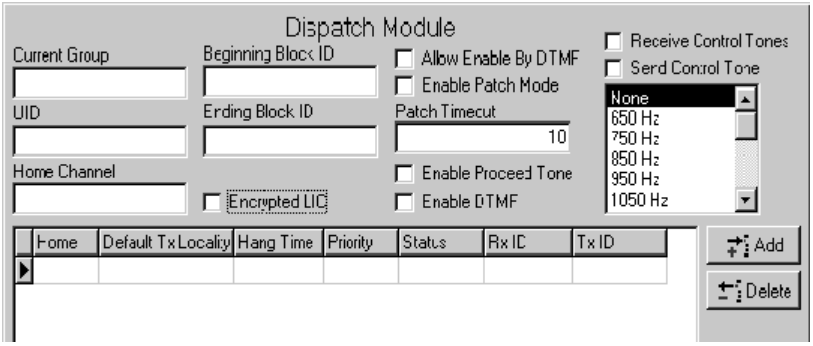
Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Unique ID	1-8163 (8164-8191 reserved)	Unique Identification (UID) number.
Home Number	1-30	Home Repeater channel.
Group ID	1-225	Group ID used for calls.
Locality Number	1-255	Locality number of the repeater.
Repeater Number	1-30	Home channel number used for calls.
Priority	1-5	Access Priority level. 1 is highest, 5 is lowest.

6.4.5 DIM (DISPATCH INTERFACE MODULE)

The DIM (Dispatch Interface Module) screen is shown in Table 6-14. This module uses either Direct Connection or Tone Remote to interface to the dispatch equipment. A DIM with direct connection is associated with only one Group Code and uses a form of Type II E&M lead input similar to the mobile PTT.

A DIM with Tone Remote connection decodes Guard Tone for the PTT indication and decodes DTMF (Dual Tone Multi-Frequency) to select from one-of-ten Group Codes. A control sequence uses the DTMF to place the DIM in scan mode or to stop and use a specific Group Code. The Tone Remote feature requires the use of a plug-in personality card. The DIM connects the 4-Wire 600 ohm balanced audio with the PCM (Pulse Code Modulation) data paths and communicates to other modules via the IDB (Intra-Terminal Data Bus). The DIM also monitors the CIM (Channel Interface Module) via the CSB (Channel Status Bus) to determine if a CIM is active with a DIM Group.

Table 6-14 Dispatch Interface Module Screen



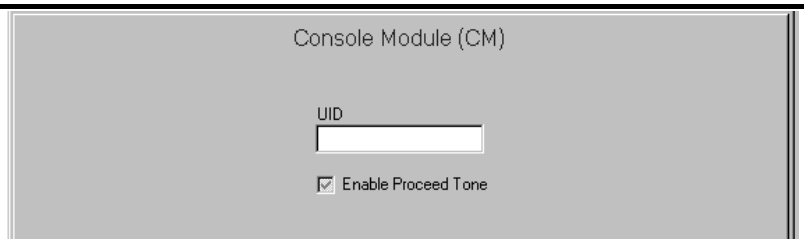
Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Current Group	0-9	Number of Extended Group personalities available to dispatcher with tone remote capability.
Unique ID	1-8163	Dispatcher Unique ID (UIDs 8164-8191 are reserved)
Home Channel	1-30	Home Repeater channel used for calls.
Beginning Block ID	1-225	Lowest number in a block of Group IDs.
Ending Block ID	1-225	Highest number in a block of Group IDs.
Encrypted LIC	Yes, No	If selected, M-Lead is used to mute audio on the LIC for UIDs 8000 and above.
Enable Patch Mode	Yes, No	If selected, this DIM is connected to a group of DIMs.
Patch Time-Out	0-255 minutes	Automatically disconnects the patch after time selected.
Enable Proceed Tone	Yes, No	If selected, a tone sounds indicating ready to talk.
Enable DTMF	Yes, No	DTMF used by Tone Remote to indicate extended group.
Allow Enable By DTMF	Yes, No	If selected, DTMF tones enable a patch.
Receive Control Tones	Yes, No	Tone Remote interface tones, input.
Send Control Tone	None to 2050 Hz in 100 Hz steps	Tone Remote Function Tone. Uses selected standard frequency.
Home	1-30	List for each Extended Group: Home Repeater Channel.
Default Tx Locality	1-255	List for each Extended Group: Default Transmit Locality.
Hang Time	1-255 seconds	List for each Extended Group: Repeater Hang Time. Time a repeater transmits data but no audio and hold the channel for the call.
Priority	1 highest - 5 lowest	List for each Extended Group: Access Priority Level.
Rx ID	1-225 or 255	List for each Extended Group: Receive Group ID.
Tx ID	1-225 or 255	List for each Extended Group: Transmit Group ID.
Add		Includes DIM properties to the list.
Delete		Removes selected DIM properties from the list.

6.4.6 IDM (INTELLIGENT DISPATCH MODULE)

The IDM (Intelligent Dispatch Module) screen is shown in Table 6-15. This module interfaces the Switch to a computer controlled dispatch Multi-Net II console. The IDM has a digital data connection that requires a separate full-duplex 9600 baud RS-232 interface called the IDIB (Intelligent Dispatch Interface Bus). The separate data path is required to allow the computer controlled dispatch consoles to monitor and display the status of other Groups. This status and display update can take place while the console is busy with voice communication on another Group. The information exchanged between the IDM and the consoles controls what the IDM receives and transmits for voice communication.

The IDM connects the 4-Wire 600 ohm balanced audio with the PCM (Pulse Code Modulation) data paths and communicates to other modules via the IDB (Intra-Terminal Data Bus). The IDM also monitors the CSB (Channel Status Bus) to send update changes to the IDM via the IDIB.

Table 6-15 Intelligent Dispatch Module Screen



Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Unique ID	1-8163	Dispatcher Unique ID (UIDs 8164-8191 are reserved)
Enable Proceed Tone	Yes, No	When selected, sounds a Proceed Tone indicating Ready-To-Talk.

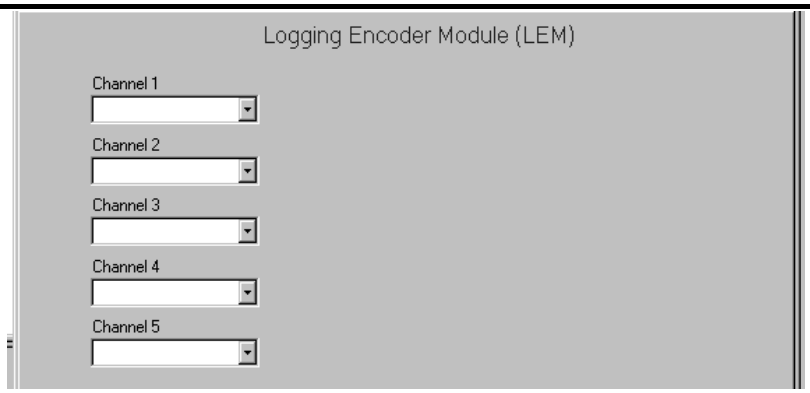
6.4.7 LEM (LOGGING ENCODER MODULE)

The LEM (Logging Encoder Module) screen is shown in Table 6-16. This module is the interface that performs the data collection and outputs of information for recording voice traffic. The LEM communicates with the other modules via the IDB (Intra-Terminal Data Bus) and monitors the CSB (Channel Status Bus) for the Groups set up to use the LEM.

The LEM is configured to monitor up to five channels for information. The LEM converts the CSB information for the five channels and outputs 1200 baud AFSK (Audio Frequency Shift Keying) to a logging recorder. There may be up to six LEMs in a Switch to cover up to thirty channels

.

Table 6-16 Logging Encoder Module Screen



Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Channel 1- Channel 5	1-30	Array with 5 Switch Channel Numbers. These are PCM time slot positions.

6.4.8 MAM (MULTI-NET ACQUISITION MODULE)

The MAM (Multi-Net Acquisition Module) screen is the same as the DIM screen shown in Table 6-14. This module uses either Direct Connection or Tone Remote to interface to the VRCM-50 (Orbacom) dispatch equipment for tone paging. A MAM with direct connection is associated with only one Group Code and uses a form of Type II E&M lead input similar to the mobile PTT.

The MAM also monitors the CIM (Channel Interface Module) via the CSB (see Section 3.3.2) to determine if a CIM is active with a MAM Group. The CIM notifies the MAM when a channel has been acquired and an alarm relay on the MAM closes the connection between the VRCM-50 console and the MAM. When the console detects the connection to the MAM, paging tones are sent.

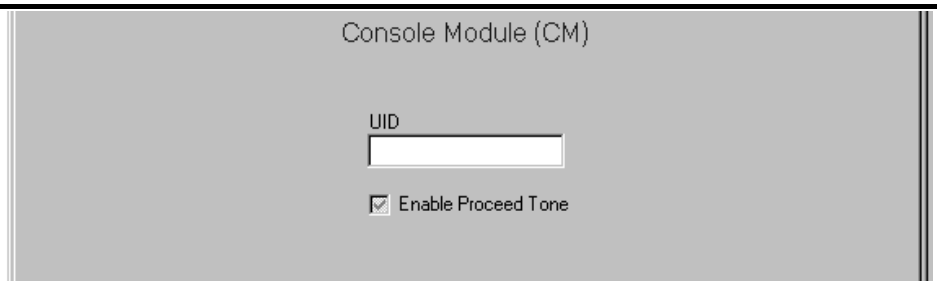
6.4.9 MCM (MULTI-NET CONSOLE MODULE)

The MCM (Multi-Net Console Module) screen is shown in Table 6-17. This module interfaces to a computer controlled VRCM-50 Series dispatch console. The MCM has a digital data connection that requires a separate full-duplex 9600 baud RS-232 interface called the IDIB (Intelligent Dispatch Interface Bus). The separate data path is required to allow computer controlled dispatch consoles to monitor and display the status of other Groups. This status and display update can take place while the console is busy with voice communication on another Group. The information exchanged between the MCM and the console controls what the MCM receives and transmits for voice communication.

The MCM connects the 4-Wire 600-ohm balanced audio with the PCM (Pulse Code Modulation) data paths and communicates to other modules via the IDB (Intra-Terminal Data Bus). The MCM also monitors the CSB (Channel Status Bus) to send update changes to the console via the IDIB (Intelligent Dispatch Interface Bus).

The MCM is similar to an IDM except it also has the capability of summing Multiple Group Audio into the Select Audio. It can also change the audio level of each Group in the Select Audio. A Conventional Patch Module (CPM) can only exist with an MCM. There may be two CPMs per MCM and they must be installed in the two address slots above the MCM. Example: MCM card address 40, CPM1 address would be 41 and CPM2 address would be 42. The functions of the CPM are controlled by the MCM.

Table 6-17 Multi-Net Console Module Screen



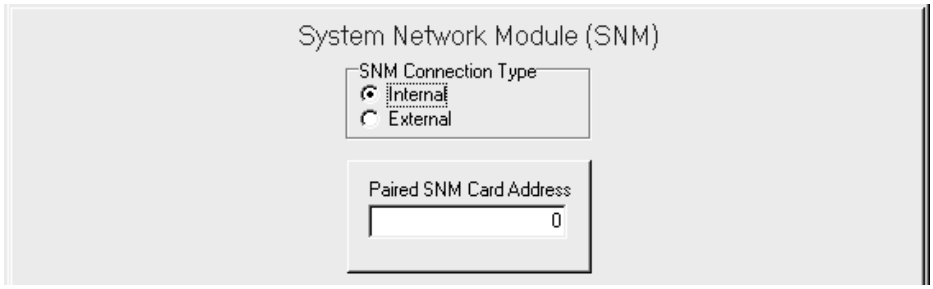
Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Unique ID	1-8163	Dispatcher Unique ID (UIDs 8164-8191 are reserved)
Enable Proceed Tone	Yes, No	When selected, sounds a Proceed Tone indicating ready to talk.

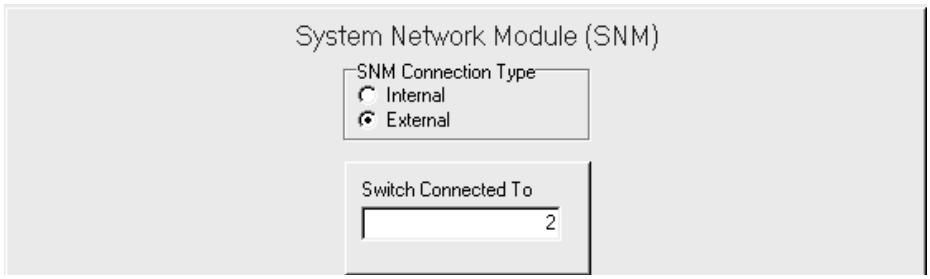
6.4.10 SNM (SYSTEM NETWORK MODULE)

The SNM (System Network Module) screen is shown in Table 6-18. This module is the interface that allows Unique ID calling from RF units and multiple Switches to be connected to a total system network. The SNM uses a 4-Wire 600-ohm balanced audio on the interface and connects audio to the PCM (Pulse Code Modulation) data paths. The SNM also uses a Type II E&M lead connection set for connection initiation and supervision.

The SNM communicates with other modules via the IDB (Intra-Terminal Data Bus) and monitors the CSB (Channel Status Bus) for a Group set up to use the SNM. SNMs use AFSK (Audio Frequency Shift Keying) data in a Blank-Burst mode to pass information on the interface relative to the type of call desired and connection status of the end device. This form of data passing allows a standard 4-Wire interface connection and does not require a specialized system switching node.

Table 6-18 System Network Module Screen





Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
SNM Connection Type	Internal, External	Is this SNM External to this Switch?
Paired SNM Card Address		Paired SNM's Address.
Switch Connected To	0 = Node Switch	Associated Switch. Provides reference as to when to select SNM when routing a call. 255 is for incoming SNM.

6.4.11 TIM (TELEPHONE INTERFACE MODULE)

General

The TIM (Telephone Interface Module) connects the Switch to the telephone lines and handles telephone line protocols. The TIM logic unit is microprocessor-controlled, and communicates to the Call Processor via the NetNIM and the IDB (Intra-Terminal Data Bus). A Switch may have multiple TIMs with varying styles of telephone lines attached. The telephone line audio is processed to interface with the PCM (Pulse Code Modulation) voice path. The basic TIM operation functions are Supervision, Signaling, Call Supervision, and Intra-Terminal Communication (see Multi-Net 3000 Series Switch Setup and Alignment Manual, Part No. 001-3139-003 or later for more detailed information).

The TIM screens vary depending on the type of telephone line being used. The TIM Card Type parameter selects one of the following types of phone lines. Refer to the indicated table for information on the screen, and to following descriptions for more information on TIM card programming.

2-Wire DID - Table 6-19
2-Wire Loop Ground - Table 6-20
4-Wire DID - Tables 6-21 and 6-23
4-Wire Loop Ground - Tables 6-22 and 6-23

Supervision

The TIM can be seized from either landside or internal. Landside seizure occurs by DID (Direct Inward Dialing) or 2-Way Start. Internal seizure comes from the IDB as a request for outgoing service on the telephone line. Once seizure has occurred, connection supervision takes place. Incoming calls are connected by Immediate Start or Wink Start. Immediate Start requires the ability to accept digits in less than 70 ms before digits are sent. Wink Start sends digits after a short battery reversal and back to normal battery before digits are received. Two-Way Incoming indicates readiness to accept “end-to-end” DTMF digits by outputting a Proceed Tone.

Signaling

Once connection supervision has occurred, the digit signaling occurs. There are two ways to send and receive digits: Dial Pulse or DTMF. The TIM sends or receives the appropriate signaling depending on the direction of the call. The TIM is capable of sending and receiving “end-to-end” signaling where the call is completed and normal voice communication takes place, or numeric information can be sent or received via DTMF. Dial Pulse information cannot pass through the telephone company’s CO (Central Office) to make it back and forth to the units.

Call Supervision

Once the signaling of the digits has occurred, call status is determined for Answer and Disconnect. Answer Supervision is an indication of when the called party answers the telephone. The preferred method is by Reverse Battery Answer, where the CO reverses the battery connection. Therefore, current flow reverses when the called party answers. The other method is Mobile Speech Activity which detects the presence of mobile speech for a certain length of time. If the telephone line cannot recognize Reverse Battery Answer, none is sent toward the CO, and no real answer supervision exits. However, the mobile speech activity can be used for answer detection.

Disconnect Supervision

Disconnect Supervision detects when the called party hangs-up (disconnects) and a message is then sent to the TIM to disconnect from the telephone line. The preferred method is Reverse Battery Answer where the battery returns to normal when the called party disconnects. The next method is to wait for the Mobile Disconnect Message. If the mobile does not hang up properly, the message is not sent and the call continues. Fail-safe alternatives watch for loss of mobile speech or detect the return of dial tone. This ensures call disconnect and allows another call to be placed. The TIM then informs the Call Processor that it has disconnected from the telephone line.

The TIM communicates to the Call Processor through the Intra-Terminal Data Bus (IDB) and sends activity information to the Call Processor. The Call

Processor sends messages to the TIM to request service, informs the TIM to disconnect, and any other necessary control information.

Telephone Line Styles

There are several different styles of telephone lines the TIM controls. The following styles of lines and their basic connection are supported:

Direct Inward Dialing (DID) - The DID offers direct inward dialing of the telephone number and supplies the –48V DC battery voltage to the incoming lines. The Central Office (CO) contacts the DID by closing the loop and sends the number to the DID by dial pulse or DTMF. The DID can handle 2, 3 or 4 digits being spilled forward by the CO.

4-Wire E&M - This is primarily used with electronic switches, public leased lines or microwave equipment to provide complete separation of transmit and receive audio lines. The signaling unit provides the -48V DC battery to the M-Lead, while the trunk unit provides ground to the M-Lead. The signaling is reversed for the E-Lead.

Dial Pulse - Dial pulsing is the “break and make” of the loop path current to cause no flow and flow. The number of breaks, when no current flows, is the number of the desired digit, with 10 pulses equaling 0.

Dual Tone Multi-Frequency (DTMF) - DTMF tone signaling is used on almost all push button telephones. DTMF is where the desired digit is composed of a combination of two tones. A tone pair consists of one tone from the low band group (697, 770, 852 or 941 Hz), and the high band group (1209, 1336, 1447 or 1633 Hz).

Audio Processing

The audio processing converts intra-terminal voice path audio to be placed on the telephone lines. The telephone line interface contains a hybrid that transmits and receives audio from the telephone line and keeps the transmitted audio out of the received audio to eliminate side-tone and echoing. The hybrid also converts the balanced telephone line to unbalanced connections.

Receive Audio

The receive audio is from the telephone line and processed for the intra-terminal Pulse Code Modulation (PCM) channel stream. The received audio has three paths:

Voice Audio - The receive audio from the telephone line comes from the unbalanced receive side of the hybrid. The audio is level adjusted through an amplifier to give a correct line level adjustment and passes through minimal filtering to eliminate the possibility of unwanted frequencies. A transmission gate turns the audio on and off toward the terminal. The gate is followed by a level adjustment amplifier/buffer before the audio enters the intra-terminal voice processing. The intra-terminal voice processing is a PCM CODEC with a time slot determination circuit. The CODEC digitizes the analog voice and outputs it on the PCM transmit channel stream in the appropriate time slot. The master clock and master frame sync are inputs to the TIM. These inputs provide timing for the CODEC and timing determination circuit.

Dial Tone Detection - The receive audio from the telephone line is taken from the line level adjust amplifier buffer and passes into a bandpass filter centered on the frequencies used for dial tone. The bandpass filter is adjusted for detection of the dial tone sent by the CO. The output of the bandpass filter passes to a rectification and detection circuit. The output of the detection circuit indicates the presence of dial tone to the logic unit.

DTMF Detection - The receive audio from the telephone line is taken from the line level adjust amplifier buffer. The audio passes into the DTMF detection circuitry and outputs the tone pair received and the valid tone pair signal to the logic unit.

Transmit Audio

The transmit audio from the PCM channel stream is processed to analog and sent to the telephone line. The functional paths of the transmit audio are as follows:

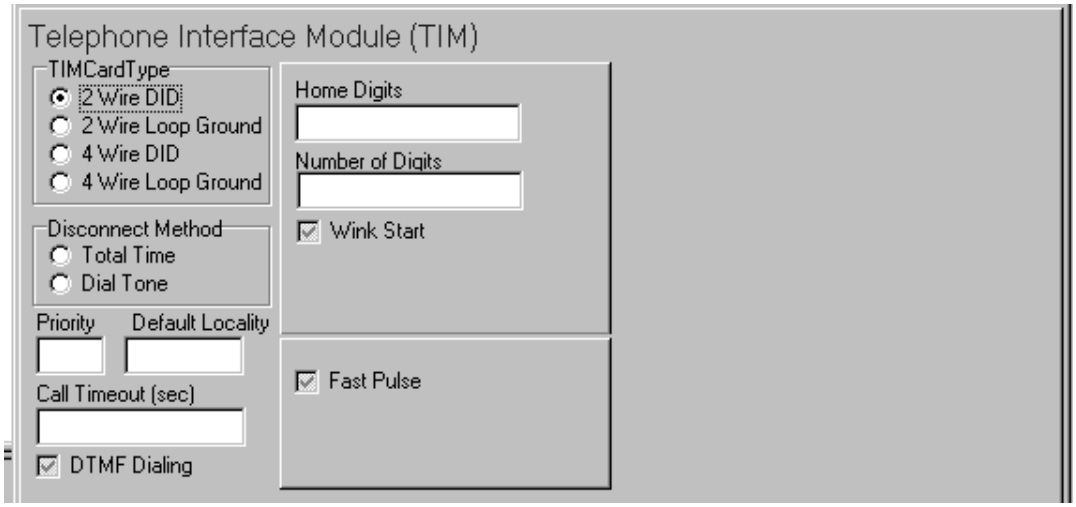
Voice Path - The transmit voice is processed from the PCM channel stream by the same CODEC and time slot determination circuitry as in the receive audio

voice path section above. The digitized voice is converted to analog and filtered by the CODEC to a high pass filter to eliminate low frequency audio. The audio is level adjusted by an amplifier buffer and gated into a summing amplifier buffer. The audio gating provides on/off control of the voice audio to the telephone line. The summing buffer has a level adjustment to set the outgoing line level and drives the unbalanced side of the telephone line hybrid.

Mobile Speech Detection - The audio for mobile speech detection comes from the CODEC amplifier buffer. The bandpass filter is centered at the audio frequency recognized for voice peaks. The filtered audio is rectified and detected for the presence of voice. The output of the detector is an input to the logic unit.

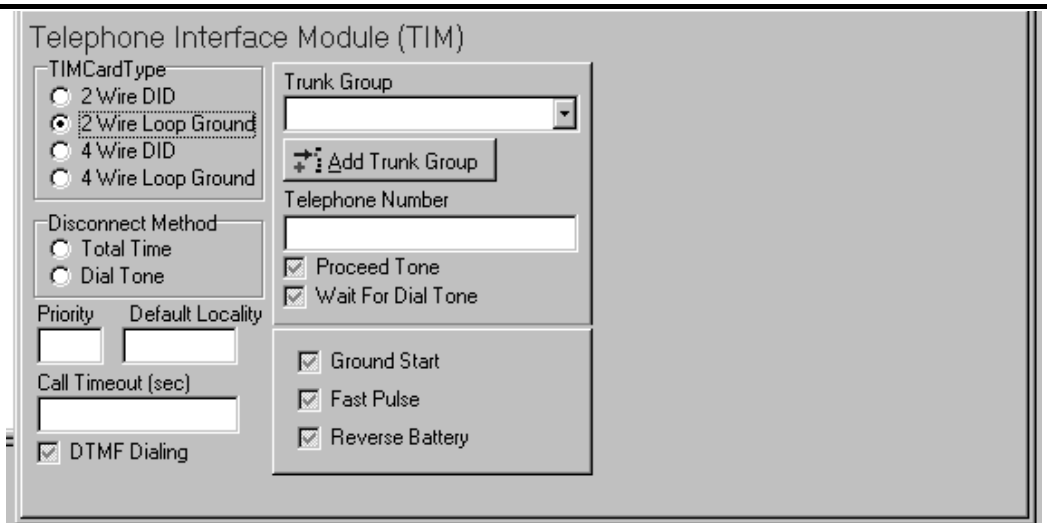
DTMF Generation - The DTMF signaling is generated on the TIM and transmitted toward the telephone line. The logic unit provides the inputs to the DTMF generation circuit. The generator outputs the desired tones and is adjusted to the proper level with respect to the voice path by an amplifier. The tones pass through a logic unit controlled audio transmission gate, summing amplifier buffer, to the telephone line.

Table 6-19 TIM 2-Wire DID Screen



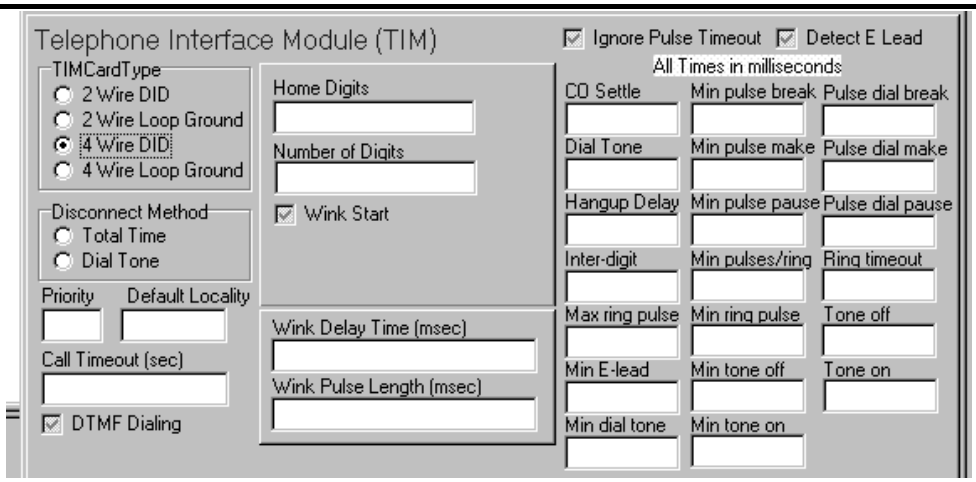
Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
TIM Card Type	2-Wire DID	DID (Direct Inward Dialing) of the telephone number. Cannot dial out to the CO. Two-Wire uses a pair of lines for short distances.
Disconnect Method	Total Time Dial Tone	Call disconnect by Dial Tone or by a Total Call Time.
Priority	1=highest, 5=lowest	Access Priority Level
Default Locality	1-30	Default Locality for a Group Call when dialing only Home/ Group.
Call Time Out	1-255	Time between PTTs in seconds for Dial Tone disconnect. Total call time in 10s of seconds for total time disconnect.
DTMF Dialing		Used on almost all push-button phones. Tone pairs are used to represent a digit.
Home Digits	10 numerical digits	PSTN number.
Number of Digits	1-9	The number of digits to receive (digits spilled forward).
Wink Start	Yes, No	Waits for battery reversal and back to normal to send digits.
Fast Pulse	Yes, No	Controls dialing rate for Pulse Dial, 20 PPS/10 PPS.

Table 6-20 TIM 2-Wire Loop Ground Screen



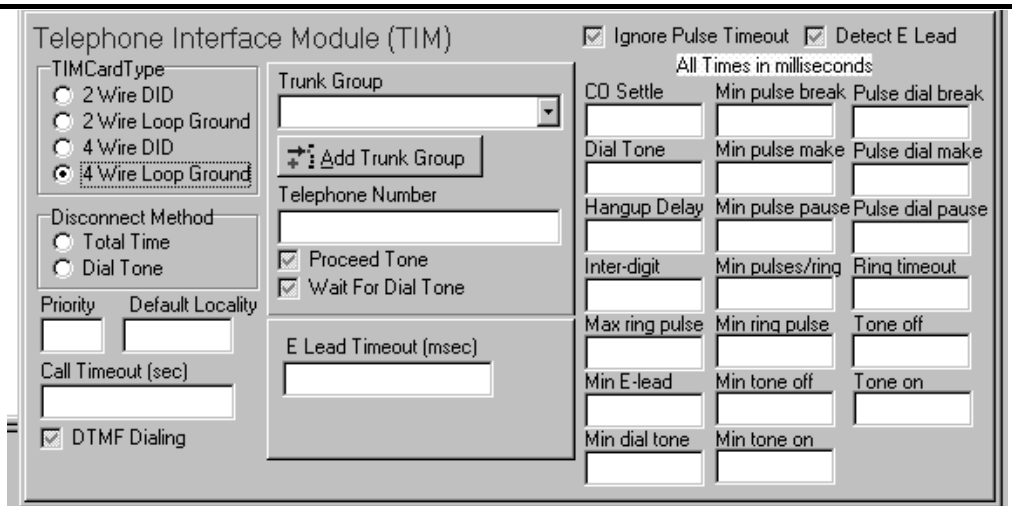
Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Disconnect Method	Total Time Dial Tone	Call disconnect by Dial Tone or Total Call Time.
Priority	1=highest, 5=lowest	Access Priority Level
Default Locality	1-30	Default Locality for a Group Call when dialing only Home/ Group.
Call Time Out	1-255	Time between PTTs in seconds for Dial Tone disconnect. Total call time in 10s of seconds for total time disconnect.
DTMF Dialing		Used on almost all push button phones. Tone pairs are used to represent a digit.
Trunk Group	0-9	Used for trunk selection (see Section 6.3.10). Corresponds to the trunk number assigned to the device connected to the PBX.
Telephone Number	10-digits	PSTN number (xxx-xxx-xxxx)
Proceed Tone	Yes, No	Outgoing tone when ready for digits.
Wait For Dial Tone	Yes, No	Wait for a Dial Tone before sending digits.
Ground Start	Yes - Ground No - Loop	Ground Start recognizes ground on Inward/Outward calls. Loop Start establishes load current on Inward/Outward calls.
Fast Pulse	Yes, No	Controls dialing rate for Pulse Dial, 20 PPS/10 PPS.
Reverse Battery	Yes - Reverse Battery No - Mobile Speech	Call answering scheme.

Table 6-21 TIM 4-Wire DID Screen



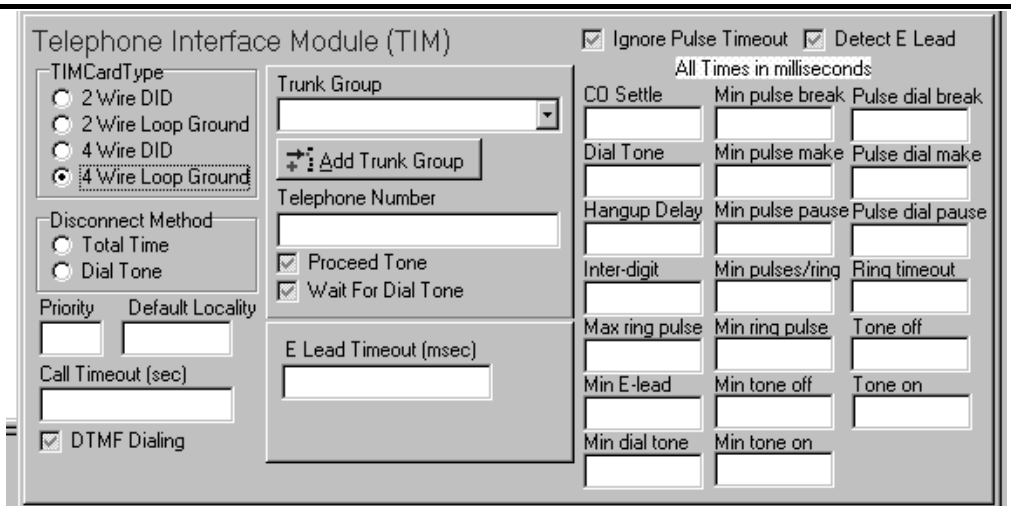
Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Disconnect Method	Total Time Dial Tone	Call disconnect by Dial Tone or by a Total Call Time.
Priority	1=highest, 5=lowest	Access Priority Level
Default Locality	1-30	Default Locality for a Group Call when dialing only Home/ Group.
Call Time Out	1-255	Time between PTTs in seconds for Dial Tone disconnect. Total call time in 10s of seconds for total time disconnect.
DTMF Dialing		Used on almost all push-button phones. Tone pairs are used to represent a digit.
Home Digits	10 numerical digits	PSTN number.
Number of Digits	1-9	The number of digits to receive (digits spilled forward).
Wink Start	Yes, No	Waits for battery reversal and back to normal to send digits.
Wink Delay Time	0-255 ms	Amount of delay between an E-Lead state change and a wink on the M-Lead is asserted.
Wink Pulse Length	0-255 ms	Length of a Wink Pulse. *NOTE: Setting both Wink Delay Time and Wink Pulse Length to zero indicates Immediate Start.*
NOTE: Refer to Table 6-23 for information on the 4-Wire Properties on the right side of the screen.		

Table 6-22 TIM 4-Wire Loop Ground Screen



Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Disconnect Method	Total Time Dial Tone	Call disconnect by Dial Tone or by a Total Call Time.
Priority	1=highest, 5=lowest	Access Priority Level
Default Locality	1-30	Default Locality for a Group Call when dialing only Home/ Group.
Call Time Out	1-255	Time between PTTs in seconds for Dial Tone disconnect. Total call time in 10s of seconds for total time disconnect.
DTMF Dialing		Used on almost all push-button phones. Tone pairs are used to represent a digit.
Trunk Group	0-9	Used for trunk selection (see Section 6.3.10). Corresponds to the trunk number assigned to the device connected to the PBX.
Telephone Number	10-digits	PSTN number (xxx-xxx-xxxx)
Proceed Tone	Yes, No	Incoming tone when ready for digits.
Wait For Dial Tone	Yes, No	Wait for a Dial Tone before sending digits.
E-Lead Time-Out	0-9950 ms	If E-Lead Detection is on, the amount of time (in 50 ms steps) to look for an E-Lead reversal before determining the line is out-of-order.
NOTE: Refer to Table 6-23 for information on the 4-Wire Properties located on the right side of the screen.		

Table 6-23 TIM 4-Wire Screen Properties



Function	Parameters	Description
Ignore Pulse Time Out	Yes, No	Accept valid Pulse Dial digits.
Detect E-Lead	Yes, No	Turns E-Lead detection on or off.
CO Settle	0-2550	The amount of time to delay after line supervision has taken place before dialing digits.
Dial Tone	0-9950	If Dial Tone detection is on, the amount of time to look for a Dial Tone before determining the line is out-of-order.
Hang-Up Delay	0-9950	The amount of time after going off-hook before an E-Lead reversal is accepted as a valid hang-up.
Inter-Digit	0-9950	Time-Out Timer that sets the maximum time allowed between digits when over-dialing a radio or (in the case of DID) the amount of time to collect a Pulse Dialed digit. In either case when a digit is detected the timer is reset. When the timer expires, the call progresses with no more digits being accepted.
Maximum Ring Pulse	0-255	The maximum length of a pulse for ring detection.
Minimum E-Lead	0-255	The minimum length of a pulse for ring detection. Along with Maximum Ring Pulse Length creates a valid frequency envelope for ring detection.
Minimum Dial Tone	0-255	The minimum amount of time a Dial Tone is detected contiguously before it is considered valid.
Minimum Pulse Break	0-255	The minimum amount of time to idle the M-Lead while dialing Pulse Dial digits for out-bound calls.
Minimum Pulse Make	0-255	The minimum amount of time to reverse the M-Lead while dialing Pulse Dial digits for out-bound calls.
Minimum Pulse Pause	0-9950	The minimum amount of time to pause between Pulse Dial Digits when making an out-bound call.
Minimum Pulses/Ring	0-255	The minimum number of ring pulses that must be gathered before the ring tone is considered valid.
Minimum Ring Pulse	0-255	The minimum length of a pulse for ring detection. Along with Maximum Ring Pulse length creates a valid frequency envelope for ring detection.
Minimum Tone Off	0-2500	The off time between DTMF digits while making an out-bound call.
Minimum Tone On	0-2500	How long to generate a DTMF digit while making an out-bound call.
Pulse Dial Break	0-255	How long to idle the M-Lead while dialing Pulse Dial digits for out-bound calls.
Pulse Dial Make	0-255	How long to reverse the M-Lead while dialing Pulse Dial digits for out-bound calls.

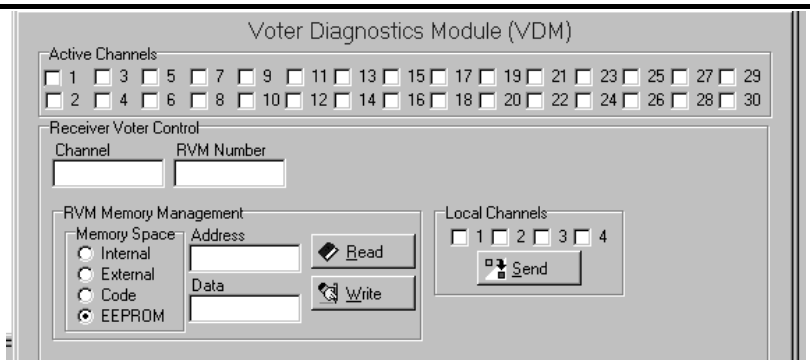
Table 6-23 TIM 4-Wire Screen Properties (Continued)

Function	Parameters	Description
Pulse Dial Pause	0-9950	The amount of time to pause between Pulse Dial digits when making an out-bound call.
Ring Time Out	200-50,000	The amount of time to wait for an answer (from a mobile or landside) when ringing.
Tone Off	0-2500	The off time between DTMF digits while making an out-bound call.
Tone On	0-2500	How long to generate a DTMF digit while making an out-bound call.

6.4.12 VDM (VOTER DIAGNOSTIC MODULE)

The VDM (Voter Diagnostic Module) screen is shown in Table 6-24. This module in the Switch is the data communication buffer module between the Call Processor and the Voting System. The VDM polls the Voter Shelf for alarms and passes the information to the Call Processor. The type of data exchanges between the Voting System and the VDM pertains to memory read of the Voters, Receiver Locality Enable/ Disable, and Alarm/Control information. The Call Processor supports the manual control of the Receiver Voter Module (RVM) in the Voter Shelf through the VDM and the VDM is configured accordingly.

Table 6-24 Voter Diagnostic Module Screen



Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10.		
Active Channels		Array with identifiers of 1-30, each identifying if the channel is active.
Channel	1-30	An active channel number indicated. Relates to the Receiver number.
RVM Number	0=current, 1-7 external	Select an RVM number in conjunction with a Channel number to communicate with a specific RVM via the VDM screen. The user, via the VDM, uses the number as a temporary selection.
RVM Memory Management	External, Internal, Code, EEPROM	Memory location to store data. External memory, Internal memory, Code ROM or the EEPROM.
Address	Number in Hex	Hex RAM address to read (memory location on selected RVM).
Data	Number in Hex	Data to write to EEPROM.
Read		Reads from the EEPROM at Address/Data location.
Write		Writes to EEPROM at Address/Data location.
Local Channels	1-4	These represent the four possible Localities a given RVM can be connected to for a given channel.
Send		Sends the data to the selected channel in the Voter shelf.

6.4.13 WAM (WIDE AREA MODULE)

The WAM (Wide Area Module) screen is shown in Table 6-25. This module communicates with the other modules via the IDB (Intra-Terminal Data Bus) and monitors the CSB (Channel Status Bus) for the Groups that are set up to use the WAM. The Wide Area Call configuration sent by the Call Processor determines when the Wide Area Call should be activated.

The Wide Area Call configuration contains a unique identification number (WAC ID) that identifies the configuration to all Call Processors on a Network. If a user at one Call Processor creates or modifies a WAC ID configuration, it propagates to all the other Call Processors on the Network.

A Wide Area Call can be configured to look like an STM* (Site Tracking Module) call or a GPM* (Group Patch Module) call. The STM call uses only one Home/Group ID and tracks units by their UID (Unique ID) across multiple Localities. The GPM call contains Locality/Home/Group ID combinations and does not care about Unique IDs.

WAMs with software version 2.17 or later allow consoles to patch together multiple wide area group calls.

* *These modules were used in previous Multi-Net Systems with an RNT. The WAM obsoleted these modules.*

Additional information on Wide Area Module programming follows:

Card Address - This is the slot number in the Switch.

Port - This is the logical port number assigned to a WAM in a switch. The port numbers must be unique and are used to identify which external WAMs are physically tied together.

Example: If a WAM located in Switch 1, Slot 32 is connected to a WAM in Switch 2, Slot 38, a port number can be assigned that identifies they are tied together. If there are more than two switches in the system, all the WAMs in the group that are tied together get the same port number.

Call Router - The Call Router option can either be set for Present or Not Used. When multiple Switches are connected together, the transmit and receive audio paths are connected together. This in effect wraps the audio from the transmit to the receive audio path. When this type of configuration is used, the Call Router option needs to be set to Present. When only one Switch is used, this option needs to be set to Not Used. This option tells the WAM whether the audio is wrapped internally or externally.

Type - A WAM can be either an Internal or External type. An Internal WAM is only used for calls occurring on that Switch with no external connections to other switches. An External WAM is used for calls to other switches designated by a Routing Group Number.

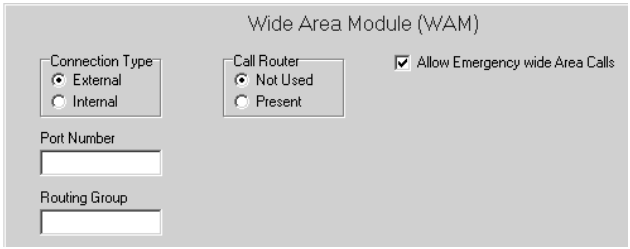
Routing Group - The Routing Group identifies which Switches are included in a WAM Group. When WAMs are wired externally, they may be connected to any or all of the other Switches in the system. Wide Area Calls are allocated to a WAM through the use of the Routing Group number.

Each WAC is configured with a Routing Group number that identifies the type of resource needed to setup the Call. If more than one set of WAMs are connected to wire the same group of Switches together, they are assigned the same Routing Group number.

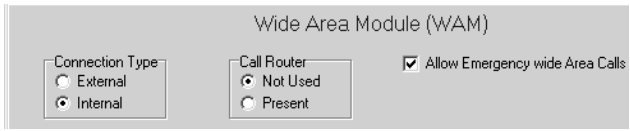
NOTE: Do not use Routing Group 0 because it is reserved for internal WAMs.

Allow Emergency Wide Area Calls - Turns on or off the WAM's ability to activate WACs for priority 1 calls. This is a serial number key dependent field. Therefore, it is displayed only if the SSM encryption key contains this feature. This key is entered using the File > Enter Key function described in Section 5.2.4.

Table 6-25 Wide Area Module Screen



External Connection Type



Internal Connection Type

Function	Parameters	Description
NOTE: Global Card Properties are described in Table 6-10, and additional information on the following parameters is located on page 6-42.		
Connection Type	External, Internal	Is this an external stand-alone WAM or is it externally connected to WAMs in other Switches?
Call Router	Not Used, Present	Indicate if a Call Router is used. In a multiple-switch environment where the switches may not be co-located, Present is selected to prevent multiple audio paths in Wide Area Calls. *NOTE: The Tx and Rx audio between WAM cards needs to be bridged together at one point in all multiple-switch systems.*
Allow Emergency Wide Area Calls	Enable/Disable	Enables or disables the ability to activate WACs for priority 1 calls. This is an optional feature that is displayed only if the SSM encryption key contains this feature.
Port Number	16 bits (0-65535)	External Only. When there is no Call Router present, the WAM Port Number represents a set of interconnected WAMs. If there is a Call Router, the port number represents only one external WAM.
Routing Group	(Do not use “0”)	Identifies which Switches are included in a WAM group.

APPENDIX A ALARM LIST

Table A-1 All Alarms (Listed By Number)

Alarm No.	Severity	Description
INTRA-TERMINAL DATA BUS ALARMS		
1	Major	CIM:Repeater Assignment Error from the RIM. The CIM is reporting a mismatch between the repeater number assigned to it and the repeater number reported by the repeater. **Data 1 Value and Description:** This is the repeater number that is programmed into the CIM and is what the CIM is expecting from the repeater. **Data 2 Value and Description:** This is the actual repeater number reported by the repeater to the CIM.
2	Major	CIM:Link Setup time-out on the CIB. The CIM tries for 30 seconds to establish a link with the repeater and if it fails, it generates this alarm. Once this alarm is generated for the first time, the CIM continues to look for the repeater and if it continues to see nothing, it proceeds to report this alarm every 5 minutes until it either sees a repeater or detects that it has been set to disable.
3	Informational	CIM:Repeater restarted unexpected from RIM. The CIM generates this alarm if the CIM receives a repeater restart message at a time it does not expect it. This alarm will be generated anytime the repeater is manually restarted after the link had been established.
4	Minor	CIM:Enable Repeater Order No Response Message from the RIM. Not used. Alarm #18 used in its place.
5	Minor	CIM:Disable Repeater Order No Response Message from the RIM. This alarm is generated if the CIM does not get a response back from the repeater indicating that the repeater has disabled as a result of a disable order sent from the CIM. A disable order is nothing more than a bit state inside of a “repeater authorization request order”. The repeater must acknowledge this order with the proper repeater number and a proper enable/disable state. If either of these two parameters are wrong or no acknowledge is received at all, this alarm is generated.
6	Informational	CIM:Received Wrong Message from the RIM. Not Used.
7	Minor	CIM:Transmit Call Request No Response Message from the RIM. Not used. Alarm #9 used in its place.
8	Minor	CIM:No Channel Acknowledge from the RIM. Not used. Alarm #18 used in its place.
9	Minor	CIM:No Transmit Call Ack Message from the RIM. If a CIM does not get a reply back from a repeater for a “transmit call request order” within 300 ms, it will send the order again. If it does not receive a response 300 ms after the third try, the CIM will send this alarm to the CP and send a NACK back to whatever device that had sent it the simulselect or channel request order in the first place.
10	Minor	CIM:No Transmit Hang Ack Message from the RIM. If a CIM does not get a reply back from a repeater for a “transmit hang request order” within 300 ms, it will send the order again. If it does not get a response within an additional 300 ms, it will send this alarm to the CP.
11	Minor	CIM:No Transmit Clear Ack Message. If a CIM does not get a reply back from a repeater for a “transmit clear request order” within 300 ms, it will send the order again. If it does not get a response within an additional 300 ms, it will send this alarm to the CP.
12	Minor	CIM:No Receive Update from the RIM. Once a CIM is in a receive state of some form as the result of receiving a “receive call request” message from its repeater at some point, the CIM expects additional messages periodically from the repeater to keep the call up. If the CIM does not receive another receive “call request message” from its repeater for a period of three minutes and if the CIM is not in duplex task, it drops the call and sends this alarm to the CP. If it does not receive another “call request message”' while it is in duplex task, it closes its audio gates routing the received audio and returns to transmit task.

Table A-1 All Alarms (Listed By Number) (Continued)

Alarm No.	Severity	Description
13	Unknown	External error. If the DIM or MAM initialization order from the Call Processor indicates there are extended groups but then no DIM extended initialization order is received by the card, the card will send this alarm message to the CP and then go back to the initialization task.
14	Informational	Group Number Error. If a DIM or MAM receives a “DIM Extended Initialization Order” from the Call Processor with a record number that is out of order, it will send this error to the CP and return to Idle Task. This may occur if for some reason the card missed one in a series of DIM Extended Initialization Orders resulting in the extended group record number not matching what it expects.
15	Informational	Idle busy conflict. If the home, group, or UID of the channel the card has selected or requested, changes to something other than what the card started with, or if the channel unexpectedly goes idle, this alarm message is sent to the CP. This alarm is produced whenever a switch side card (WAM, MCM, SNM, DIM, TIM, MAM, IDM, etc.) attempts to take control of an idle channel and gets a negative response. This could be caused by such things as two cards requesting a channel at the same time (collisions), a radio getting a channel just prior to an attempt by a card, a console taking over control of a channel, or the channel going down for some reason. A few of these alarms a day are normal but hundreds may indicate a very busy system in need of reconfiguration. Note that this alarm does not indicate lost calls because a retry is immediately made on another channel.
16	Informational	Transmit time-out error
17	Informational	Hang error
18	Minor	CIM:No Repeater Authorization Ack Message
19	Major	TIM:No Trunk Error
20	Minor	SNM:Connection Failure
21	Minor	CIM:Link Established Message No Response Order
22	Minor	CIM:Repeater Enabled Message No Response Order
23	Minor	CIM:Repeater Disabled Message No Response Order
24	Minor	Loss of E-lead on the PCM
25	Minor	No response from the SMM
26	Minor	No response from the module
27	Minor	No Trunk Response Order
28	Minor	No disconnect response
29	Minor	No DIM Response
30	Minor	SNM:No SNB Response
31	Major	TIM:2-WAY not able to get service
32	Minor	TIM:No dial tone received
33	Minor	TIM:No wink received
34	Major	TIM:No trunk connected to 2-way
35	Informational	Lost a Registration Request Message
36	Minor	CIM:RIM Link Lost

Table A-1 All Alarms (Listed By Number) (Continued)

Alarm No.	Severity	Description
37	Major	No RVM Response. The VDM polls each RVM it believes exists sequentially every two seconds. If it does not get a response back from one, it sends an error message on the IDB informing the CP of which RVM it has lost communication with. **Data 1 Value and Description:** Range of the value is 8 to 255. This is an 8-bit number binaurally representing the RVM and channel number of the reportedly missing RVM. Bits 0-2 represent the RVM number. A zero in these three bits means the cRVM is missing. Anything in the range of 1 to 7 means a specific slave RVM is missing. The upper 5 bits (3-7) represent the repeater number (or cRVM number) of the missing RVM. These 5 bits can range in value from 1 and 30. **Data 2 Value and Description:** Range of the value if 0 to 1. If this field is a zero then this alarm is “set”' meaning the RVM in Data 1 is currently missing. If this field is a one, then this alarm is “cleared” meaning the RVM in Data 1 has had communication restored.
38	Informational	CIM:Went to standby
39	Informational	SNM:SNB link restored
40	Minor	IDM:Link was lost between IDM and console
41	Informational	IDM:Link was restored between IDM and console
42	Minor	IDM:Repeater Alarm/IDM Link Error
46	Informational	Not all channels active in WAM. The WAM did not get all the channels needed to fully service the wide area call, usually because not enough were available. It indicates that one or more of the participants did not participate. A few if these messages are normal during busy periods, but hundreds per day may indicate a need for additional channels. **Data 1 Value and Description:** Indicates that task the WAM was in where the alarm was generated. They can be as follows: 3 - Rx Only; 4 - Rx of Other Tx; 5 - Tx Only; 8 - Duplex. **Data 2 Value and Description:** Indicates the site number of the site that was unable to bring up all needed channels. Note that this only displays the first site the WAM sees that did not bring up all channels. There may have been others.
72	Major	NIM:IDB lock up
73	Major	NIM:CSB lock up
74	Major	NIM:NIM Card Lock up
100	Critical	Out of Memory
101	Minor	Received Card Address out of range
102	Informational	Clock Status
103	Major	NIM:Clock Takeover
104	Informational	Unexpected DIM Ack
105	Informational	DIM Initialization Complete
106	Informational	Device Enabled
107	Informational	CIM Initialization Complete
108	Informational	STM Initialization
109	Informational	CCM Initialized
110	Informational	SNM Initialized
111	Minor	Device Not Defined at Initialization
112	Informational	CIM:Repeater Enabled
113	Informational	CIM:Repeater Disabled
114	Informational	UID Terminated
115	Minor	Unexpected UID Termination
116	Informational	UID Reassigned
117	Minor	Failed Terminate Set up
118	Minor	Failed Interrogate Setup
119	Minor	Selective Unit Disable Time-out

Table A-1 All Alarms (Listed By Number) (Continued)

Alarm No.	Severity	Description
120	Minor	No Response Suspend Audio Order
121	Minor	Failed Dynamic Reassignment Setup
122	Minor	Dynamic Reassignment Response Time-out
123	Minor	NAK to Selective Unit Disable Order
124	Minor	Execute Selective Unit Disable Failure
125	Minor	Fail Execute of Dynamic Reassignment
126	Minor	Unexpected Dynamic Reassignment
127	Informational	System Boot Complete
128	Minor	Call Failure Prior to SUD
129	Informational	RNT Registration out to others failure
130	Minor	No Response for DIM to accept a UID call
131	Minor	No Response for SNM to accept a UID call
132	Minor	Exceeded number of tries to disconnect
133	Unknown	Pointer indicate idle and still on timed list
134	Informational	SNM Idle Time-out Error
135	Informational	TIM Initialization
136	Minor	No TIM Response to Trunk Request
137	Informational	TIM Idle Time-out Error
138	Informational	NAK to a TIM Outgoing Request
139	Minor	No TIM Response to Call Destination Order
140	Minor	No DIM Response to Call Destination Order
141	Minor	No SNM Response to Call Destination Order
142	Minor	NACK Execute of Dynamic Reassignment by Mobile
143	Informational	Failure to complete enable of card
144	Unknown	Reserved
145	Unknown	Reserved
146	Unknown	Reserved
147	Unknown	Reserved
148	Unknown	Reserved
149	Unknown	Reserved
150	Unknown	Reserved
151	Informational	DCM Initialization
152	Minor	SUD Kill Not Allowed by Radio
153	Unknown	Reserved
154	Unknown	Reserved
155	Informational	VDM Initialization
156	Informational	Group Patch Initialization
157	Minor	GPM Configure Setup Failure

Table A-1 All Alarms (Listed By Number) (Continued)

Alarm No.	Severity	Description
158	Minor	GPM Tear Down Failure
159	Minor	No Queue setup completion message
160	Informational	IDM Initialization
161	Informational	LEM Initialization
162	Minor	Dynamic Freq. No CIM Response
163	Minor	IDM fail to ack patch setup
164	Minor	GPM fail to ack patch add order
165	Minor	GPM fail to ack reconfiguration order
CALL PROCESSOR ALARMS		
240	Unknown	Keith Barnes Personal TIM debug message (call for details)
256	Informational	Selection Complete
257	Informational	No channels available for interrogate
258	Informational	Interrogate succeeded
259	Informational	Interrogate failed
260	Minor	Selective Unit Disable setup failed
261	Informational	User Kill completed
262	Major	Network time-out
263	Minor	User suspend audio failed
264	Minor	WAM abort failed
265	Major	Card failed
266	Minor	EM activate failed
267	Minor	No available channels
268	Informational	No available WAMs. At the instant the Call Processor needed a WAM to configure a wide area call, all were busy or were in the 10-second dwell time after a call. A few of these messages a day is considered normal, but hundreds may indicate a need for additional WAMs.
269	Informational	Net WAM nak. The Call Processor receives a NACK when a wide area call configuration order is sent to a WAM and fails. This could occur if the WAM went busy with another call at the same time this order was sent. The CP then reattempts on a different WAM. As with alarm 268, hundreds of these alarms a day may indicate a need for additional WAMs.
270	Informational	Channel was busy
271	Informational	“Kill user failed, no available channels”
272	Minor	TIM request failed
273	Minor	EM enable failed
274	Informational	Emergency plan aborted
275	Informational	NIM:CSB OK
276	Critical	NIM:CSB failed

Table A-1 All Alarms (Listed By Number) (Continued)

Alarm No.	Severity	Description
277	Informational	VDM memory log. The VDM receives a memory message from an RVM as a result of it initially sending a memory order to it. The memory order includes the memory location and the type of memory being read from the card. The order sent from the VDM to the RVM is itself the result of a VDM order sent to the VDM from the CP. The memory order from the CP is itself originated from a user requesting the memory read from the VDM card property of the SSM. The result is a VDM Memory Message being sent to the CP from the VDM containing the contents of the memory message it received from the RVM. The CP then generates the informational VDM Memory Log alarm (277) and logs it to the alarm log with the following data fields set as follows: **Data 1 Value and Description:** Range of the value is 1 to 65535. This 16-bit number represents the RVM number and the channel number that had its memory read. The RVM number is located in the top 8 bits of the field value and the channel number is in the lower 8 bits of the field. The RVM number ranges from 0 to 7 with 0 being the cRVM and 1 to 7 being the possible slave RVMs. Example, if memory read occurred on the cRVM of channel one the 16-bit binary representation would be 0000000000000001 or 1 in decimal. If the memory read occurred on slave RVM number 1 of channel 2, the binary representation would be 0000000100000010 or 258 in decimal (12h in hex). **Data 2 Value and Description:** Range of the value is 1 to 65535. This 16-bit number represents the memory location (in decimal) read from the respective RVM. **Data 3 Value and Description:** Range of the value is 1 to 65535. This 16-bit number represents the value returned by the RVM as a result of reading the location displayed in Data2. The lower 8 bits of this 16-bit number is the value returned for the actual memory location displayed in Data2. The upper 8 bits are from the location directly above the memory location displayed in Data 2. In other words, every memory read returns the contents of two locations. The one requested and the one above it.
278	Informational	RVM message log. The cRVM sets a bit in its RVM error bit map when it does not get a response back from a slave RVM. The bitmap is seven bits long with the least significant bit representing RVM 1 and the most significant bit representing RVM 7. Example: If the cRVM lost contact with RVM 3, the RVM error bit map would be set to 0000100 (or decimal 4). If it lost contact with RVMs one, two, and six it would set it to 0100011 (decimal 35). This bit map is supplied in every RVM status message to the VDM. If the VDM detects a change to the bit map for the given RVM, it writes an “RVM Message” to the CP via the IDB informing the CP of the new bit map state. The CP will write this out as an informational alarm (278) with the data fields set as described below. *See also alarm 37.* **Data 1 Value and Description:** Range of the value is 1 to 30. This is the repeater number of the cRVM that originated the data to the VDM. **Data 2 Value and Description:** Range of the value is 0 to 128. This is the 7-bit bitmap representing the failed RVMs the cRVM is reporting on. If this value is 0, then all previously reported RVM failures have cleared. **Data 3 Value and Description:** Range of the value is 1 to 128. This is the 7-bit bitmap representing the RVMs that are expected to be present and communicating with the cRVM. The source of this setting is a dip switch setting on the cRVM.

Table A-1 All Alarms (Listed By Number) (Continued)

Alarm No.	Severity	Description
279	Informational	CDM message log. RVMs send their status to the VDM when polled. Included in this status is the status of the CDM bus (bus that transfers RSSI information to the RVM). If an RVM detects a bad CDM bus on one or more of its sites, it sets that site's respective number in a 4-bit bitmap. Example: If the RVM lost the CDM bus on the third site, the CDM Error bit map would be set to 0100 (or decimal 4). If it lost sites one and two it would set it to 0011 (decimal 3). This bit map is supplied in every RVM status message to the VDM. If the VDM detects a change to the bit map for the given RVM, it writes a "CDM Message" to the CP via the IDB informing the CP of the new bit map state. The CP then writes this out as an informational alarm (279) with the data fields set as described follows: **Data 1 Value and Description:** Range of the value is 1 to 65535. This 16-bit number represents the RVM number and the channel number. The RVM number is located in the top 8 bits of the field value and the channel number is in the lower 8 bits of the field. The RVM number itself ranges from 0 to 7 with 0 being the cRVM and 1 to 7 being the possible slave RVMs. Example: If the CDM error occurred on the cRVM of channel one the 16-bit binary representation would be 0000000000000001 or 1 in decimal. If the error occurred on slave RVM number 1 of channel 2, the binary representation would be 0000000100000010 or 258 in decimal (102h in hex). **Data 2 Value and Description:** Range of the value is 0 to 15. This is the CDM error bit map value. If the value is 0, then the last change to the bit map resulted in any previous CDM errors being cleared. A number from 1 to 15 binaurally describes which of the 4 CDM busses for that given RVM is in an error state. Example: If sites one and three are in an error state, the bit map would be 0101 or 5 in decimal.
280	Informational	RDM message log. RVMs send their status to the VDM when polled. Included in this status is the status of the RDM bus (bus that transfers RSSI information to the RVM). If an RVM detects a bad RDM bus on one or more of its sites, it sets that site's respective number in a 4-bit bitmap. Example: If the RVM lost the RDM bus on the third site, the RDM Error bit map would be set to 0100 (or decimal 4). If it lost sites one and two it would set it to 0011 (decimal 3). This bit map is supplied in every RVM status message to the VDM. If the VDM detects a change to the bit map for the given RVM, it writes a "RDM Message" to the CP via the IDB informing the CP of the new bit map state. The CP writes this out as an informational alarm (279) with the data fields set as follows: **Data 1 Value and Description:** Range of the value is 1 to 65535. This 16-bit number represents the RVM number and the channel number. The RVM number is located in the top 8 bits of the field value and the channel number is in the lower 8 bits of the field. The RVM number itself ranges from 0 to 7 with 0 being the cRVM and 1 to 7 being the possible slave RVMs. Example: If the RDM error occurred on the cRVM of channel one, the 16-bit binary representation would be 0000000000000001 or 1 in decimal. If the error occurred on slave RVM number 1 of channel 2, the binary representation would be 0000000100000010 or 258 in decimal (12h in hex). **Data 2 Value and Description:** Range of the value is 0 to 15. This is the RDM error bit map value. If the value is 0, then the last change to the bit map resulted in any and all previous RDM errors being cleared. A number from 1 to 15 binaurally describes which of the 4 RDM busses for that given RVM is in an error state. Example: If sites one and three are in an error state, the bit map would be 0101 or 5 in decimal.
281	Minor	TIM:Bad TIM type
282	Minor	Dispatch card initialize failed
283	Informational	Card restart log entry
284	Minor	Bad card address detected
285	Informational	Memory log error
286	Informational	Log standby
287	Informational	Card initialized
288	Minor	Card Initialize failure
289	Minor	Card restart failure

Table A-1 All Alarms (Listed By Number) (Continued)

Alarm No.	Severity	Description
290	Informational	Bad opcode detected. The Call Processor received a IDB message addressed to it with an opcode it does not handle. This could be caused by improper programming of a CIM or other card.
291	Minor	UID not in database
292	Minor	Group or home not in database
293	Informational	CIM Initialized
294	Critical	NIM:IDB Tx Bus Failure
295	Critical	NIM:IDB General Bus Failure
296	Informational	Emergency plan execution started
297	Informational	Emergency plan completed
298	Minor	Sleep call setup failed
299	Minor	Sleep call failed
300	Minor	Sleep call timed out waiting for a response
301	Minor	Sleep execute failed
302	Minor	“Sleep call failed, no available channels”
303	Informational	Sleep Completed successfully
304	Informational	Group Alpha Tag completed successfully
305	Minor	Group Alpha Tag Failed
306	Minor	“Group Alpha Tag failed, no available channels”
307	Minor	“Group Alpha Tag Failed, no response from CIM”
308	Informational	Wide Area Call aborted due to glare on specified port number
309	Informational	Alpha Numeric Message sent successfully
310	Informational	Alpha Numeric Message failed.
311	Minor	“Alpha Numeric Message failed, No available channels”
312	Minor	“Alpha Numeric Message failed, no response received.”
313	Minor	ESN by UID call failed
314	Minor	“ESN by UID call failed, No available channels”
315	Minor	“ESN by UID call failed, No response from subscriber unit”
316	Informational	ESN successfully retrieved from UID
317	Minor	UID by ESN call failed
318	Minor	“UID by ESN call failed, No available channels”
319	Minor	“UID by ESN call failed, No response from subscriber unit”
320	Informational	UID successfully retrieved from ESN
321	Informational	ESN Authentication Done
322	Informational	ESN Authentication Started
323	Minor	WAM Configuration Failed
324	Unknown	RPTR:SMC
325	Unknown	RPTR:VNC
326	Unknown	RPTR:AC Fail
327	Unknown	RPTR:IAC 1
328	Unknown	RPTR:IAC 2
329	Unknown	RPTR:IAC 3
330	Unknown	RPTR:IAC 4
331	Unknown	RPTR:MAC

Table A-1 All Alarms (Listed By Number) (Continued)

Alarm No.	Severity	Description
332	Unknown	RPTR:HSDB
333	Unknown	RPTR:IRDB
334	Unknown	RPTR:CIM
335	Unknown	RPTR:TIC
336	Unknown	RPTR:Battery Fail
337	Unknown	RPTR:PS Thermal
338	Unknown	RPTR:FAN 1
339	Unknown	RPTR:FAN 2
340	Unknown	RPTR:GPS 1PPS
341	Unknown	RPTR:IAC Mismatch
342	Unknown	RPTR:SMC Link
343	Unknown	RPTR:No A/D
344	Unknown	RPTR:GPS 10 MHZ
345	Unknown	RPTR:Setup
346	Unknown	RPTR:RF Shutdown
347	Unknown	RPTR:RF Half Power
348	Unknown	RPTR:RF Thermal
349	Unknown	RPTR:RF 1 & 2
350	Unknown	RPTR:RF 3 & 4
351	Unknown	RPTR:RF VSWR
352	Unknown	RPTR:Tx Synth Lock
353	Unknown	RPTR:Rx Synth Lock
354	Unknown	RPTR:HSS Rx Lock
355	Unknown	RPTR:HSS Tx Lock
356	Unknown	RPTR:RF 1/4 Power
357	Unknown	RPTR:Disabled
358	Unknown	RPTR:Test Mode
359	Informational	Alpha Group Page failed - No channels available
360	Informational	Alpha Group Page failed - No response from unit
361	Informational	Alpha group Page Completed Successfully
362	Informational	Alpha Group Page failed
363	Informational	TIM went idle unexpectedly
400	Informational	CIM:Repeater Link Established
401	Informational	NIM:IDB OK
402	Unknown	RPTR: Undefined Forwarded Repeater Alarm
100000	Minor	Bogus Alarm

APPENDIX B CALL SEQUENCES

B.1 GROUP CALL

B.1.1 MOBILE-TO-MOBILE ON SAME LOCALITY

Use two mobiles with the same Home and list of Group IDs. Select the same Group on the mobiles.

1. Press the PTT on Mobile-1.

- The CIM associated with the active repeater changes from Idle Task “2” to Receive Task “4”.
- Mobile-2 receives the voice communication from Mobile-1.
- No DIMs receive voice communication.

2. Release the PTT on Mobile-1.

- The active CIM returns to the Idle Task “2”.
- Mobile-2 returns to Idle and is silent.

3. Repeat these steps using Mobile-2 as PTT Mobile.

B.1.2 MOBILE-TO-MOBILE WITH DIM MONITORING

Use two mobiles with the same Home and list of Group IDs. On the Dispatch Console (DC) select a DIM and mobiles with a group that is common to both.

1. Press the PTT on Mobile-1.

- The CIM associated with the active repeater changes from Idle Task “2” to Receive Task “4”.
- The associated DIM changes from Idle Task “2” to Receive Task “4”.
- The DIM receives the voice communication.
- Mobile-2 receives the voice communication from Mobile-1.

2. Release the PTT on Mobile-1.

- The CIM returns to Idle Task “2”.
- Mobile-2 returns to Idle and is silent.
- The DIM returns to Idle Task “2” and no voice communication is heard at the DC.

3. Repeat these steps using Mobile-2 as PTT Mobile.

B.2 WIDE AREA GROUP CALL

B.2.1 MOBILE TO GROUP OF MOBILES ON MULTIPLE LOCALITIES

Use a mobile with a Home/Group that exists in a Wide Area Call Configuration on the Call Processor. The Wide Area Call Configuration can contain entries for multiple Localities, Homes and Groups.

1. Press the PTT on Mobile-1.

- The CIM associated with the active repeater changes from Idle Task “2" to Receive Task “4”.
- The WAM card picks up the call from the Channel Status Bus and acquires channel resources based on the Wide Area Call Configuration.
- The acquired CIM cards change from Idle Task “2” to Transmit Task “3”.
- The other mobiles receive the audio for Mobile-1.

2. Release the PTT on Mobile-1.

- The active CIM in Receive Task “4” returns to Idle Task “2”.
- The associated WAM returns to Idle Task and releases the acquired channels.
- The acquired CIMs return from Transmit Task to Idle Task.

3. Repeat these steps from any Mobile in the Wide Area Call Configuration.

B.3 DISPATCH CONSOLE (DC) TO MOBILE GROUP CALL

Use two mobiles with the same Home and list of Group IDs. Select the DIM with this Group ID.

1. Press the PTT function on the DC.

- The associated DIM changes from the Idle Task “2” to the Transmit Task “3”.
- The Associated CIM is selected and changes from the Idle Task “2” to Transmit Task “3”.
- The mobiles receive the voice communication.

2. Release the PTT on the DC.

- The associated DIM returns to Idle Task “2”.
- The associated CIM returns to Idle Task “2”.

  If the associated DIM has Hang Time defined, the associated CIM enters Hang Task “7” for the defined time.

  When the Hang Time has expired the associated CIM returns to Idle Task “2”.

- The mobiles return to idle and stop receiving.

B.4 MOBILE GROUP CALL TO DISPATCH CONSOLE

Use two mobiles with the same Home and list of Group IDs. On the Dispatch Console (DC) select a DIM and mobiles with a group that is common to both.

1. Press the PTT on Mobile-1.

- The CIM associated with the active repeater changes from Idle Task “2” to Receive Task “4”.
- The associated DIM changes from Idle Task “2” to Receive Task “4”.
- The DIM receives the voice communication.
- Mobile-2 receives the voice communication.

2. On the DC press the PTT of the DIM.

- The associated DIM changes to Transmit Task “3”.
- The associated DIM changes to Duplex Task “6”.
- Mobile-2 receives voice communication from both the DC and Mobile-1.

3. Release the PTT of Mobile-1.

- The associated CIM changes to Transmit Task “3”.
- Both mobiles now receive the DIM voice communication.

  If the associated DIM has Hang Time defined, the associated CIM enters Hang Task “7” for the defined time.

  When the Hang Time has expired the associated CIM returns to Idle Task “2”.

- The mobiles return to idle and are silent.

B.5 MOBILE TO UNIQUE ID

Use two mobiles defined to different Home and Group ID.

NOTE: Some of these tasks change rapidly.

1. Mobile-1, the originating mobile, selects the Auxiliary Call group code.

2. Press the PTT of Mobile-1 to access the system.

- Originating CIM (O-CIM), changes from Idle Task “2” to Dial Tone Task “C”.

3. Release the PTT of Mobile-1.

- Mobile-1 hears “Dial Tone” from O-CIM.

4. Press the PTT of Mobile-1.

5. When Mobile-1's transmit light is lit, enter 4-digits of DTMF for the Unique ID of Mobile-2 (terminating mobile).

6. Release the PTT of Mobile-1.

- Mobile-1 hears the “Confirmation Tone” from the O-CIM confirming the acceptance of the digits.
- O-CIM changes to the Ringing Task “D”.
- Mobile-1 hears “Ringing Tone” from the O-CIM.
- Originating SNM (O-SNM) changes from Idle Task “2” to SNM Outgoing Task “8”.
- Destination SNM (D-SNM) changes from Idle Task “2” to incoming Seize Task “3”.
- D-SNM changes from Incoming Seize Task “3” to SNM Incoming Task “4”.
- D-SNM changes to Incoming Channel Task “5”.
- O-SNM changes to Outgoing Channel Task “9”.
- Destination CIM (D-CIM) changes from Idle Task “2” to Transmit Task “3”.
- Mobile-2 hears “Ringing Tone”.

7. Press the PTT on Mobile-2.

- D-CIM changes to Duplex Task “6”.
- O-CIM changes to Transmit Task “3”.
- Mobile-1 hears the voice of Mobile-2.

8. Release the PTT on Mobile-2.

- D-CIM changes to Transmit Task “3”.
- Mobile-1 is silent.

9. Press the PTT on Mobile-1.

- O-CIM changes to Duplex Task “6”.
- Mobile-2 hears the voice of Mobile-1.

10. Release the PTT on Mobile-1.

- O-CIM changes to transmit Task “3”.
- Mobile-2 is silent.

11. Press the PTT on Mobile-1.

12. Press DTMF “#” key for longer than 1 second.

- O-CIM changes to the End Call Task “E”.
- Mobile-1 hears the “End Call Tone”.
- O-CIM changes to Idle Task “2”.
- O-SNM changes to the Idle Task “2”.
- D-SNM changes to the End Call Task “C”.
- D-CIM changes to the End Call Task “E”.
- Mobile-2 hears the “End Call Tone”.
- D-CIM changes to the Idle Task “2”.
- D-SNM changes to the Idle Task “2”.

B.6 MOBILE TO UNIQUE ID FOR A MOBILE OUTSIDE SWITCH

Use two mobiles defined to different Home and Group ID.

NOTE: Some of these tasks change rapidly.

1. Mobile-1, the originating mobile, selects the Auxiliary Call group code.

2. Press the PTT of Mobile-1 to access the system.

- The originating CIM (O-CIM), changes from Idle Task “2” to Dial Tone Task “C”.

3. Release the PTT of Mobile-1.

- Mobile-1 hears “Dial Tone” from O-CIM.

4. Press the PTT of Mobile-1.

5. When Mobile-1's transmit light is lit, Enter 7-DTMF digits, 3 for Locality outside the Switch and 4 for the Unique ID of Mobile-2 (terminating mobile).

6. Release the PTT of Mobile-1.

- Mobile-1 hears the “Confirmation Tone” from the O-CIM confirming the acceptance of the digits.
- O-CIM changes to the Ringing Task “D”.
- Mobile-1 hears “Ringing Tone” from the O-CIM.
- Originating SNM (O-SNM) changes from Idle Task “2” to SNM Outgoing Task “8”.
- Destination SNM (D-SNM) changes from Idle Task “2” to incoming Seize Task “3”.
- D-SNM changes from Incoming Seize Task “3” to SNM Incoming Task “4”.
- D-SNM changes to Incoming Channel Task “5”.
- O-SNM changes to Outgoing Channel Task “9”.
- Destination CIM (D-CIM) changes from Idle Task “2” to Transmit Task “3”.
- Mobile-2 hears “Ringing Tone”.

7. Press the PTT on Mobile-2.

- D-CIM changes to Duplex Task “6”.
- O-CIM changes to Transmit Task “3”.
- Mobile-1 hears the voice of Mobile-2.

8. Release the PTT on Mobile-2.

- D-CIM changes to Transmit Task “3”.
- Mobile-1 is silent.

9. Press the PTT on Mobile-1.

- O-CIM changes to Duplex Task “6”.
- Mobile-2 hears the voice of Mobile-1.

10. Release the PTT on Mobile-1.

- O-CIM changes to transmit Task “3”.
- Mobile-2 is silent.

11. Press the PTT on Mobile-1.

12. Press DTMF "#" key for longer than 1 second.

- O-CIM changes to the End Call Task "E".
- Mobile-1 hears the "End Call Tone".
- O-CIM changes to Idle Task "2".
- O-SNM changes to the Idle Task "2".
- D-SNM changes to the End Call Task "C".
- D-CIM changes to the End Call Task "E".
- Mobile-2 hears the "End Call Tone".
- D-CIM changes to the Idle Task "2".
- D-SNM changes to the Idle Task "2".

B.7 MOBILE TO DIRECTED GROUP CALL (DTMF ENTRY WITHIN SWITCH)

Use two mobiles defined to different Home and Group ID.

NOTE: Some of these tasks change rapidly.

1. Mobile-1, the originating mobile, selects the Auxiliary Call group code.

2. Press the PTT of Mobile-1 to access the system.

- The originating CIM (O-CIM), changes from Idle Task "2" to Dial Tone Task "C".

3. Release the PTT of Mobile-1.

- Mobile-1 hears "Dial Tone" from O-CIM.

4. Press the PTT of Mobile-1.

5. When Mobile-1's transmit light is lit, enter DTMF digits:

- Enter 5-DTMF digits, 2 for Home channel and 3 for the Group ID desired.
- Enter 8-DTMF digits, 3 for different Localities within Switch, 2 for Home channels and 3 for Group IDs desired.

6. Release the PTT of Mobile-1 to indicate completion of dialing.

- O-CIM hears the "Confirmation Tone".
- Originating SNM (O-SNM) changes to SNM Outgoing Task "8".
- Destination SNM (D-SNM) changes to Incoming Seize Task "3".
- D-SNM changes to Incoming Task "4".
- Destination CIM (D-CIM) changes to Transmit Task "3".
- D-SNM changes to Incoming Channel Task "5".
- O-SNM changes to Outgoing Channel Task "9".
- O-CIM changes to Ringing Task "D".
- Mobile-1 hears the "Call Proceed Tone".

7. Press the PTT on Mobile-1.

- O-CIM changes to Receive Task "4".
- D-CIM changes to Transmit Task "3".
- Mobile-2, destination mobile, hears Mobile-1 voice communication.

8. Release the PTT on Mobile-1.

- O-CIM changes to Hang Task "7".
- D-CIM changes to Hang Task "7".
- Mobile-2 is silent.

9. Press the PTT on Mobile-2.

- D-CIM changes to Receive Task "4".
- O-CIM changes to Transmit Task "3".
- Mobile-1 hears the voice of Mobile-2.

10. Release the PTT on Mobile-2.

- D-CIM changes to Hang Task "7".
- O-CIM changes to Hang Task "7".
- Mobile-1 is silent.

11. Press the PTT on Mobile-1.

- O-CIM changes to Receive Task "4".
- D-CIM changes to Transmit Task "3".
- Mobile-2 hears the voice of Mobile-1.

12. Press DTMF "#" key for longer than 1 second.

- O-CIM changes to the End Call Task "E".
- Mobile-1 hears the "End Call Tone".
- O-CIM changes to Idle Task "2".
- Both SNMs change to the End Call Task "C".
- D-CIM changes to the End Call Task "E".
- Mobile-2 hears the "End Call Tone".
- D-CIM and both SNMs change to the Idle Task "2".

B.8 MOBILE TO DIRECTED GROUP CALL (DTMF ENTRY OUTSIDE THE SWITCH)

Use two mobiles defined to different Home and Group ID.

NOTE: Some of these tasks change rapidly.

1. Mobile-1, the originating mobile, selects the Auxiliary Call group code.

2. Press the PTT of Mobile-1 to access the system.

- Originating CIM (O-CIM), changes from Idle Task "2" to Dial Tone Task "C".

3. Release the PTT of Mobile-1.

- Mobile-1 hears "Dial Tone" from the O-CIM.

4. Press the PTT of Mobile-1.

5. When Mobile-1's transmit light is lit, enter DTMF digits:

- Enter 5-DTMF digits, 2 for Home channel and 3 for the Group ID desired.
- Enter 8-DTMF digits, 3 for different Localities within Switch, 2 for Home channel and 3 for Group ID desired.

6. Release the PTT of Mobile-1 to indicate completion of dialing.

- O-CIM hears the "Confirmation Tone".
- Originating SNM (O-SNM) changes to SNM Outgoing Task "8".
- Destination SNM (D-SNM) changes to Incoming Seize Task "3".
- D-SNM changes to Incoming Task "4".
- Destination CIM (D-CIM) changes to Transmit Task "3".
- D-SNM changes to Incoming Channel Task "5".
- O-SNM changes to Outgoing Channel Task "9".
- O-CIM changes to Ringing Task "D".
- Mobile-1 hears the "Call Proceed Tone".

7. Press the PTT on Mobile-1.

- O-CIM changes to Receive Task "4".
- D-CIM changes to Transmit Task "3".
- Mobile-2, destination mobile, hears Mobile-1 voice communication.

8. Release the PTT on Mobile-1.

- O-CIM changes to Hang Task "7".
- D-CIM changes to Hang Task "7".
- Mobile-2 is silent.

9. Press the PTT on Mobile-2.

- D-CIM changes to Receive Task "4".
- O-CIM changes to Transmit Task "3".
- Mobile-1 hears the voice of Mobile-2.

10. Release the PTT on Mobile-2.

- D-CIM changes to Hang Task "7".
- O-CIM changes to Hand Task "7".
- Mobile-1 is silent.

11. Press the PTT on Mobile-1.

- O-CIM changes to Receive Task "4".
- D-CIM changes to Transmit Task "3".
- Mobile-2 hears the voice of Mobile-1.

12. Press DTMF "#" key for longer than 1 second.

- O-CIM changes to End Call Task "E".
- Mobile-1 hears the "End Call Tone".
- O-CIM changes to Idle Task "2".
- Both SNMs change to End Call Task "C".
- D-CIM changes to End Call Task "E".
- Mobile-2 hears "End Call Tone".
- D-CIM and both SNMs change to Idle Task "2".

B.9 MOBILE ORIGINATED TELEPHONE CALL

1. Mobile selects the Telephone Call group code.

2. Press the mobile's PTT to access the system.

- The associated CIM changes from Idle Task "2" to Dial Tone Task "C".

3. Release the PTT of the mobile.

- Mobile hears "Dial Tone" from the CIM.

4. Press the PTT of the mobile.

5. When the transmit light of the mobile is lit, enter DTMF digits.

- When the SMM is set for normal dialing translation, enter the required digits to exercise the dialing translation function.
- When the SMM is set for PBX operation, enter the complete set of digits, no wait for second dial tone after the access digits.

6. Release the PTT of the mobile.

- CIM hears the "Confirmation Tone".
- TIM changes from Idle Task "2" to TIM Outgoing Task "8".
- When digit dialing is complete, the TIM changes to Channel Conversation Task "9".
- CIM changes to Ringing Task "D".
- Mobile hears landside progress tones, ringing, busy or called party answer.

7. Press the PTT on the mobile.

- CIM changes to Duplex Task "6".
- Called party hears the mobile voice.

8. Release the PTT on the mobile.

- CIM changes to Transmit Task "3".
- Mobile hears the called party.
- Called party does not hear the mobile.

9. Press the PTT on the mobile.

- CIM changes to Duplex Task "6".
- Called party hears the mobile voice.

10. Press the DTMF "#" key for longer than 1 second and release the PTT.

- CIM changes to End Call Task "E".
- Mobile hears the "End Call Tone".
- CIM changes to Idle Task "2".
- Mobile returns to idle and is silent.
- TIM changes to End Call Task "C".
- TIM disconnects the telephone line.
- TIM changes to Idle Task "2".

B.10 LANDSIDE (TIM) ORIGINATE TO MOBILE WITHIN SWITCH USING A DID LINE

1. Dial the desired number for a mobile within the Switch.

- The associated TIM changes from Idle Task "2" to Incoming Seize Task "3".
- CIM changes from Idle Task "2" to Transmit Task "3".
- TIM changes to Incoming Channel Conversation Task "5".
- Landside party and mobile hear "Ringing Tone".

2. Press the PTT on the mobile.

- "Ringing Tone" is turned off.
- CIM changes to Duplex Task "6".
- Landside party hears the mobile voice.

3. Release the PTT on the mobile.

- Landside party hears silence.
- CIM changes to Transmit Task "3".
- Mobile hears the landside party.

4. The mobile disconnects by pressing the PTT and DTMF "#" key for 1 second.

5. The landside party disconnects by pressing the DTMF "#" key for 1 second.

- CIM changes to the End Call Task "E".
- Mobile hears the "End Call Tone".
- CIM changes to the Idle Task "2".
- Mobile is silent.
- TIM changes to end Call Task "C".
- Landside party hears "End Call Tone".
- TIM disconnects the telephone line when landside disconnects.
- TIM changes to Idle Task "2".

B.11 LANDSIDE (TIM) ORIGINATE TO MOBILE WITHIN SWITCH USING A 2WY LINE

1. Dial the desired number for the 2WY line.

- The associated TIM changes from Idle Task “2” to Incoming Seize Task “3”.
- Landside party hears the proceed tone.

2. The landside party enters the 4-DTMF digits of the Unique ID of the mobile.

- CIM changes from Idle Task “2” to Transmit Task “3”.
- TIM changes to Incoming Channel Conversation Task “5”.
- Landside party and the mobile hear “Ringing Tone”.

3. Press the PTT on the mobile.

- “Ringing Tone” is turned off.
- CIM changes to Duplex Task “6”.
- Landside party hears the mobile voice.

4. Release the PTT on the mobile.

- Landside party hears silence.
- CIM changes to Transmit Task “3”.
- Mobile hears the landside party.

5. Press mobile's PTT and DTMF “#” key for 1 second or landside party presses the DTMF “#” key for 1 second.

- CIM changes to the End Call Task “E”.
- Mobile hears the “End Call Tone”.
- CIM changes to the Idle Task “2”.
- Mobile is silent.
- TIM changes to end Call Task “C”.
- TIM disconnects the telephone line.
- TIM changes to Idle Task “2”.

B.12 TIM ORIGINATE TO MOBILE OUTSIDE SWITCH USING A DID LINE

NOTE: Some of these tasks change rapidly.

1. Dial the number for a mobile within the Switch.

- The associated TIM changes from Idle Task “2” to Incoming Seize Task “3”.
- TIM changes to TIM incoming Task “4”.
- Originating SNM (O-SNM) changes from Idle Task “2” to Incoming Seize Task “3”.
- O-SNM changes to SNM Outgoing Task “8”.
- Destination SNM (D-SNM) changes from Idle Task “2” to Incoming Seize Task “3”.
- D-SNM changes to SNM Incoming Task “4”.
- Destination CIM (D-CIM) changes from Idle Task “2” to Transmit Task “3”.
- D-SNM changes to Incoming Channel Task “5”.
- O-SNM changes to TIM Outgoing Conversation Task “E”.
- TIM changes to SNM Incoming Conversation Task “D”.
- Landside party and mobile hear “Ringing Tone”.

2. Press the PTT on the mobile.

- “Ringing Tone” is turned off.
- CIM changes to Duplex Task “6”.
- Landside party hears the mobile voice.

3. Release the PTT on the mobile.

- Landside party hears silence.
- CIM changes to Transmit Task “3”.
- Mobile hears the landside party.

4. Mobile disconnects by pressing the PTT and DTMF “#” key for 1 second.

5. Landside party disconnects by pressing the DTMF “#” key for 1 second.

- CIM changes to the End Call Task “E”.
- Mobile hears the “End Call Tone”.
- CIM changes to the Idle Task “2”.
- Mobile is silent.
- Both SNMs change to End Call Task “C”.
- TIM changes to end Call Task “C”.
- Landside party hears “End Call Tone”.
- TIM disconnects the telephone line.
- TIM changes to Idle Task “2”.
- Both SNMs change to Idle Task “2”.

B.13 LANDSIDE ORIGINATE TO MOBILE OUTSIDE SWITCH USING A 2WY LINE

NOTE: Some of these tasks change rapidly.

1. Dial the desired number for the 2WY line.

- The associated TIM changes from Idle Task “2” to Incoming Seize Task “3”.
- TIM changes to TIM Incoming Task “4”.
- Landside party hears a “Proceed Dialing Tone”.

2. The landside party enters the 4-DTMF digits of the Unique ID of the mobile.

- CIM changes from Idle Task “2” to Transmit Task “3”.
- TIM changes to Incoming Channel Conversation Task “5”.
- Landside party and the mobile hear “Ringing Tone”.

3. Press the PTT on the mobile.

- “Ringing Tone” is turned off.
- The CIM changes to Duplex Task “6”.
- Landside party hears the mobile voice.

4. Release the PTT on the mobile.

- Landside party hears silence.
- CIM changes to Transmit Task “3”.
- Mobile hears the landside party.

5. The mobile presses the PTT and DTMF “#” key for 1 second or landside party presses the DTMF “#” key for 1 second.

- CIM changes to the End Call Task “E”.
- Mobile hears the “End Call Tone”.
- CIM changes to the Idle Task “2”.
- Mobile is silent.
- TIM changes to end Call Task “C”.
- TIM disconnects the telephone line.
- TIM changes to Idle Task “2”.

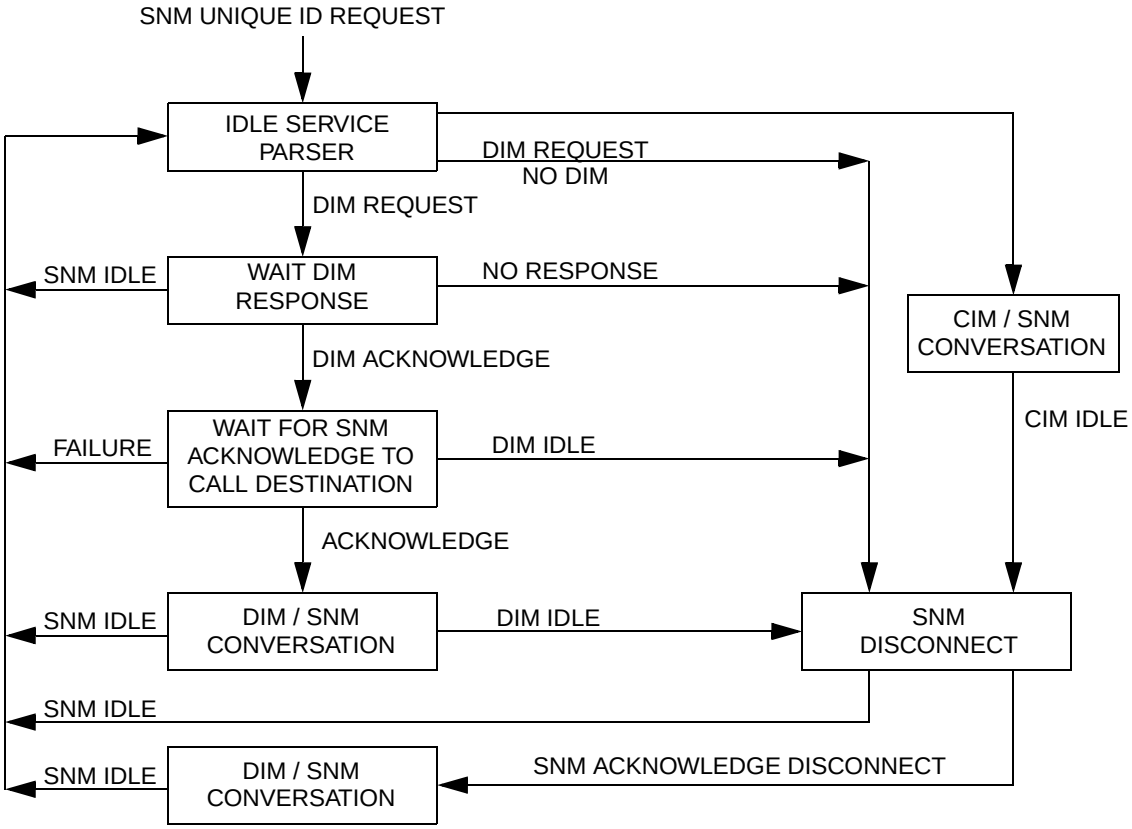


Figure B-1 SNM Unique ID Request Flowchart

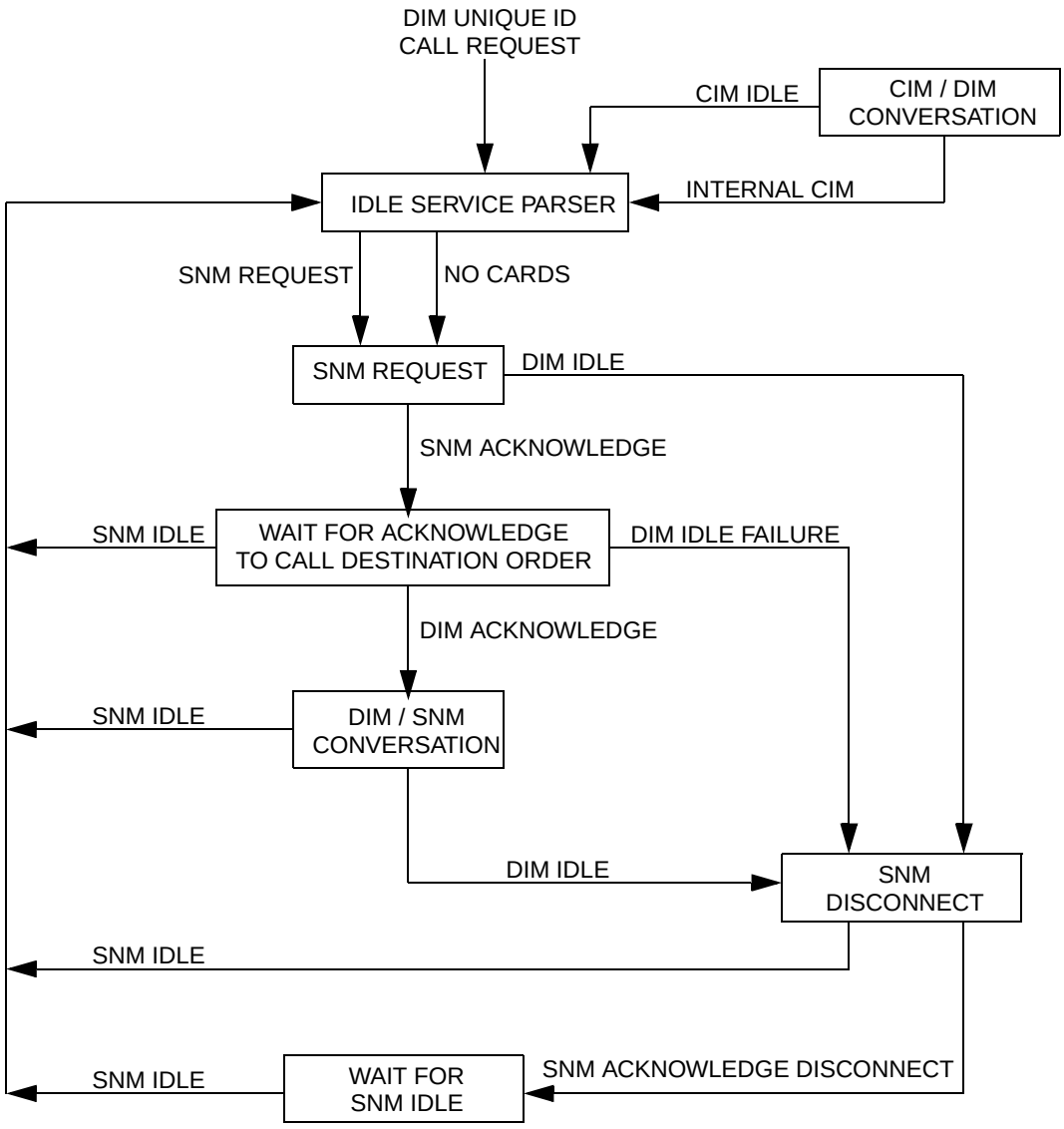


Figure B-2 DIM Unique ID Request Flowchart

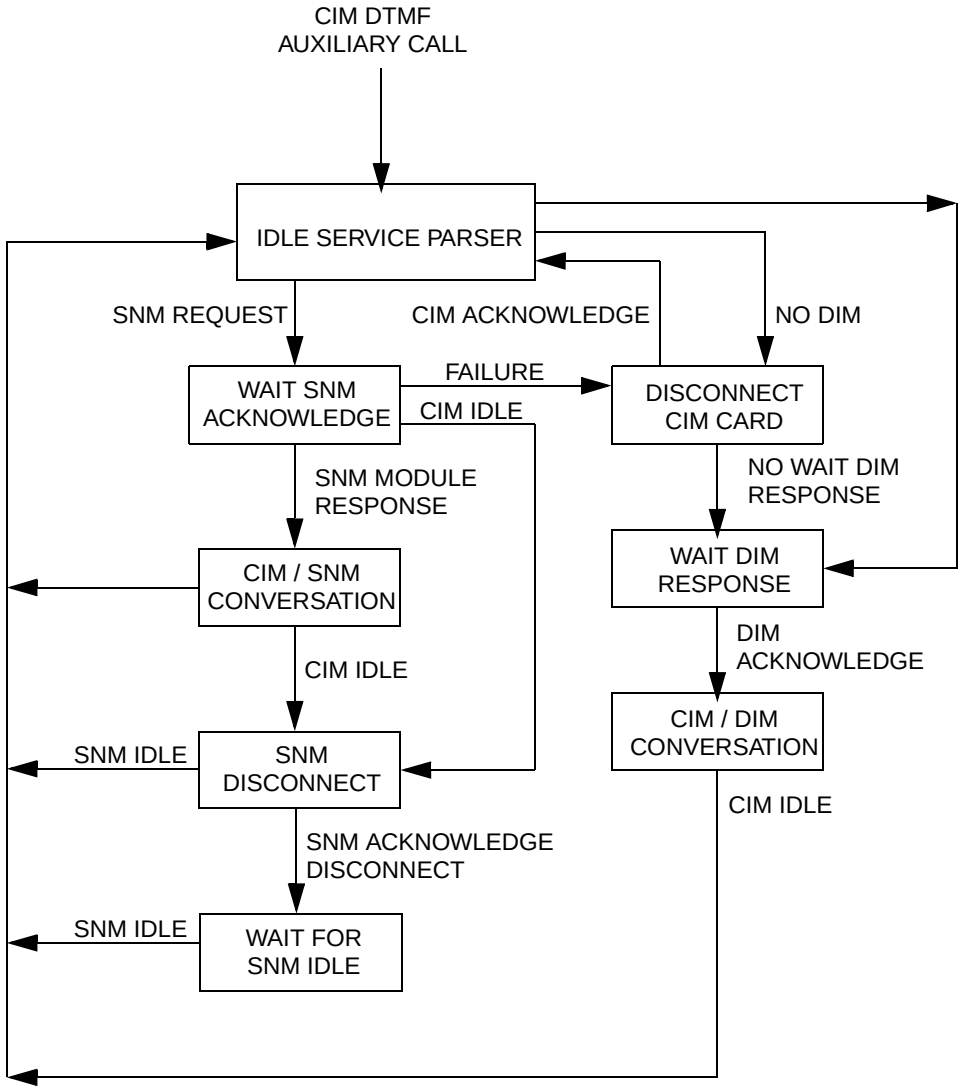


Figure B-3 CIM DTMF Auxiliary Call Flowchart

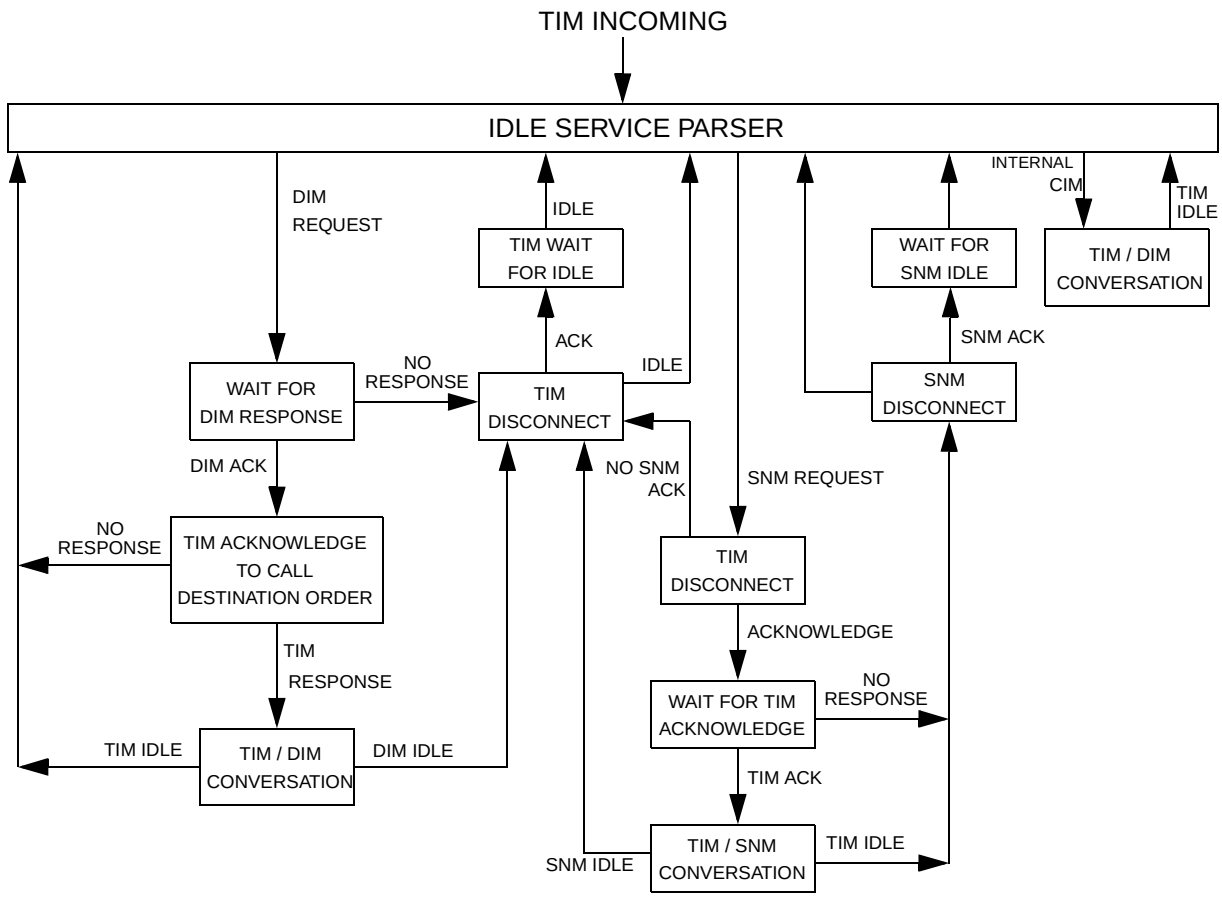


Figure B-4 Telephone Incoming TIM Incoming Flowchart

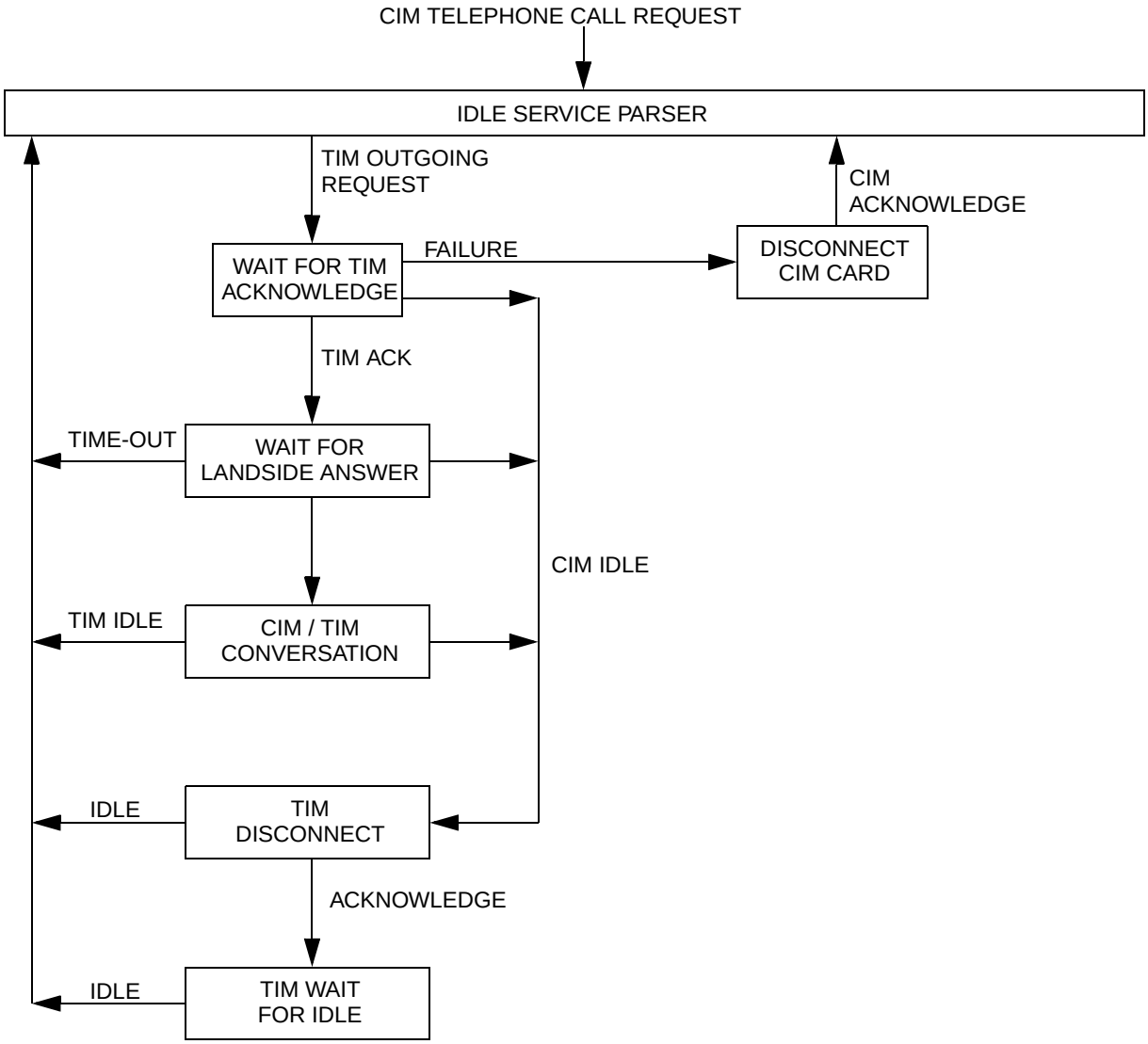


Figure B-5 Telephone Calling CIM Telephone Call Request Flowchart

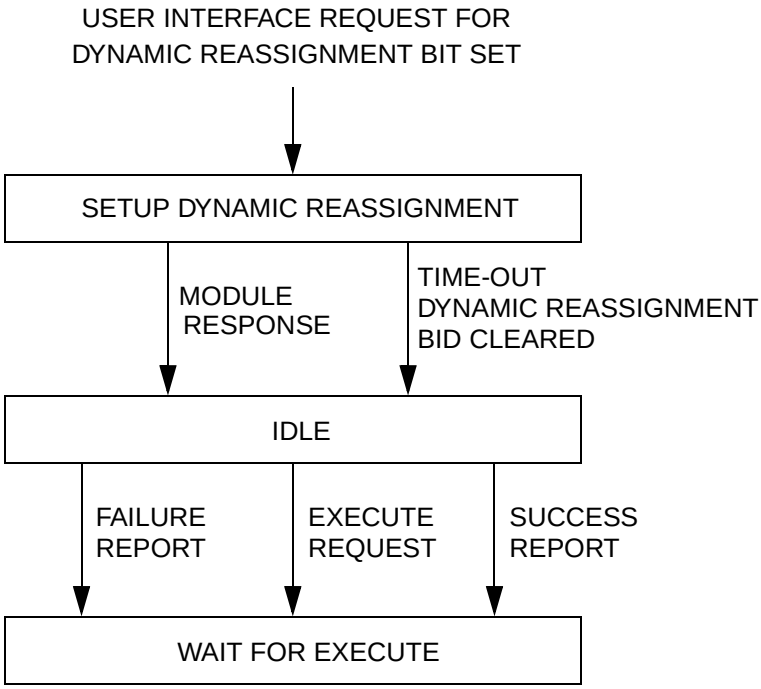


Figure B-6 Dynamic Reassignment User Interface Request Flowchart

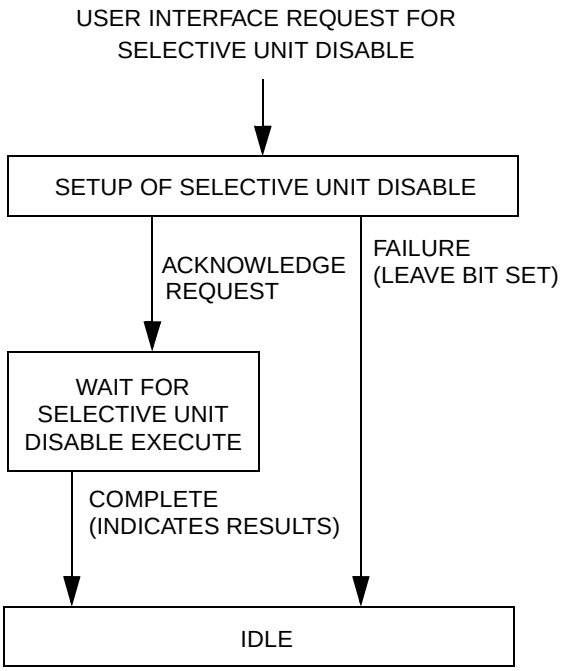


Figure B-7 Selective Unit Disable User Interface Request Flowchart

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