Technical Reference Manual

EDACS® VAX

Site Controller Software

Release 8.0

ERICSSON

REVISION HISTORY

Revision	Date	Reason for Change
R1A	Oct 1996	Original Release - based on Site Controller software content of LBI-38985C, plus changes and additions for Site Controller software Release 8.0.
R1B	Nov 1996	Correction to Figure 7 on page 19, addition of introductory paragraph under Analog/Digital Console Preempt on page 24, and addition of caution box on page 25.

NOTICE!

This Manual covers Ericsson and General Electric products manufactured and sold by Ericsson Inc.

NOTICE!

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

NOTICE!

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INTRODUCTION

SCOPE OF MANUAL

This manual covers Release 8.0 of the VAX Site Controller software which can be used with the following VAX Site Controllers (or PDP-11 Site Controllers that have been upgraded to a VAX Site Controller):

- Part # 19A149302P2 upgraded to level of -P5
  PDP-11 upgraded to a VAX
  Connections via separate EMULEX panels
- Part # 19A149302P3 upgraded to level of -P5
  PDP-11 upgraded to a VAX
  Connections via separate EMULEX panels
- Part # 19A149302P4 upgraded to level of -P5
  PDP-11 upgraded to a VAX
  Connections via separate DILOG panels
- Part # 19A149302P5
  VAX
  Connections via separate DILOG panels
- Part # 19A149302P6
  VAX
  Connections via separate DILOG panels
- Part # 19A149302P8
  VAX
  Connections via separate DILOG panels
- Part # 19A149302P9
  VAX
  Connections via modular connectors on back panel

References in this manual to System Manager screens and configurable parameters refer to Release 6 of the VAX System Manager software. (See the System Manager instruction manual for more information.)

RELATED MANUALS

For information about the Site Controller computer hardware, or other equipment located in the Site Controller cabinet, see the following instruction manuals:

LBI-39074 - Basic & Level 1 System Installation

LBI-38984 - System Manager User's Guide

AE/LZB 119 1914/1 - System Interface Cabinet (new - VAX Site Controller Hardware & Options)

LBI-38985 - VAX Site Controller Software, Hardware, & Options (up to Software Release 7.0 only)

LBI-38812 - EDACS Interface Panel

LBI-39128 - DB8860-Based Power Monitor Unit

LBI-38513 - RIC/LIC Local Telephone Interconnect

LBI-39076 - ELI Enhanced Local Interconnect

LBI-39077 - GTI Configurator Software (ELI)

LBI-38896 - Downlink GETC Configuration

LBI-38894 - GETC Shelf

LBI-38822 - GETC 1e Turbo Board)

LBI-33031 - Downlink/System Manager Modem

LBI-31939 - Test and Alarm Unit

LBI-38980 - 900 MHz MDX Test Unit

LBI-39167 - Orion Test Unit (2-RU Version)

AE/LZB 119 1899 - Orion Test Unit (3-RU Version)

LBI-39004 - Guardog

LBI-38550 - Station Power Supply

LBI-4841 - 120 VAC Outlet Strip

LBI-4842 - Cabinet Top Fan

TECHNICAL ASSISTANCE

For technical assistance, contact the Ericsson Technical Assistance Center (TAC) at the number shown on the last page of this manual.

DESCRIPTION

The software for a VAX (or PDP upgraded to a VAX) Site Controller consists of a set of initial parameter values (known as the Site Controller's Personality) and an operational program (known as the Site Controller's Application Software).

PERSONALITY

The Site Controller's Personality is contained in a set of two PROMs located on the PROM Card (see the Installation section of this manual for location). Site Controller Personalities generated using Release 8.0 of the Personality Programmer Utility (software used in the factory to generate generic and customer-specific Site Controller Personalities) are identified by the words "VAX Site Controller Personality (V8.0)" marked on the top line of each Personality Data sheet shipped with the Site Controller (or Personality, if shipped separately).

If customer-specific information is not available at the time the Site Controller is assembled in the factory, a generic Personality is temporarily installed to permit testing in the factory and the field. Although this generic Personality contains typical values for most parameters, it must be replaced as soon as possible with a customer-specific Personality. At the very least, the customer-specific Personality must contain customer-specific values for the following critical parameters:

For FCC Compliance:

- Site Morse Code (see Miscellaneous Data)

For Communication with User's Radios:

- RF Site ID (see System Manager Configuration)

For Communications with System Manager:

- Port Type (see System Manager Configuration)
- Port Speed (see System Manager Configuration)
- Phone (see System Manager Configuration)
- Site Number (see System Manager Configuration)
- Password (see System Manager Configuration)

Many initial parameter values may be reconfigured through a System Manager. However, if the Site Controller will not be connected to a System Manager, the set of initial parameter values cannot be reconfigured. If this set of initial parameter values provides unsatisfactory operation, a new Personality must be ordered from the factory.

Values for the parameters described here may be specified in the Personality. Particular attention should be given to those parameters that cannot be reconfigured through a System Manager (i.e. can only be specified in the Personality), and are therefore shown in italics. Note that there are some additional parameters, not listed here, that can only be reconfigured through the System Manager (see the System Manager users guide for details).

Channel Data

NOTE

Parameters that cannot be reconfigured through a VAX System Manager (i.e. can only be specified in the Personality) are shown in itallics.

Channel Data includes a set of values (one for each channel number) for each of the following parameters:

- RF - Is this channel equipped as an EDACS repeater? This parameter is used to limit search routines to equipped RF channels. Choices are Yes and No for channels 1-26. Default is Yes for channels 1-20 and No for channels 21-26.
- Interconnect - Is this channel equipped to support interconnect calls? Choices are Yes and No for channels 1-20. Default is Yes for channels 1-20.
- Digital Voice - Is this channel equipped to support digital voice calls? Choices are Yes and No for channels 1-26. Default is Yes for channels 1-20 and No for channels 21-26.
- Data - Is this channel equipped to support data calls? Choices are Yes and No for channels 1-26. Default is Yes for channels 1-20 and No for channels 21-26.
- Channel Test - Do you want this channel placed in a test partition? Choices are Yes and No for channels 1-26. (If you don't know what this is, the answer is No.) Default is No for channels 1-26.
- Allowed CC - Is this channel allowed to be a Control Channel? Choices are Yes and No for channels 1-26. Default is Yes for channels 2-20 and No for channels 1 & 21-26.

- Wide Area - Is this channel equipped to support multisite and/or Simulcast operation? Choices are Yes and No for channels 1-26. Default is Yes for channels 1-20 and No for channels 21-26.

- Downlink - Is this channel a Downlink GETC? Choices are Yes and No for channels 1-26. Default is No for channels 1-20 and Yes for channels 21-26.

- *PMU Enable - Should the PMU report alarms for this channel? Choices are Yes and No for channels 1-20. Default is Yes for channels 1-20.*

- *Analog Voice - Is this channel to be enabled for analog voice? Choices are Yes and No for channels 1-26. Default is Yes for channels 1-20 and No for channels 21-26.*

Channel Data also includes a single value for each of the following parameters:

- *Control Channel - Which channel number should be used as the Control Channel at startup? Range is any channel number from 1 to 24. Default is 2.*

- Multiple Channel Partitioning - Is Multiple Channel Partition to be used on the system? Choices are Enabled and Disabled. Default is Disabled.

PMU Data

NOTE

Parameters that cannot be reconfigured through a VAX System Manager (i.e. can only be specified in the Personality) are shown in itallics.

PMU Data includes a single value for each of the following parameters:

- Power Monitor Unit - What is the intended status of the optional Power Monitor Unit feature? Choices are On and Off. Default is Off. Note that this parameter must be On in order to specify New-8860 as the model (see next parameter).

- *Model - If the intended status of the optional Power Monitor Unit feature is On, what model of Power Monitor Unit is being used? Choices are Old-8843 and New-8860. Default is Old-8843.*

PMU Data also includes a set of values (one for each channel number) for the following parameter:

- PMU Power Levels - What is the low forward power threshold level (in watts for New-8860 or in tenths of watts for Old-8843), below which a PMU alarm is to occur? Range is from 0 to 255. Default is 20 (20 watts for New-8860 or 2.0 watts for Old-8843).

Interconnect Data

NOTE

Parameters that cannot be reconfigured through a VAX System Manager (i.e. can only be specified in the Personality) are shown in itallics.

Interconnect Data includes a single value for each of the following parameters:

- *Interconnect Mode - What type of telephone interconnect is to be used? Choices are Local-uses RICs, Local-uses GTIs, CTIS, and Jessica. Default is Local-uses RICs.*

- *Max Line - If the type of telephone interconnect to be used is Local-uses RICs, what is the number of interconnect telephone lines connected? If the type of telephone interconnect to be used is Local-uses GTIs, what is the highest numbered channel connected to an interconnect telephone line? Range is from 0 to 255. Default is 8.*

- Max Calls - What is the maximum number of interconnect calls to be allowed at any one time? Range is from 0 to 20. Default is 20.

Interconnect Data also includes a set of values for the following parameter:

- Rotary 1 Defaults - (Not for CTIS or Jessica) Which telephone line numbers will the Site Controller search for an available line for radio-originated interconnect calls, and in what order? Up to 16 lines can be specified. Default is line 16 first, line 15 second, etc. to line 1 sixteenth.

Interconnect Data also includes a single value for each of the following parameters:

- *Normal Polling Interval - (Not for CTIS or Jessica) How long (in milliseconds) should the Site Controller wait between consecutive polling messages to the interconnect equipment when no interconnect calls are in the process of being connected? Range is from 0 to 20,000. Default is 1000.*

- *Fast Polling Interval - (Not for CTIS or Jessica) How long (in milliseconds) should the Site Controller wait between consecutive polling messages to the interconnect equipment when one or more interconnect calls are in the process of being connected? Range is from 0 to 20,000. Default is 100.*

- *Dial Tone Detect Duration - (Not for CTIS or Jessica) How long (in milliseconds) should the Site Controller wait for a dial tone from a telephone line during a radio-originated call? Range is from 0 to 20,000. Default is 1000.*

- *Start Dial Delay - (Only if the type of telephone interconnect to be used is Local-uses RICs.) How long (in milliseconds) should the Site Controller wait between seeing dial tone and starting to dial during a radio-originated call? Range is from 0 to 20,000. Default is 50.*

- *Pause In Dialing Duration - (Only if the type of telephone interconnect to be used is Local-uses RICs.) How long (in milliseconds) should the Site Controller wait after the # character before resuming to dial during a radio-originated call? Range is from 0 to 20,000. Default is 120.*

- *Pulse Digit Delay Base - (Only if the type of telephone interconnect to be used is Local-uses RICs.) What is the minimum amount of time (in milliseconds) for the first pulse in the dialed digit that the Site Controller is to wait between telephone digits when using pulse dialing for a radio-originated call? Range is from 0 to 20,000. Default is 800.*

- *Pulse Digit Delay Increment - (Only if the type of telephone interconnect to be used is Local-uses RICs.) What is the incremental amount of time (in milliseconds) that should be added to the Pulse Digit Delay Base for each additional pulse in the dialed digit that the Site Controller is to wait between telephone digits when using pulse dialing for a radio-originated call? Range is from 0 to 20,000. Default is 100.*

- *DTMF Digit Delay - (Only if the type of telephone interconnect to be used is Local-uses RICs.) What is the amount of time (in milliseconds) that the Site Controller is to wait between telephone digits when using DTMF dialing for a radio-originated call? Range is from 0 to 20,000. Default is 120.*

- *DTMF Digit Detect Duration - (Only if the type of telephone interconnect to be used is Local-uses RICs.) How long (in milliseconds) should the Site Controller wait for the first DTMF digit from a telephone line during a telephone-originated call before dropping the call? Range is from 0 to 20,000. Default is 4000.*

- *Line Dropping Duration - (Not for CTIS or Jessica) How long (in milliseconds) is the Site Controller to wait between hanging up a telephone line and attempting to reuse the same telephone line for a radio-originated call? Range is from 0 to 20,000. Default is 4000.*

- *Ring Radio On Landline Originated - (Only if the type of telephone interconnect to be used is Local-uses RICs.) Is a radio to be rung when a telephone-originated interconnect call is made to the radio? Choices are Yes and No. Default is Yes.*

- *Allow landline to GID calls - (Not for CTIS or Jessica) Is the Site Controller to allow telephone-originated interconnect calls to GIDs? Choices are Yes and No. Default is Yes.*

Miscellaneous Data

NOTE

Parameters that cannot be reconfigured through a VAX System Manager (i.e. can only be specified in the Personality) are shown in itallics.

Miscellaneous Data includes a single value for each of the following parameters:

- Recent Call Interval - What is the maximum amount of time (in milliseconds) that the Site Controller will give a half level priority advantage to a new call request from a participant in a recent call, if the call is queued? Range is from 1000 to 30,000. Default is 5000.

- Activity Dump Threshold - What quantity of activity records do you want the Site Controller to accumulate before sending them to the System Manager? Range is from 0 to 16,383. Using 0 will stop the Site Controller from sending the activity records to the System Manager. Default is 1000.

- *Site ID Delay - What period of time should a radio wait for a reply to a call request? Range is from 0 to 3. (Represents, but is not equal to, the maximum*

number of outbound Control Channel frames the radio should have to wait for the site to respond.) Default is 2.

- *Site Morse Code - What is the Morse Code ID assigned by the FCC? Default is none. (Note that this parameters is critical to the operation of the system, where required by the FCC.)*

- Test Unit - Is the status of the Test Unit option? Choices are Enabled and Disabled. Default is Enabled.

- Local Test Unit - Will a Local Test Unit be connected to the Site Controller? Choices are Yes and No. Default is Yes.

- *Remote Test Call Alarm Level - What is the number of consecutive remote test call failures that the Site Controller must receive for a specific channel before the Site Controller reports it as a failed channel alarm to the System Manager? Choices are an from 0 to 6 (recommend not more than 3). Default is 0.*

- *Data Call Mode - Should the Site Controller's support of data calls be limited to mobile-to-mobile calls, or be expanded to also include mobile-to-CEC/IMC switch? Choices are RF (mobile-to-mobile only) and Landline (includes CEC/IMC switch). Default is RF.*

- *Queue Data Calls - Should the Site Controller support queuing of data calls. Choices are Yes (when all useable channels are busy, data calls will be queued) and No (when all useable channels are busy, data calls will be given a system busy). Default is No.*

- *Console Pre-empts - Should the Site Controller allow a console to interrupt voice calls in progress, and if so, what type(s)? Choices are None, Analog Only, Digital Only, and Digital and Analog. Default is Analog Only.*

- *Console Digital Preempt Delay - For console preempts of digital voice calls, how long after the console's PTT should the Site Controller wait before sending the Working Channel assignment? Range is from 0 to 500 (milliseconds) in intervals of 10. Default is 180.*

- *Enable 900 MHz Assignment - Should the Site Controller use the GE-NET channel assignment algorithm in order to minimize adjacent channel assignments? Choices are Yes and No. Default is No. (Can be reconfigured through a VAX System Manager with Release 6 or later software.)*

- Rotate Assignments - Should the Site Controller assign channels in a rotating pattern? Choices are Yes and No. Default is Yes.

- Assign Channels - If you specified that the Site Controller is to assign channels in a rotating pattern, which direction should the Site Controller rotate the assignments? Choices are Ascend and Descend. Default is Ascend.

System Manager Configuration

NOTE

Parameters that cannot be reconfigured through a VAX System Manager (i.e. can only be specified in the Personality) are shown in itallics.

System Manager Configuration includes a single value for each of the following parameters:

- *Site Number - What site number should the Site Controller use for communications with the System Manager? Choices are from 1 to 32. Default is 1. (Note that the Site Number is critical to the operation of the system, and must agree with the Site Number defined in the System Manager.)*

- *RF Site ID - What site ID number should system under the direction of the Site Controller use for communications with the radios using the system? Choices are from 0 to 31. Default is 1. (Note that the RF Site ID is critical to the operation of the system, and must agree with the RF Site ID programmed into the radios to be used with the system.)*

- *Output Attempts - How many times should the Site Controller attempt to send a specific message to the System Manager before switching to the backup data link to the System Manager (if there is one) or giving up? Range is from 1 to 5 (failures to respond). Default is 3.*

- *ACK Timeout - How long should the Site Controller wait for an acknowledgment from the System Manager before going to next step? Range is from 1 to 10 (seconds). Default is 3.*

- *Sanity Poll Timeout - How long should the Site Controller wait for a sanity poll from the System*

Manager before declaring the link to the System Manager logically disconnected? Range is from 10 to 30 (seconds). Default is 12.

- *Password - What is the password that the Site Controller must send to the System Manager to verify that it is the Site Controller, and the System Manager must send to the Site Controller to verify that it is the System Manager? Default is 16PLUS. (Note that the Password is critical to the operation of the system, and must agree with the Password defined for this Site Number in the System Manager.)*

- *Primary Port Number - What Site Controller serial port is to be used for the primary communication link between the Site Controller and the System Manager? Default is 00.*

- *(Primary) Port Type - What type of circuit is to be used for the primary communications link between the Site Controller and the System Manager? Choices are Hardwire (DC link), Dial-up (audio link), and Dedicated (audio link). Default is Hardwire. (Note that the Port Type is critical to the operation of the system, and must agree with the type of circuit used for the connection to the System Manager.)*

- *(Primary) Port Speed - What data speed is to be used for the primary communications link between the Site Controller and the System Manager? Choices are 19200, 9600, 4800, 2400, 1200, and 300 (baud rate). Default is 9600. (Note that the Port Speed is critical to the operation of the system, and must agree with the Port Speed at the System Manager.)*

- *(Primary) Phone - If a dial-up audio link is to be used for the primary communications link between the Site Controller and the System Manager, what is the telephone number? The telephone number may have up to 20 digits and will accept the AT-command set pause character W, if required. Default is 1234. (Note that the Phone (number) is critical to the operation of the system, if a dial-up type circuit is used for the connection to the System Manager.)*

- *Backup Port - What should be the status of a backup Site Controller port for communications with the System Manager? Choices are Enabled and Disabled. Default is Disabled.*

- *Backup Port Number - What Site Controller serial port is to be used for the backup communication link between the Site Controller and the System Manager? Default is 00.*

- *(Backup) Port Type - What type of circuit is to be used for the backup communications link between the Site Controller and the System Manager? Choices are Hardwire (DC link), Dial-up (audio link), and Dedicated (audio link). Default is Hardwire.*

- *(Backup) Port Speed - What data speed is to be used for the backup communications link between the Site Controller and the System Manager? Choices are 19200, 9600, 4800, 2400, 1200, and 300 (baud rate). Default is 9600.*

- *(Backup) Phone - If a dial-up audio link is to be used for the backup communications link between the Site Controller and the System Manager, what is the telephone number? The telephone number may have up to 20 digits and will accept the AT-command set pause character W, if required. Default is 5678.*

- *Dial Attempts - If a dial-up audio link is to be used for the communications link between the Site Controller and the System Manager, what is the number of times the site Controller will attempt to get a connection before giving up? Default is 3.*

- *Carrier Timeout - If a dial-up audio link is to be used for the communications link between the Site Controller and the System Manager, how long will the Site Controller wait to receive a carrier before giving up? Default is 30 (seconds).*

- *DTR Drop Duration - If a dial-up audio link is to be used for the communications link between the Site Controller and the System Manager, how long will the Site Controller hold the DTR line down to hang up the modem? Default is 3 (seconds).*

- *DTR Wait Duration - If a dial-up audio link is to be used for the communications link between the Site Controller and the System Manager, how long will the Site Controller wait to make the call after bringing the DTR line up? Default is 3 (seconds).*

Timing Data

NOTE

Parameters that cannot be reconfigured through a VAX System Manager (i.e. can only be specified in the Personality) are shown in itallics.

Timing Data includes a single value for each of the following parameters:

- *Unit Enable/Disable Interval - What is the time between the unit enable/disable messages sent out on the Control Channel? Range is from 30 to 30,000 milliseconds. Default is 500.*
- *Regroup Message Interval - What is the time between the regroup messages sent out on the Control Channel? Range is from 30 to 30,000 milliseconds. Default is 160.*
- *GETC Polling Interval - What is the rate at which every GETC should be polled? Range is from 1000 to 4000 milliseconds. Default is 2000.*
- *Patch Message Interval - What is the time between patch messages sent out on the Control Channel? Range is from 30 to 2000 milliseconds. Default is 100.*
- *Simulselect Update Interval - What is the time between Simulselect update messages sent out on the Control Channel? Range is from 30 to 2000. Default is 250.*
- Morse Code Broadcast Interval - What is to be the interval between consecutive FCC Morse Code ID messages? Range is from 0 to 3600 seconds. A value of 0 disables the feature. Default is 1800.
- Background Test Interval - What is to be the interval between consecutive background test calls? Range is from 0 to 3600 seconds. A value of 0 disables the feature. Default is 300.
- Scanner Scramble Interval - What is to be the interval between consecutive scanner scramble transmissions? Range is from 0 to 3600 seconds. A value of 0 disables the feature. Default is 0.

Alarm Enable Data

NOTE

Parameters that cannot be reconfigured through a VAX System Manager (i.e. can only be specified in the Personality) are shown in itallics.

Alarm Enable Data includes a single value for each of the following parameters:

- *Carrier Failures - Should carrier failures (reported by the GETCs to the Site Controller) be reported to the System Manager? Choices are Enabled and Disabled. Enable only for Group 21 and later GETC software. Default is Enabled.*
- *Auxiliary Alarms - Should auxiliary alarms (reported by the GETCs to the Site Controller) be reported to the System Manager? Choices are Enabled and Disabled. Default is Enabled.*
- *FSL Alarms - Should FSL alarms (reported by the GETCs to the Site Controller) be reported to the System Manager? Choices are Enabled and Disabled. Default is Disabled.*
- *Phone Line Failures - Should phone line failures (reported by the GETCs to the Site Controller) be reported to the System Manager? Choices are Enabled and Disabled. Default is Enabled.*

ACU Data

ACU Data includes a set of values (one for each of 32 alarm inputs) for each of the following parameters:

- Active - Do you want the ACU to enable this alarm input? Choices are Yes and No. Default is Yes.
- Alarm Hi - Do you want the ACU to interpret a logic high at this alarm input as an alarm condition? Choices are Yes and No. Default is No.
- Major - Do you want the ACU to classify an alarm condition at this alarm input as a major alarm? Choices are Yes and No. Default is No.

ACU Data also includes a set of values (one for each of 8 relay outputs) for the following parameter:

- Relay - Do you want this relay to be energized? Choices are Yes and No. Default is No.

LID Data

LID Data includes a single value for each of the following parameters:

- Hang Time - How much hang time (time in seconds between unkey and channel drop) do you want for LIDs? Range is 0 to 255. Default is 0.
- Channel Priority (Voice) - What queue priority level do you want for voice calls for LIDs? Range is 0 to 7 (highest numbers get unqueued first). Default is 3.
- Channel Priority (Data) - What queue priority level do you want for data calls for LIDs? Range is 0 to 7 (highest numbers get unqueued first). Default is 3.
- Channel Priority (DVG) - What queue priority level do you want for Digital Voice Guard calls for LIDs? Range is 0 to 7 (highest numbers get unqueued first). Default is 3.
- Channel Priority (Phone) - What queue priority level do you want for interconnect calls for LIDs? Range is 0 to 7 (highest numbers get unqueued first). Default is 3.

GID Data

NOTE

Parameters that cannot be reconfigured through a VAX System Manager (i.e. can only be specified in the Personality) are shown in itallics.

GID Data includes a single value for each of the following parameters:

- Hang Time - How much hang time (time in seconds between unkey and channel drop) do you want for GIDs? Range is 0 to 255. Default is 0.
- Channel Priority (Voice) - What queue priority level do you want for voice calls for GIDs? Range is 0 to 7 (highest numbers get unqueued first). Default is 3.
- Channel Priority (Data) - What queue priority level do you want for data calls for GIDs? Range is 0 to 7 (highest numbers get unqueued first). Default is 3.
- Channel Priority (DVG) - What queue priority level do you want for Digital Voice Guard calls for GIDs? Range is 0 to 7 (highest numbers get unqueued first). Default is 3.
- Channel Priority (Phone) - What queue priority level do you want for interconnect calls for GIDs? Range is 0 to 7 (highest numbers get unqueued first). Default is 3.
- *Special Fleet All-Call GID - What GID do you want reserved for the Special Fleet All-Call feature? Range is 0 to 2048 (using 2048 disables this feature). Default is 2048.*

Failure Levels

NOTE

Parameters that cannot be reconfigured through a VAX System Manager (i.e. can only be specified in the Personality) are shown in itallics.

Failure Levels includes a single value for each of the following parameters:

- *GETC # of answers for ON - What number of consecutive polls must a specific GETC correctly respond to, to be declared ON after being declared OFF? Range is from 1 to 255. Default is 4.*
- *GETC # of failures for OFF - What number of consecutive polls must a specific GETC fail to correctly respond to, to be declared OFF after being declared ON? Range is from 1 to 255. Default is 2.*
- *Test Unit # of answers for ON - What number of consecutive polls must the Test Unit correctly respond to, to be declared ON after being declared OFF? Range is from 1 to 255. Default is 4.*
- *Test Unit # of failures for OFF - What number of consecutive polls must the Test Unit fail to correctly respond to, to be declared OFF after being declared ON? Range is from 1 to 255. Default is 8. (Can be reconfigured through a VAX System Manager with Release 6 or later software.)*

  Note that this parameter must be set to 8 for a RANGR TU, to eliminate unnecessary TU device failures. (A RANGR TU can miss up to 8 polls when switching from the User Call mode to the Test Unit mode.)

- *Success Modifier - How many additional polls must a specific GETC pass to be declared ON after failing a test call? Range is from 0 to 255. Default is 6.*

- *Channel Fault Tolerance Threshold - What percentage of the total equipped channels must fail due to non-critical alarms before the Site Controller considers the most common alarm type as bogus? Range is from 0 to 100 (per cent). Default is 50.*

Startup Wide Area

Startup Wide Area includes a single list for the following parameter:

- Startup Wide Area IDs - What LIDs and/or GIDs do you want wide area enabled at startup (until the Site Controller is able to obtain the LID and GID databases from the System Manager)? Up to 63 LIDs and/or GIDs may be enabled. The Range of LIDs is from 0 to 16383 L. The range of GIDs is from 0 to 2048 G. Default is 16383 L.

APPLICATION SOFTWARE

The Application Software for the VAX Site Controller computer is contained in a set of 14 PROMs located on the PROM Card (see the Installation section of this manual for location). Release 8.0 Application Software is identified by "RON 107 784 R8A" marked on each Application Software PROM. The Application Software supports a set of standard features, a set of optional hardware features, and individual optional software features. Note that the individual optional software features must be enabled in the Personality.

Standard Features

Release 8.0 of the VAX Site Controller software supports the following standard features when connected to a System Manager:

System Trunking

Shared use of up to 20 RF channels, supporting up to 19 concurrent calls, for single-site systems (or up to 24 RF channels, supporting up to 23 concurrent calls, for Simulcast & Voted multi-site systems)

Dynamic Site Reconfiguration

Parameters for most trunking features may be reconfigured remotely through the System Manager when needed, without disrupting service on the system:

Unit Enable / Disable

The Unit Enable / Disable feature allows the System Manager to remotely enable or disable individual radio units (LIDs) and specific groups (GIDs).

Caller / Callee ID Validation

The LID and GID validation feature allows the site to deny call requests to LIDs and GIDs not defined in the database. LIDs and GIDs may be added or deleted from the database through the System Manager.

Dynamic Regrouping

The Dynamic Regrouping feature allows radios to be programmed over the air with up to 8 new groups. The individual radios are given regrouping instructions, one radio at a time. After all radios have been given regrouping instructions, an activation message is sent to all radios to be regrouped and the radios regroup in unison.

Priority Queuing

The priority queuing feature allows the site to assign queued calls to available channels using a system of priorities. The priority for each call type (Voice, Data, and Digital Voice) for each defined LID and GID may be reconfigured through the System Manager.

Recent Call Queuing Priority

The recent call queuing priority feature increases the queuing priority for participants in a recently completed call, should queuing be necessary. This feature helps maintain the continuity of question and answer sequences during heavy traffic periods when calls are being queued.

If a participant in a recently completed call makes a call request (keys radio) within a specific time period after the recently completed call is unkeyed, the queuing priority for the call given a half level increase. This specific time period (in milliseconds), called the Recent Call Queue Interval, may be specified in the Site Controller's Personality PROMs (miscellaneous data) and may also be reconfigured through the System Manager (menu item 10, panel 2). Range is from 0 to 30,000. Default is 5,000.

To keep participants in a recently completed call from hogging the system during heavy traffic periods, a limit is placed on how many times a specific ID can receive this increased priority during any specific sequence of calls. A wrap around 0 to 7 counter, maintained for each ID, is incremented each time a call is placed by that ID (each PTT). If the counters for both the calling and called ID are anywhere from 0 to 3, the call request is given increased priority. However, if the counter for either the calling or called ID is anywhere from 4 to 7, no increased priority is given to the call request. This assures that, in the worst case, two IDs do not get this increased priority more than 50% of the time, within a specific sequence of calls. When the last Recent Call Queue Interval that applies to a specific ID expires, the counter for that ID is reset to 0.

Message Trunking

LIDs and GIDs with a Hang Time greater than 0 are message trunked (the same channel will be used for each transmission). In the Analog Mode only, the Hang Time for each LID and GID may be reconfigured through the System Manager.

Confirmed Call

The confirmed call feature allows the site to assign the radio logged into that LID (or each radio logged into that GID) to a Working Channel before the caller is allowed to talk. This feature may be enabled or disabled for each LID and GID through the System Manager.

Activity Logging

The Site Controller logs the following events in the form of Activity Records:

- Call Requests
- Channel Assignments
- Channel Drops
- Equipment Failed
- Equipment Returned to Service
- Alarm State Changes

These Activity Records may then be sent to the System Manager for use in making reports. Activity Records may be automatically sent to the System Manager when the quantity reaches the Activity Dump Threshold, or may be manually requested through the System Manager (menu item 31). The Activity Dump Threshold may be specified in the Site Controller's Personality PROMs (miscellaneous Data) or may be reconfigured through the System Manager (menu item 10, panel 2). Range is from 0 to 16383. Using 0 disables the automatic sending of the Activity Records. Default is 1000.

In the event that the Site Controller is unable to send the Activity Records to the System Manager before its memory becomes full, the Site Controller overwrites the oldest Activity Records first. This allows the most recent records to be sent once communications to the System Manager is restored.

Alarm Reporting

The Site Controller reports the state of the following alarms to the System Manager whenever an alarm changes state, or whenever requested to do so by the System Manager.

- Auxiliary Alarm (by RF channel #) - Indicates the detection of a Test Unit alarm for the specific channel by the TUAI at a Simulcast transmitter site. State changes are reported to the Site Controller by the Control Point GETC for that channel.

- Carrier Alarm (by RF channel #) - Indicates the presence of an RF carrier without proper signaling for the specific channel (possible interfering signal or deliberate jamming). State changes are reported to the Site Controller by the GETC for that channel.

- Power Alarm (by RF channel #) - Indicates that the MASTR III repeater's output power has dropped below the alarm threshold level. State changes are reported to the Site Controller by the GETC for that channel. (First supported by GETC Release 6 and System Manager Release 6.)

- Synthesizer Alarm (by RF channel #) - Indicates that the MASTR III repeater's synthesizer is not locked. State changes are reported to Site Controller by the GETC for that channel. (First supported by GETC Release 6 and System Manager Release 6.)

- Voter Alarm (by RF channel #) - Indicates that error messages are being received by GETC from Voter. State changes are reported to the Site Controller by the GETC for that channel. (First supported by GETC Release 6 and System Manager Release 6.)

- Interconnect (RIC) Alarm (by RF channel #) - Indicates that poll responses from the interconnect equipment (RIC or GTI) are not being received by the Site Controller).

- PMU Alarm (by RF channel #) - Indicates that the output power level for the channel has exceeded the alarm threshold as measured by the PMU. State changes are reported to the Site Controller by the PMU.

- TU Alarm (by RF channel #) - Indicates that a test call failed for that channel. State changes are reported to the Site Controller by the TU.

- ACU Alarm (by alarm input #) - Indicates that an alarm signal is being received by the ACU at this alarm input. State changes are reported to the Site Controller by the ACU.

- Phone (Line) Alarm (by channel #) - Indicates the absence of data from a Voter in Voted or Simulcast System (possible line noise or breakage on link from Voter to GETC). State changes are reported to the Site Controller by the GETC for that channel.

- Poll Alarm (by channel #) - Indicates that poll responses from a Working Channel or Downlink GETC are not being received by the Site Controller).

- Turbo Alarm (by channel #) - Indicates that there is a disruption in communication between a specific GETC's main processor and its Turbo Board. State changes are reported to the Site Controller by the GETC for that channel. (First supported by GETC Release 6 and System Manager Release 6.)

- Antenna Feed Alarm (by antenna #) - Indicates that the low power or SWR alarm threshold for the antenna circuit has exceeded. State changes are reported to the Site Controller by the PMU. (See the PMU heading in the Optional Trunking Features section for more information.)

- TU Alarm (device) - Indicates that the TU is not responding to polls, FTT processing has failed the TU, or the TU has been disabled in the database.

- PMU Alarm (device) - Indicates that the PMU is not responding to polls, FTT processing has failed the PMU, or the PMU has been disabled in the database.

- ACU Alarm (device) - Indicates that poll responses from the ACU are not being received by the Site Controller.

- Interconnect (LIC) Alarm (device) - Indicates that poll responses from the interconnect equipment (LIC or GTI) are not being received by the Site Controller.

Site Activity Monitoring

Alarm and trunking activity at the site may be monitored in real time on the System Manager's Alarm Display and Acknowledge screen, and Site Monitor screen.

Wide-Area Enable / Disable

RF channels, LIDs, and GIDs can independently be enabled/disabled for Wide-Area calls when the system, controlled by the Site Controller, is connected to one or more other devices or systems through a CEC/IMC switch.

Analog / Digital Console Preempt

The Analog and/or Digital Console Preempt feature allows a dispatcher's call to preempt an existing group call. This means the dispatcher's call is heard at all radios and the transmitting radio is still heard by the dispatcher. The Analog and/or Digital Console Preempt feature also allows a dispatcher (at a Supervisor console only) to preempt another dispatcher's preempt call.

Optional Features

Hardware

Release 8.0 of the VAX Site Controller software supports the following optional hardware features:

- Alarm & Control Unit
- Test Unit
- Power Monitor Unit
- Local Telephone Interconnect
- Redundant Downlink

Software

Release 8.0 of the VAX Site Controller software supports the following optional software feature:

- Multiple Channel Partition

INSTALLATION

NOTE

This software can only be used with a VAX Site Controller computer (or PDP-11 that has been upgraded to a VAX).

PROM CARD REMOVAL

The Site Controller's software is located on the PROM Card inside the Site Controller computer. The PROM Card must temporarily be removed to install the new software. The following three procedures correspond to the three different package designs for the Site Controller computer.

Back Entry with RJ11-Type Connectors

The latest VAX Site Controller is characterized by the modular RJ11-type connectors on its back panel. Access to the PROM card is through the back using the following procedure:

1. Turn off the Site Controller (switch is on the back).
2. Loosen the two fastener screws holding the back panel to the chassis (see Figure 1).

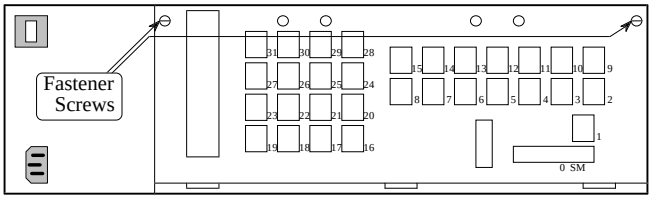

Figure 1 - Location of Fastener Screws

3. Pull the top of the back panel out and down (be careful not to damage the ribbon cables).

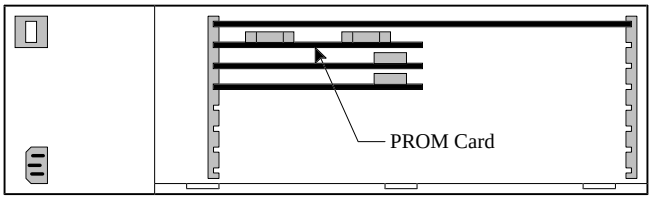

Figure 2 - PROM Card Location In Later VAX

4. Remove the PROM Card (see Figure 2) by pulling on the two tabs fastened to the front edge of the card. Once the card has disengaged the connector, use one hand to push up on the board above to help prevent the PROM Card from dragging as it is pulled out. (Observe standard handling practices for static sensitive components.)

Back-Entry with DILOG or EMULEX Panels

The earlier VAX and later PDP-11 Site Controllers are characterized by the DILOG or EMULEX panels connected by ribbon cables. Access to the PROM card is through the back using the following procedure:

1. Turn off the Site Controller (switch is on the back).
2. Loosen the two fastener screws holding the back panel to the chassis (see Figure 3).

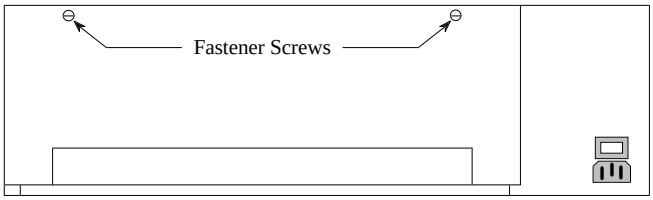

Figure 3 - Fastener Screw Location In Earlier VAX

3. Lift the back panel out of the way (be careful not to damage the ribbon cables).
4. Remove the PROM Card (see Figure 4) by pulling on the two tabs fastened to the front edge of the card. Once the card has disengaged the connector, use one hand to push up on the board above to help prevent the PROM Card from dragging as it is pulled out. (Be careful not to damage the ribbon cables and observe standard handling practices for static sensitive components.)

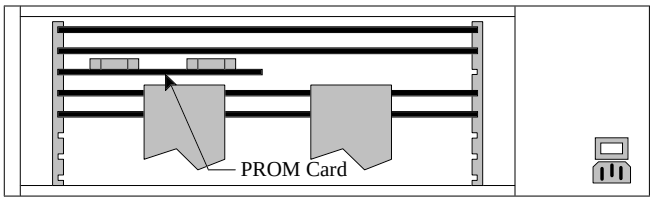

Figure 4 - PROM Card Location In Earlier VAX

Top-Entry with DILOG or EMULEX Panels

The earliest PDP-11 Site Controller is characterized by the DILOG or EMULEX panels connected by ribbon cables. Access to the PROM card is through a lift-up door in the top using the following procedure:

1. Turn off the Site Controller (switch is on the back).

2. Pull the Site Controller chassis all the way forward on its slide-out track.

3. Pull up the top cover with the attached card cage, and have someone other than you hold it up.

4. Remove the PROM Card (see Figure 5) by pulling on the two tabs fastened to the front edge of the card. Once the card has disengaged the connector, use one hand to push up on the board above to help prevent the PROM Card from dragging as it is pulled out. (Observe standard handling practices for static sensitive components.)

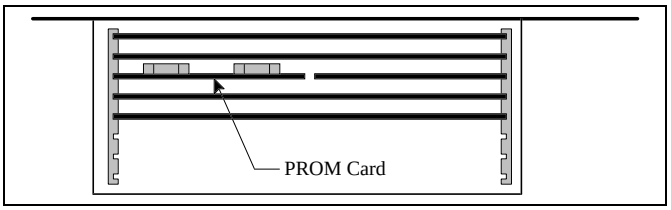

Figure 5 - PROM Card Location for Top Entry

PROM REPLACEMENT

The Application Software consists of fourteen (14) PROMs and the Personality consists of two (2) PROMs. The location of each PROM on the MRV11-D PROM Card is shown in Figure 6. The following rules apply when replacing Site Controller PROMs:

- Observe standard handling practices for static-sensitive components.
- Replace PROMs as a set only.
- Put each PROM in its correct location. Be especially careful of location numbers 01 and 02 since these numbers are used for both sets of PROMs.
- Orient each PROM with the notched end as shown.
- Make sure no PROM leads get bent under the PROM during insertion into the socket.

Application Software PROMs

A typical Application Software PROM label is shown in Figure 7. Each PROM in the set must be marked with the same software revision number, and the set must contain one PROM for each of the fourteen (14) PROM locations.

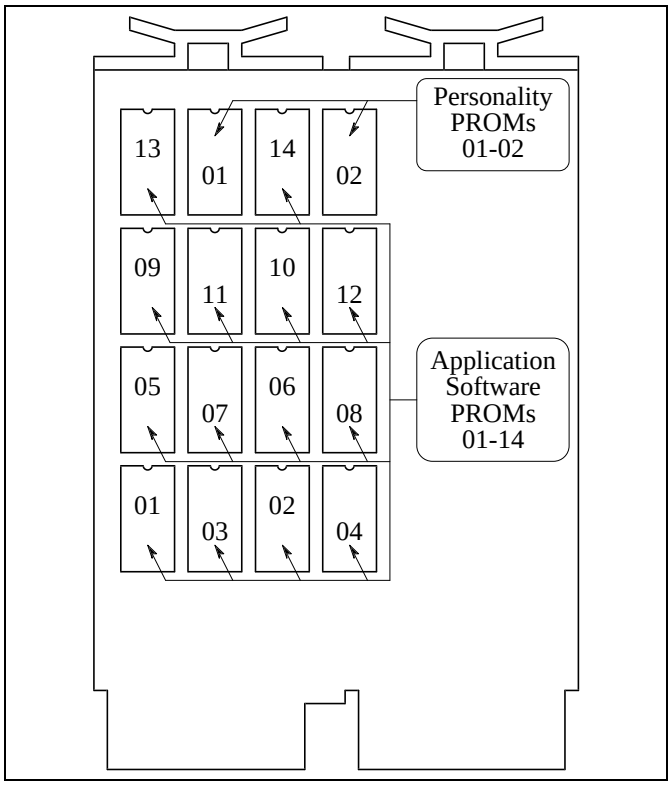

Figure 6 - Location of PROMs on PROM Card

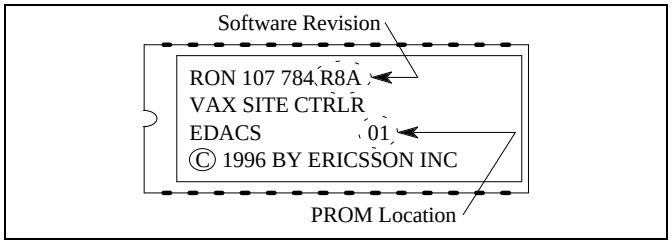

Figure 7 - Application Software PROM Label

Personality PROMs

A typical Personality PROM label is shown in Figure 8. Each PROM in the set must be marked with the same serial number, and the set must contain one PROM for each of the two (2) PROM locations.

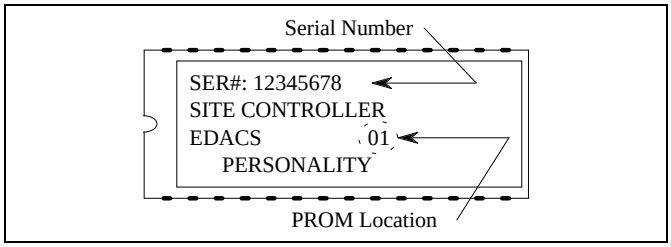

Figure 8 - Personality PROM Label

FULL-FEATURED TRUNKING

Full-Featured Trunking refers to trunking under the direction of the Site Controller with a full set of standard features. Without a functioning Site Controller, the system operates in Failsoft, which is trunking under the direction of the Control Channel GETC with a reduced set of features. To determine if the system is operating in Full-Featured Trunking or Failsoft, look at the L1 indicator on the front of any Station or Downlink GETC. The L1 indicator is lit when the system is operating in Failsoft.

SITE CONTROLLER STARTUP

Initialization

Each time the Site Controller is powered-up or reset, the working memory of the Site Controller is initialized and loaded with the operating program from the Application Software PROMs and the initial set of parameter values from the Personality PROMs. When the loading is complete, the operating program is started at its beginning. If the Site Controller is not connected to a System Manager, this initial configuration cannot be changed and will remain as the active configuration of the Site Controller until new Personality PROMs are installed.

Request for Databases

When the initialization is complete, the Site Controller will attempt to communicate with the System Manager to obtain the latest databases that apply to the site. These databases are sets of values for those Site Controller parameters that are reconfigurable through the System Manager. If the databases have not been specifically configured for the site, the databases will contain default values. When the databases (default or reconfigured) are received from the System Manager, the initial parameter values in the Site Controller's working memory are updated with the new values, and the Site Controller's active configuration is no longer the initial configuration.

The Site Controller's active configuration may then be changed as often as needed by partial database transfers from the System Manager. The Site Controller's active configuration may also be changed by the use of temporary reconfiguration (non-database) transfers from the System Manager. However, because these temporary changes are not made to the databases, they will be lost the next time the Site Controller is powered down or reset.

Some parameter values are not reconfigurable through the System Manager (such as the Site Morse Code, RF Site ID, and the System Manager communications parameters). To change parameter values not reconfigurable through the System Manager, or to change any parameter value when no System Manager is connected to the Site Controller, a new set of Personality PROMs must be ordered from the factory.

Switch To Full-Featured Trunking

If the Site Controller is powered-up and becomes operational (allow up to 90 seconds) before the Station GETCs are powered up and become operational (may be as little as 2 seconds), the site will become operational in Full-Featured Trunking. However, if the Site Controller becomes operational after the Station GETCs become operational, the site will become operational in Failsoft.

To bring the site out of Failsoft, reset a GETC (preferably the Control Channel GETC) for a channel that is allowed to be a Control Channel by the Site Controller (press S4 on the front edge of the GETC Logic Board inside the GETC shelf). If you accidently reset a GETC (whether it is the Control Channel GETC or not) for a channel that is not allowed to be a Control Channel by the Site Controller, the site will not come out of Failsoft. If this happens, you must move the Control Channel (by resetting the Control Channel GETC) to a channel that is allowed to be a Control Channel by the Site Controller. Then, reset the Control Channel GETC once more to bring the site out of Failsoft.

CONTROL CHANNEL SELECTION

The Control Channel is the RF channel to which all user radios tune to request and receive channel assignments for trunked calls (the trunked call itself takes place on a Working Channel). Only one RF channel is assigned as a Control Channel at a time. To determine which RF channel is assigned as the Control Channel, look at the L6 indicator on the front of each Station GETC. The L6 indicator on the Control Channel GETC will remain lit continuously, while the L6 indicator on a Working Channel GETC will only be lit when assigned to a call. If a System Manager is connected the Site Controller, you can also determine which RF channel is assigned as the Control Channel by looking at the Site Monitor screen (menu selection 32) and observing which channel's "Channel Activity" is listed as the Control Channel.

Initial Control Channel

Upon completion of initialization, the Site Controller starts sending polling messages on the individual data links to each GETC. The Site Controller sends Control Channel instructions to the initial Control Channel specified in its Personality PROMs to let it know that it is the Control Channel. However, if the initial Control Channel GETC fails to respond to polls, the Site Controller will accept (as a Control Channel) the first GETC that responds to polls and is allowed to be a Control Channel.

Change Due To Database Download

If the databases maintained by the System Manager specify a different set of channels allowed to be the Control Channel, the Site Controller may move the Control Channel after receiving the initial database download from the System Manager. That is, if the initial Control Channel is no longer among those channels allowed to be a Control Channel, the Site Controller selects the next higher available (free) channel number from the new set of channels allowed to be a Control Channel. When looking for an available channel, the Site Controller checks successively higher channel numbers. When all higher channel numbers are checked, the Site Controller starts over with the lowest channel number.

System Manager Reconfiguration

The channel presently selected as the Control Channel and the channels which are allowed to be used as a Control Channel may subsequently be changed through the System Manager. These changes can be made in the databases maintained by the System Manager and then uploaded to the Site Controller, or these changes can be uploaded to the Site Controller without changing the databases maintained by the System Manager. When changes are not saved in the databases maintained by the System Manager, they are temporary and will be lost the next time the Site Controller is powered down or reset.

Control Channel Failure

If the Control Channel GETC fails to respond to a Site Controller polls, or is failed by the TU or PMU, the Site Controller selects the next higher available (free) channel number from the set of channels allowed to be a Control Channel, as specified in its active configuration. When looking for an available channel, the Site Controller checks successively higher channel numbers. When all higher channel numbers are checked, the Site Controller starts over with the lowest channel number. When the original Control Channel is fixed and tested, the Site Controller will add the channel to its bitmap of available channels, but will leave the Control Channel where it presently is. Note that a channel may be available and still be alarmed (due to Fault Tolerance Threshold processing). However, an alarmed channel will not be assigned as a Control Channel, unless no unalarmed channels exist.

WORKING CHANNEL ASSIGNMENTS

A Working Channel is an RF channel which can be assigned to a trunked call to provide the audio path for the call. All RF channels, other than the Control Channel, are Working Channels.

Placing a Call

To place a trunked call from a user's radio, the user selects the communications mode (normal analog voice, local telephone interconnect, digital voice, or data), call type (individual, group, emergency group, interconnect, or system all call), and the LID, GID, or telephone number called. The user then pushes the Push-To-Talk (PTT) button on the radio to send a call request to the Control Channel. The message includes the radio's identification (LID), communication mode, call type, and the identification (LID, GID, or telephone number) of the individual or group called. When the Control Channel GETC receives the call request from the field radio, it sends a call request message to the Site Controller.

Caller/Callee ID Validation

When the Site Controller receives the call request message from the Control Channel GETC, it checks the caller's and callee's LID or GID. Each caller's and callee's LID or GID must be defined in the Site Controller's active configuration, whether initially from the Personality, or later from the site database sent from the System Manager. If either the caller's or callee's LID or GID is not defined in the active configuration, the Site Controller sends a call denied message to the Control Channel GETC, the Control Channel GETC sends a call denied message to the calling radio, the calling radio gives a call denied signal to the caller, and the call request ends there.

If no System Manager is connected to the Site Controller, the LID and GID defaults must be defined in the Personality PROMs. If a System Manager is connected to the Site Controller, the LIDs and GIDs may be defined through the System Manager using the Unit Identification screen (menu selection 11) and Group Identification screen Menu selection 12). Then use the Database Upload Request screen (menu selection 30) to send the Logical and Group ID Changes to the Site Controller.

Channel Rotation

The method or pattern used by the Site Controller to search for an available (free) channel to assign to a call depends upon whether channel rotation has been selected, and whether the channels are to be assigned in ascending or descending order.

If no System Manager is connected to the Site Controller, these parameters must be specified in the Personality PROMs. If a System Manager is connected to the Site Controller, these parameters may be reconfigured through the System Manager using the External Device Definition screen (menu selection 10). Then use the Site Reconfiguration screen (menu selection 20) to send the reconfigured site database to the Site Controller.

Communication Modes

If the caller's and callee's LID or GID is defined in the active configuration, the Site Controller searches the available (free) channels to find one enabled for the communications mode requested (Interconnect, Digital Voice, Data, Channel Test, Wide Area, and Analog Voice). If no channels have been enabled for the requested communications mode, the Site Controller sends a call denied message to the Control Channel GETC, the Control Channel GETC sends a call denied message to the calling radio, the calling radio gives a call denied signal to the caller, and the call request ends there.

If no System Manager is connected to the Site Controller, channels must be enabled or disabled for each communications mode in the Personality PROMs. If a System Manager is connected to the Site Controller, channels may be enabled and disabled as needed for each communications mode through the System Manager using the External Device Definition screen (menu selection 10) to select which channels are enabled for which communications mode. Then use the Site Reconfiguration screen (menu selection 20) to send the reconfigured site database to the Site Controller.

Care must be taken to only enable a channel for a communications mode that it is equipped to support. But, just because it is equipped to support that communications mode, it need not be enabled. (For example, all channels are equipped to support Analog Voice calls, but it may be desirable for a system to have one or more channels disabled for Analog Voice.)

NOTE

Note that Analog Voice cannot be reconfigured through the System Manager, and therefore must be configured correctly in the Personality.

Call Queuing

If all channels that are enabled for the requested communications mode are busy, the Site Controller queues the call request in the specific queue for the requested communications mode and sends a queued call message to the Control Channel GETC, the Control Channel GETC sends a queued call message to the calling radio, the calling radio gives a queued call signal to the caller, and the caller waits for an available channel.

The Site Controller manages a separate queue for Analog Interconnect, Digital Interconnect, Analog Voice, Digital Voice, and Data communication modes. As channels become available, the highest priority queued call request is dequeued first. If two or more queued call requests have the same priority level, the call request with the longest time queued is dequeued first. The priority level of a call request is determined by the call type, the higher of the caller's or the callee's user priority, and the Recent Call Queue Interval for the system.

Two call types are automatically given the highest priority levels. The highest priority level is given to a System All Call. The next highest priority level is given to any Emergency Group call. If two Emergency Group calls are queued, the GID with the higher user priority is dequeued first.

User priority levels for Voice (Analog), Data, Interconnect, and Digital Voice are be assigned to each defined LID and GID. If no System Manager is connected to the Site Controller, user priority levels must be assigned in the Personality PROMs (all LIDs will be assigned to one set of priority levels and all GIDs will be assigned to a second set of priority levels). If a System Manager is connected to the Site Controller, these user priority levels may be reconfigured independently for each LID and GID. To reconfigure the user priority levels through the System Manager, use the Unit Identification screen (menu selection 11) and the Group Identification screen (menu selection 12). Then use the Database Upload Request screen (menu selection 30) to send the Logical and Group ID Changes to the Site Controller.

The Site Controller gives a recent user a slight edge when its call is queued (to help maintain the continuity of a conversation). The Site Controller increases the priority of a call request by half a level if the time between the last call

request and the current call request is less than the Recent Call Queue Interval for the site. If no System Manager is connected to the Site Controller, the Recent Call Queue Interval must be specified in the Personality PROMs. If a System Manager is connected to the Site Controller, the Recent Call Queue Interval may be reconfigured through the System Manager using the External Device Definition screen (menu selection 10). Then use the Site Reconfiguration screen (menu selection 21) to send the reconfigured site database to the Site Controller.

Callee Busy

If a channel that is enabled for the requested communications mode is found, the Site Controller checks to see if the callee is involved in another call. If the called radio is involved in another call, the Site Controller sends a busy message to the Control Channel GETC, the Control Channel GETC sends a busy message to the calling radio, the calling radio gives a busy signal to the caller, and the call request ends there.

Channel Assignment

If a channel that is enabled for the requested communications mode is found and the called radio is not involved in another call, the Site Controller assigns the channel to the call request and sends a Working Channel assignment message to the Control Channel and Working Channel GETCs, and the Control Channel GETC sends a Working Channel assignment to the calling and called radios.

Opening The Audio Path

When the calling and called radios receive the Working Channel assignment on the Control Channel, they tune to the assigned Working Channel. After a high speed handshake between the Working Channel and the calling radio, the calling radio gives the caller the "OK to transmit" signal indicating that the caller can begin talking. Signaling on the assigned Working Channel tells the called radio to unmute its speaker so that the caller can be heard.

Ending The Call

The length of time the call is allowed to use the Working Channel depends upon the hang time and the conversation time limit. The hang time is the length of time that the Working Channel will remain assigned to the call after the caller releases the PTT button. A finite (non-zero) hang time allows a called radio to respond to the caller using the same Working Channel assignment if the response is made within the hang time. This helps to maintain the continuity of the message and is called Message Trunking. A hang time of zero drops the Working Channel assignment at the end of each transmission and is called Transmission Trunking.

If no System Manager is connected to the Site Controller, the hang time must be specified in the Personality PROMs. One hang time may be specified for all LIDs. Another hang time may be specified for all GIDs. If a System Manager is connected to the Site Controller, the hang time may be reconfigured through the System Manager using the Unit Identification screen (menu selection 11) and the Group Identification screen (menu selection 12). Then use the Database Upload Request screen (menu selection 30) to send the Logical and Group ID Changes to the Site Controller. Different hang times may be defined for each LID and GID.

A second hang time called the Interconnect Hang Time applies specifically to telephone interconnect calls. The Interconnect Hang Time may be reconfigured only through the System Manager using the External Device Definition screen (menu selection 10). Then use the Site Reconfiguration screen (menu selection 21) to send the reconfigured site database to the Site Controller. A single Interconnect Hang Time applies to all LIDs and GIDs.

A third hang time called the Emergency Hang Time applies specifically to emergency calls. The Emergency Hang Time may be reconfigured only through the System Manager using the External Device Definition screen (menu selection 10). Then use the Site Reconfiguration screen (menu selection 21) to send the reconfigured site database to the Site Controller. A single Emergency Hang Time applies to all LIDs and GIDs.

There are two conversation time limits: one for Message Trunking and another for Transmission Trunking. The Message and Transmission Conversation Time Limits may be reconfigured only through the System Manager using the External Device Definition screen (menu selection 10). Then use the Site Reconfiguration screen (menu selection 21) to send the reconfigured site database to the Site Controller. A single Message Time Limit applies to all LIDs and GIDs. A single Transmission Time Limit applies to all LIDs and GIDs.

When the caller finishes talking, the caller releases the PTT button, sending an unkey message to the assigned Working Channel and all called radios. The Site Controller receives either a call dropped (Transmission Trunked call) or a call unkey (Message Trunked call) depending upon the hang time included in the Working Channel assignment message for the call. With Transmission Trunking, the radios involved in the call return to monitor the Control

Channel. With Message Trunking, the radios stay on the Working Channel until hang time or the Message Conversation Limit expires.

SITE CONTROLLER FAILURE

If the Control Channel GETC stops receiving polling messages from the Site Controller and sees no pulses on the FSL (Frame Sync Line) other than its own, it switches from the Site Controller Mode to the Failsoft Mode and signals each other GETC (using the pulses it puts on the FSL) to switch to the Failsoft Mode. In going to the Failsoft Mode, each GETC switches its serial input from its Site Controller data link to the BSL (Backup Serial Line) connected to all GETCs. The Control Channel GETC then takes over the Failsoft trunking activity, directing the Working Channel GETCs over the BSL.

SITE CONTROLLER RECOVERY

If the whole site is powered up together after a short power outage (one short enough not to discharge the battery in the Uninterruptible Power Supply), the site will come up in the Full-Featured Trunking mode of operation. This is because the Site Controller remained powered up by the Uninterruptible Power Supply and did not have to be initialized. Therefore, when the Station GETCs finished their initialization, they were able to see and respond to the polling messages from the Site Controller and remained in the Site Controller Mode.

If the whole site is powered up together after a prolonged power outage (one long enough to discharge the battery in the Uninterruptible Power Supply), the site will come up in the Failsoft Trunking mode of operation. This is because it takes much longer for the Site Controller to initialize itself than for the Station GETCs. Therefore, at the time each Station GETC is looking for polling messages on its individual Site Controller data link, the Site Controller hasn't finished the initialization and isn't sending any polling messages to the Station GETCs. The Station GETCs, seeing no polling messages, assume the Site Controller has failed and switch to the Failsoft Mode.

In the Failsoft Mode, each GETC's serial input is switched to the BSL instead of its Site Controller data link. Therefore, when the Site Controller resumes polling the GETCs on these data links (after a prolonged power outage, or an actual Site Controller hang-up or failure), each GETC will be unaware of the polling. To get the GETCs to switch from the Failsoft Mode to the Site Controller Mode, you must get each GETC to switch its serial input from the BSL back to its Site Controller data link.

To bring the site out of Failsoft, reset a GETC (preferably the Control Channel GETC) for a channel that is allowed to be a Control Channel by the Site Controller (press S4 on the front edge of the GETC Logic Board inside the GETC shelf). If you accidently reset a GETC (whether it is the Control Channel GETC or not) for a channel that is not allowed to be a Control Channel by the Site Controller, the site will not come out of Failsoft. If this happens, you must move the Control Channel (by resetting the Control Channel GETC) to a channel that is allowed to be a Control Channel by the Site Controller. Then, reset the Control Channel GETC once more to bring the site out of Failsoft.

When the GETC emerges from reset, it will have its serial input switched to its Site Controller data link and be able to see polls from the Site Controller. When the GETC starts responding to polls from the Site Controller, the Site Controller will check to see if it is allowed to be a Control Channel. If it is allowed to be a Control Channel, the Site Controller will assign that GETC's channel as the Control Channel. The GETC will then signal each other GETC (via the FSL) to switch its serial input from the BSL to its individual Site Controller data link.

ANALOG/DIGITAL CONSOLE PREEMPT

The Digital Console Preempt feature is supported by Release 8.0 and later Site Controller software.

Description

Normally a dispatcher will receive a system busy signal from the Site Controller when trying to place a call to a GID that is busy with an existing group call. The Analog and/or Digital Console Preempt feature allows a dispatcher's call to preempt an existing group call. This means the dispatcher's call is heard at all radios and the transmitting radio is still heard by the dispatcher. The Analog and/or Digital Console Preempt feature also allows a dispatcher (at a Supervisor console only) to preempt another dispatcher's preempt call.

The Analog Console Preempt feature is for analog voice calls. The Digital Console Preempt feature is for digital voice calls (AEGIS and Voice Guard). Note that message-trunked calls are not supported in the digital mode. Also note that Interconnect calls cannot be preempted in either mode. When a dispatcher tries to place a call to a GID that is busy with an existing Interconnect group call, the Site Controller sends a system busy signal to the dispatcher.

Configurable Parameters

The following two parameters must be specified in the Site Controller's Personality PROMs:

- Console Preempts
- Console Digital Preempt Delay

The Console Preempts parameter must be specified in the Site Controller's Personality PROMs (not System Manager reconfigurable) as one of the following:

- None - Console Preempt is not allowed for any type of call (disables feature).
- Analog Only - Console Preempt is allowed for transmission-trunked analog-voice group calls only.
- Digital Only - Console Preempt is allowed for transmission-trunked digital-voice group calls only.
- Digital and Analog - Console Preempt is allowed for transmission -trunked digital and analog-voice group calls.

CAUTION

Digital Preempt must be enabled on all systems or no systems - not just some of the systems in a network. If just some systems are enabled for Digital Preempt, problems (such as call dropping and missed audio) will be encountered in the systems not enabled. For more information, see the Product Release Notes AE/LZT 123 3218/1 for Digital Preempt.

When "Digital Only" or "Digital and Analog" is specified for the Console Preempts parameter, the Console Digital Preempt Delay parameter must also be specified in the Site Controller's Personality PROMs (not System Manager reconfigurable). This delay defines the time between when the dispatcher keys the call and when the dispatcher is assigned to the Working Channel for the group call. The required delay depends upon the type of radios (MPA, MRK, etc.) used with the system. The default value of 180 ms should be sufficient for all radio types, but may be specified at any 10 ms step from 0 to 500 ms if needed.

Console Preempt of Existing Group Call

The description given here is for Digital-Voice Console Preempts of an existing digital-voice group call. For Analog-Voice Console Preempts of an existing analog-voice group call, ignore references to the digital preempt delay timer and the preempt-pending message.

When a dispatcher tries to place a call to a GID that is busy with an existing group call, the Site Controller sends a preempt-pending message to the Working Channel GETC and sets the digital preempt delay timer for that channel. When the timer expires, the Site Controller assigns the preempting console to the Working Channel, and all receiving members of the talkgroup will hear the dispatcher instead of the transmitting member of the talkgroup. The transmitting member of the talkgroup will be heard by the dispatcher, but will not hear the dispatcher until unkeying his/her radio. If the transmitting member of the talkgroup is still keyed when the call from the dispatcher is unkeyed, the transmitting member's call will be restored.

If the dispatcher aborts (unkeys) the group call before the digital preempt delay timer expires, the Site Controller will abort processing the preempt call from the dispatcher and allow the transmitting member's call to be restored.

Console Preempt of Existing Console Preempt Call

NOTE

A console preempt of a console preempt is only possible from a supervisor console. For more details, see the console instruction manual.

The description given here is for Digital-Voice Console Preempts of an existing digital-voice group call. For Analog-Voice Console Preempts of an existing analog-voice group call, ignore references to the digital preempt delay timer and the preempt-pending message.

When a second dispatcher (must be at a Supervisor console only) tries to place a call to a GID that is busy with an existing Console Preempt call from another dispatcher (has been assigned), the Site Controller sends a preempt-pending message to the Working Channel GETC and sets the digital preempt delay timer for that channel. When the timer expires, the Site Controller assigns the second preempting console to the Working Channel and all receiving members of the talkgroup will hear the second dispatcher instead of the first dispatcher or the transmitting member of the talkgroup. The transmitting member of the talkgroup will be heard by the second dispatcher, but will not hear the second dispatcher until unkeying his/her radio. The preempted dispatcher's call is dropped. If the preempted radio is still keyed when the second dispatcher unkeys, the transmitting member's call will be restored.

If the second dispatcher aborts (unkeys) the group call before the digital preempt delay timer expires, the Site Controller will abort processing the preempt call from the second dispatcher, but the first dispatcher's preempt call will not be restored. If the preempted radio is still keyed when the second dispatcher unkeys, the transmitting member's call will be restored.

Console Preempt of Pending Console Preempt Call

NOTE

A console preempt of a console preempt is only possible from a supervisor console. For more details, see the console instruction manual.

The description given here is for Digital-Voice Console Preempts of an existing digital-voice group call.

When a second dispatcher tries to place a call (must be at a Supervisor console only) to a GID that is busy with an existing group call and a Console Preempt call is being processed (but has not been assigned - delay timer has not yet expired) from another dispatcher, the Site Controller will abort processing the preempt call from the first dispatcher and begin processing the preempt call from the second dispatcher. When the timer expires, the Site Controller assigns the second preempting console to the Working Channel and all receiving members of the talkgroup will hear the second dispatcher instead of the first dispatcher or the transmitting member of the talkgroup. The transmitting member of the talkgroup will be heard by the second dispatcher, but will not hear the second dispatcher until unkeying his/her radio. The preempted dispatcher's call is dropped. If the preempted radio is still keyed when the second dispatcher unkeys, the transmitting member's call will be restored.

If the second dispatcher aborts (unkeys) the group call before the digital preempt delay timer expires, the Site Controller will abort processing the preempt call from the second dispatcher, but the first dispatcher's preempt call will not be restored. If the preempted radio is still keyed when the second dispatcher unkeys, the transmitting member's call will be restored.

MULTI-SITE OPERATION

Channel Assignment

To support multi-site and console operation, the Site Controller sends all channel assignment, hang time, and channel drop information to the Downlink GETC.

Simulcast

In Simulcast systems, a Site Controller data link is connected to each Control Point GETC instead of to each Station GETC. From the Site Controller's point of view the Control Point GETC behaves just like a Station GETC.

Voted Non-Simulcast

In Voted Non-Simulcast systems, a Site Controller data link is connected to each Main Site GETC instead of to each Station GETC. From the Site Controller's point of view the Main Site GETC behaves just like a Station GETC.

OPTIONAL TRUNKING FEATURES

The following optional trunking features are supported by the Site Controller, but require additional hardware installation:

- Alarm & Control Unit
- Test Unit
- Power Monitor Unit
- Redundant Downlink
- RIC/LIC Interconnect
- Enhanced Local Interconnect

The following optional trunking feature does not require additional hardware installation, but is only supported when the feature is ordered through Lynchburg:

- Multiple Channel Partition

ALARM & CONTROL UNIT

Description

The Alarm and Control Unit (ACU) is an EDACS Site Controller option used as the system input point for up to 32 alarms from user-supplied devices, the system output point for up to 8 controls to user-supplied devices, and the local display of the alarm and control status for the system under the control of the local Site Controller.

The ACU receives the following information from the following devices:

- Alarm inputs from up to 32 user-supplied devices
- Alarm Mask message from Site Controller
- Set Relays message from Site Controller

The ACU sends the following information to the following devices:

- Control outputs to up to 8 user-supplied devices
- Alarm system status to indicators on the front panel
- Status message to Site Controller

Configurable Parameters

The ACU parameters listed here are configurable in the site database maintained by the System Manager.

Alarm Inputs

The following parameters may be reconfigured in the Alarm Control Unit Definition screen (menu selection 16), and transferred to the site using the Database Upload Request screen (menu selection 30):

Enabled - Defines if the alarm is enabled for reporting. Site Controller personality default is Y (yes). System Manager default is N (no).

Active High - Defines if a logic high is an alarm condition. Site Controller personality and System Manager defaults are N (no).

Major - Defines if the alarm is a major alarm. Site Controller personality and System Manager defaults are N (no).

Control Outputs

The following parameter may be reconfigured in panel 1 of 4 in the External Device Definition screen (menu selection 10), and transferred to the site using panel 5 of 5 in the Site Reconfiguration screen (menu selection 24):

Relay on - Defines the normal state of the output relay. Select Y (relay's NO (normally open) contact is closed) or N (relay's NO contact is open). Site Controller personality and System Manager defaults are N.

Relay trigger definitions for these control outputs are configurable in the Alarm Activated Relays screen (menu selection 41), and transferred to the site using panel 5 of 5 in the Site Reconfiguration screen (menu selection 24). See the System Manager user's manual for more information.

Messaging

The ACU communicates with the Site Controller through an asynchronous RS232C serial data link. The Site Controller uses the following messages to supervise the operation of the ACU:

- Poll - causes a Status message response.
- Reset - causes the ACU to reset itself.
- Alarm Mask - configures the alarm inputs.

- Set Relays - configures the control output relays.

The ACU uses the following message to report its status to the Site Controller:

- Status - reports latest status to Site Controller.

Operation

Startup

The Site Controller sends a Poll message at regular intervals to the ACU, whether the ACU responds or not. Whenever the ACU receives a Poll message, it responds with a Status message. When the Site Controller first receives a Status message from the ACU, it sends the Reset message to the ACU.

The Reset message from the Site Controller causes the ACU to initiate a reset cycle, during which time the ACU performs a diagnostic self test. During this self test, the ACU disables all 32 alarm inputs, leaves all 8 control output relays in their existing positions, and turns on all front panel LEDs. Any detected ACU problem is reported in the Status message to the Site Controller.

The Site Controller then sends the Alarm Mask message and the Set Relays message. The ACU is then ready for normal operation.

Alarm Inputs

The Alarm Mask message contains a 32-bit mask for each of the three Alarm Input parameters. The Enabled mask defines which alarm inputs are enabled for reporting. The Active High mask defines if a logic high is an alarm condition. The Major mask defines if the alarm is a major alarm.

The ACU continually scans the 32 alarm inputs, looking for changes from user-supplied alarm-sensing devices. Whenever the ACU detects a change in an enabled alarm input, the ACU sends an updated Status message to the Site Controller, and updates its front panel display by turning on or off any affected LEDs.

Control Outputs

The Set Relays message contains an 8-bit mask for the Control Output parameter. The parameter defines which control output relays should normally be on (energized). In an energized relay, the NC contacts are open.

The ACU continually scans the 8 control output relays, looking for discrepancies between the mask in the last Set Relays message and the actual state of the relays. If a discrepancy is detected, the ACU turns on the "RELAY ERROR" LED in the "ALARM UNIT STATUS" display group and tries to latch (or unlatch) the appropriate relay. If the relay is successfully latched (or unlatched), the discrepancy disappears and the "RELAY ERROR" LED is turned off.

ACU Front Panel Alarm Display

An Alarm Input LED is lit when that enabled Alarm Input is active (in the alarmed condition). A Control Output LED is lit when that relay is energized. An Alarm Unit Status LED is lit for the following conditions:

- Major Alarm - indicates that one or more of the active alarms are defined as Major Alarms.
- Minor Alarm - indicates that one or more of the active alarms are defined as Minor Alarms.
- ACU Error - indicates that a logic error has been detected in the ACU.
- Relay Error - indicates that one or more relays are in the wrong state.
- Ready - indicates that the ACU is ready for normal operation.
- Polled - indicates that the ACU has received a Poll message from the Site Controller.
- Not Ready - indicates that the ACU has not received the Alarm Mask and Set Relays messages from the Site Controller since it was last reset.

The System Status LEDs indicate the status of the system as sent to the ACU in the messages from the Site Controller. For more information about the ACU, see the Test and Alarm Unit manual listed in the Introduction of this manual.

System Manager Alarm Display

The status of the alarm inputs from up to 32 user-supplied devices is also shown in the System Manager's "Alarm Display and Acknowledge" screen (menu selection 40), "Current Alarms" panel, in the field to the right of "ACU". A ♦ symbol is shown below the alarm input number for each active alarm input (alarm condition).

LOCAL TEST UNIT

Description

The Local Test Unit (TU) is an EDACS Site Controller hardware option used to test the messaging on the radio channels for a single EDACS Trunked Site. Three different TU types have been supplied to date. The first type, a RANGR TU, was available in models for the VHF, UHF, and 800 MHz bands. The second type, a MDX TU, was available in the model for the 900 MHz band. The third type, an Orion TU, replaces the first two types and is available in models for the VHF, UHF, 800 MHz, and 900 MHz bands.

RANGR Test Unit

The RANGR TU contains a VHF, UHF, or 800 MHz RANGR mobile radio. The radio and connecting cables are mounted in the pull-out TU shelf just below (and a part of) the ACU. For more information, see the ACU manual listed in the Introduction section of this manual.

MDX Test Unit

The MDX TU contains a 900 MHz MDX mobile radio that has been specially modified, programmed, and labeled in the factory. The radio and connecting cables are mounted in the pull-out TU shelf just below (and a part of) the ACU. For more information, see the 900 MHz TU manual listed in the Introduction section of this manual.

Orion Test Unit

The Orion TU contains a VHF, UHF, 800 MHz, or 900 MHz Orion mobile radio that has had the TU feature enabled in the factory. The radio and connecting cables are mounted in the Orion TU shelf just below the ACU. For more information, see the Orion TU manual listed in the Introduction section of this manual.

Configurable Parameters

The TU parameters listed here are configurable in the site database maintained by the System Manager.

The following parameters may be reconfigured in panel 3 of 4 in the External Device Definition screen (menu selection 10), and transferred to the site using panel 3 of 5 in the Site Reconfiguration screen (menu selection 22):

- Test Unit Enabled - tells the Site Controller if it should poll the TU (without poles from the Site Controller, the TU will never become operational) - enter Y for yes or N for no - default is Y (enabled).

- Local Test Unit - tells the Site Controller if the TU is local (located at the same site) or remote (located at a different site - such as at a Remote Transmitter Site in a Simulcast system) relative to the Site Controller's location - select from Local (default) or Remote.

- Background Test Call Interval - tells the Site Controller how long to wait (in minutes) between successive Background Test Calls - enter an integer from 0 to 1440 (24 hours) - default is 5 (entering 0 inhibits Background Test Calls).

Messaging

The TU communicates with the Site Controller through an asynchronous RS232C serial data link. The Site Controller uses the following messages to supervise the operation of the TU:

- Reset - Tells the TU to perform a hardware reset. When the hardware reset is complete, the TU will send a Status Response message to the Site Controller.

- Status Request - Tells the TU to send a Status Response message to the Site Controller.

- Monitor Control Channel - Tells the TU to start monitoring the Control Channel, the present channel number of the Control Channel, and the site ID.

- Testcall State - Tells the TU to place a test call.

The TU uses the following messages to report the results of its activities to the Site Controller:

- Status Response - Tells the Site Controller the state in which it is operating (Power-Up, Initialization, Set-Up, Monitor, or Test Call).

- Call Results - Sent at the end of each test call. Tells the Site Controller the Working Cannel number and what error(s) (if any) were detected.

- CC Fail - Sent only when an error is detected while monitoring the Control Channel. Tells the Site Controller the Control Channel number and what error(s) were detected.

Operation

The RANGR TU and Orion TU operate in either the User Call Mode or the Test Unit Mode. The MDX TU operates in the Test Unit Mode only.

User Call Mode

In the User Call Mode, service personnel may use the Orion TU as a mobile radio to place Group Calls on the system. While in the User Call Mode, the Orion TU will not monitor the Control Channel. While in the User Call Mode, the Orion TU will not respond to messages from the Site Controller, and therefore will not place test calls on the system until the Orion TU is returned to the Test Unit mode.

Test Unit Mode

In the Test Unit Mode, the TU follows instructions from the Site Controller to either monitor the outgoing messages on the Control Channel (Monitor Control Channel message) or place a test call on the system (Testcall State message).

When the TU receives the Monitor Control Channel message from the Site Controller, the TU starts monitoring the outgoing messages on the Control Channel. The TU sends a CC Fail message to the Site Controller only to report one of the following conditions, if detected:

- Cannot Find - The Test Unit was unable to find the Control Channel.
- Cannot Sync - The Test Unit cannot synchronize with the data frames being sent by the Control Channel.
- Cannot Decode - The Test Unit cannot decode four consecutive messages sent by the Control Channel.

When the TU receives the Testcall State message from the Site Controller, the TU places a test call on the system to simulate a system user. A Call Results message is sent to the Site Controller at the end of each test call. The Call Results message will specifically report any of the following conditions, if detected:

- Cannot Find (Control Channel) - The Test Unit was unable to find the Control Channel.
- Cannot Sync (Control Channel) - The Test Unit was unable to synchronize with the data frames being sent by the Control Channel.
- No Channel Assignment - The Test Unit was unable to decode the Working Channel assignment on the Control Channel.
- Cannot Sync (Working Channel) - The Test Unit was unable to synchronize with the data frames being sent by the assigned Working Channel.
- No High-Speed Data - The Test Unit was unable to decode the high-speed data on the assigned Working Channel.
- No Low-Speed Data - The Test Unit was unable to decode the low-speed data on the assigned Working Channel.
- No Drop Channel Message - The Test Unit was unable to decode a drop channel message on the assigned Working Channel.

Test calls placed on channels that are presently in service (OK) are called Background Test Calls. Test calls placed on channels that are presently out of service (failed) are called Recovery Test Calls. Each type of test call is identical; only the interval between calls is different.

Background Test Calls

Background Test Calls are test calls placed on channels that are presently in service and are thought to be OK. The time interval between successive Background Test Calls is determined by the Background Test Call Interval parameter in the site's database, which can be reconfigured through the System Manager (see Parameters heading). If the quantity of operational (not failed) Working Channels drops to one, no Background Test Calls will be placed. (This is to ensure that the last remaining non-failed Working Channel is not failed due to a test call.)

Recovery Test Calls

Recovery Test Calls are test calls placed on channels that have been taken out of service for one of the following reasons:

- TU Test Call Failure - Recovery Test Calls are started as soon as the failure occurs, and continue until the failure is cleared.
- PMU Transmitter Power Alarm - Recovery Test Calls are started as soon as the alarm occurs, and continue until the alarm is cleared.
- GETC Alarm - Recovery Test Calls are started only after the GETC Alarm has been cleared.

The time interval between successive Recovery Test Calls is determined by the Success Modifier parameter that is configured when the Site Controller's Personality PROMs are programmed in the factory (it cannot be reconfigured through the System Manager). The default value for this parameter is six seconds. With this default value, the interval starts at six seconds and increases by six seconds after each unsuccessful Recovery Test Call (on that specific channel) until the maximum interval of 255 seconds is reached. Thereafter, the interval stays fixed at 255 seconds (a little over 4 minutes). With the six-second default, the maximum interval is reached approximately 1 1/2 hours after the start of the Recovery Test Calls.

To speed up the recovery of a channel that has been out of service due to a TU of PMU alarm, switch off the DC power supply for that channel for a few seconds. When the channel's GETC is powered on, its resumption of poll response messages to the Site Controller will cause the Site Controller to have the TU place a Recovery Test Call on that channel, without waiting for the end of the current time interval between successive Recovery Test Calls. Alternatively, the channel may be configured off for RF and then back on again through the System Manager.

There is no need to take any special action to speed up the recovery of a channel that has been out of service due to a GETC alarm. As soon as the alarm condition is reported to have cleared, the Site Controller will have the TU place a Recovery Test Call on the channel before it is placed back in service.

REMOTE TEST UNIT

The Remote Test Unit is similar to the Local Test Unit, except for the following differences:

- Description - The Remote Test Unit (Remote TU) is an EDACS Site Controller hardware option used to test the messaging on the radio channels for a single remote EDACS Trunked Site in a Simulcast system.

- Configurable Parameters - The Test Unit Enabled parameter must be set to Y (enabled) even though the Site Controller will not be able to get poll responses from the Remote TU. The Local Test Unit parameter must be set to Remote.

- Messaging - Messages to the Remote TU are sent from the Site Controller to the Control Channel's Control Point GETC, and sent out on the Control Channel. The Remote TU receives these messages by monitoring the Control Channel. Messages from the Remote TU are sent to the Simulcast alarm system, and a failed channel is reported back to the Site Controller as an Auxiliary alarm by the Control Point GETC for the failed channel.

- Operation - The Remote TU operates only in the Test Unit mode. Attempting to use the Remote TU in the User Call mode may have undesirable effects on the operation of the system.

POWER MONITOR UNIT

Description

The Power Monitor Unit (PMU) is an EDACS Site Controller option used to test the RF output power for each radio channel and the SWR into each transmit antenna for a single EDACS trunked site. The current model (identified by the absence of a keypad on its front panel) is referred to as the DB8860-based PMU. The previous model (identified by a keypad on its front panel) is referred to as the DB8843-based PMU.

DB8860-Based PMU Configurable Parameters

Personality Parameters

Values for the following PMU parameters are programmed into the Personality PROMs for the Site Controller at the factory. If the values for one or more parameters need to be changed, a new set of Personality PROMs must be ordered from the factory. (These Personality PROMs are not field programmable.)

- Channel Fault Tolerance Threshold - What percentage of RF enabled channels must fail before Fault Tolerance processing is initiated by the Site Controller? Range is 0% to 100%. Default is 50 %. (The value of this parameter must (can only) be programmed in the Personality PROMs.)

- PMU Enable (channel, not device) - For which channels should the PMU report alarms? Choices are yes (enabled) or no (disabled), for each channel from 1 to 20. Default is yes (enabled), for all channels from 1 through 20. (This parameter must (can only) be enabled in the Personality PROMs.)

- Power Monitor Unit - Do you want the PMU (device, not channel) enabled? Choices are on (enabled) or off (disabled). Default is off (disabled). (Even though this parameter can be reconfigured in the Site Controller's Active Configuration through the System Manager, this parameter must be enabled in the Personality

PROMs in order to configure the PMU Model parameter to "New-8860" (see next).)

- PMU Model - Which PMU model is being used? Choices are "Old-8843" and "New-8860". Default is "Old-8843". (This parameter must (can only) be programmed in the Personality PROMs and must be configured to "New-8860".)

- PMU Low Power Alarm Thresholds - What is the low power alarm limit for each channel from 1 to 20 (a separate limit may be programmed for each channel)? Range is 0 to 255 watts. Default is 20 watts for all channels from 1 through 20. (This parameter should be programmed in the Personality PROMs even though it can be reconfigured in the Site Controller's Active Configuration through a System Manager.)

System Manager Parameters

Values for the following PMU parameters are configurable in the System Manager's database for the site. The database for the site is then used to reconfigure the values of these parameters in the Site Controller's Active Configuration whenever the Site Controller is powered up or reset, or a system administrator makes changes through the System Manager. (Note that whenever the Site Controller is powered up or reset, the Site Controller will use the values in its Personality PROMs until its Active Configuration is reconfigured by the site database from the System Manager.)

- Power Monitor Unit Enabled - Do you want the PMU (device, not channel) enabled? Choices are yes (enabled) or no (disabled). Default is yes (enabled). (Note that the PMU must also be enabled in the Site Controller's personality (and be specifically enabled for the DB8860 model) in order for this enable to work.)

- PMU Power Level - What is the low power alarm limit for all channels from 1 through 20 (same limit all channels)? Range is 0 to 255 watts. Default is 40 watts for all channels from 1 through 20.

Values for the following PMU parameters are configurable in the PMU (using an RS232 CRT terminal, or PC with terminal emulation software).

- Transmitter Lower Alarm Limit - What is the low power alarm limit for each channel from 1 to 20 (a separate limit may be programmed for each channel)? Range is 0.0 to 999.9 watts. Default is 0.0 watts for each channel from 1 to 20. (Note that the reconfiguration of this parameter is temporary until the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

- Transmitter Upper Alarm Limit - What is the high power alarm limit for each channel from 1 to 20 (a separate limit may be programmed for each channel)? Range is 0.0 to 999.9 watts. Default is 125.0 watts for each channel from 1 to 20. (Note that the reconfiguration of this parameter is not affected when the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

- Antenna Lower Alarm Limit - What is the low power alarm limit for each antenna (a separate limit may be programmed for each antenna)? Range is 0.0 to 999.9 watts. Default is 0.0 watts for each antenna. (Note that the reconfiguration of this parameter is not affected when the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

- Antenna Upper Alarm Limit - What is the high power alarm limit for each antenna (a separate limit may be programmed for each antenna)? Range is 0.0 to 999.9 watts. Default is 999.9 watts for each antenna. (Note that the reconfiguration of this parameter is not affected when the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

- SWR Upper Limit - What is the high SWR alarm limit for each antenna (a separate limit may be programmed for each antenna)? Range is 0.00 to 9.99. Default is 2.00 for each antenna. (Note that the reconfiguration of this parameter is not affected when the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

- Antenna Mapping - To which antenna is each channel connected? Choices are AI025 (antenna #1) or AI027 (antenna #2) for each channel from 1 to 20. (Note that the reconfiguration of this parameter is not affected when the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

DB8843-Based PMU Configurable Parameters

Personality Parameters

Values for the following PMU parameters are programmed into the Personality PROMs for the Site Controller at the factory. If the values for one or more parameters need to be changed, a new set of Personality PROMs must be ordered from the factory. (These Personality PROMs are not field programmable.)

- Channel Fault Tolerance Threshold - What percentage of RF enabled channels must fail before Fault Tolerance processing is initiated by the Site Controller? Range is 0% to 100%. Default is 50 %. (The value of this parameter must (can only) be programmed in the Personality PROMs.)

- PMU Enable (channel, not device) - For which channels should the PMU report alarms? Choices are yes (enabled) or no (disabled), for each channel from 1 to 20. Default is yes (enabled), for all channels from 1 through 20. (This parameter must (can only) be enabled in the Personality PROMs.)

- Power Monitor Unit - Do you want the PMU (device, not channel) enabled? Choices are on (enabled) or off (disabled). Default is off (disabled). (This parameter must be enabled in the Personality PROMs only if the Site Controller is not connected to a System Manager.)

- PMU Model - Which PMU model is being used? A personality made using V5.5.2 or later personality utility, will specify "Old-8843" or "New-8860". Default is "Old-8843". (This parameter must (can only) be programmed in the Personality PROMs and must be configured to "Old-8843".)

  A personality made using a pre-V5.5.2 personality utility, is automatically configured for the DB8843-based PMU.

- PMU Low Power Alarm Thresholds - What is the low power alarm limit for each channel from 1 to 20 (a separate limit may be programmed for each channel)? Range is 0.0 to 25.5 watts (for more information, see the Power Monitor Unit heading on page 67). Default is 2.0 watts for all channels from 1 through 20. (This parameter should be programmed in the Personality PROMs even though it can be reconfigured in the Site Controller's Active Configuration through a System Manager.)

System Manager Parameters

Values for the following PMU parameters are configurable in the System Manager's database for the site. The database for the site is then used to reconfigure the values of these parameters in the Site Controller's Active Configuration whenever the Site Controller is powered up or reset, or a system administrator makes changes through the System Manager. (Note that whenever the Site Controller is powered up or reset, the Site Controller will use the values in its Personality PROMs until its Active Configuration is reconfigured by the site database from the System Manager.)

- Power Monitor Unit Enabled - Do you want the PMU (device, not channel) enabled? Choices are yes (enabled) or no (disabled). Default is yes (enabled).

- PMU Power Level - What is the low power alarm limit for all channels from 1 through 20 (same limit all channels)? Range is 0.0 to 25.5 watts (for more information, see the Power Monitor Unit heading on page 67). Default is 4.0 watts for all channels from 1 through 20.

Front Panel Parameters

Values for the following PMU parameters are configurable in the PMU (using the keypad on the front).

- MIN IPF - What is the low power alarm limit for each channel from 1 to 20 (a separate limit may be programmed for each channel)? Range is 0 to 255 watts. (Note that the reconfiguration of this parameter is temporary until the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

- MIN IPF - What is the low power alarm limit for each antenna (a separate limit may be programmed for each antenna)? Range is 0 to 255 watts. (Note that the reconfiguration of this parameter is not affected when the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

- MAX SWR - What is the high SWR alarm limit for each antenna (a separate limit may be programmed for each antenna)? Range is 0.0 to 9.9 watts. (Note that the reconfiguration of this parameter is not affected when the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

- CHNL DES - To which antenna is each channel connected? Choices are 01 or 02 for each channel from 1 to 20. (Note that the reconfiguration of this

parameter is not affected when the next EDACS Configuration Setup is sent to the PMU from the Site Controller.)

Messaging

The PMU communicates with the Site Controller through a dedicated asynchronous RS232C serial data link. The Site Controller uses the following messages to supervise the operation of the PMU:

- Clear Alarms - clear all active alarms set by previous measurements or calculations
- Poll - request for a Status message response
- Enable Mask - which alarms are enabled
- Program Threshold - alarm limits
- On Channel - when to start and stop measurements on a specific transmitter or antenna

The PMU uses the following message to report the results of its activities to the Site Controller:

- Status - which (if any) transmitter and antenna alarms were detected

A transmitter alarm for a specific channel is reported to the Site Controller for the following condition:

- DB8860-Based PMU - The measured output power for that channel's transmitter exceeds the upper or lower alarm threshold limit.
- DB8843-Based PMU - The measured output power for that channel's transmitter exceeds the lower alarm threshold limit.

An antenna alarm for a specific antenna is reported to the Site Controller for the following conditions:

- DB8860-Based PMU - The measured input power for that channel's antenna exceeds the upper or lower alarm threshold limit.
- DB8843-Based PMU - The measured input power for that channel's antenna exceeds the lower alarm threshold limit.
- Both PMUs - The calculated SWR for that channel's antenna exceeds the SWR alarm threshold limit.

Operation

Startup

As soon as the Site Controller is operating (power on and initialization complete) and the parameter that enables the PMU option is enabled (from the Site Controller's Personality PROMs or reconfigured through the System Manager), the Site Controller should start sending Poll messages to the PMU at the rate of one per second. Each Poll message tells the PMU to send a Status message back to the Site Controller.

After the Site Controller is powered up or reset, the Site Controller must receive a Status message reply to five consecutive Poll messages before the Site Controller will recover the PMU device. After recovery of the PMU device, the Site Controller takes the following action:

- Sends information to the System Manager indicating that the PMU device is no longer failed.

PMU Device Alarm

If no Status message is received by the Site Controller within one second of any Poll message, the Site Controller fails the PMU device and takes the following action:

- Stops using the PMU alarm to fail a channel.
- Sends information to the System Manager indicating that the PMU device is now failed.

After a polling failure (PMU does not respond to one or more polls), the Site Controller must receive a Status message reply to five consecutive Poll messages before the Site Controller will recover the PMU device. After recovery of the PMU device, the Site Controller takes the following action:

- Sends information to the System Manager indicating that the PMU device is no longer failed.
- Resumes using the PMU alarm to fail a channel.

If the Fault Tolerance Threshold is reached for the PMU device (too many channels failed by the PMU - see the Fault Tolerance Heading in the Alarm section of this manual), the Site Controller fails the PMU device and takes the following action:

- Stops using the PMU alarm to fail a channel.
- Sends information to the System Manager indicating that the PMU device is now failed.

- Attempts to recover each channel that was failed because of a PMU alarm by assigning a Recovery Test Call to each channel.

- Continues to send all new PMU alarms to the System Manager.

After the PMU device is failed because the Fault Tolerance Threshold is reached, all PMU alarms must be cleared before the Site Controller will recover the PMU device. After recovery of the PMU device, the Site Controller takes the following action:

- Sends information to the System Manager indicating that the PMU device is no longer failed.

- Resumes using the PMU alarm to fail a channel.

Transmitter Alarms

The Site Controller sends an On Channel message to the PMU each time a channel has been assigned or is about to be dropped. This message tells the PMU when to start and when to stop measuring the transmitter power for each specific channel.

As soon as the PMU detects that a transmitter power threshold limit has been exceeded for a specific channel, the PMU sends a Status message to the Site Controller indicating that a transmitter power threshold limit was exceeded and for which channel. Any one Status message may contain information for one or more new alarms. If three or more new alarms are reported in the same Status message, the Site Controller will disregard the new alarms in the message.

When the Site Controller receives a Status message from the PMU indicating that a transmitter power threshold limit is now being exceeded, the Site Controller takes the following action:

- Fails the channel (removes the channel from service).

- Sends information to the System Manager indicating which channel was failed.

- Sends a Reset message to the Alarm and Control Unit (ACU) with information to light the GETC FAIL and CHN PWR FAIL indicators in the SYS STATUS group on the front of the ACU.

- If the system is equipped with a Test Unit (TU), the Site Controller initiates a Recovery Test Call for the channel just failed. This keys that channel's transmitter so that the PMU can make another power measurement while the TU performs its tests. If the system is not equipped with a TU, the Site Controller initiates a Pseudo Test Call for the channel just failed. This also keys that channel's transmitter so that the PMU can make another measurement, but without the TU tests).

When the Site Controller receives a Status message from the PMU indicating that a transmitter power threshold limit is no longer being exceeded, the Site Controller takes the following action:

- Recovers the channel (returns the channel to service).

- Sends information to the System Manager indicating which channel was recovered.

- Sends a Reset message to the Alarm and Control Unit (ACU) with information to turn off the CHN PWR FAIL indicator in the SYS STATUS group on the front of the ACU (if there is no outstanding PMU transmitter alarm), and with information to turn off the GETC FAIL indicator (if there is no outstanding failed channel).

- If the system is equipped with a Test Unit (TU), the Site Controller resumes Background Test Calls at regularly-scheduled intervals for the channel just recovered.

Note that there may be a noticeable delay between when a transmitter problem is corrected and when the alarm is cleared from the System Manager's Alarm Display and Acknowledge screen (menu selection 40). This is because a transmitter alarm condition is not considered cleared until a test call (Recovery, Background, or Pseudo) has been successfully completed on that channel.

Antenna Alarms

The Site Controller sends an On Channel message to the PMU each time a channel has been assigned or is about to be dropped. This message tells the PMU when to start and when to stop measuring the SWR for each specific antenna.

As soon as the PMU detects that an SWR threshold limit has been exceeded for a specific antenna, the PMU sends a Status message to the Site Controller indicating that an SWR threshold limit was exceeded and for which antenna.

When the Site Controller receives a Status message from the PMU indicating that an SWR threshold limit is now

being exceeded, the Site Controller counts how many alarms are received for this antenna during the last three consecutive polling cycles. If two or more alarms are received for this antenna during the last three consecutive polling cycles, the Site Controller takes the following action:

- Sends information to the System Manager indicating which antenna has high SWR.
- Sends a Reset message to the Alarm and Control Unit (ACU) with information to light the ANT PWR FAIL indicators in the SYS STATUS group on the front of the ACU.

When the Site Controller receives a Status message from the PMU indicating that an SWR threshold limit is no longer being exceeded, the Site Controller takes the following action:

- Sends information to the System Manager indicating which antenna no longer has high SWR.
- Sends a Reset message to the Alarm and Control Unit (ACU) with information to turn off the ANT PWR FAIL indicator in the SYS STATUS group on the front of the ACU (if there is no outstanding alarm for another antenna).

If only one alarm is received for this antenna during any three consecutive polling cycles, the Site Controller will only send information to the System Manager indicating which antenna no longer has high SWR, so that the momentary antenna alarm can be noted on the alarm report.

REDUNDANT DOWNLINK

Description

The data link between a single-site or multi-site system and the CEC/IMC switch is referred to as a Downlink. A Downlink GETC is used as the data interface at the system end. A Redundant Downlink and its Redundant Downlink GETC are used to backup the (main) Downlink and its Downlink GETC.

Configurable Parameters

Channel 26 is always Downlink enabled in the Site Controller's Active Configuration and is reserved for the (main) Downlink. Channel 25 must be Downlink enabled in the Site Controller's Active Configuration if the system is equipped with a Redundant Downlink. If no System Manager is connected to the Site Controller, channel 25 must be Downlink enabled in the Personality PROMs. If a System Manager is connected to the Site Controller, channel 25 may be Downlink enabled through the System Manager using the External Device Definition screen (menu selection 10). Then use the Site Reconfiguration screen (menu selection 20) to send the reconfigured site database to the Site Controller to modify its Active Configuration.

Downlink Selection

Downlink selection is based on which channel numbers have been Downlink enabled in the Site Controller's active configuration and which Downlink is not failed. Assuming that the (main) Downlink has not failed, the Site Controller will initially select the (main) Downlink GETC.

A Downlink will be failed for any of the following reasons:

- Poll Failure - The Site Controller does not receive a pole response message from the Downlink GETC for a specific number of consecutive poll cycles. This number is specified in the Site Controller's Personality (normally is 2). Currently, the System Manager sends a default value of 2 to the Site Controller though, which cannot be reconfigured by the System Manager.
- Link Failure - The Downlink GETC has stopped receiving information from the network end of the Downlink.
- Turbo Failure - The Downlink GETC's main processor is unable to communicate with its Turbo Board.

If the (main) Downlink is failed and the system is equipped with a functioning Redundant Downlink, the Site Controller will select the Redundant Downlink. After the (main) Downlink GETC is fixed, the Site Controller will not switch back to the (main) Downlink GETC, unless the Redundant Downlink fails or the Site Controller is powered up or reset.

RIC/LIC LOCAL INTERCONNECT

The RIC/LIC Local Interconnect has been replaced by the Enhanced Local Interconnect. Although the hardware is distributed differently and the pieces go by different names, the RIC/LIC Local Interconnect is functionally identical to the Enhanced Local Interconnect. See the next heading for description, parameters, and operation.

ENHANCED LOCAL INTERCONNECT

Description

The Enhanced Local Interconnect (ELI) is an EDACS Site Controller option which allows radios to be connected (under the direction of the Site Controller and without dispatcher assistance) to the local telephone system (at the location of the Site Controller). Authorized radio users may place calls from their radios to the local telephone system, or receive calls from the local telephone system to their radios.

Configurable Parameters

General

Values for the following local telephone interconnect parameters are programmed into the Personality PROMs for the Site Controller at the factory. If the values for one or more parameters need to be changed, a new set of Personality PROMs must be ordered from the factory. (These Personality PROMs are not field programmable.)

- Interconnect (Channel Data) - Which channels are enabled for telephone interconnect calls? Choices are enabled or disabled, for each channel from 1 to 20. Default is enabled for each channel from 1 to 20. (This parameter can be reconfigured in the Site Controller's Active Configuration through the System Manager - see the Interconnect (Channel Configuration) parameter.)

- Phone (LID Data) - What queue priority will be used for telephone interconnect calls to/from each LID (same value for each LID)? Range is from 0 (lowest priority) to 7 (highest priority). Default is 3. (This parameter can be reconfigured in the Site Controller's Active Configuration through the System Manager - see the Interconnect (Radio Parameters) parameter.)

- Phone (GID Data) - What queue priority will be used for telephone interconnect calls to each GID (same value for each GID)? Range is from 0 (lowest priority) to 7 (highest priority). Default is 3. (This parameter can be reconfigured in the Site Controller's Active Configuration through the System Manager - see the Interconnect (Group Parameters) parameter.)

- Interconnect Mode (Interconnect Data) - Which type of telephone interconnect equipment is to be used for this site? Choices are Jessica (PBX gateway), CTIS (Central Telephone Interconnect System), Local-Uses GTIs (ELI Interconnect), and Local-Uses RICs (RIC/LIC Interconnect). Default is Local-Uses RICs (RIC/LIC Interconnect). (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.)

- Max Line (Interconnect Data) - What is the highest-numbered channel at this site that is connected to a GTI unit (ELI Interconnect), or what is the total number of local telephone interconnect lines connected to this site (RIC/LIC Interconnect)? Default is 8. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.)

- Max Calls (Interconnect Data) - What is the maximum number of concurrent telephone interconnect calls permitted for this site? Default is 20. (This parameter can be reconfigured in the Site Controller's Active Configuration through the System Manager - see the Max # Concurrent Intcon (Site Parameters) parameter.)

- Rotary 1 Defaults (Interconnect Data) - In what sequence will the local telephone interconnect lines be searched for an available line for a radio-originated call from a LID assigned a Rotary Number of 1 (any 16 or less lines may be listed in any order)? Default is line numbers 1 through 8 in ascending order. (This parameter can be reconfigured in the Site Controller's Active Configuration through the System Manager.)

- Normal Polling Interval (Interconnect Data) - What is the time between consecutive Site Controller polls to the local telephone interconnect equipment when no calls are being processed? Default is 1 second. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.)

- Fast Polling Interval (Interconnect Data) - What is the time between consecutive Site Controller polls to the local telephone interconnect equipment when calls are being processed? Default is 100 milliseconds. (The value of this parameter cannot be reconfigured in the Site Controller's Active

Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.)

- Dial Tone Detect Duration (Interconnect Data) - How much time should be allowed between taking a telephone line off-hook and receiving a dial tone, before dropping the interconnect call? Default is 1 second. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.) (See the Interconnect Timing Settings heading for more information.)

- Start Dial Delay (Interconnect Data for RIC/LIC Interconnect only) - How much time should be allowed between receiving a dial tone and the start of dialing? Default is 50 milliseconds. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.) (See the Interconnect Timing Settings heading for more information.)

- Pause In Dialing Duration (Interconnect Data for RIC/LIC Interconnect only) - How much time should be allowed between a "#" character and the next digit when dialing the telephone number? Default is 120 milliseconds. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.) (See the Interconnect Timing Settings heading for more information.)

- Pulse Digit Delay Base (Interconnect Data for RIC/LIC Interconnect only) - How much time should be allowed between the last dial pulse of one digit and the first dial pulse of the next digit of a telephone number when pulse dialing is used? Default is 800 milliseconds. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.) (See the Interconnect Timing Settings heading for more information.)

- Pulse Digit Delay Increment (Interconnect Data for RIC/LIC Interconnect only) - How much time should be allowed between the start of consecutive dial pulses within each digit of a telephone number when pulse dialing is used? Default is 100 milliseconds. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.) (See the Interconnect Timing Settings heading for more information.)

- DTMF Digit Delay (Interconnect Data for RIC/LIC Interconnect only) - How much time should be allowed between the start of consecutive DTMF digits of a telephone number when DTMF dialing is used? Default is 120 milliseconds. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.) (See the Interconnect Timing Settings heading for more information.)

- DTMF Digit Detect Duration (Interconnect Data for RIC/LIC Interconnect only) - How much time should be allowed between answering a telephone-originated call and the receipt of the DTMF digits for the called LID or GID, before dropping the call? Default is 4 seconds. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.) (See the Interconnect Timing Settings heading for more information.)

- Line Dropping Duration (Interconnect Data) - How much time should be allowed between the call drop at the end of one call and the line being available for the next call? Default is 4 seconds. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be programmed in the Site Controller's Personality PROMs.) (See the Interconnect Timing Settings heading for more information.)

- Ring Radio on Landline Originated (Interconnect Data for RIC/LIC Interconnect only) - Do you want the local telephone interconnect equipment to ring the called radio? Default is yes. (The value of this parameter cannot be reconfigured in the Site Controller's Active Configuration through the System Manager, and therefore must be

programmed in the Site Controller's Personality PROMs.)

- Allow Landline to GID Calls (Interconnect Data) - Are GIDs enabled to receive telephone-originated interconnect calls (same for each GID)? Default is yes for each GID. (The value of this parameter can be reconfigured in the Site Controller's Active Configuration through the System Manager - see the Inb Interconnect (Radio Parameter) parameter.)

Values for the following local telephone interconnect parameters are configurable in the System Manager's database for the site. The database for the site is then used to reconfigure the values of these parameters in the Site Controller's Active Configuration whenever the Site Controller is powered up or reset, or a system administrator makes changes through the System Manager. (Note that whenever the Site Controller is powered up or reset, the Site Controller will use the values in its Personality PROMs until its Active Configuration is reconfigured by the site database from the System Manager.)

- Interconnect (Channel Configuration) - Which channels are enabled for telephone interconnect calls? Choices are Y (enabled) or N (disabled), for each channel from 1 to 24. The Site Controller default is Y (enabled) for each channel from 1 to 20. The System Manager default is N (disabled) for each channel from 1 to 24. (Only channels equipped with a RIC Shelf or GTI Unit should be enabled.)

- Interconnect Hang Time (Site Parameters) - How much time should be allowed between unkey (release of the PTT key on the radio) and channel drop for telephone interconnect calls? Range is from 1 to 255 seconds. The Site Controller and System Manager defaults are 30 seconds.

- Max # Concurrent Intcon (Site Parameters) - What is the maximum number of concurrent telephone interconnect calls permitted for this site? Range is from 0 to 30. The Site Controller default is 20. The System Manager default is 2.

- Interconnect (Radio Parameters) - What queue priority will be used for telephone interconnect calls to/from this LID (different value for each LID)? Range is from 0 (lowest priority) to 7 (highest priority). The System Manager default is 0.

- Interconnect (Group Parameters) - What queue priority will be used for telephone interconnect calls to this GID (different value for each GID)? Range is from 0 (lowest priority) to 7 (highest priority). The System Manager default is 0.

- Inb Interconnect (Radio Parameters) - Is this LID enabled to receive telephone-originated interconnect calls (different for each LID)? Choices are Y (enabled) and N (disabled). The Site Controller and System Manager defaults are N (disabled) for each LID.

- Inb Interconnect (Group Parameters) - Is this GID enabled to receive telephone-originated interconnect calls (different for each GID)? Choices are Y (enabled) and N (disabled). The Site Controller default is Y (enabled) for each GID. The System Manager default is N (disabled) for each GID.

- Toll Call Rest (Radio Parameters) - Which toll call restriction level applies to this LID for radio-originated interconnect calls? Range is 0 (no access to any telephone number) or from 1 to 15. The Site Controller and System Manager defaults are 0 for all LIDs.

- Toll Call Parameters (table) - Which digit patterns (for the first four digits of a called telephone number) are allowed (Y) and which digit patterns (for the first four digits of a called telephone number) are denied (N) for each toll call restriction level? Digit choices are a space (wildcard for *, #, or any number from 0 to 9), an X (wildcard for any number from 0 to 9), or a number from 0 to 9. (Unused digit patterns are represented by four periods.) The Site Controller default allows all patterns (with four spaces) for each restriction level. The System Manager default allows no patterns (with four periods) for each restriction level.

- The Site Controller defaults cause a Site Controller not connected to a System Manager to allow radio-originated interconnect calls to all telephone numbers. The System Manager defaults cause a Site Controller connected to a System Manager to deny radio-originated interconnect calls to all telephone numbers, until the Toll Call Rest parameter and the Toll Call Parameters (table) are configured.

- Dedicated Line (Radio Parameters) - To which (if any) local interconnect subscriber line is this LID dedicated (must be tried first) for radio-originated calls? The Site Controller and System Manager defaults are 1 (line 1) for all LIDs.

- Rotary Number (Radio Parameters) - Which rotary hunt sequence is used for this LID. Range is 0 (no access) or from 1 to 15. The Site Controller default is 1. The System Manager default is 0. (Note that a 0 for both the Rotary Number and Dedicated Line parameters for a specific LID will block all radio-originated telephone interconnect calls from that LID.)

- Line Selection (table) - Which local telephone interconnect lines are searched, and in what sequence, for each Rotary Number? The Site Controller default defines Rotary Number 1 only (line numbers 1 through 8 in ascending order). The System Manager default defines no lines for each Rotary Number from 1 to 15.

  A Site Controller not connected to a System Manager, will allow radio-originated interconnect calls on line numbers 1 through 8. A Site Controller connected to a System Manager will allow radio-originated interconnect calls on no lines, until the Rotary Number and the Line Selection (table) are configured.

- Line Active (Line Parameters) - Is this interconnect subscriber line available for use by the local interconnect equipment? The Site Controller and System Manager defaults are N (no) for each line.

- Pulse Dial (Line Parameters) - Does this interconnect subscriber line require pulse dialing? The Site Controller and System Manager defaults are N (no) for each line. (This parameter is ignored by the ELI Interconnect.)

- Dedicated To Unit (Line Parameters) - To which (if any) LID is this interconnect subscriber line dedicated (connected) for all telephone-originated calls received on this line? The Site Controller and System Manager defaults are 0 (no LID) for each line.

Interconnect Timing Settings

NOTE

When upgrading pre-Release 7.0 Site Controller application software, the values of the interconnect timing parameters that you were using in the Site Controller's personality may need to be changed.

These timing parameters were designed to guide the system response time for certain interconnect sequences, such as dial tone detection and DTMF digit detection. Pre-Release 7.0 Site Controller application software added significant time to these timing parameters. As an example, the one-second default value for the Dial Tone Detect Duration parameter actually took 1.6 seconds. In another example, the 20-second default value for the DTMF Digit Detect Duration parameter actually took 32 seconds. These examples show how rotary hunts took longer than (and interconnect resource recovery was delayed beyond) what you might have expected from the values of the interconnect timing parameters in the Site Controller personality.

To eliminate the confusion, Release 7.0 and later Site Controller application software no longer adds time to the values of the interconnect timing parameters given in the Site Controller personality. In other words, the values of the interconnect timing parameters are now an accurate representation of the times used by the application software, and it should be easier for you to specify the times needed for your system. However, this means that you will probably need to update the Site Controller personality concurrently with the Site Controller application software update, in order to maintain the same actual time intervals. The new interconnect timing parameters may need upward adjustment by multiplying the old value by 1.6. The default values and adjusted default values are shown in Table 1).

Table 1 - Local Interconnect Timing Parameter Adjustments For Release 7

LOCAL TELEPHONE INTERCONNECT TIMING PARAMETER	**DEFAULT VALUE[1]**	**ADJUSTED DEFAULT VALUE[2]** (needed with Release 7 to maintain the same timing margin as pre-Release 7)	**RECOMMENDED VALUE[3]** (assumes the Current Value[4] provides the desired level of operation)
Dial Tone Detect Duration	1,000 ms (1 sec)	1,600 ms (1.6 sec)	Use the 1,000 ms if the dial tone is present within 1/2 sec; otherwise use Adjusted Default Value.
Start Dial Delay (RIC/LIC Interconnect only)	50 ms	80 ms	Use Adjusted Default Value, or optimize by trying other values between Current Value and Adjusted Default Value.
Pause In Dialing Duration (RIC/LIC Interconnect only)	120 ms	192 ms	Use Adjusted Default Value, or optimize by trying other values between Current Value and Adjusted Default Value.
Pulse Digit Delay Base (RIC/LIC Interconnect only)	800 ms	1,280 ms	Use Adjusted Default Value, or optimize by trying other values between Current Value and Adjusted Default Value.
Pulse Digit Delay Increment (RIC/LIC Interconnect only)	100 ms	160 ms	Use Adjusted Default Value, or optimize by trying other values between Current Value and Adjusted Default Value.
DTMF Digit Delay (RIC/LIC Interconnect only)	120 ms	192 ms	Use Adjusted Default Value, or optimize by trying other values between Current Value and Adjusted Default Value.
DTMF Digit Detect Duration (ELI Interconnect only)	20,000 ms (20 sec)	20,000 ms (20 sec); maximum possible value	Use 20,000 ms.
DTMF Digit Detect Duration (RIC/LIC Interconnect only)	4,000 ms (4 sec)	6,400 ms (6.4 sec)	Use Adjusted Default Value, or optimize by trying other values between Current Value and Adjusted Default Value.
Line Dropping Duration	4,000 ms (4 sec)	6,400 ms (6.4 sec)	Use Adjusted Default Value, or optimize by trying other values between Current Value and Adjusted Default Value.

[1] *Default Value: The Default Value is the value used in the Personality if no specific value is specified.*

[2] *Adjusted Default Value: The Adjusted Default Value equals 1.6 times the Default Value. (Example: for a Default Value of 1000 ms, the Adjusted Default Value equals 1.6 times the Default Value of 1000 ms, or 1600 ms.)*

[3] *Recommended Value: The Recommended Value is the value of the parameter that should be used with release 7 and later Application Software. The recommendations are conservative and are intended to minimize any customer impact by providing timing margins equivalent with past releases. You can try existing personalities with the Release 7 upgrade; there may be sufficient timing margin to accommodate the more accurate Release 7 timings. However, be aware of the timing sequences and be prepared to update the personality if performance problems are encountered.*

[4] *Current Value: The Current Value is the value of the parameter currently being used satisfactorily with pre-release 7 Application Software.*

Toll Call Restrictions

The Site Controller checks the first four digits of the called telephone number, for each radio-originated local interconnect call. Up to 16 allowable initial digit patterns may be configured (through the System Manager) for each of up to 16 toll call restriction levels. Each LID is then assigned (through the System Manager) to one of the 16 toll call restriction levels. In other words, a toll call restriction level restricts all called telephone numbers (from each LID assigned to that toll call restriction level) to the allowable initial digit patterns that have been configured for that toll call restriction level. Specially defined non-numerical characters may be configured as digits in the initial digit patterns to allow more than one value for that digit (see the System Manager manual for details).

If the Site Controller is not connected to a System Manager, the Site Controller defaults will allow radio-originated interconnect calls to all telephone numbers. If the Site Controller is connected to a System Manager, the System Manager defaults will allow radio-originated interconnect calls to no telephone numbers, until the Toll Call Rest parameter and Toll Call Parameters (matrix) are configured.

Dedicated Lines

There are two parameters regarding dedicated lines. One involves radio-originated calls; the other involves telephone-originated calls.

For radio-originated calls, the Dedicated Line parameter is somewhat misleading (since more than one LID can be "dedicated" to the same line, and the Site Controller is only required to try the line specified by the Dedicated Line parameter first). If this line is busy, the interconnect rotary for this LID will be checked for an available line. If no available line is found, the radio will receive a system busy.

For telephone-originated calls, the Dedicated To Unit parameter allows each local telephone interconnect line to be dedicated to a single LID (only one LID per line). Therefore, if a line has been dedicated to a specific LID, all telephone-originated calls received on this line will be connected to the assigned LID. If the LID is busy with another call, the caller will be given a busy signal. (Note that even if a line is dedicated to a LID, the LID must still be enabled for inbound (telephone-originated) interconnect calls.)

Interconnect Rotary Definition

If a LID is dedicated to a specific local telephone interconnect line, the Site Controller must first try that local telephone interconnect line for a radio-originated local interconnect call. If the LID is not dedicated to a specific local telephone interconnect line (or if the dedicated line is failed or busy), the Site Controller's search for an available local telephone interconnect line is based on the Rotary Number assigned to the calling LID and the lines assigned to that Rotary Number in the Interconnect Rotary Definition (matrix).

In the Interconnect Rotary Definition (matrix), a sequence of up to 16 local telephone interconnect lines may be defined (through the System Manager) for each of up to 15 Rotary Numbers. Then, a Rotary Number may be assigned (through the System Manager) to each LID. The Site Controller will search the lines in the order listed in the matrix, for the Rotary Number assigned to the LID that has placed the call. When Rotary Number 0 is assigned to a LID, no lines in the matrix are searched. Therefore, if Rotary Number 0 and Dedicated Line 0 are both assigned to a LID, all local interconnect calls from this LID will be denied.

If the Site Controller is not connected to a System Manager, the Site Controller defaults will allow radio-originated interconnect calls on all lines. If the Site Controller is connected to a System Manager, the Site Controller defaults will allow radio-originated interconnect calls on no lines, until the Rotary Number and Line Selection (matrix) are configured.

Operation

The following terms are used to describe the operation of the Local Telephone Interconnect:

- Telephone-originated call - a call from a telephone, through a telephone line connected to an EDACS repeater site, to one or more radios using that EDACS repeater site.

- Radio-originated call - a call from a radio using an EDACS repeater site, through a telephone line connected to that EDACS repeater site, to a telephone.

- Line-connected GTI - (for ELI Interconnect) the GTI unit connected to the telephone line for the interconnect call being described. (This is equivalent to the LIC for a RIC/LIC Interconnect.)

- Channel-connected GTI - (for ELI Interconnect) the GTI unit connected to the radio channel for the interconnect call being described. (This is equivalent to a RIC for a RIC/LIC Interconnect.)

Note that for the ELI Interconnect, a line-connected GTI and a channel-connected GTI may be the same physical GTI unit or different physical GTI units. Although each GTI unit is capable of being connected to one line and to one channel, the Site Controller makes each radio channel and telephone line assignment, based on availability and the constraints of its Active Configuration, not on whether they share the same GTI unit. For the RIC/LIC Interconnect, there is no confusion since the RICs that interface with the radio channels are physically separate from the LIC that interfaces with the telephone lines.

Telephone-Originated Call

The sequence of steps for a telephone-originated local interconnect call is as follows:

DETECTING THE CALL

1. Somewhere in the telephone system, a user dials the telephone number of a subscriber line connected to a GTI unit.

2. The line-connected GTI detects the call by sensing the presence of a ringing voltage (or an E-lead signal), and sends a message to the Site Controller indicating that a call has been detected by this GTI unit.

3. The Site Controller checks to see if it is permitted to add another telephone interconnect call. (There may be a limit on the number of telephone interconnect calls allowed at any one time.)

   If the Site Controller is not permitted to add another telephone interconnect call, it lets the call go unanswered. This ends the sequence here.

4. If the Site Controller is permitted to add another telephone interconnect call, it checks the *Dedicated to Unit* field of the line definition for this line.

   If the value is non-zero, then the Site Controller will take this value as the callee LID or GID and the sequence advances to step 20.

5. If the value in the *Dedicated to Unit* field is zero, the Site Controller checks to see if a channel-connected GTI is available to collect overdial digits. (The Site Controller will check the GTI on the Control Channel first and if available, use it for this operation.)

   If no channel-connected GTI is available, the Site Controller lets the call go unanswered. The caller should hang up and try again after 3 ringbacks. This ends the sequence here.

ANSWERING THE CALL

6. If a channel-connected GTI is available, the Site Controller allocates it for digit collection.

7. The Site Controller sends a message to the line-connected GTI, directing it to answer the call.

8. The line-connected GTI answers the call and lights the "LINE CONNECTED" indicator on its front panel. (For RIC/LIC interconnect, the LIX card will light a corresponding LED for the line that has gone "off hook".)

9. The Site Controller directs the line-connected GTI to apply dial tone to the line.

10. The Site Controller directs the line-connected GTI to look for DTMF or dial click (pulse) signals. (RIC/LIC interconnect will only look for DTMF signals.)

11. The Site Controller starts a rapid polling mode of operation to poll the Master GTI (or LIC/RIC) more frequently than usual. The fast polling is used during the anticipated dialing process to speed the processing of the dialed digits. The Site Controller will fast poll for the DTMF digit detection duration to collect the digits. The call will be disconnected if the DTMF digits collection exceeds this time.

    This parameter differs for ELI and RIC/LIC interconnect. For ELI interconnect, this parameter is set to 20 seconds by ELI and is not configurable in the Site Controller personality. For RIC/LIC interconnect, this parameter defaults to 4 seconds in the Site Controller personality, and is also configurable from there.

12. The caller hears the dial tone from the line-connected GTI, and starts sending DTMF digits indicating whether the call is analog or digital, if it's to a group or individual, and what the ID of the individual or group is.

IDENTIFYING CALLED ID

13. The channel-connected GTI detects the first DTMF digit, momentarily lights the "DTMF DETECTED" red LED on the front panel, and reports the digit to the Site Controller. (RIC/LIC interconnect lights a similar "DTMF DETECTED" LED on the front of the RIC.)

14. The Site Controller directs the line-connected GTI to stop sending a dial tone to the calling line, and sets up a counter to count the received DTMF digits.

15. The Site Controller checks the first DTMF digit to see if it is a #, *, or number from 0 to 9.

    If the first DTMF digit is a #, the call is identified as a digital call, but the counter is not advanced. (Note: If this is ELI Interconnect, the call will be assigned but audio will be incorrect. This is because ELI does not support digital mode.)

    If the first DTMF digit is a *, the call is identified as a group call, and the counter is advanced by one. (Note: If this is ELI Interconnect, a 9 also identifies that call as a group call (used for pulse dialed calls).

    If the first DTMF digit is a number from 0 to 9 (8 for ELI interconnect), the digit is stored in the ID buffer and the counter is advanced by one.

16. The channel-connected GTI detects the next DTMF digit, momentarily lights the “DTMF DETECTED” red LED on the front panel, and reports the digit to the Site Controller. (RIC/LIC interconnect lights a similar “DTMF DETECTED” LED on the front of the RIC.)

17. The Site Controller receives the report from the channel-connected GTI, stores the digit in its ID buffer, advances the counter by 1, and checks to see if the counter has reached 5. If the Site Controller is still within its DTMF digit detection fast polling duration and the counter has not reached 5, return to step 17.

    For ELI interconnect, if the counter has not reached 5 within the 20 second fast polling duration, the Site Controller will send a message to the channel-connected GTI instructing it to send the call denied tone or voice prompt and hang up. This ends the sequence here.

    For RIC/LIC interconnect, if a digit is not detected within the 4 second fast polling duration, the Site Controller will send a message to the channel-connected GTI instructing it to send the call denied tone and hang up. This ultimately means that all five digits must be detected with 20 seconds of fast polling. This ends the sequence here.

18. If the counter has reached 5, the Site Controller has now received all digits of the ID, and directs the line-connected GTI to stop looking for DTMF signals and disconnect itself from the channel-connected GTI.

19. The Site Controller checks to see if the ID is valid and if the *Inb Interconnect* is set to receive inbound interconnect calls.

    If the call is not allowed, the Site Controller sends a message to the line-connected GTI instructing it to send the call denied tone (or voice prompt for ELI interconnect) and hang up. This ends the sequence here.

OBTAINING WORKING CHANNEL

20. If the call is allowed, the Site Controller checks to see if a working channel with a channel-connected GTI is available.

    If no working channel with a channel-connected GTI is currently available, the Site Controller queues the call and instruct the GTI to apply a queue tone (or voice prompt) to the line. When the call comes out of the queue, continue to next step.

21. If a working channel with a channel-connected GTI is available, the Site Controller sends a message to the control channel GETC to send the working channel assignment to the radio(s) with the Logical or Group ID called.

22. The radio(s) with the Logical or Group ID called receive(s) the working channel assignment and tune(s) to the assigned working channel.

23. The Site Controller sends a message directing the channel-connected GTI to connect its associated radio channel for a telephone interconnect call.

24. The Site Controller sends a message directing the line-connected GTI to connect itself to the assigned channel-connected GTI.

25. The Site Controller sends a message directing the channel-connected GTI unit to apply a ringing tone to the called radio(s) and the line-connected GTI unit to apply a ringback tone to the calling telephone.

26. A radio user hears the ringing tone and pushes the PTT switch.

27. The assigned working channel GETC detects the radio transmission on the assigned working channel and sends a radio keyed message to the Site Controller. If the Site Controller does not receive this message within the *Interconnect Hang Time* specified in the Site Controller Personality PROMs or in the System Manager, it sends a hang up message to the line-connected GTI and a disconnect message to the working channel GETC.

28. If the Site Controller receives the radio keyed message within *Interconnect Hang Time*, it sends a connect audio message to the Master GTI (RIC/LIC). The audio path should now be connected between the calling telephone and the called radio.

29. The Site Controller sends a message to the Master GTI (RIC/LIC), directing the line-connected GTI to look for DTMF digits.

ENDING THE CALL

30. To end the telephone interconnect call, the caller presses the # key on the DTMF keypad and hangs up. (If the telephone does not have a # key, the caller can just hang up.)

31. When the line-connected GTI detects the DTMF # digit or end of call signaling (if the line provides it), the Master GTI (RIC/LIC) sends a message to the Site Controller indicating that the telephone has been hung up.

    The called radio user can also terminate the call by pushing the EXIT, SPC, or designated button on the radio (see the operator's manual for the radio). This causes the radio to transmit a disconnect signal to the assigned working channel GETC.

32. When the Site Controller receives a hang up message from the Master GTI (RIC/LIC), a disconnect message from the Working Channel GETC, or the conversation time limit is exceeded, the Site Controller first directs the channel-connected GTI to extract itself from the audio loop of the assigned working channel, then directs the line-connected GTI to hang-up the line, and finally directs the assigned working channel GETC to terminate the call.

Radio-Originated Call

A request for a telephone interconnect call can be made from any radio that is equipped with the controls to place a telephone interconnect call. However, a telephone line will not be connected and the trapped telephone interconnect digits will not be re-dialed to the telephone line until the Site Controller has verified the following:

- The trapped telephone interconnect digits meet the toll call restrictions for that radio ID.

- The Site Controller receives the digital stream terminator digit.

- All other system parameter and protocol requirements are met along the way (i.e., calling radio is valid for the site).

A telephone interconnect number is a string of decimal numbers (digits). The string can be anywhere from 0 to 32 digits long. It can be pre-programmed (pre-stored), or manually keyed just prior to pressing the PTT switch (temporarily-stored). The radio automatically adds a terminator digit to the end of a pre-stored telephone interconnect number. However, you may have to manually add the terminator digit (press the * Key) at the end of temporarily-stored telephone interconnect number (see operator's manual for the radio). When a working channel is assigned, all digits including the terminator digit are sent digitally to the assigned working channel GETC. The channel-connected GTI takes the digitally-transmitted digits and decodes them for the Site Controller.

A telephone interconnect number may be a complete or partial telephone number. (An example of a partial telephone number is an access code plus an area code.) When the telephone interconnect number is only a partial telephone number, the caller must supply the remaining digits of the telephone number as overdialed digits, after the telephone line has been connected and the trapped interconnect digits have been re-dialed on the telephone line. Overdialed digits are logged by the Site Controller and then passed directly to the telephone line, through the channel-connected GTI and line-connected GTI, without interception and regeneration.

The toll call restrictions test is performed on the first 4 interconnect digits, or as many of the first 4 interconnect digits as it has received before receiving the terminator digit. The lack of the terminator digit will not hold up the toll call restrictions test once 4 interconnect digits are received, but the terminator digit must be received before the telephone line is connected and the trapped interconnect digits are re-dialed to the telephone line. If less than 4 interconnect digits have been received by the time the terminator digit is received, the Site Controller adds wild-card digits to the end of the string of received interconnect digits, until it has 4 digits for the toll call restrictions test. Each wild-card digit is tested for all possible values from 0 to 9.

The following sequence of steps describes the main events involved in a radio-initiated local telephone interconnect call:

OBTAINING A WORKING CHANNEL

1. The radio user sets the radio to the mode of operation that allows an interconnect call, either selects a pre-

stored telephone number or types in a temporarily-stored telephone number, and pushes the PTT switch.

2. The radio sends an interconnect call request on the control channel.

3. The control channel GETC receives the request for an interconnect call, and sends the request to the Site Controller.

4. The Site Controller receives the request for an interconnect call, and checks to see if it is permitted to add another interconnect call. There may be a limit, imposed by the System Manager (or Site Controller personality), on the number of telephone interconnect calls allowed at any one time.

   If the Site Controller is not allowed to add another interconnect call, it directs the control channel GETC to send a busy signal to the calling radio. This ends the sequence here.

5. If the Site Controller is allowed to add another interconnect call, it checks if the Master GTI is responding to polls (or if the LIC is responding to polls for RIC/LIC interconnect).

   If the Master GTI (or LIC) is not responding to polls, the Site Controller directs the control channel GETC to send a call-denied signal to the calling radio. This ends the sequence here.

6. If the Master GTI (or LIC) is responding to polls, the Site Controller checks to see if the telephone line specified by the *Dedicated Line* of the radio is available.

   If the telephone line specified by the *Dedicated Line* of the radio is not available, the Site Controller will search for another telephone line according to the *Rotary Definition* of the radio. If no telephone line is available, the Site Controller directs the control channel GETC to send a busy signal to the calling radio. This ends the sequence here.

7. If a telephone line is available, the Site Controller checks to see if a working channel with a channel-connected GTI is available.

   If a working channel with a channel-connected GTI is not available, the Site Controller will queue the call request and send a queued tone to the radio. Continue to the next step when the call comes out of the queue.

8. If a working channel with a channel-connected GTI is available, the Site Controller directs the control channel GETC to send the working channel assignment to the calling radio, and directs the assigned working channel GETC to look for the digits from the calling radio.

INTERCONNECT DIGITS

9. The calling radio receives the working channel assignment, tunes to the assigned working channel, and sends the pre-stored or temporarily-stored interconnect digits (with the terminator digit) to the assigned working channel GETC.

10. The assigned working channel GETC receives the interconnect digits (and terminator digit), and sends them to the Site Controller.

11. As the Site Controller receives the digits, it counts and stores each interconnect digit, and looks for the terminator digit. As soon as it counts 4 interconnect digits received or sees the terminator digit, it performs the toll call restrictions test for that radio ID, using wild-card digits if necessary.

    If the received interconnect digits fail the toll call restrictions test, the Site Controller directs the assigned working channel GETC to terminate the call and de-allocate the telephone line. This ends the sequence here.

    If the received interconnect digits pass the toll call restrictions test and the Site Controller has received the terminator digit, skip step 12.

12. If the received interconnect digits pass the toll call restrictions test, but the Site Controller has not received the terminator digit, the Site Controller will continue to receive, count, and store each interconnect digit until it either sees the terminator digit, the received interconnect digits exceed the maximum storage capacity of 32, or the allowed hang time expires.

    If the Site Controller receives too many interconnect digits or does not receive the terminator digit within the allowed hang time, it directs the assigned working channel GETC to terminate the call and de-allocate the telephone line. This ends the sequence here.

13. The Site Controller directs the assigned working channel's channel-connected GTI to insert itself into the channel's audio loop.

RE-DIALED DIGITS

14. The Site Controller then directs the allotted line-connected GTI to take the line off-hook and check if dial tone is present.

For ELI interconnect, if the *Dial Tone Required* field is set to **Y** in the System Configuration of the GTI Configurator, then the absence of dial tone, for whatever line type (E&M or End-to-End), will cause the Site Controller to initiate a rotary hunt to get an available telephone line. The Site Controller will apply a rotary hunt tone to the calling radio. If all of the lines are exhausted by the rotary hunt, the call is dropped (for more information, see the descriptions of the Rotary Number and Line Selection parameters, earlier in this section).

15. When the line-connected GTI detects dial tone (or E-lead signal) (or if *Dial Tone Required* is **N** and the *Dial Tone Seek Time* is up for ELI interconnect), it sends a dial tone detected message to the Site Controller. The caller should hear a dial tone (but will hear nothing for an E-lead signal).

    If the Site Controller does not receive the dial tone detected message within the *Dial Tone Detect Duration* in the Site Controller Personality, the Site Controller will initiate a rotary hunt for an available telephone line. The Site Controller will apply a rotary hunt tone to the calling radio. If all of the lines are exhausted by the rotary hunt, the call is dropped (for more information, see the descriptions of the Rotary Number and Line Selection parameters, earlier in this section).

16. The Site Controller sends the interconnect digits (that have been trapped and stored) to the line-connected GTI for re-dialing (DTMF or pulse dial) to the connected line. The caller should hear these DTMF tones or dial clicks (pulse dial) as the digits are dialed.

17. For ELI only, the Site Controller sends a message to the Master GTI, directing the line-connected GTI to look for DTMF digits. (This is used to detect the pressing of # by the telephone user to end the call.)

OVERDIALED DIGITS

18. If the telephone interconnect number was only a partial telephone number, the caller must now supply the remaining digits of the telephone number as overdialed digits. These overdialed digits are sent as DTMF tones directly through the channel-connected GTI and line-connected GTI to the telephone line, without trapping and re-dialing. All overdialed digits are logged into the call record.

ENDING THE CALL

19. The normal method to end a radio-originated telephone interconnect call is for the caller to press the EXIT, SPC, or a designated button on the radio (see the operator's manual for the radio). This causes the radio to transmit a digital end-of-call signal to the assigned working channel GETC. (The telephone end can hang up by placing the telephone on-hook (for ELI, pressing # for one second will also work).)

20. The assigned working channel GETC receives the end-of-call signal from the calling radio, and sends end-of-call information to the Site Controller.

21. When the Site Controller receives the end-of-call information (or the conversation time limit is exceeded), it first directs the channel-connected GTI to extract itself from the audio loop of the assigned working channel, then directs the line-connected GTI to hang-up the line, and finally directs the assigned working channel GETC to terminate the call.

MULTIPLE CHANNEL PARTITION

Description

Multiple Channel Partition (MCP) is an optional feature of the EDACS Site Controller. This feature requires no additional hardware, but must be enabled at the factory (can't be enabled through the System Manager). The MCP option allows selected sets of channels (partitions) to be set aside for exclusive use by selected sets of users (one set of channels for each set of users). Backup sets of channels may also be set aside for alternate use by these selected sets of users, to be used when a Working Channel is not available within the primary set of channels and the configurable condition for use is met.

Up to 15 partitions may be set aside (defined) for each system that is under the direction of a Site Controller. One primary and up to three backup partitions may then be selected for each Logical unit ID (LID) and Group ID (GID). LIDs and GIDs may individually be MCP enabled. When a LID or GID is MCP enabled, channel assignments are from within its primary or backup partitions. When a LID or GID is not MCP enabled, channel assignments are made from the partition that contains the Control Channel.

Initial values for the MCP parameters allow the system to operate initially as if MCP doesn't exist. After a partition plan is developed, channels can be set aside in partitions and partitions can be selected for IDs as needed through the System Manager.

Compatibility/System Requirements

Channel Test

The Channel Test feature (formerly called Partition 2) operates independently of the MCP feature. Therefore, both features may be in operation at the same time on the same system under the direction of a Site Controller.

Test Calls

Test calls placed by a Test Unit are independent of the MCP feature. There is no change in the procedure for selecting the next channel for a background test call, for taking a channel out of service for failing a test call, for initiating a recovery test call, for processing the results, and for either returning the channel to service or reporting the test call failure. However, a partition containing only one channel will be unavailable to users during a test call for that channel (about 5 or 6 seconds).

Mixing MCP Enabled & Disabled Systems

A network may contain some systems that are MCP enabled and some systems that are not MCP enabled. Until a system is MCP enabled, the System Manager will not send any MCP Data to the Site Controller for that system. Therefore, a system that is not MCP enabled will behave exactly as if no MCP option or MCP Data exists, even though the LIDs and GIDs using the system may be MCP enabled.

System Manager

The MCP feature requires the following hardware and software for the System Manager:

- Model - Must be a VAX model (not PDP).
- Software - Must be version 5.01 (release 5, group 5) or later software. The version number is displayed in the heading of the User Menu screen (V5.01 means version 5.01).

Configurable Parameters

The configurable parameters that apply to the MCP feature are referred to as MCP Data. MCP Data may be reconfigured at any time, regardless of weather the system has been MCP enabled or not. However, no MCP Data will be sent to the Site Controller until the system is MCP enabled. (A system is MCP enabled when the MCP feature is enabled in the Site Controller's personality.) MCP Data is made up of MCP Channel Data and MCP ID Data.

MCP Channel Data

MCP Channel Data refers to the channel-related MCP parameters. These parameters may be (but do not need to be) identical for each system in a network. MCP Channel Data consists of the following parameters:

- MC Partition - defines a single partition number for each specific channel number. Each channel can only be assigned to one partition. Any number of channels may be assigned to the same partition.
- Allowed CC - defines which channels may be used as Control Channels. (This parameter indirectly controls which partition or partitions will be the Active Control Channel partition.)

MCP ID Data

MCP ID Data refers to the ID-related MCP parameters. These parameters will be different for different sets of LIDs and GIDs. MCP ID Data will be used by each MCP enabled system in the network. Partition assignments may be reconfigured at any time, regardless of weather the ID has been MCP enabled or not. However, MCP enabled systems will not use the partition assignments for a specific ID until that ID is MCP enabled. MCP ID Data consists of the following parameters:

- ID Subject to Partitioning - defines if the ID is subject to partitioning. (When an ID is subject to partitioning it is MCP enabled.)
- Primary Partition - defines the first partition to be searched for an available Working Channel.

MCP ID Data also consists of the following parameters for each of three backup partition assignments (optional):

- Condition For Use - defines the condition that must exist before a specific backup partition may be searched. A condition must be selected for each backup partition that is defined.
- MC Partition - defines a specific backup partition to be searched for an available Working Channel.

Partition Planning

> **NOTE**
>
> Before you try to configure the MCP Channel Data or MCP ID Data, make a plan. Without a plan it is too easy to get results that you don't expect and don't want. Use the checklist and planning worksheets in Appendix A of this manual.

Overview

Before you try to configure the MCP Channel Data or MCP ID Data, make a plan. To make that plan, you will first need to carefully read this partition planning information through to the end. You must thoroughly understand not only what each parameter does, but what effect it has on each other parameter. Even then, there will be a certain amount of trial and error. Without a plan it is too easy to get results that you don't expect and don't want.

When you make a plan, start off simple. Then try to keep it as simple as possible. Because of the tremendous flexibility of this feature, it is easy to make the partitioning unnecessarily complex. With time you will get a better feel for which alternatives are most advantageous for your specific partition needs. Keep all systems in mind when creating the plan.

Throughout this section many situations involving IDs will be described. At all times it will be assumed that these IDs have been validated for all the systems involved.

Channel Partitions

A partition exists, or is said to be defined for a system, when one or more channels in a system are assigned to that partition. By default, all channels are initially assigned to partition 1, making partition 1 the only partition initially defined for the system. Each channel can then be reassigned to any partition from 1 to 15. However, a channel can only be assigned to one partition at a time. For example: a 15-channel system could have as many as 15 channels in one partition, as few as one channel in each of 15 partitions, or any of the many combinations in between.

The main advantage of a trunked system is its ability to share all the channels with all the users to minimize the average access time for all users of the system. Partitions are barriers to this sharing of channels, and therefore tend to increase the access time. The use of backup partition assignments (to be covered later) can sometimes be used to reduce the effects of partitioning on access time.

Partitioning can be used to set aside a specific set of channels to be used exclusively by a specific set of users. This specific set of users may then experience an increase or decrease in access time (more or fewer queued calls). If this specific set of users experience a decrease in access time (fewer queued calls) as a result of the partition, it is likely that the remaining users of the system will experience an increase in access time (more queued calls). The following general rules apply to the effect of partitions on access time:

- After the addition of a partition to a system, some (possibly all) users will experience more queued calls.
- The more partitions that are defined for a system, the fewer channels will be in each partition.
- The fewer the channels in a partition, the more calls will be queued.

> **NOTE**
>
> In general, the more partitions that are defined for a system, the fewer the channels per partition, and the more often calls will be queued. For the smallest possible partition (a partition containing a single channel) no channel will be available while a background test call is being performed.

Although the partition assigned to a specific channel in one system does not need to be the same as the partition assigned to the same channel in another system, and a partition that is defined in one system does not need to be defined in another system, it is recommended that all systems in a network be configured as similarly as possible. If you have no choice but to configure the systems differently, you will need to be very careful when you later assign IDs to these partitions so that you won't accidentally exclude some users from a system where a specific partition is not defined.

> **NOTE**
>
> All systems in a network need not have their partitions configured identically. However, when this happens, you must be especially careful not to accidently exclude some users from a system where a specific partition is not defined.

If at all possible, the channel partition assignments should be completed before partitions are assigned to any ID. The full consequences of changing channel partition assignments after partitions have been assigned to IDs can

be especially difficult and requires caution. Changing the partition assignment of the last remaining channel in a partition, removes that partition from the system. If that partition was assigned to an ID, that ID may suddenly be unable to use the system for some calls.

If neither the primary partition nor any of the optional backup partition assignments for an ID are defined in a system for which the ID is MCP enabled, call requests from that ID will be handled as follows:

- Caller/called ID partition assignment the same - System will deny the call.

- Caller/called ID partition assignment different - System will look for an available channel in the Active Control Channel (ACC) Partition only. However, if the ACC Partition does not contain a channel equipped to handle the call type, the system will deny the call.

No restrictions have been placed on partition removal, even when it may have adverse effects for some IDs. This allows the system administrator to quickly disable a partition, without having to spend the time to modify all the affected IDs. However, if you have time before you remove a partition from a system, make a list of all the IDs to which this partition has been assigned. Then check and possibly restructure each affected ID's individual partition assignments to minimize any negative impact.

When the Site Controller is reset, or powers-up after an outage, it requests the latest site database from the System Manager to update its initial configuration. While waiting for this site database update, the Site Controller uses its initial configuration consisting of a single partition, no IDs subject to partitioning, and no ID validation. During this interval the Site Controller allows all users access to all channels, regardless of what partition information has been programmed into the site database by the System Manager.

Active & Allowed Control Channels

The MCP feature attaches special significance to the partition which contains the Control Channel. This partition is referred to as the Active Control Channel Partition (ACC Partition). All calls involving an ID that is not MCP enabled, calls between IDs having different partition assignments, System All-Call, and Dynamic Regrouping calls are restricted to this partition (see Table 19 for more details). Therefore, the ACC Partition must be large enough to handle all calls that are restricted to the ACC Partition, plus all calls between IDs assigned specifically to that partition number. The ACC Partition must also contain channels enabled to support the expected call types (such as digital voice, digital data, and interconnect). If the ACC Partition is sometimes in one partition and sometimes in another (due to the Control Channel moving from one partition to another), then each possible ACC Partition must be large enough and contain channels enabled to support the expected call types.

An Allowed Control Channel (Allowed CC) is a channel that is allowed to be used as a Control Channel. Several channels are generally designated as Allowed Control Channels, to allow for possible channel failures. All Allowed Control Channels do not have to be in the same partition. However, if they are not all in the same partition, the Control Channel (and the calls restricted to the ACC Partition) could be in one partition at one time and in another partition at another time. So if you don't want this to happen, make sure all Allowed Control Channels are in the same partition.

In order to decide whether it is best to limit the ACC Partition to a single partition or to permit the ACC Partition to move between more than one partition, you must estimate how many channels will be needed to support the expected calls in the ACC Partition (don't forget to count the Control Channel), and you must estimate the minimum number of Allowed Control Channels you will need (to provide adequate Control Channel backup). If more channels are needed to support the expected calls than are needed for Control Channel backup, limiting the ACC Partition to a single partition will keep it simple plus give you additional Control Channel backup (you might just as well enable each channel in the partition as an Allowed Control Channel).

If more channels are needed for Control Channel backup than are needed to support the expected calls, it would be wasteful to limit the ACC Partition to a single partition, because the channels would be idle too much of the time. To improve the utilization of the channels, you can assign an additional set of users to that partition number to share the partition with those calls that are restricted to the ACC Partition. Alternatively, you can permit the ACC Partition to move between two or more partitions (each partition must be large enough and contain channels enabled to support the expected call types), but use the smallest number of partitions that will add up to the total number of Allowed Control Channels needed to provide adequate Control Channel backup.

When enabling Allowed Control Channels, the following items should be considered:

- FCC ID - The lowest frequency channel (usually channel 1) is reserved as a Working Channel so

that it can be used to send periodic FCC ID messages. Do not configure the lowest frequency channel to be an Allowed Control Channel in a system where FCC ID messages are required.

- Antennas - If all channels are not connected to the same antenna, assigning some channels from each antenna group as Allowed Control Channels to increase the probability of always having a functioning channel available for a Control Channel, even if either antenna system is damaged.

- Control Channel Backup - Make sure that enough channels are enabled to be Allowed Control Channels. The higher the number of Allowed Control Channels the higher the probability of always having a functioning channel available for a Control Channel, even if there are many channel failures.

- Limit Possible ACC Partitions - Each partition containing an Allowed Control Channel is a possible ACC Partition. Keep the number of ACC Partitions to a minimum (one if possible).

- Traffic - Make sure that enough channels are included in each possible ACC Partition to provide for all calls restricted to the ACC Partition, all calls between IDs assigned specifically to that partition number, and the Control Channel.

- Call Type - Make sure that enough channels are included in each possible ACC Partition that are enabled for each needed type of call (data, digital voice, etc.).

- Small Partitions - Do not enable the only channel in a partition as an Allowed Control Channel. If it is ever selected as the Control Channel, there will be no Working Channel left in the partition to be used for calls. A two-channel partition is only one channel-failure away from a one-channel partition.

IDs Subject to Partitioning

Each ID (LID or GID) can be selected to be subject to partitioning or not. When an ID is selected to be subject to partitioning, that ID is said to be MCP enabled, and is referred to as an MCP enabled ID. Primary and backup partitions can be assigned to each ID regardless of whether the ID is MCP enabled or not. However, until an ID is MCP enabled, its partition assignments will be ignored and it will only be assigned channels in the ACC Partition.

Generally, LIDs and GIDs must be entered into the system database before they can use the MCP feature. However, by default, the Site Controller will fill in LID 16383 for users that do not have a LID entered into the site database. Also, by default, LID 16383 is MCP enabled and assigned to partition #1 in the site database. This allows all users initial access to the system to give you time to reconfigure the site database through the System Manager. There is no equivalent default mechanism for GIDs.

NOTE

After the site database has been reconfigured, it is recommended that you leave LID 16383 in the site database, but invalidate it for all systems in the network. This will ensure that non-existent LIDs cannot access the system.

Primary Partition

The MCP feature allows for the assignment of one primary partition for each LID and GID. Whenever a call request is received in an MCP enabled system (to and from MCP enabled IDs, each having the same primary partition), the Site Controller scans through the primary partition assigned to those IDs looking for an available channel. Therefore, a Unit or Group's primary partition assignment should reflect where the system administrator wants that ID to get channel assignments. This partition may be used as a way of limiting different functional groups of IDs to specific quantities of channels. In systems where not all channels have the same coverage area, this partition may be a way to limit IDs in a smaller coverage area to those channels covering that smaller area, so as to reserve the channels covering a larger area for those IDs needing the larger coverage area.

If a call request is to or from an ID that is not MCP enabled, or if both IDs do not have the same primary partition assignment, the site will only look in the ACC Partition for an available channel. Therefore, IDs that call each other frequently should probably be assigned the same primary partition.

If an ID is given the ALL assignment (instead of a specific partition) for its primary partition, its call request is treated as if partitioning doesn't exist. That is, all the channels at the site will be searched for an available channel. If all the channels do not have the same coverage area, and the first available channel covers a smaller area than is needed to complete the call, the call will not be completed and the caller will have to call again. In this case, the ALL assignment is not a good choice.

Backup Partitions

The MCP feature allows for the assignment of up to three backup partitions for each LID and GID. If the Site Controller cannot find an available channel within the assigned primary partition, it looks at the first backup partition assignments for the IDs.

If the call is to a LID and the LIDs have the same first backup partition and condition for use, the Site Controller looks to see if the condition for use is met. If the condition is met, the Site Controller then looks to see if there is an available channel. If the condition is not met (or the condition is "Not Used"), the Site Controller looks at the second backup partition assignments for the LIDs, and so on. If, after looking at all of the assigned backup partitions, no available channel was found in the partition(s) searched (but at least one channel was found busy), the call is queued in each partition where a busy channel was found. If all channels in the partition(s) searched were found failed, the call is denied.

If the LIDs have different first backup partitions or conditions for use, the Site Controller searches the ACC Partition for an available channel. After the ACC Partition is searched, no other partition is searched. If, after looking at the ACC Partition, no available channel was found in the partition(s) searched (but at least one channel was found busy), the call is queued in each partition where a busy channel was found. If all channels in the partition(s) searched were found failed, the call is denied.

If the call is to a GID, only the backup partition assignments for the GID are used to determine which partitions are searched. For Patch and Simulselect calls, see the notes at the bottom of Table 19. If the backup partition assignment is ALL, all channels are searched regardless of partitions.

There is no requirement that backup partitions must be assigned. Initially, the database contains no backup partition assignments. If a backup partition is to be assigned, its condition for use must first be selected from one of the following:

- Not Used (default) - Indicates that this partition should not be used.
- Emergency - Indicates that this partition should only be searched if this is an emergency call, and all channels in the partition last searched were failed or busy.
- Failed/Busy - Indicates that this partition should only be searched if all channels in the partition last searched were failed or busy.
- Failed Only - Indicates that this partition should only be searched if all channels in the partition last searched were failed (none were busy).

"Partition last searched", means last searched for an available channel, not a partition just looked at to see if the condition for using that backup partition is met. Note that the result of the partition last searched (failed/busy or failed only) may change as the search proceeds from partition to partition.

There is no requirement that the backup partitions have all the capabilities of the primary partition. However, the system administrator should be aware of any limitations. Before backup partitions are assigned, the system administrator should compare the capabilities of the primary and possible backup partitions for the following:

- Coverage Area - The coverage area of a backup partition should at least include the coverage area of the primary partition.
- Channel Capabilities - If the user of the primary partition requires features such as data, digital voice, and/or telephone interconnect, any backup partition for this user should support these same features.

Before a backup partition is assigned, the system administrator should be convinced that the backup partition is necessary. Here are some things to consider:

- Reliability - Assigning a backup partition improves the reliability of small partitions because they are especially vulnerable to a small number of channel failures.
- Too Many Backups - On the other hand, assigning too many backup partitions tends to cancel the effects of partitioning.
- The ALL Assignment - This partition assignment is extremely prone to canceling the effects of partitioning and should be used with extreme care.

Examples

Single-Site System with One Partition

If a system that is MCP enabled has not received any MCP Data, it will appear to operate just like a system that is

not MCP enabled. If a site that is MCP enabled has only received MCP Channel Data, it will only assign channels in the ACC Partition. If a site that is MCP enabled has only received MCP ID Data, it will behave one of two ways:

1. Caller/called ID partition assignment is same:
    - Primary partition assignment = 1 - Site will assign channel as if no partition exists.
    - Primary partition assignment ≠ 1 - Site will deny call.
2. Caller/called ID partition assignment is different:
    - Site will assign channel as if no partition exists.

Single-Site System with Multiple Partitions

NEED: Suppose there are two agencies that operate in the same coverage area. Both want to share the lower cost of one larger shared system, as opposed to the higher cost of two smaller separate systems. The first agency thinks it will need six working channels; the second agency will need eight. However, each agency wants to have exclusive use of its channels.

SOLUTION #1: The agencies got together and decided to share a fifteen-channel site with two partitions. One partition would serve as the primary partition for the first agency, and the other partition would serve as the primary partition for the second agency. Since the second agency's partition contained more channels, both agencies agreed to add one more channel (to be used as the Control Channel) to that partition and to only designate channels in that partition as Allowed Control Channels.

So they installed the system, made the following assignments, and everything was fine:

- Partition 3: channels 1-6
- Partition 5: channels 7-15
- Allowed Control Channels: channels 7-15
- Primary partition for 1st agency's IDs: partition 3
- Primary partition for 2nd agency's IDs: partition 5
- Backup partitions: none

Then one day someone in one agency discovered that calls could be made to the other agency, and it turned out to be beneficial to both agencies. It was only after some time (after more inter-agency calls were being placed) that the second agency realized that all of these inter-agency calls were being placed on their channels - and it wasn't fair. (Calls between IDs with different partition assignments are only given channel assignments in the ACC Partition.) So a new need developed, requiring a new solution.

SOLUTION #2: The agencies got together and decided to each donate one channel (the second agency actually donated two channels: one of its own and one for use as the Control Channel) to a third partition that could be used as the pool of Allowed Control Channels, and therefore the inter-agency calls. This left the first agency with 5 channels, the second with 7, and the new partition with 2 channels plus the Control Channel, and they agreed to share the costs associated with the new partition.

So they reconfigured the MCP Data as follows and everything was fine:

- Partition 3: channels 1-5
- Partition 9: channels 6-8
- Partition 5: channels 9-15
- Allowed Control Channels: channels 6-8
- Primary partition for 1st agency's IDs: partition 3
- Primary partition for 2nd agency's IDs: partition 5
- Backup partitions: none

Then one day there was a lot of activity in the first agency and it was taking a long time to get channel assignments, but when an inter-agency call was placed, the call went right through. Later someone got to wondering why those two channels now reserved for inter-agency calls couldn't be used as backup channels for either agency when either agency's own channels were fully loaded. So a new need developed, requiring a new solution.

SOLUTION #3: The agencies got together and decided to use the shared partition as the first backup for all the IDs in both agencies. They also decided that the condition for using this backup should be if their own channels were all failed or busy.

So they reconfigured the MCP Data as follows and everything was fine:

- Partition 3 to channels 1-5
- Partition 9 to channels 6-8
- Partition 5 to channels 9-15
- Allowed Control Channels to channels 6-8
- Primary partition for 1st agency's IDs: partition 3

- Primary partition for 2nd agency's IDs: partition 5
- 1st backup partition for 1st agency's IDs: failed/busy - partition 9
- 1st backup partition for 2nd agency's IDs: failed/busy - partition 9
- Additional backup partitions: none

Initial MCP Data

The initial values for the MCP Data have been selected so that the MCP feature can be installed without noticing any change in the system operation. In other words, any ID that is validated at a site will be allowed to use that site as if there is no partitioning. At any time thereafter, the system administrator may configure the MCP Data for the desired MCP operation. The MCP Data is made up of MCP Channel Data and MCP ID Data.

MCP Channel Data

The MCP Channel Data parameters are shown in System Manager screen 10, Channel Configuration panel (1:4) or System Manager screen 20, Channel Configuration panel (1:5). Initial values for these parameters are as follows:

- MC Partition - 1 (for each channel)
- MC Partitioning Enabled - N

MCP ID Data

The MCP ID Data parameters are shown in System Manager screens 11 (for LID) or 12 (for GID), Multiple Channel Partitioning panel (4:4). Initial values for these parameters are as follows (for each ID):

- ID Subject to Partitioning - N
- Primary Partition - 1
- First (Backup Partition) - Not Used
- Second (Backup Partition) - Not Used
- Third (Backup Partition) - Not Used

MCP Channel Data Configuration

MCP Channel Data refers to MCP parameters that are assigned to a specific site. Changes to the MCP Channel Data are made in the System Manager. Select Menu Item 10 to look at the External Device Definition screen. Within the Selected Device panel, select the desired site by entering the site number or site name in the Device Number field or the Device Name field respectively.

MC Partitioning Enabled

Within the Channel Configuration panel (1:4), the MC Partitioning Enabled field is a read-only field. The field will display either Disabled or Enabled. The information indicated by each message is as follows:

- Disabled (default): Indicates that, either the System Manager has not communicated with the selected site since the site was MCP enabled, or the System Manager has lost track of the site's MCP status.
- Enabled: Indicates that the last time the selected site communicated with the System Manager, the site reported that its MCP feature was enabled.

Regardless of the message in the MC Partitioning Enabled field, the system administrator can enter MCP Channel Data for that system. However, the MCP Channel Data will not be sent to the Site Controller until it is MCP enabled. For any system that is not MCP enabled, IDs will be given channel assignments as if the MCP feature did not exist.

Allowed CC

The Allowed CC (Control Channel) parameter defines which channels will be allowed to be used as a Control Channel. Although the Allowed CC parameter may already have been configured for general trunking without MCP, the parameter may need to be reconfigured when adding the MCP feature. See the information under Active & Allowed Control Channels under Partition Planning.

Within the Channel Configuration panel (1:4), the Allowed CC field will show a single character for each of the 24 channels (default = Y for channel 2 and N for all other channels). To reconfigure the Allowed CC assignment for a specific channel, change the character in the column for that specific channel. The character Y allows the channel to be a Control Channel, and the character N does not allow the channel to be a Control Channel. After you have completed all the change(s) you wish to make to this field, press the Do key to save your change(s) in the database.

MC Partition

The MC Partition parameter defines one partition for each channel. Any channel not specifically given a partition assignment, remains assigned to partition 1 (default).

Within the Channel Configuration panel (1:4), the MC Partition field will show a single character for each of the 24 channels (default = 1). To reconfigure the partition assignment for a specific channel, change the character in the column for that specific channel. The characters 1 through 9 represent partitions 1 through 9 respectively, and the characters A through F represent partitions 10 through 15 respectively. Partition assignments do not have to be sequential or to groups of adjacent channels. They can be in any order. After you have completed all the change(s) you wish to make to this field, press the Do key to save your change(s) in the database.

Database Uploads

When you press the Do key to save changes to the site database in the System Manager, these changes are not automatically sent to the Site Controller. Use the following procedure to send the latest MCP Channel Data from the System Manager to the Site Controller. The procedure must be repeated for each site for which MCP Channel Data needs to be transferred.

- Select Menu Item 20 to look at the Site Reconfiguration screen.
- In the Selected Site panel, enter the Site Number or Site Name for the site to be sent the MCP Channel Data.
- In the Channel Configuration panel (1:5), change the character in the MC Partition row between the Database box and the Site box from N to Y and press the Do key.

Temporary Uploads

The following procedure allows a system administrator to send temporary MCP Channel Data to a site without changing the site database in the System Manager. The procedure must be repeated for each site for which temporary MCP Channel Data needs to be transferred.

- Select Menu Item 20 to look at the Site Reconfiguration screen.
- In the Selected Site panel, enter the Site Number or Site Name for the system to be sent the temporary MCP Channel Data.
- In the Channel Configuration panel (1:5), reconfigure the temporary MCP Channel Data in the MC Partition row of the Database box.
- In the Channel Configuration panel (1:5), change the character in the MC Partition row between the Database box and the Site box from N to Y and press the Do key.

If the Site Controller for a system with temporarily reconfigured MCP Channel Data is reset or powered on, it will automatically request the latest site (system) database from the System Manager, and the temporarily reconfigured MCP Channel Data will be lost.

MCP ID Data Configuration

MCP ID Data refers to MCP parameters that are assigned to individual IDs (LIDs and GIDs). To make changes in the MCP ID Data for a LID, select Menu Item 11 to look at the Unit Identification screen. Within the Selected Unit panel, select the desired unit by entering the unit number or unit name in the Unit Number field or the Unit Name field respectively.

To make changes in the MCP ID Data for a GID, select Menu Item 12 to look at the Group Identification screen. Within the Selected Group panel, select the desired Group by entering the group number or group name in the Group Number field or the Group Name field respectively.

MCP Availability

Within the Multiple Channel Partitioning panel (4:4), the MCP Availability field is a read-only field. The field will display either No Sites, Selective, or Universal. The information indicated by each message assumes that the System Manager has communicated with each MCP enabled Site Controller since it was MCP enabled. If this communication has not taken place, the indicated message will be wrong. The information indicated by each message is as follows:

- No Sites: (default): Indicates that none of the sites (systems) for which this ID is validated, are MCP enabled (or the System Manager has not communicated with the site since MCP was enabled).[5]
- Selective: Indicates that one or more (but not all) of the systems for which this ID is validated, are MCP enabled.

[5] *Group 5 System Manager Software Only: The System Manager sometimes loses track of this information, and incorrectly indicates that no sites (for which an ID is validated) are MCP enabled. If you suspect that this has happened, go to the Site Reconfiguration screen for each site (system) in the network. This will force each site to report its current status to the System Manager and correct the MCP Availability field.*

- Universal: Indicates that all of the systems for which this ID is validated, are MCP enabled.

Regardless of the message in the MCP Availability field, the system administrator can enter MCP ID Data for this ID. However, the MCP ID Data will only be sent to those systems which are MCP enabled. For any system that is not MCP enabled, this ID will be given channel assignments as if MCP did not exist.

ID Subject to Partitioning

Within the Multiple Channel Partitioning panel (4:4), the ID Subject to Partitioning field will show one of the following letters: N or Y. To reconfigure this field, type in the desired letter. The information indicated by each letter is as follows:

- Y: Indicates that, for any system that is MCP enabled, this ID will be given channel assignments in accordance with the remaining MCP ID Data fields for this ID.

- N (default): Indicates that, for any system that is MCP enabled, this ID will not be given channel assignments in accordance with the remaining MCP ID Data fields for this ID, but will instead be given channel assignments in the Active Control Channel (ACC) partition. (The ACC partition is the partition which currently includes the Control Channel.)

For any system that is not MCP enabled, this ID will be given channel assignments as if no partitioning exists, regardless of whether the ID is subject to partitioning or not.

Primary Partition

Within the Multiple Channel Partitioning panel (4:4), the Primary Partition field will show the present assignment for the primary partition level. The default assignment is 1. To change the present assignment, enter a new assignment in place of the present one. Allowable assignments are as follows:

- Single Character: Indicates that the Site Controller should search only the partition represented by the character. Characters 1 through 9 represent partitions 1 through 9 respectively. Characters A through F represent partitions 10 through 15 respectively.

- ALL: Indicates that the Site Controller should search all channels regardless of their partition assignments. If ALL is entered, all backup partition level assignments will be ignored.

Backup Partitions

Within the Multiple Channel Partitioning panel (4:4), there is a Condition For Use field and MC Partition field for each of the three backup partition levels.

For each backup partition level that is to be assigned a partition (not required), the Condition For Use field must be selected first, from one of the following:

- Not Used (default): Indicates that this partition level should be skipped.

- Failed/Busy - Emergency: Indicates that this partition should be searched for an available channel only if this is an emergency call, and all channels in the partition last searched were failed or busy.

- Failed/Busy - All: Indicates that this partition should be searched for an available channel only if all channels in the partition last searched were failed or busy.

- Failed Only: Indicates that this partition should be searched for an available channel only if all channels in the partition last searched were failed (none were busy).

To select a condition for use, move the cursor to First, Second, or Third (under Backup Partition) and press the Select key. Then move the cursor to the desired choice and again press the Select key.

For each backup partition to be assigned (not required), the MC Partition field will show the present partition assignment. The default assignment is blank (none). To change the partition assignment, enter a new assignment in place of the present one. Allowable partition assignments are as follows:

- Single Character: Indicates that the Site Controller should search only the partition represented by the character. Characters 1 through 9 represent partitions 1 through 9 respectively. Characters A through F represent partitions 10 through 15 respectively.

- ALL: Indicates that the Site Controller should search all channels regardless of partitions. If All is entered, all information for the next Backup Partition(s) will be ignored.

Each partition assignment (primary and each backup) must be different, but does not have to be in any order, except for the ALL assignment. The ALL assignment may be used for a primary or backup partition, but no backup partition assignments should be made after an ALL assignment. Any unused backup partitions should have Not Used selected in the Condition For Use field. Whenever Not Used is selected in the Condition For Use field, the MC Partition field will automatically be blank.

After you finish all the change(s) you wish to make to this panel for a specific ID, press the Do key to save your change(s) in the database. If the message "Duplicate Backup Partition Number" appears at the bottom of the screen, you selected a duplicate partition assignment and your changes were not saved. Each partition assignment must be different before the changes can be saved.[6]

Database Uploads

When exiting either the Unit Identification screen (menu selection 11) or the Group Identification screen (menu selection 12), the System Manager will prompt you with a database upload request. If a record has been deleted, move the cursor to "All" and press the Select key to upload all records. If records have been changed, move the cursor to "Modified" and press the Select key to upload only the modified records. If for some reason an upload is not desired at this time, move the cursor to "None" and press the Select key to upload no records.

If at a later time the records need to be uploaded, use the following procedure to send the latest MCP ID Data from the System Manager to the Site Controller. The procedure must be repeated for each ID for which MCP ID Data needs to be transferred.

- Select Menu Item 30 to look at the Database Upload Request screen.
- In the All Sites and Devices section of the screen, change the character in the Logical ID Changes and Group ID Changes fields from N to Y and press the Do key.

Temporary Uploads

Temporary changes to the MCP ID Data (unlike the MCP Channel Data) require changing the site database in the System Manager. See Database Uploads.

Operation

MCP Disabled Systems

Until a system is MCP enabled, the System Manager will not send MCP Data to that system's Site Controller. Therefore, a system that is not MCP enabled will behave exactly as if no MCP feature or MCP Data exists. This means that, even though LIDs and GIDs using this system may have partitions assigned for use with other systems that are MCP enabled, this system will not be aware of and so will not use any of these partition assignments.

Which Partition Is Searched

After a system is MCP enabled, the search for an available channel will depend upon the MCP Data received by the Site Controller from the System Manager. However, the partition searched may not always be the partition assigned to the calling or called ID. Sometimes only the ACC Partition is searched. The partition searched depends upon the following factors (see summary in Table 2):

- What is the call type? For Dynamic Regrouping and System All-Call, only the ACC partition is searched.
- How many LIDs and GIDs for field radios are involved in the call?
- How many of these LIDs and GIDs are subject to partitioning? If one or more are not subject to partitioning, only the ACC partition is searched.

[6] *Group 5 System Manager Software Only: The duplicate partition assignment may be hidden from view in a Not Used assignment. To remove a hidden duplicate partition assignment, temporarily change each Not Used assignment to some other condition so you can see the hidden partition number. Then select ALL as the partition number and change the condition back to Not Used.*
If the Select key is accidentally pressed while the "Duplicate Backup Partition Number" message is shown on the screen, the pop-up window appears to get stuck on the screen because the cursor is not in the pop-up window. To get the cursor into the pop-up window, press the Select key again. Then highlight the desired condition for use and press the Select key once again.

Table 2 - Which Partition Is Searched

CALL TYPE	LIDs & GIDs FOR FIELD RADIOS ①			WHICH PARTITION IS SEARCHED
	HOW MANY ARE INVOLVED IN CALL	HOW MANY ARE SUBJECT TO PARTITIONING	COMPARISON OF ASSIGNED PARTITIONS AND CONDITIONS	
Individual Data	1 LID	None	N/A	ACC Partition
		One	N/A	Assigned partition for LID
Local & Central Interconnect	1 LID or GID	None	N/A	ACC Partition
		One	N/A	Assigned partition for LID or GID
Group	1 GID	None	N/A	ACC Partition
		One	N/A	Assigned partition for GID
Group Data	1 GID	None	N/A	ACC Partition
		One	N/A	Assigned partition for GID
Individual	2 LIDs	None	Doesn't Matter	ACC Partition
		One	Doesn't Matter	ACC Partition
		Both	Different ③	ACC Partition
			Same ③	Assigned partition for both LIDs
Patch ②	2 or More GIDs Only	None	Doesn't Matter	ACC Partition
		1 or More but Not All	Doesn't Matter	ACC Partition
		All	Different ④	ACC Partition
			Same ④	Assigned partition for collected GIDs
Simulselect ②	2 or More LIDs, GIDs, or LIDs & GIDs	None	Doesn't Matter	ACC Partition
		1 or More but Not All	Doesn't Matter	ACC Partition
		All	Different ④	ACC Partition
			Same ④	Assigned partition for collected IDs
Dynamic ⑤ Regrouping	2 or More GIDs	Doesn't Matter	Doesn't Matter	ACC Partition
System All-Call	All	Doesn't Matter	Doesn't Matter	ACC Partition

① IDs for host data and telephone interconnect equipment are not assigned MCP ID Data and therefore are not a factor in determining which partition is searched.
② The partition(s) to be searched are determined when the Patch or Simulselect is activated. If the MCP ID Data is changed for an ID that is part of an activated Patch or Simulselect, that Patch or Simulselect must be deactivated and then reactivated before the changes will have any effect on which partition(s) are to be searched. This is the standard operation for Patch or Simulselect with any LID or GID database (not just for MCP).
③ Only the single partition assignment for the partition level being searched (primary or one backup) must be the same.
④ The complete set of assignments for all partition levels (primary and each backup) must be the same.
⑤ This call type refers only to the call made to the radios during regrouping. A Call to a group that has been dynamically regrouped is treated like any ordinary group call.

- Are the partition assignments (and conditions for use) for these LIDs and GIDs the same?

The comparison of partition assignments (partition and condition for use) is different depending upon whether it is an individual call, or whether it is a Patch or Simulselect call.

For an individual call, separate comparisons are made at each partition assignment level as the search progresses. When both partition assignments are the same for the partition assignment level being checked, that partition assignment is searched for an available channel. When both partition assignments are not the same for the partition assignment level being checked, the ACC partition is searched for an available channel. Once the ACC partition is searched, no other partition will be searched.

For Patch or Simulselect, one comparison is made of the complete partition assignment set (including all partition assignment levels), between each ID involved in the Patch or Simulselect (at the time of activation). A single set of partition assignments is then assigned to the SAID (System Assigned ID) for the Patch or Simulselect. If the partition assignment sets for the IDs involved in the Patch or Simulselect are the same, that partition assignment set is assigned to the SAID and will be used to determine which partitions are searched when a call is later placed to that SAID. If the partition assignment sets for the IDs involved in the Patch or Simulselect are not the same, only the ACC partition is assigned to the SAID and only the ACC partition will be searched when a call is later placed to that SAID.

For Patch or Simulselect, one comparison is made of the complete assignment set of all partition assignment levels. between each ID involved (at the time of activation), and a single set of partition assignments is assigned to the SAID (System Assigned ID) for the Patch or Simulselect. If the partition assignment sets for each ID involved in the Patch or Simulselect are the same, that partition assignment set is assigned to the SAID and will be used to determine which partitions are searched when a call is placed to that SAID. If the partition assignment sets for each ID involved in the Patch or Simulselect are not the same, only the ACC partition is assigned to the SAID and only the ACC partition will be searched when a call is placed to that SAID.

Conditions for Searching Backup Partitions

In addition to meeting any requirements for a comparison of partition assignments, no backup partition assignment will be searched unless the condition for use agrees with the results of previous partition level searched (see summary in Table 3).

Table 3 - When Is Backup Partition Searched

CONDITION FOR USE OF THIS BACKUP PARTITION	RESULTS OF PREVIOUS PARTITION SEARCHED			
	EMERGENCY CALL		NON-EMERGENCY CALL	
	ALL FAILED OR BUSY (BUT NOT ALL FAILED)	ALL FAILED	ALL FAILED OR BUSY (BUT NOT ALL FAILED)	ALL FAILED
Failed / Busy All	Search this backup partition	Search this backup partition	Search this backup partition	Search this backup partition
Failed / Busy Emergency	Search this backup partition	Search this backup partition		
Failed Only		Search this backup partition		Search this backup partition
Not Used				

Primary Level of Search

When the Site Controller receives a call request, the Site Controller must check its personality to see if MC Partitioning has been disabled or enabled.

I. Disabled - If MC Partitioning has been disabled, all channels are searched for an available channel.

   A. Available - If an available channel is found, the channel is assigned to the call.

   B. Busy - If all channels are found to be failed or busy (but not all failed), the call is queued.

   C. Failed - If all channels are found to be failed, the call is denied.

II. Enabled - If MC Partitioning has been enabled, each LID or GID for the field radios involved in the call is checked to see if it is "subject to partitioning".

   A. Not All - If none, one, or more (but not all), of the LIDs and GIDs for the field radios involved in the call are "subject to partitioning", only the Active Control Channel (ACC) partition is searched for an available channel.

      1. Available - If an available channel is found, the channel is assigned to the call.

      2. Busy - If all channels are found to be failed or busy (but not all failed), no other partition is searched, but the call is queued in the ACC partition.

      3. Failed - If all channels are found to be failed, no other partition is searched and the call is denied.

   B. All - If all of the LIDs and GIDs for the field radios involved in the call are "subject to partitioning", their partition assignments for the primary partition level are compared. (For Patch and Simulselect, the partition assignments are compared for all partition levels at the time the IDs for Patch or Simulselect are activated.)

      1. Different - If their partition assignments for the primary partition level are different, the Active Control Channel (ACC) partition is searched for an available channel. (For Patch and Simulselect: if their partition assignments for the primary partition level are different, if their partition assignments for the first backup partition level are different, if their partition assignments for the second backup partition level are different, or if their partition assignments for the third backup partition level are different.)

         a. Available - If an available channel is found, the channel is assigned to the call.

         b. Busy - If all channels are found to be failed or busy (but not all failed), no other partition is searched and the call is queued.

         c. Failed - If all channels are found to be failed, no other partition is searched and the call is denied.

      2. Same - If their partition assignments for the primary partition level are the same, the partition number must be checked with the MCP Channel Data for the system. (For Patch and Simulselect: if their partition assignments for the primary partition level are the same, their partition assignments for the first backup partition level are the same, their partition assignments for the second backup partition level are the same, and their partition assignments for the third backup partition level are the same.)

         a. ALL - If the partition number is ALL, all channels are searched for an available channel, regardless of partitions.

            (1) Available - If an available channel is found, the channel is assigned to the call.

            (2) Busy - If all channels are found to be failed or busy (but not all failed), the call is queued in each busy partition.

            (3) Failed - If all channels are found to be failed, the call is denied.

         b. Not Defined - If the partition number is not defined (no channels assigned to that partition number), no other partition is searched and the call is denied.

         c. Defined - If the partition number is defined (one or more channels assigned to that partition number), the partition is searched for an available channel.

(1) Available - If an available channel is found, the channel is assigned to the call.

(2) Busy - If all channels are found to be failed or busy (but not all failed), the partition is noted as busy and the Site Controller proceeds to the 1st backup level of the search.

(3) Failed - If all channels are found to be failed, the partition is noted as failed and the Site Controller proceeds to the 1st backup level of the search.

First Backup Level of Search

Each LID or GID for the field radios involved in the call is checked to see if a partition has been assigned to the 1st backup partition level.

I. None - If none of the LIDs and GIDs for the field radios involved in the call have a partition assigned to the 1st backup partition level (all have "Not Used" selected), the Site Controller proceeds to the 2nd backup level of the search.

II. Some or All - If some or all of the LIDs and GIDs for the field radios involved in the call have a partition assigned to the 1st backup partition level, their partition assignments for the 1st backup partition level (numbers and conditions for use) are compared.

A. Different - If their 1st backup partition numbers and conditions for use are different (including the case where one or more (but not all) do not have a partition assigned (have "Not Used" selected)), the Active Control Channel (ACC) partition is searched for an available channel.

1. Available - If an available channel is found, the channel is assigned to the call.

2. Busy - If all channels are found to be failed or busy (but not all failed), no other partition is searched, but the call is queued in the ACC partition and the primary partition if a busy channel was found.

3. Failed - If all channels are found to be failed, no other partition is searched, but a check is made to see if any channel was found busy in the primary partition.

a. Busy - If any channel was found busy in the primary partition, the call is queued in the primary partition.

b. Failed - If all channels were found failed in the primary partition, the call is denied.

B. Same - If their 1st backup partition numbers and conditions for use are the same, the condition for use must be checked with the results from searching the primary partition.

1. Condition Not Met - If the condition for use is not met, the Site Controller proceeds to the 2nd backup level of the search.

2. Condition Met - If the condition for use is met, the partition number must be checked with the MCP Channel Data for the system.

a. ALL - If the partition number is ALL, all channels are searched for an available channel, regardless of partitions.

(1) Available - If an available channel is found, the channel is assigned to the call.

(2) Busy - If all channels are found to be failed or busy (but not all failed), the call is queued in each busy partition.

(1) Failed - If all channels are found to be failed, the call is denied.

b. Not Defined - If the partition number is not defined (no channels assigned to that partition number), the Site Controller proceeds to the 2nd backup level of the search.

c. Defined - If the partition number is defined (one or more channels assigned to that partition number), the partition is searched for an available channel.

(1) Available - If an available channel is found, the channel is assigned to the call.

(2) Busy - If all channels are found to be failed or busy (but not all failed), the partition number is noted as busy and the Site Controller proceeds to the 2nd backup level of the search.

(3) Failed - If all channels are found to be failed, the partition number is noted as failed and the Site Controller proceeds to the 2nd backup level of the search.

Second Backup Level of Search

Each LID or GID for the field radios involved in the call is checked to see if a partition has been assigned to the 2nd backup partition level.

I. None - If none of the LIDs and GIDs for the field radios involved in the call have a partition assigned to the 2nd backup partition level (all have "Not Used" selected), the Site Controller proceeds to the 3rd backup level of the search.

II. Some or All - If some or all of the LIDs and GIDs for the field radios involved in the call have a partition assigned to the 2nd backup partition level, their partition assignments for the 2nd backup partition level (numbers and conditions for use) are compared.

A. Different - If their 2nd backup partition numbers and conditions for use are different (including the case where one or more (but not all) do not have a partition assigned (have "Not Used" selected)), the Active Control Channel (ACC) partition is searched for an available channel.

1. Available - If an available channel is found, the channel is assigned to the call.

2. Busy - If all channels are found to be failed or busy (but not all failed), no other partition is searched, but the call is queued in the ACC partition and each previously searched partition where a busy channel was found.

3. Failed - If all channels are found to be failed, no other partition is searched, but a check is made to see if any channel was found busy in a previously searched partition.

a. Busy - If any channel was found busy in a previously searched partition, the call is queued in each partition where a busy channel was found.

b. Failed - If all channels were found failed in all previously searched partitions, the call is denied.

B. Same - If their 2nd backup partition numbers and conditions for use are the same, the condition for use must be checked with the results from the last partition level searched.

1. Condition Not Met - If the condition for use is not met, the Site Controller proceeds to the 3rd backup level of the search.

2. Condition Met - If the condition for use is met, the partition number must be checked with the MCP Channel Data for the system.

a. ALL - If the partition number is ALL, all channels are searched for an available channel, regardless of partitions.

(1) Available - If an available channel is found, the channel is assigned to the call.

(2) Busy - If all channels are found to be failed or busy (but not all failed), the call is queued in each busy partition.

(3) Failed - If all channels are found to be failed, the call is denied.

b. Not Defined - If the partition number is not defined (no channels assigned to that partition number), the Site Controller proceeds to the 3rd backup level of the search.

c. Defined - If the partition number is defined (one or more channels assigned to that partition number), the partition is searched for an available channel.

(1) Available - If an available channel is found, the channel is assigned to the call.

(2) Busy - If all channels are found to be failed or busy (but not all failed), the partition number is noted as busy and the Site Controller proceeds to the 3rd backup level of the search.

(3) Failed - If all channels are found to be failed, the partition number is noted as failed and the Site Controller proceeds to the 3rd backup level of the search.

Third Backup Level of Search

Each LID or GID for the field radios involved in the call is checked to see if a partition has been assigned to the 3rd backup partition level.

I. None - If none of the LIDs and GIDs for the field radios involved in the call have a partition assigned to the 3rd backup partition level (all have "Not Used" selected), no other partition is searched, but a check is made to see if any channel was found busy in a previously searched partition.

A. Busy - If any channel was found busy in a previously searched partition, the call is queued in each partition where a busy channel was found.

B. Failed - If all channels were found failed in all previously searched partitions, the call is denied.

II. Some or All - If some or all of the LIDs and GIDs for the field radios involved in the call have a partition assigned to the 3rd backup partition level, their partition assignments for the 3rd backup partition level (numbers and conditions for use) are compared.

A. Different - If their 3rd backup partition numbers and conditions for use are different (including the case where one or more (but not all) do not have a partition assigned (have "Not Used" selected)), the Active Control Channel (ACC) partition is searched for an available channel.

1. Available - If an available channel is found, the channel is assigned to the call.

2. Busy - If all channels are found to be failed or busy (but not all failed), no other partition is searched, but the call is queued in the ACC partition and each previously searched partition where a busy channel was found.

3. Failed - If all channels are found to be failed, no other partition is searched, but a check is made to see if any channel was found busy in a previously searched partition.

a. Busy - If any channel was found busy in a previously searched partition, the call is queued in each partition where a busy channel was found.

b. Failed - If all channels were found failed in all previously searched partitions, the call is denied.

B. Same - If their 3rd backup partition numbers and conditions for use are the same, the condition for use must be checked with the results from the last partition level searched.

1. Condition Not Met - If the condition for use is not met, no other partition is searched, but a check is made to see if any channel was found busy in any previously searched partition.

a. Busy - If any channel was found busy in a previously searched partition, the call is queued in each partition where a busy channel was found.

b. Failed - If all channels were found failed in all previously searched partitions, the call is denied.

2. Condition Met - If the condition for use is met, the partition number must be checked with the MCP Channel Data for the system.

a. ALL - If the partition number is ALL, all channels are searched for an available channel, regardless of partitions.

(1) Available - If an available channel is found, the channel is assigned to the call.

(2) Busy - If all channels are found to be failed or busy (but not all failed), the call is queued in each busy partition.

(3) Failed - If all channels are found to be failed, the call is denied.

b. Not Defined - If the partition number is not defined (no channels assigned to that partition number), no other partition is searched, but a check is made to see if any channel was found busy in any previously searched partition.

(1) Busy - If any channel was found busy in a previously searched partition, the call is queued in each partition where a busy channel was found.

(2) Failed - If all channels were found failed in all previously searched partitions, the call is denied.

c. Defined - If the partition number is defined (one or more channels assigned to that partition number), the partition is searched for an available channel.

(1) Available - If an available channel is found, the channel is assigned to the call.

(2) Busy - If all channels are found to be failed or busy (but not all failed), no other partition is searched, but the call is queued in each partition where a busy channel was found.

(3) Failed - If all channels are found to be failed, no other partition is searched, but a check is made to see if any channel was found busy in a previously searched partition.

(a) Busy - If any channel was found busy in a previously searched partition, the call is queued in each partition where a busy channel was found.

(b) Failed - If all channels were found failed in all previously searched partitions, the call is denied.

Call Queuing

A call is queued only after all channels that were allowed to be searched were found to be failed or busy (but not all failed). At that time the call is queued in each searched partition where one or more busy channels were found. As soon as a channel becomes available in any partition where the call was queued, the available channel is assigned to the call and the call is removed from the queue in all partitions where the call was queued.

Call Denial

A call is denied only after all channels that were allowed to be searched were found to be either failed (none busy) or unable to support the call request (i.e., digital, data, wide area, etc.). This is assuming the IDs are valid and that their database partition assignments exist on the site(s). Also, if all assigned partitions for the IDs involved in the call are not defined (do not exist) for the site and the conditions for using the ACC Partition are not met, the call will be denied.

Examples of Non-Emergency Individual Calls

Table 4 - Example 1

Partition Level	Calling LID		Called LID		Search Results
	Partition	Condition	Partition	Condition	
Primary	2	N/A	2	N/A	2 Busy
1st Backup	3	Fail/Busy All	3	Fail/Busy All	3 Busy
2nd Backup	4	Fail/Busy All	1	Fail/Busy All	ACC Free
3rd Backup	1	Fail/Busy All	4	Fail/Busy All	

Primary: partition same, search partition 2, all busy or failed (not all failed).

First backup: partition & condition same, condition met, search partition 3, all busy or failed (not all failed).

Second backup: partition different, search ACC partition, channel free & assigned to call.

Table 5 - Example 2

Partition Level	Calling LID		Called LID		Search Results
	Partition	Condition	Partition	Condition	
Primary	2	N/A	2	N/A	2 Failed
1st Backup	3	Fail/Busy All	3	Fail/Busy All	3 Busy
2nd Backup	4	Fail/Busy All	1	Fail/Busy All	ACC Busy
3rd Backup	1	Fail/Busy All	4	Fail/Busy All	

Primary: partition same, search partition 2, all failed.

First backup: partition & condition same, condition met, search partition 3, all busy or failed (not all failed).

Second backup: partition different, search ACC partition, all busy or failed (not all failed), queue call in partitions 3 and ACC.

Table 6 - Example 3

Partition Level	Calling LID		Called LID		Search Results
	Partition	Condition	Partition	Condition	
Primary	2	N/A	2	N/A	2 Busy
1st Backup	3	Fail Only	3	Fail Only	No Search
2nd Backup	5	Fail/Busy Emer	5	Fail/Busy Emer	No Search
3rd Backup		Not Used	4	Fail/Busy All	ACC Busy

Primary: partition same, search partition 2, all busy or failed (not all failed).

First backup: partition & condition same, condition not met, skip.

Second backup: partition & condition same, condition not met, skip.

Third backup: condition different, search ACC partition, all busy or failed (not all failed), queue call in partitions 2 and ACC.

Table 7 - Example 4

Partition Level	Calling LID		Called LID		Search Results
	Partition	Condition	Partition	Condition	
Primary	2	N/A	2	N/A	2 Busy
1st Backup	3	Fail Only	3	Fail Only	No Search
2nd Backup		Not Used		Not Used	No Search
3rd Backup		Not Used	4	Fail/Busy All	ACC Busy

Primary: partition same, search partition 2, all busy or failed (not all failed).

First backup: partition & condition same, condition not met, skip.

Second backup: Not Used for all IDs, skip.

Third backup: condition different, search ACC partition, all busy or failed (not all failed), queue call in partitions 2 and ACC.

Examples of Non-Emergency Group Calls

Table 8 - Example 5

Partition Level			Called GID Partition	Called GID Condition	Search Results
Primary			2	N/A	2 Busy
1st Backup			3	Fail Only	No Search
2nd Backup			4	Fail/Busy Emer	No Search
3rd Backup			1	Fail/Busy All	1 Busy

Primary: partition same, search partition 2, all busy or failed (not all failed).

First backup: partition & condition same, condition not met, skip.

Second backup: partition & condition same, condition not met, skip.

Third backup: partition & condition same, condition met, search partition 1, all busy or failed (not all failed), queue call in partitions 1 and 2.

Table 9 - Example 6

Partition Level			Called GID Partition	Called GID Condition	Search Results
Primary			2	N/A	2 Busy
1st Backup			3	Fail/Busy Emer	No Search
2nd Backup			4	Fail/Busy All	4 Free
3rd Backup			1	Fail/Busy All	

Primary: one GID (group call), search partition 2, all busy or failed (not all failed).

First backup: one GID (group call), condition not met, skip.

Second backup: one GID (group call), condition met, search partition 4, channel free & assigned to call.

Examples of Emergency Group Calls

Table 10 - Example 7

Partition Level			Called GID Partition	Called GID Condition	Search Results
Primary			2	N/A	2 Busy
1st Backup			3	Fail Only	No Search
2nd Backup			4	Fail/Busy Emer	4 Free
3rd Backup			1	Fail/Busy All	

Primary: one GID (group call), search partition 2, all busy or failed (not all failed).

First backup: one GID (group call), condition not met, skip.

Second backup: one GID (group call), condition met, search partition 4, channel free & assigned to call.

Table 11 - Example 8

Partition Level			Called GID Partition	Called GID Condition	Search Results
Primary			2	N/A	2 Busy
1st Backup			3	Fail/Busy All	3 Busy
2nd Backup			4	Fail/Busy Emer	4 Busy
3rd Backup			1	Fail Only	No Search

Primary: one GID (group call), search partition 2, all busy or failed (not all failed).

First backup: one GID (group call), condition met, search partition 3, all busy or failed (not all failed).

Second backup: one GID (group call), condition met, search partition 4, all busy or failed (not all failed).

Third backup: one GID (group call), condition not met, skip, queue call in partitions 2, 3, and 4.

ALARMS

ALARM DETECTION

Alarm conditions may be detected by the Site Controller itself, or by standard or optional equipment connected directly or indirectly to the Site Controller. Some alarms are only sent to the Site Controller if optional alarm-detecting devices are installed and enabled in the system. The performance of a specific alarm depends on how the parameters for that alarm are configured. For additional information about a specific alarm, see the instruction manual for the device that is responsible for detecting that alarm condition.

Site Controller

The Site Controller detects the following conditions (resulting in the generation of an alarm for a polled device or an alarm-reporting device):

- Polling Failure
- Fault Tolerance Threshold Exceeded

Power Monitor Unit

The Power Monitor Unit (PMU) sends an alarm to the Site Controller when either a transmitter alarm condition or an antenna alarm condition is detected.

A transmitter alarm condition is detected when a channel's output power (as measured by the PMU) exceeds the allowable limits. The DB8843-based PMU uses a low power limit only. The DB8860-based PMU uses both a lower and an upper power limit. The low power limit is specified in the Site Controller's Personality and is configurable through the System Manager's "Site Reconfiguration" screen. Site Controller application software marked "344A3265Gx" (where x = 6 or higher), or marked "RON 107 784 Rxx" (where xx = 8A or higher), allows the low power limit to be re-configured through the System Manager. This limit should be set to the exact power level (in watts) that the power should not fall below (note the exception for the DB8843-based PMU).

Note that a DB8843-based PMU divides the low power limit (sent to it from the Site Controller) by 10. This means that the low power limit must be set (in the Site Controller personality and the System Manager) to 10 times the desired alarm threshold (in watts) when using a DB8843-based PMU. Since 255 is the largest value that can be configured (in the Site Controller personality or through the System Manager) for the low power limit, the highest configurable alarm threshold (in watts) for a DB8843-based PMU is 25.5 watts. However, a higher alarm threshold (in watts) can be configured temporarily through the keypad on the front of the DB8843-based PMU. (Note that any temporarily configured level must be manually reconfigured after a disruption in communication between the PMU and the Site Controller, such as after a power outage.)

On the other hand, a DB8860-based PMU alarms at the exact level that is sent to it. This means that if 255 is sent from the System Manager, then a DB8860-based PMU will alarm if the power level goes below 255 watts. The low power limit can be reconfigured temporarily through a dumb terminal connected to the DB8860-based PMU. The high power limit can be reconfigured permanently through a dumb terminal connected to the DB8860-based PMU. (Note that any temporarily configured low power limit must be manually reconfigured after a disruption in communication between the PMU and the Site Controller, such as after a power outage.)

An antenna alarm condition is detected when either the forward power at an antenna's input is too low (as measured by the PMU), or the SWR (measurement of reflected power) at an antenna's input is too high (as measured and calculated by the PMU).

Alarm & Control Unit

The Alarm & Control Unit sends an alarm to the Site Controller when one of the following conditions exist:

- User-Supplied Alarms - ACU reports alarm for any of 32 user-supplied alarm inputs (see "ACU Parameters" panels in System Manager screen 16, "Alarm Control Unit Definition").
- ACU Error - Diagnostic self-test after reset detects problem in ACU.

Test Unit

The Test Unit sends alarm information to the Site Controller when one of the following conditions exist:

- Control Channel Alarm Conditions - The following Control Channel alarm conditions are sent to the Site Controller in the CC Fail message as soon as detected while monitoring the Control Channel:
  - Cannot Find - The Test Unit was unable to find the Control Channel.

- Cannot Sync - The Test Unit cannot synchronize with the data frames being sent by the Control Channel.
- Cannot Decode - The Test Unit cannot decode four consecutive messages sent by the Control Channel.

- Working Channel Alarm Conditions - The following Working Channel alarm conditions are sent to the Site Controller in the Call Results message at the end of the test call:
  - Cannot Find (Control Channel) - The Test Unit was unable to find the Control Channel.
  - Cannot Sync (Control Channel) - The Test Unit was unable to synchronize with the data frames being sent by the Control Channel.
  - No Channel Assignment - The Test Unit was unable to decode the Working Channel assignment on the Control Channel.
  - Cannot Sync (Working Channel) - The Test Unit was unable to synchronize with the data frames being sent by the assigned Working Channel.
  - No High-Speed Data - The Test Unit was unable to decode the high-speed data on the assigned Working Channel.
  - No Low-Speed Data - The Test Unit was unable to decode the low-speed data on the assigned Working Channel.
  - No Drop Channel Message - The Test Unit was unable to decode a drop channel message on the assigned Working Channel.

Station / Main Site / Control Point GETC

Station GETCs in a single-site system, Main Site GETCs in a Non-Simulcast Voted system, and Control Point GETCs in a Simulcast system send an alarm to the Site Controller when one of the following conditions exist:

NOTE

The following alarms cannot be reconfigured through the System Manaager.

- Auxiliary (Aux) Alarm (Control Point only) - Indicates that a Test Unit alarm is detected at one of the transmit sites for this channel. This alarm is sent through the Simulcast alarm system to the Control Point GETC for that channel, and then on to the Site Controller. This alarm will only be used to fail the channel if it is enabled in the Personality of the Site Controller (default is enabled). (See the Auxiliary Alarm Reporting heading under the Alarm Management heading later in this section.)

- Phone Line (PL) Failure Alarm (Main Site and Control Point only) - Indicates that this GETC is not receiving data from the Voter (possible line noise or breakage of data link in direction from Voter to GETC). This alarm will only be used to fail a channel if it is enabled in the Site Controller's personality.

- Voter Alarm (Main Site and Control Point only) - Indicates that this GETC is receiving error messages from the Voter (possible line noise or breakage of data link in direction from GETC to Voter). (See Critical Fault Alarms heading.)

- Carrier Present Alarm (Single-Site and Main Site only) - Indicates that this GETC is detecting the presence of an RF carrier without proper signaling (possible interfering signal or deliberate jamming). This alarm will only be used to fail a channel if it is enabled in the Site Controller's personality.

- PA Failure Alarm (Single-Site and Main Site only) - Indicates that the MASTR III repeater's output power has dropped below the threshold level. (See Critical Fault Alarms heading.)

- Synth Unlock Alarm (Single-Site and Main Site only) - Indicates that the MASTR III repeater's synthesizer is not locked. (See Critical Fault Alarms heading.)

- Turbo Board Failure Alarm (Single-Site, Main Site, and Control Point) - Indicates a disruption in the communication between this GETC's main processor and its Turbo Board. (See Critical Fault Alarms heading.)

- Frame Sync Line (FSL) Failure (This alarm is not yet implemented.) - Indicates the absence of (or an abnormality in) the sync pulses from the Control Channel GETC to this GETC (possible open or shorted line, or fault in Control Channel GETC). This alarm will only be used to fail a channel if it is enabled in the Site Controller's personality (default is disabled - not currently supported).

Downlink GETC

A Downlink (or Redundant Downlink) GETC sends an alarm to the Site Controller when one of the following conditions exist:

- Link Failure Alarm - Indicates that the Downlink GETC has stopped receiving information from the network end of the Downlink.
- Turbo Failure Alarm - Indicates that the Downlink GETC's main processor is unable to communicate with its Turbo Board.

If the primary downlink GETC fails to respond to polls from the Site Controller or reports a turbo alarm, then the Site Controller will fail that downlink. When the IMC does not see messages from the Site Controller on the primary downlink, it will switch to the redundant downlink (if one is defined). The Site Controller sends the same messaging to all defined downlinks so when the IMC looks to the redundant downlink, it will see the same messaging it was expecting to see from the primary downlink. If the Site Controller does not see messages from the IMC, it will set a bit in its message to the IMC indicating that there is a problem with the messages coming from the IMC. This will also cause the IMC to switch to the redundant downlink (if one is defined).

ALARM MANAGEMENT

Alarm conditions detected by the Site Controller itself, or by standard or optional equipment connected directly or indirectly to the Site Controller, are used to take a channel or piece of equipment out of service when it is no longer a benefit to the operation of the system. The Site Controller follows a specific course of action (depending upon the type of alarm) to fail such equipment, report the alarm to the System Manager, attempt to recover the failed equipment, and (if successful) report the alarm cleared to the System Manager.

Channel Failure/Recovery

Any one of the following alarm conditions results in the immediate failure of the channel and its removal from service (no user calls will be assigned to the failed channel until it is returned to service):

- Polling Failure for Station GETC
- GETC Alarm from Station GETC
- CC Fail message from TU for Control Channel
- Test Call Failure from TU for Working Channel
- Working Channel Power Failure from PMU for Working Channel
- Control Channel Power Failure from PMU for Control Channel

As soon as the failed channel is removed from service, the Site Controller pursues the following course of action:

- If the failed channel is the Control Channel, the Site Controller selects a new Control Channel.
- The Site Controller reports the failure to the System Manager in an Activity Record.
- The Site Controller continues to poll the failed channel's GETC.
- For PMU and test call failures, the Site Controller directs the TU to place test calls on the failed channel at more frequent intervals than for non-failed channels.
- For PMU failures in a system without a functioning TU, the Site Controller places Pseudo test calls on the failed channel (keys channel) to allow the PMU to measure the channel's output power level.

The failed channel is returned to service when one of the following conditions is met:

- The original alarm condition is cleared and a test call is successfully completed on the failed channel (if a TU exists).
- The total number of failed channels reaches the Fault Tolerance Threshold, and the non-critical alarm type (for which the channel was failed) is responsible for the highest number of non-critical channel failures. A test call must also be successfully completed on the failed channel (if a TU exists). (For more details, see the Fault Tolerance Threshold heading.)

Polling Failure/Recovery

A polling failure occurs when the Site Controller does not receive a single correct response to a certain number of consecutive polls. The following pieces of equipment are polled by the Site Controller and are therefore subject to polling failures:

- Station GETCs (one for each RF channel)
- Downlink GETC

- Redundant Downlink GETC
- PMU (Power Monitor Unit)
- ACU (Alarm & Control Unit)
- TU (Test Unit)
- Local Telephone Interconnect (two data links - two polls)

When a polling failure occurs, the Site Controller fails the piece of equipment and pursues the following course of action:

- If the polling failure is for a Station GETC, see the previous heading on Channel Failure/Recovery.
- The Site Controller reports the polling failure to the System Manager in an Activity Record.
- The Site Controller continues to poll the piece of equipment in order to recover it as soon as the failure is corrected.

When the Site Controller receives a correct response to each of a certain number of consecutive poll messages, the Site Controller returns the piece of equipment to service and reports the clearing of the polling failure to the System Manager.

Auxiliary Alarm Reporting

Starting with Site Controller Application Software Release 8.0, a Remote Test Call Alarm Level parameter can be specified in the Site Controller Personality when a Remote Test Unit is specified. This parameter (not reconfigurable through the System Manager) specifies the number of consecutive test call failures (Auxiliary Alarms) that must be received from a Control Point GETC before the Site Controller will report the Auxiliary Alarm for that channel to the System Manager. This feature is used to minimize the reporting of temporary Auxiliary Alarms that require no action.

As soon as an Auxiliary Alarm is received from the Control Point GETC (regardless of the Remote Test Call Alarm Level parameter's value), the affected channel is taken out of service and the channel is indicated as failed on the System Manager's Site Monitor screen. If a test call is successfully completed before the specified number of consecutive test call failures is reached, the channel is returned to service, the channel is indicated as available on the System Manager's Site Monitor screen, and no alarm is reported to the System Manager.

If a test call is not successfully completed before the specified number of consecutive test call failures is reached, the channel remains out of service, the channel is indicated as failed on the System Manager's Site Monitor screen (with "AUX ALARM" shown as Channel Activity), and an Auxiliary alarm is reported to the System Manager (shown on the Alarm screen).

The Remote Test Call Alarm Level parameter has a default value of 0, which will allow each received Auxiliary alarm (temporary or not) to be reported to the System Manager. Although you may order a Site Controller Personality with this parameter set as high as 6, values higher than 3 are strongly discouraged (since this could unnecessarily delay the reporting of an alarm when it actually exists).

Fault Tolerance Threshold

In general, the channel fault tolerance threshold (FTT) is used to determine when too many channels have failed and some need to be recovered. If the quantity of channels failed (due to any combination of alarms) reaches the FTT, all channels failed due to the non-critical alarm type that has failed the most channels will be put back into service. The FTT processing does not return channels to service that are failed due to critical alarms (see Critical Fault Alarms heading).

When the FTT is reached, the Site Controller takes the following action:

- The Site Controller determines which non-critical alarm type is responsible for the most failed channels.
- If this alarm type is being reported by the PMU, the Site Controller fails the PMU and sends a PMU fail alarm to the System Manager, stops using this alarm type to fail channels (although it continues to report any new alarms of this alarm type to the System Manager - for display on the alarm screen), and attempts to bring each PMU-failed channel back into service by successfully completing a Recovery Test Call on each of these channels. In a system without a functioning TU, the Site Controller places Pseudo Test Calls in place of the Recovery Test Calls (keys the channel's transmitter so the PMU can make a power measurement).
- If this alarm type is being reported by the TU, the Site Controller fails the TU and sends a TU fail alarm to the System Manager, stops using this alarm type to fail channels (although it continues to report any new alarms of this alarm type to the

System Manager - for display on the alarm screen), and returns all channels to service that were failed by this alarm type.

- If this alarm type is for any failure other than a PMU or TU failure, the Site Controller stops using this alarm type to fail channels (although it continues to report any new alarms of this alarm type to the System Manager - for display on the alarm screen), and returns all channels to service that were failed by this alarm type.

- When all alarms for this alarm type have cleared from the System Manager alarm screen (those detected before and after the FTT was reached), the Site Controller resumes using this alarm type to fail channels. In a case where this alarm type was reported by the PMU or TU, the Site Controller recovers that device and reports to the System Manager that the alarm for the device is cleared.

Example (non-critical alarms only): Suppose a system has 8 channels, a FTT of 50%, 3 channels fail due to carrier alarms, and 1 channel fails due to a PMU alarm. The FTT is met because 4 out of 8 channels (50%) have failed. The channels that have failed due to carrier alarms will be brought back into service, because this alarm type is a non-critical fault alarm and is responsible for the most failed channels. The channel that has failed due to the PMU alarm will remain failed. If additional carrier alarms are received, they will not be used to take channels out of service.

Example (critical and non-critical alarms): Suppose a system has 8 channels, a FTT of 50%, 3 channels fail due to a PA failure, and 1 channel fails due to a carrier alarm. The FTT is met because 4 out of 8 channels (50%) have failed. The channels that have failed due to a PA failure will not be brought back into service (even though this alarm type is responsible for the most failed channels), because this alarm type is a critical fault alarm. The 1 channel with the Carrier alarm will be brought back into service because, of the non-critical fault alarm types, it is responsible for the most failed channels (even though it is only 1 channel). If additional carrier alarms are received, they will not be used to take channels out of service.

Example (critical alarms only): Suppose a system has 8 channels, a FTT of 50%, 3 channels failed due to PA failures, and 1 channel failed due to a Turbo alarm. The FTT is met because 4 out of 8 channels (50%) have failed. The channels that have failed due to a PA failure or a Turbo alarm will not be brought back into service (even though these alarm types are responsible for all of the failed channels), because both of these alarm types are critical fault alarms. In this example, the Site Controller does not return any channels to service.

The value for the FTT (default is 50%) is contained in the Site Controller personality and cannot be reconfigured through the System Manager. If some other value is desired, a new personality must be obtained from the factory.

ACU Display Panel

The following "SYS STATUS" alarms, displayed on the ACU (Alarm & Control Unit) display panel, are driven by alarm information from the Site Controller:

- ANT PWR FAIL - Lit when an antenna alarm (for one or both antennas) is received by the Site Controller from the PMU.

- CHN PWR FAIL - Lit when a transmitter alarm (for one or more channels) is received by the Site Controller from the PMU.

- GETC FAIL - Lit when a GETC alarm (for one or more GETCs) is received by the Site Controller from the GETCs.

- INTERCONNECT FAIL - Lit when an alarm for the local telephone interconnect is received the Site Controller.

- BACKUP LINK FAIL - Lit when an FSL (Frame Sync Line) alarm (for one or more GETCs) is received by the Site Controller from the GETCs.

CRITICAL FAULT ALARMS

Description

Unlike other GETC alarms which are sent to and used by the Site Controller to fail RF channels, the critical fault alarms are used by the Station GETCs to fail RF channels directly (without relying on the Site Controller). These alarms are sent to the Site Controller so calls won't be assigned to the RF channels already failed by the GETCs, and so the alarms can be reported to the System Manager. The primary difference between critical and non-critical alarms is that the Fault Tolerance Threshold does not apply for critical alarms (does not return channels to service that are failed due to critical alarms).

These four critical fault alarms are as follows:

- PA Failure Alarm - Indicates that the MASTR III repeater's output power has dropped below the threshold level.
- Voter Alarm - Indicates that error messages are being received from the Voter.
- Synth Unlock Alarm - Indicates that the MASTR III repeater's synthesizer is not locked.
- Turbo Board Failure Alarm - Indicates a disruption in the communication between the main GETC processor and its Turbo Board.

System Requirements

The following minimum configurations are required for the following equipment in order to support these alarms:

- System Manager:
  - VAX model
  - Group 6 software[7]
- Station GETCs:
  - Logic Board Hardware must be 19D901868G4 (or G3 upgraded to G4).
  - Logic Board Software must be 349A9607G6 or later.
  - Turbo Board Software must be 344A4414G4 or later.
  - Personality Software must have PA Failure alarm enabled (if no PMU exists in the system).

[7] *Use of Group 5 or earlier (instead of Group 6 or later) System Manager software will not affect the operation of the GETCs or Site Controller regarding these alarms. The System Manager will receive information to indicate that a channel has failed, but be unable to recognize the alarm that caused the channel to be failed. Therefore, the user will have no idea why the channel is failed, and may believe the system is operating incorrectly. Group 5 System Manager software can report the alarm type using the logging to printer feature. Alarm types can be determined at the GETC. See the System Manager and GETC manuals for details.*

Compatibility with PMU Option

NOTE

The PA Failure alarm is not compatible with the PMU option. The Site Controller can be programmed to respond to either the alarms from the PMU or the PA Failure alarms from the Station GETCs, but not both.

To have the Site Controller respond to all alarms from the PMU (ignore all PA Failure alarms from the Station GETCs), the following configurations are required:

- The Power Monitor Unit parameter must be enabled in the System Manager. If using the DB8860-based PMU (with or without a System Manager), this parameter must be enabled in the Site Controller's personality (so that the DB8860 model can be selected). If using the DB8843-based PMU without a System Manager, this parameter must be enabled in the Site Controller's personality.
- The PA Failure alarm must be disabled in each Station GETC's personality.

To have the Site Controller respond to all PA Failure alarms from the Station GETCs (ignore all alarms from the PMU), the following configurations are required:

- The Power Monitor Unit parameter must be disabled in the System Manager. If using either PMU without a System Manager, this parameter must be disabled in the Site Controller's personality.
- The PA Failure alarm must be enabled in each Station GETC's personality.

Channel Failure / Recovery

The process of failing an RF channel due to a critical alarm is as follows:

- The Station GETC receives or detects a critical alarm.
- The Station GETC sends the alarm to the Site Controller.
- The Station GETC takes itself out of service (stops responding to call requests from the Site Controller).

- The Site Controller fails the RF channel failed by the Station GETC (stops assigning calls to the GETC).
- The Site Controller sends alarm information to the ACU.
- The Site Controller sends alarm information to the System Manager.
- The Site Controller continues to poll the Station GETC for the failed RF channel.
- The Station GETC continues to respond to polls from the Site Controller.

The process of recovering an RF channel that was failed due to a critical alarm is as follows:

- The Station GETC stops receiving the alarm or detects that the alarm has cleared.
- The Station GETC stops sending the alarm to the Site Controller.
- The Station GETC puts itself back into service (starts responding to call requests from the Site Controller).
- The Site Controller assigns a test call to the RF channel cleared by the Station GETC.
- If the test call is successful, the Site Controller recovers the RF channel that was previously failed by the Station GETC.
- The Site Controller sends alarm cleared information to the ACU.
- The Site Controller sends alarm cleared information to the System Manager.

TROUBLESHOOTING

RECOVERY FROM FAILSOFT

To bring the site out of Failsoft, reset a GETC (preferably the Control Channel GETC) for a channel that is allowed to be a Control Channel by the Site Controller (press S4 on the front edge of the GETC Logic Board inside the GETC shelf). If you accidently reset a GETC (whether it is the Control Channel GETC or not) for a channel that is not allowed to be a Control Channel by the Site Controller, the site will not come out of Failsoft. If this happens, you must move the Control Channel (by resetting the Control Channel GETC) to a channel that is allowed to be a Control Channel by the Site Controller. Then, reset the Control Channel GETC once more to bring the site out of Failsoft.

TROUBLESHOOTING GUIDES

Table 12 consists of a troubleshooting guide for MCP-related problems. Find the applicable symptom. Then look at each possible cause. When the cause is found, you may want to take the corrective action or leave as is.

Table 12 - Multiple Channel Partition (MCP) Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Group voice or data call is denied.	Partition not defined at site.	Use different group or define partition for that site.
	No digital channels in partition.	Assign digital channel to partition.
	No data channels in partition.	Assign data channel to partition.
	ACC partition moved to called group's partition and it only has one channel defined, which is now the Control Channel, so there are no working channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them.
Individual voice call is denied.	If both radios are in same partition the partition may not be defined at site.	In the site database maintenance screen, define partition for that site. Also, from the site reconfiguration screen, send the new channel MCP data.
	No digital channels in partition.	Assign digital channel to partition.
	If both radios in same partition and ACC moved to that partition or radios in different partitions, the ACC partition may be located in partition with only one channel, which is now the Control Channel, so there are no Working Channels in that partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them.
Individual data call is denied.	Data radio's partition may not be defined at site.	In the site database maintenance screen, define partition for that site. Also, from the site reconfiguration screen, send the new channel MCP data.
	No data channels in partition.	Assign data channel to partition.
	ACC partition moved to data radio's partition and it only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them.
Dynamic Regroup call is denied.	ACC partition moved to partition that only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them.
System All-Call is denied.	ACC partition may have moved to a partition that only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them.

(Continued)

Table 12 - Multiple Channel Partition (MCP) Troubleshooting Guide (Continued)

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Patch activation is denied.	If all GIDs are in the same partition, partition may not be defined at one of more of the sites.	In the site database maintenance screen, ensure that partitions are defined for all of the sites. Also, from the site reconfiguration screen, send the new channel MCP data.
	If GIDs are in different partitions at one or more of the sites, the ACC partition may have moved to a partition that only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them, for all sites.
Group Simulselect activation is denied.	If all GIDs are in the same partition, partition may not be defined at one of more of the sites.	In the site database maintenance screen, ensure that partitions are defined for all of the sites. Also, from the site reconfiguration screen, send the new channel MCP data.
	If GIDs are indifferent partitions, at one or more of the sites, the ACC partition may have moved to a partition that only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them, for all sites.
Individual Simulselect activation is denied.	If all LIDs are in the same partition, partition may not be defined at one of more of the sites.	In the site database maintenance screen, ensure that partitions are defined for all of the sites. Also, from the site reconfiguration screen, send the new channel MCP data.
	If LIDs are in different partitions, at one or more of the sites, the ACC partition may have moved to a partition that only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them, for all sites.
LID & GID Simulselect activation is denied.	If all LIDs & GIDs are in the same partition, partition may not be defined at one of more of the sites.	In the site database maintenance screen, ensure that partitions are defined for all of the sites. Also, from the site reconfiguration screen, send the new channel MCP data.
	If LIDs & GIDs are in different partitions, at one or more of the sites, the ACC partition may have moved to a partition that only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them, for all sites.

(Continued)

Table 12 - Multiple Channel Partition (MCP) Troubleshooting Guide (Continued)

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Radio-originated Local or Central Interconnect call is denied.	Calling radio's partition may not be defined at site.	In the site database maintenance screen, define partition for that site. Also, from the site reconfiguration screen, send the new channel MCP data.
	If this is a Local Interconnect call, the number called may be toll call restricted.	Change toll call restrictions for the calling LID to allow called number.
	If this is a Local Interconnect call, there may not be any channels with interconnect equipment in partition.	Assign interconnect channel to partition.
	ACC partition moved to calling radio's partition and it only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them.
Telephone-originated Local or Central Interconnect call is denied.	Called radio's partition may not be defined at site.	In the site database maintenance screen, define partition for that site. Also, from the site reconfiguration screen, send the new channel MCP data.
	If this is a Local Interconnect call, the called LID or GID may not be allowed to receive Local Interconnect calls.	Enable LID or GID to receive Local Interconnect calls.
	If this is a Local Interconnect call, there may not be any channels with interconnect equipment in partition.	Assign interconnect channel to partition.
	ACC partition moved to calling radio's partition and it only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them.
Multisite call is not assigned to some sites.	Call's partition may not be defined at all sites.	In the site database maintenance screen, ensure that partitions are defined for all of the sites. Also, from the site reconfiguration screen, send the new channel MCP data.
	ACC partition may have moved to a partition that only has one channel defined, which is now the Control Channel, so there are no Working Channels in the partition.	From the reconfiguration screen of the System Manager, only allow the Control Channel on channels in partitions with at least two channels assigned to them.

(Continued)

Table 12 - Multiple Channel Partition (MCP) Troubleshooting Guide (Continued)

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Group Central Interconnect call is assigned and then drops at radio. Phone gets a busy signal.	One or more sites do not have the group's partition defined.	When making the partition plan, be aware that enabling a group for MCP and assigning it to a partition that only exists at certain sites will cause multi-site calls to that GID to be denied on certain sites.
System permits LID-to-LID call even when each partition assigned to one or both LIDs does not exist in system.	Present software design checks similarity of partitions assigned to LIDs before checking existence of partitions in system. When partitions assigned to LIDs are dissimilar, the search for an available channel is directed to the ACC Partition regardless of whether the partitions assigned exist in system.	When making your partition plan, be aware that non-existent partition assignments do not deny access to a system for calls between LIDs with dissimilar partition assignments.
System permits LID-to-LID call even when each partition assigned to one or both LIDs does not exist in system, and even if one or both are MCP disabled.	Present software design checks for MCP disabled status of LIDs before checking existence of partitions in system. When either LID is MCP disabled, the search for an available channel is directed to the ACC Partition regardless of whether the partitions assigned exist in system.	When making your partition plan, be aware that MCP disabling a LID does not deny access to a system (it guarantees access to a system).
System permits Patch or Simulselect to be activated even when each partition assigned to one or more IDs does not exist in system.	Present software design checks similarity of partitions assigned to IDs before checking existence of partitions in system. When partitions assigned to IDs are dissimilar, the search for an available channel is directed to the ACC Partition regardless of whether the partitions assigned exist in system.	When making your partition plan, be aware that non-existent partition assignments do not prevent activation or deny access to a system for Patch or Simulselect involving IDs with dissimilar partition assignments.
System permits Patch or Simulselect to be activated even when each partition assigned to one or more IDs does not exist in system, and even if one or more are MCP disabled.	Present software design checks for MCP disabled status of IDs before checking existence of partitions in system. When any ID is MCP disabled, the search for an available channel is directed to the ACC Partition regardless of whether the partitions assigned exist in system.	When making your partition plan, be aware that MCP disabling an ID does not prevent activation or deny access to a system for Patch or Simulselect (it guarantees access to a system).

GLOSSARY

ACC Partition..... See Active Control Channel Partition.

Active Control Channel Partition..... The Active Control Channel (ACC) partition is the partition presently containing the Control Channel, in a system using the Multiple Channel Partition (MCP) option.

Active Configuration..... The Active Configuration is the complete set of presently active (currently being used) values for the configurable parameters for a specific piece of equipment. The active configuration may consist entirely of the default values set during power-up or reset, or may have some or all values subsequently reconfigured.

Allowed CC ..... The Allowed CC (Control Channel) parameter defines (for a system's set of channels) which channels may be used as Control Channels.

Application Software ..... The Application Software is the software that runs a device (an executable program). Several versions of Application Software may be written for a single device; one for each of several applications.

Backup Serial Line..... The Backup Serial Line is a data bus used for communications between GETCs during Failsoft Trunking. It is connected to each Station, Downlink, and Uplink GETC in an EDACS system.

Basic EDACS System..... A Basic EDACS System uses Failsoft Repeaters, operating in the Trunked Failsoft mode, to provide voice and data trunked radio communications for an EDACS site.

BSL ..... See Backup Serial Line.

Control Channel ..... A Control Channel is any allowed radio channel (only one at a time) at an EDACS Trunked Site that is used for call requests and Working Channel assignments for trunked calls.

Control Channel GETC..... The Control Channel GETC is the specific Station GETC that is connected to the EDACS repeater currently assigned as the Control Channel.

Downlink GETC ..... The Downlink GETC is the communications interface between an EDACS Repeater site and the Downlink to the IMC.

EDACS ..... Enhanced Digital Access Communications System. EDACS is a registered trademark of Ericsson Inc., and is used by Ericsson to describe specific communications systems and their specific equipment which meet or exceed the needs of the Public Service, Industrial, Commercial, and Utility markets world-wide.

EDACS Site Controller..... The EDACS Site Controller is made up of the Site Controller cabinet, the Site Controller computer, and any supporting equipment that is mounted in the Site Controller cabinet.

Failsoft Trunking..... Failsoft Trunking refers to basic EDACS trunking under the direction of the Control Channel GETC. This is the normal mode of trunking for a Basic EDACS repeater site having no EDACS Site Controller, or the backup mode of trunking for an EDACS repeater site having an EDACS Site Controller.

Fault Tolerance Threshold ..... Fault Tolerance Threshold (FTT) is that level (quantity) of failed channels at which FTT processing starts to be applied in an attempt to recover some of these failed channels. This level is specified as a percent of the equipped channels.

Full-Featured Trunking.....Full-Featured Trunking refers to EDACS trunking under the direction of the EDACS Site Controller. It provides additional features beyond the basic features provided by Failsoft Trunking.

FTT.....See Fault Tolerance Threshold.

FTT Processing.....FTT processing refers to the special condition when the FTT is reached and the Site Controller is allowed to assign some failed channels to calls.

GETC.....A GETC is a communications interface with many possible hardware and software configurations, depending upon its application. When configured for a specific application, it acquires the name of the application, such as a Station GETC, a Control Channel GETC, a Working Channel GETC, a Downlink GETC, etc.

GID.....Group ID. A GID is a unique number used to identify a specific collection of radio units that normally communicate with each other in an EDACS trunked system.

IMC .....Integrated Multisite and Console Controller.

Initial Configuration .....An Initial Configuration is the Active Configuration of a specific piece of equipment as long as it consist entirely of the default values set during power-up or reset.

Level 1 EDACS System.....A Level 1 EDACS System is a Basic EDACS System, with a Site Controller and System Manager added, to allow operation in the Full-Featured Trunking mode.

LID .....Logical unit ID. A LID is the unique number used to identify an individual radio unit in an EDACS trunked system.

MCP.....Multiple Channel Partition. MCP is an optional feature of the EDACS Site Controller which allows selected sets of channels (partitions) to be set aside for exclusive use by selected sets of users (one set of channels for each set of users).

MCP Channel Data.....The MCP Channel Data set is made up of those parameters that are assigned specifically to that system.

MCP Data.....The MCP Data for an EDACS system is a complete set of those variables used for the MCP option. The MCP Data is made up of one MCP Channel Data set and many MCP ID Data sets.

MCP ID Data.....Each MCP ID Data set is made up of those parameters that are assigned to that individual ID (LID or GID). The MCP ID Data sets will be used by all MCP enabled EDACS systems in the EDACS network.

Modem.....A Modem is a data communications interface between a digital data circuit (such as defined by the RS-232 standard) and an analog voice circuit (such as a telephone line or a microwave channel).

Partition .....A partition is a selected set of channels set aside for exclusive use by a selected set of users.

Personality .....A Personality is a set of values for the configurable parameters of a device, that can be used to customize the operation of that device for each user.

Personality PROM.....A Personality PROM is used to store an initial Personality in a piece of equipment. Depending upon the piece of equipment, this initial Personality may or may not be partially or completely reconfigured at some other memory location in the piece of equipment. The PROM itself cannot be reconfigured without being removed from the piece of equipment.

Redundant Downlink GETC ..... A Redundant Downlink GETC is a redundant communications interface between an EDACS Repeater site and the Downlink to the IMC. It is identical to the Downlink GETC; only its connection points are different.

Site Controller..... See Site Controller Computer.

Site Controller Computer ..... The Site Controller Computer (usually referred to as the Site Controller) is the computer (along with its Application Software and customer-specific Personality) that is used to supervise the Full-Featured Trunking mode of operation for an EDACS site (system).

Site Database..... The Site Database is a set of parameter values (maintained by the System Manager) for a specific EDACS Repeater system. The Site Database is used by the Site Controller to supervise the Full-Featured Trunking mode of operation for that specific EDACS Repeater system.

Station GETC..... A Station GETC is the GETC located with a MASTR II, IIe, or III repeater to make it an EDACS repeater. A Station GETC connected to a Control Channel is called a Control Channel GETC. A Station GETC connected to a Working Channel is called a Working Channel GETC.

Working Channel ..... A Working Channel is any radio channel at an EDACS Trunked Site that is available or in use to carry trunked calls.

Working Channel GETC..... A Working Channel GETC is any Station GETC that is connected to an EDACS repeater currently assigned as a Working Channel.

APPENDIX A - MCP ASSISTANT

The MCP Assistant includes an MCP Feature Checklist and MCP Planning Worksheets. These tools, along with the MCP Troubleshooting Guide, located in the Troubleshooting section of the main text, will assist in implementing and managing MCP. Refer to the MCP section in the main text for additional information on what MCP is, how it is used, and what is needed before making a plan.

MULTIPLE CHANNEL PARTITION (MCP) FEATURE CHECKLIST

The MCP Checklist is summarized as follows:

1. System Requirements
2. Running the System with Default MCP Data
3. Creating Partition Plan
4. Implementing Partition Plan
5. Partition Plan Operational Verification
6. Partition Plan Updates
7. Partition Plan Deactivation

Items 1 through 5 should be executed in order. Items 6 and 7 are independent and are provided for future reference.

The checklist items are described in more detail as follows:

1. System Requirements

❑ VAX System Manager Release 5 (version 5.xx) or later.

❑ VAX Site Controller Release 7 (version 7.xx) or later.

❑ Site Controller Personality has MCP enabled.

2. Running the System with Default MCP Data

❑ Use defaults until partition plan is defined.

- MCP Channel Data defaults all channels to partition 1. MCP ID Data defaults all LIDs and GIDs to “No” for the ID subject to partitioning status. This is functionally equivalent to an EDACS system (site) running with MCP disabled, but it sets things up for activating MCP once a plan is defined.

3. Creating Partition Plan

❑ Before you start to configure the MCP Channel Data or MCP ID Data, make a plan. Keep all EDACS systems (sites) in the EDACS network and all call types for IDs in mind when creating a plan.

A. MCP Channel Data

❑ For each system in the network that is enabled for MCP, the MCP Channel Data must be set up.

- At least one partition must always be defined at the site.
- A highly partitioned system may result in a high call queuing rate.
- Channel partitioning is done on a per site basis. The partition number assigned to a specific channel number at one site does not need to be the same as the partition number assigned to the same channel number at another site, particularly when the number of channels varies from site to site.

❑ The RF field still defines which channels are enabled for the site.

B. Allowed Control Channel Management

❑ The Active Control Channel (ACC) partition should contain a sufficient number of channels to handle MCP assignments. These assignments include calls between IDs having different partition designations, calls for IDs that are not MCP enabled, and calls for IDs with the primary partition number of the ACC. Coverage area, call type, and quantity of channels should all be taken into consideration when setting up the ACC partition.

❑ When specifying the allowed control channels (Allowed CC on the System Manager), use the fewest number of MCP partitions needed to provide adequate CC movement per customer requirements. This maximizes partition use for calls per the partition plan.

C. MCP ID Data

❑ For each GID and/or LID in the System Manager database that is subject to partitioning, MCP ID Data must be set up.

- GID and LID partitioning is currently done on a network wide basis (all sites).

❑ The ID Subject to Partitioning field in the LID and GID database screens indicate whether or not the ID is MCP enabled ” yes” or disabled “no”. If the ID is not subject to partitioning, the ACC partition will be used.

❑ The Primary Partition field in the LID and GID database screens designates the partition of choice (where the call should be assigned) under typical system conditions.

❑ The Optional Backup Partition fields in the LID and GID database screens will indicate the condition for using this partition when the primary partition is unavailable and the partition number assigned to that backup. The site will search these backup partitions in ascending numerical order.

4. Implementing Partition Plan

❑ Once you have created a plan, you can start to configure the site(s) with MCP Channel Data and MCP ID Data.

❑ Perform a System Manager Database Backup to establish a non-MCP baseline.

A. Entering MCP Channel and ID Data

- Note there are three options given here as to how the partition plan can be entered. The difference among the options is the impact that MCP will have on system operation versus the ease in entering the data. As a guideline, option 2 is recommended.

  The issue is as follows: once the MCP Data is entered, but before you are ready to update the site with the data, the Site Controller may get reset (e.g., power outage). If this happens, the (perhaps partial) MCP Data that has been entered will update the site. This will consequently affect system operation (i.e., If the Channel Data has been entered but no ID Data, then all calls will go to the ACC partition. This could cause calls to get queued if the ACC is not large enough to handle all system activity.)

  Since the likelihood of the Site Controller being reset may vary from system to system, these three options give you the ability to enter the MCP Data in the manner that will suit your particular needs (whether they be ease in entering or safety from the Site Controller being reset).

  Note that Channel Data must be entered for all sites before ID Data is entered. ID Data is configured on a network wide basis, it will update all MCP enabled sites in the network with this information. Since Channel Data is configured on a per site basis, all MCP enabled sites must be configured with their Channel Data before the ID Data is entered.

Option 1 - Quick Data Entry (with potentially high Site Controller reset impact):

❑ This option is useful for the following scenarios:

- Small partition plans
- Low call activity
- System installation (where the system and/or network is not yet on-line)

This option provides the easiest method of entering the MCP Data, but it is subject to operational risk if the Site Controller is reset before all data is entered. If there is relatively low risk that the Site Controller will be reset before all data is entered and this process is taking place during a very low call activity period, then this option is most likely the best one for you.

I) Enter and save the MCP Channel Data in the System Manager Site Definition Screen (screen 10) for all MCP enabled sites. *Do not update the site(s) with the MCP Channel Data at this time.* Channel Data must be entered before MCP ID Data. If MCP ID Data is entered before MCP Channel Data and the site(s) gets updated with the data (i.e., site is reset), then calls made to and from MCP enabled IDs may be denied (since there are not channels assigned to any other partition but 1).

ii) Enter and save all of the MCP GID Data (enable the ID and set up the primary and backup partition information) in the System Manager Group Definition Screen (screen 12). When entering the data, do it by MCP primary partition (i.e., enter MCP Data for all GIDs with primary partition 1 first, then for all GIDs with primary partition 2, then with primary partition 3, etc.) *Do not update the site(s) with the MCP GID Data at this time.*

iii) Enter and save all of the MCP LID Data (enable the ID and set up the primary and backup partition information) in the System Manager Logical Unit Definition Screen (screen 11). When entering the data, do it by MCP primary partition (i.e., enter MCP Data for all LIDs with primary partition 1 first, then for all LIDs with primary partition 2, then with primary partition 3, etc.) *Do not update the site(s) with the MCP LID Data at this time.*

iv) Create the following System Manager reports and verify that the MCP Data is correct:

- Device Report (screen 60)
- Logical Unit Report (screen 61)
- Group Report (screen 62)

Option 2 - Partition-based Data Entry (with low Site Controller reset impact):

❑ This option is recommended for general use. It is useful for the following scenarios:

- Large partition plans
- High call activity
- Low tolerance to Site Controller reset scenario

This option provides a more difficult method of entering the MCP Data, but with almost no impact if the Site Controller is reset before all data is entered. If there is a real risk that the Site Controller will be reset before all data is entered or this process is taking place during a very high call activity period which may cause queuing, then this option is most likely the best one for you.

i) Enter and save the MCP Channel Data for one of the partitions from the partition plan (we'll call this partition X - screen 10). Do this for all MCP enabled sites. *Do not update the site(s) with the MCP Channel Data at this time.*

ii) Enter and save the MCP GID primary and backup partition information for those GIDs that will have a primary partition of X. *Do not update the site(s) with the MCP GID Data at this time.*

iii) Enter and save the MCP LID primary and backup partition information for those LIDs that will have a primary partition of X. *Do not update the site(s) with the MCP LID Data at this time.*

iv) For those GIDs that will have a primary partition of X, enable them for MCP and save. *Do not update the site(s) with the MCP GID Data at this time.*

v) For those LIDs that will have a primary partition of X, enable them for MCP and save. *Do not update the site(s) with the MCP LID Data at this time.*

vi) Repeat steps i through v until all MCP Data for all partitions from the partition plan has been entered and saved for all sites.

vii) Create the following System Manager reports and verify that the MCP Data is correct:

- Device Report (screen 60)
- Logical Unit Report (screen 61)
- Group Report (screen 62)

Option 3 - Phased Data Entry (with Delayed Activation):

❑ This option is useful for the following scenarios:

- System installation (where turn on of MCP is delayed, and partition planning definition phase may be done on System Manager)

This option provides a compromise between the ease of entering the MCP Data and safety from the Site Controller being reset. If there is a minimal risk that the Site Controller will be reset before all data is entered but this process is taking place during a very high call activity period, then this option is most likely the best one for you.

This procedure is executed in two phases, which will require two passes through the ID databases.

Phase I (prior to Site Controller turn-on):

I-i) Enter and save the MCP Channel Data in the System Manager Site Definition Screen (screen 10) for all MCP enabled site(s). *Do not update the site(s) with the MCP Channel Data at this time.* Channel Data must be entered before MCP ID Data. If MCP ID Data is entered before MCP Channel Data and the site(s) gets updated with the data (i.e., Site Controller is reset), then calls made to and from MCP enabled IDs may be denied (since there are not channels assigned to any other partition but 1).

I-ii) Enter and save the MCP GID primary and backup partition information for all GIDs. This is done in the System Manager Group Definition Screen (screen 12). When entering the data, do it by MCP primary partition (i.e., enter MCP Data for all GIDs with primary partition 1 first, then for all GIDs with primary partition 2, then with primary partition 3, etc.) *Do not update the site with the MCP GID Data at this time.*

I-iii)Enter and save all of the MCP LID primary and backup partition information for all LIDs. This is done in the System Manager Logical Unit Definition Screen (screen 11). When entering the data, do it by MCP primary partition (i.e., enter MCP Data for all LIDs with primary partition 1 first, then for all LIDs with primary partition 2, then with primary partition 3, etc.) *Do not update the site with the MCP LID Data at this time.*

Phase II (sometime after system is on-line):

II-i) For those GIDs changed in step ii, enable them for MCP and save (screen 12). *Do not update the site with the MCP GID Data at this time.*

II-ii)For those LIDs changed in step iii, enable them for MCP and save (screen 11). *Do not update the site with the MCP LID Data at this time.*

II-iii)Create the following System Manager reports and verify that the MCP Data is correct:

- Device Report (screen 60)
- Logical Unit Report (screen 61)
- Group Report (screen 62)

B. **Activate Partition Plan**

❑ Update each MCP enabled site with the MCP Channel Data using the System Manager Site Reconfiguration Screen, Channel (screen 20). *Note that Channel Data is entered on a per site basis where ID Data is entered for all sites. This means all sites must be updated before updating the site with the MCP ID Data.*

❑ Update the system with the MCP ID Data using the System Manager Device Communication, Database Upload Screen (screen 30). Simply mark the Full Logical ID Database and Full Group ID Database fields with a "Y" and submit your request. Note that all sites will be updated at once. *This should be done after updating all MCP enabled systems with MCP Channel Data.*

5. Partition Plan Operational Verification

❑ Place calls on the system(s) that exercise the partition plan.

❑ Verify the System Manager Activity Detail Report confirms that the IDs got assigned to channels in the proper partition, according to the partition plan. *This assumes that the MCP Channel Data has not been altered since the calls were placed. If so, make sure to use the Channel Data that was defined at the point in time that the calls were placed.*

❑ Perform a System Manager Database Backup to establish an MCP baseline.

6. Partition Plan Updates

❑ Enter changes and activate per partition using option 2 of Step 4.A, Implementing Partition Plan.

❑ Verify operation and perform system manager backup using Step 5, Partition Plan Operational Verification.

7. Partition Plan Deactivation

- Note there are two methods given here as to how to terminate the partition plan if necessary.

Method 1:

❑ Apply per partition using option 2 of Step 4.A, Implementing Partition Plan, if possible, option 1 of Step 4.A if in a hurry.

i) The idea here is to execute the Implementation of the partition plan in reverse. Note that you only need to make each ID not subject to partitioning. The actual partition information does not have to be changed.

ii) Once all IDs are no longer subject to partitioning, if all channels for each MCP enabled site are not assigned partition 1 do this now.

iii) Update all MCP enabled sites using Step 4.B.

Method 2:

❑ Restore the non-MCP baseline from the System Manager backup (done in Step 4).

i) Once the backup restoration is complete, update all MCP enable sites with the restored MCP Channel and ID Data using step 4.B.

- Note that the backup restore operation will restore all non-MCP database information as well. *If this is not acceptable, use method 1.*

MULTIPLE CHANNEL PARTITION (MCP) PLANNING WORKSHEETS

MCP Template: Channel Data

Site Definition - Channel Configuration Partitioning

This template is an extract from the System Manager screen 10 (panel 1.4). Use this as a guide to setup each site that is MCP enabled.

Device Number : _____

Channel Configuration:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
RF:																							
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Allowed CC:																							
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MC Partition:																							
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Legend:

RF: Enter 'Y' for enabled, 'N' for disabled, and 'C' for the control channel.

Allowed CC: Enter 'Y' if the channel is allowed to be a control channel and 'N' if it is not.

MC Partition: Enter the character (1-9 for partitions 1-9 and A-F for partitions 10-15) for the partition that should be assigned to the channel.

MCP Template: ID Data

Unit Multiple Channel Partitioning

This template is an extract from the System Manager screen 11 (panel 4.4). Use this as a guide to setup each Logical Unit ID for MCP.

Unit Number: _____

ID Subject to Partitioning: ___

Primary Partition: ___

First Backup Partition:
Condition for Use: _____ MC Partition: ___

Second Backup Partition:
Condition for Use: _____ MC Partition: ___

Third Backup Partition:
Condition for Use: _____ MC Partition: ___

Legend:

ID Subject to Partitioning: Enter 'Y' if LID should be enabled for MCP or 'N' if LID should be disabled for MCP).

Primary Partition: Enter the character (1-9 for partitions 1-9 and A-F for partitions 10-15) for the partition that should be assigned to the LID.

First/Second/Third Backup Partition *(Optional)*: Enter the Condition for Use and MC Partition for each desired backup.

Condition for Use: Choose one of the following -
Not Used Skip (do not search) this backup definition.
Failed/Busy - All Search if previous partition was failed or busy.
Failed/Busy - Emer Search if call is an emergency and previous partition was failed or busy.

MC Partition: Enter the character (1-9 for partitions 1-9 and A-F for partitions 10-15) for the partition that should be assigned to the LID.

MCP Template: ID Data

Group Multiple Channel Partitioning

This template is an extract from the System Manager screen 12 (panel 4.4). Use this as a guide to setup each Group ID for MCP.

Group Id : _____

ID Subject to Partitioning: ___

Primary Partition: ___

First Backup Partition:
Condition for Use: _____ MC Partition: ___

Second Backup Partition:
Condition for Use: _____ MC Partition: ___

Third Backup Partition:
Condition for Use: _____ MC Partition: ___

Legend:

ID Subject to Partitioning: Enter 'Y' if GID should be enabled for MCP or 'N' if GID should be disabled for MCP).

Primary Partition: Enter the character (1-9 for partitions 1-9 and A-F for partitions 10-15) for the partition that should be assigned to the GID.

First/Second/Third Backup Partition *(Optional)*: Enter the Condition for Use and MC Partition for each desired backup.

Condition for Use:	Choose one of the following:
Not Used	Skip (do not search) this backup definition.
Failed/Busy - All	Search if previous partition was failed or busy.
Failed/Busy - Emer	Search if call is an emergency and previous partition was failed or busy.

MC Partition: Enter the character (1-9 for partitions 1-9 and A-F for partitions 10-15) for the partition that should be assigned to the GID.

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