System Release 7.17.2
ASTRO®25
INTEGRATED VOICE AND DATA

Console Sites
Reference Guide

NOVEMBER 2017

MN004302A01-A

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Document History

Version	Description	Date
MN004302A01-A	Original release of the *Console Sites Reference Guide*	November 2017

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About Console Sites

Motorola Solutions Console Sites make up a high-tier and mission-critical IP-based radio dispatch console system.

What Is Covered In This Manual?

This manual provides an introduction to the hardware and software components associated with Console Site workstations. Included are detailed procedures for installation, configuration, and maintenance. This manual is intended for service managers and field service technicians who attended the Motorola Solutions formal MCC 7500 VPM, MCC 7500E or MCC 7100 training.

NOTICE: This manual focuses on console sites supported by the M-Series and L-Series architectures. For Console Site implementation in ASTRO® 25 Conventional systems supported by Conventional Master Sites (K core) and Distributed Conventional Hub Sites, see the *K Core Conventional Architecture Engineer Guide*.

NOTICE:
For information about console sites equipped with Voice Processor Module (VPM)-based Dispatch Consoles, see the *MCC 7500 Dispatch Console with VPM User Guide*.

For information about the MCC 7500E console, see the *MCC 7500E Dispatch Console User Guide*.

This booklet contains the following chapters:

- Console Sites and System Architecture Description on page 27 that provides a high-level description of Console Sites and the function they serve on ASTRO® 25 system.
- Console Sites Theory of Operations on page 37 that explains how Console Sites work in the context of ASTRO® 25 system.
- Console Sites Installation on page 81 that details installation procedures for Console Sites.
- Console Sites Configuration on page 87 that details configuration procedures for Console Sites.
- Console Sites Optimization on page 95 that contains optimization procedures and recommended settings for Console Sites.
- Console Sites Operation on page 107 that details tasks that you perform after Console Sites are installed and operational on your system.
- Console Sites Troubleshooting on page 111 that provides fault management and troubleshooting information about Console Sites.
- Console Sites Reference on page 117 that contains supplemental reference information about Console Sites.

Helpful Background Information

Motorola Solutions offers various courses designed to assist in learning about the system. For information, go to http://www.motorolasolutions.com/training to view the current course offerings and technology paths.

Related Information

Refer to the following documents for associated information about the radio system.

Related Information	Purpose
Standards and Guidelines for Communication Sites (6881089E50)	Provides standards and guidelines that should be followed when setting up a Motorola communications site. Also known as R56 manual. This document may be purchased by calling the North America Parts Organization at 800-422-4210 (or the international number: 302-444-9842)
System Overview and Documentation Reference Guide	Provides an overview of the ASTRO® 25 new system features, documentation set, technical illustrations, and system-level disaster recovery that support the ASTRO® 25 radio communication system.
Console Site Bandwidth Management Feature Guide	Describes bandwidth management in the dispatch console subsystem. Bandwidth management involves setting call counts at the console site to ensure that bandwidth is not exceeded, to ensure efficient transport for the services in ASTRO® 25 systems, for example, voice calls and data services.
MCC 7500 Dispatch Console/AIS with VPM Setup Guide	Describes the process and procedures needed to install and configure the MCC 7500 Dispatch Console and the MCC 7500 Archiving Interface Server.
Elite Admin User Guide	Provides administrators with information on configuring and administering the Elite Admin software application to enable communication paths between dispatch console operators and radio system resources for the MCC 7500 VPM, MCC 7500E and MCC 7100 Dispatch Consoles.
Elite Dispatch User Guide	Provides console operators with information on using the Elite Dispatch software application that supports the MCC 7500 VPM, MCC 7500E and MCC 7100 Dispatch Consoles.
MCC 7500 Dispatch Console with VPM User Guide	Describes the site-level characteristics of MCC 7500 Dispatch Console with Voice Processor Module (VPM) feature - a high-tier, mission-critical, IP-based radio dispatch console system.
MCC 7500E Dispatch Console User Guide	Provides setup and operational details for the MCC 7500E Dispatch Console feature and describes the requirements and considerations necessary for implementing this feature in ASTRO® 25 systems.
MKM 7000 Console Alias Manager User Guide	Provides information relating to the MKM 7000 Console Alias Manager that provides the capability to map Unit IDs to aliases at the dispatch center level for display on the MCC 7500 and MCC 7100 Consoles. These Unit ID-to-alias mappings override

Table continued…

Related Information	Purpose
	the aliases defined for the Unit IDs in the Provisioning Manager.
RF Site Technician Reference Guide	Describes the ASTRO site components and tools used in their installation, configuration, and maintenance in ASTRO® 25 systems, and contains referential sections that provide additional information relevant when performing operations described in the *RF Site Technician Guide*, including feature descriptions, diagrams, and lists of parameters.
Provisioning Manager User Guide	Provides a description of the Provisioning Manager application, including information on how to tailor this application for system use and how to provision ASTRO® 25 systems with various system-level, user-level, and device-level configuration parameters. The *Provisioning Manager User Guide* references in this manual do not apply to ASTRO® 25 systems with K core, or to ASTRO® 25 Express systems. For K core systems, see the *Configuration Manager for Conventional Systems User Guide* and, for ASTRO® 25 Express, see the *Configuration Manager for Trunking Systems User Guide*.
Motorola GGM 8000 Hardware User Guide	Available on the Motorola Online website. To access the manual, select **Resource Center** → **Product Information** → **Manuals** → **Network Infrastructure** → **Routers and Gateways**.
Motorola Network Router (MNR) S2500 Hardware User Guide	
Motorola Network Router (MNR) S6000 Hardware User Guide	
GGM 8000 System Gateway Feature Guide	Provides information relating to the installation, configuration, and management of the GGM 8000 Gateway used in various network locations.
Dynamic System Resilience Feature Guide	Provides information necessary to understand, operate, maintain, and troubleshoot the Dynamic System Resilience (DSR) feature which may be implemented on your ASTRO® 25 system. This feature adds a geographically separate backup zone core to an existing zone core to protect against catastrophic zone core failures.
MCC 7100 IP Dispatch Console User Guide	Provides setup and operational details for the MCC 7100 IP Dispatch Console software only feature and describes the requirements and considerations necessary for implementing this feature in ASTRO® 25 systems.

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Chapter 1

Console Sites and System Architecture Description

This section provides a high-level description of console sites to learn more about the function they serve on your system.

1.1 Console Sites Architecture Overview

In an ASTRO® 25 radio communication system, a console site is the location of a dispatch console equipment that is a dispatch console position and/or Archiving Interface Server (AIS). Dispatch console subsystem is a term used for the combination of equipment that directly supports console operations in various system configuration architectures.

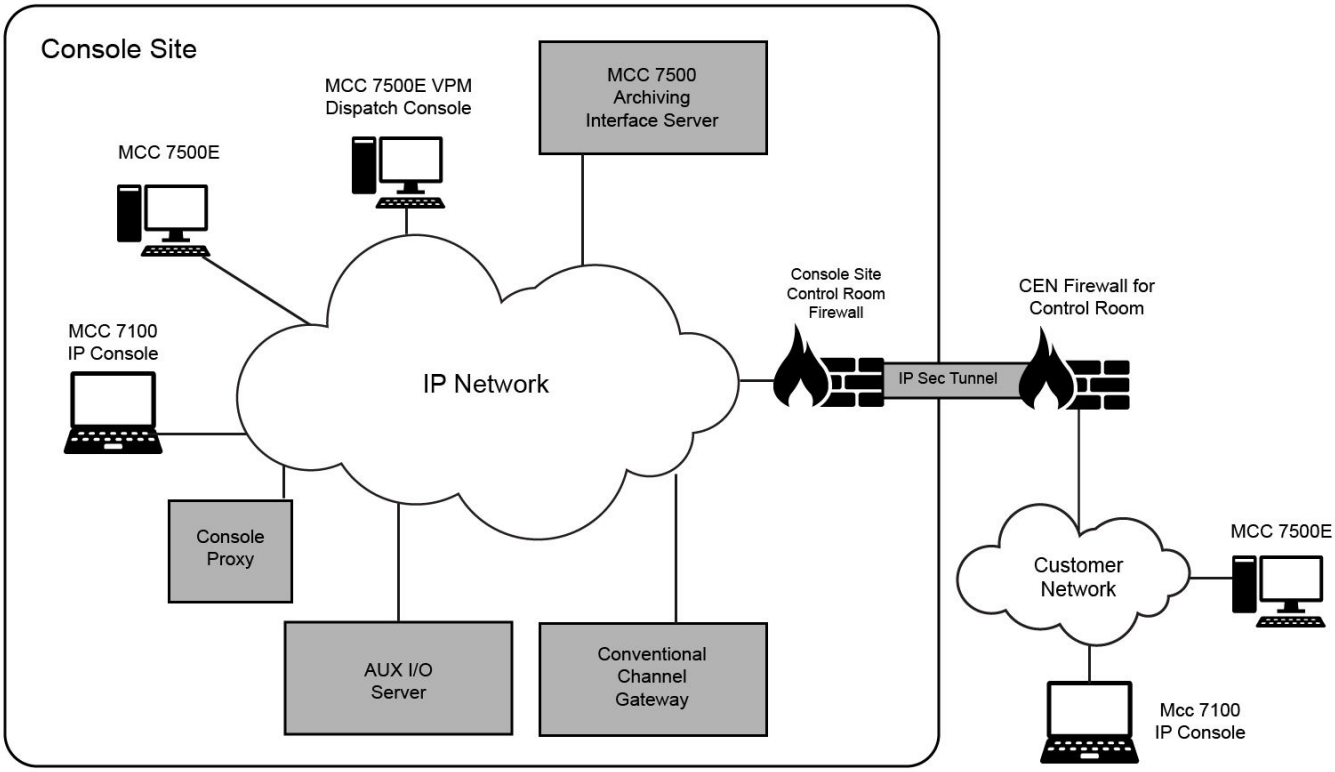
The dispatch console subsystem equipment can include the following components:

- Consolette
- Conventional Channel Gateway
- Conventional Site Controller
- Logging Recorder
- MCC 7100 IP Dispatch Console
- MCC 7500 Archiving Interface Server (AIS)
- MCC 7500 Auxiliary Input and Output (Aux I/O) Server
- MCC 7500 VPM Dispatch Console
- MCC 7500E Dispatch Console
- PRX 7000 Console Proxy
- Replay Station
- Voice Processing Module (VPM)
- Router and gateway equipment

NOTICE: Router and gateway equipment differs depending on the system configuration. In your console sites, you can have only router equipment, both router and gateway equipment, and equipment configured to serve as a router and a gateway.

Figure 1: Key Components of Console Sites

See the figure for an example of how key components of a console site are connected.



NOTICE: The dispatch operator position at a Console Site is an MCC 7500 VPM Dispatch Console, an MCC7500E Dispatch Console or an MCC 7100 IP Dispatch Console. MCC 7500 VPM Dispatch Consoles are always inside the Radio Network Infrastructure (RNI), in a Console Site. MCC 7100 IP Dispatch Consoles and MCC 7500E Dispatch Consoles can be inside and outside the RNI. If you deploy an MCC 7100 IP Dispatch Console or an MCC 7500E Dispatch Console outside the RNI, it connects over the Internet through a firewall to the PRX 7000 Console Proxy located inside the RNI in a Console Site.

NOTICE: Archiving Interface Server is always based on MCC 7500 VPM platform and is always in the RNI.

Console sites are supported in the following system architectures:

Table 1: System Architectures supporting Console Sites

ASTRO® 25 System Architectures	Zone Core
ASTRO® 25 system, Single Zone Redundant/Non-Redundant System Architecture	M1 or M2 Zone Core
ASTRO® 25 system, Multi-Zone Capable Redundant System Architecture	M3 Zone Core
ASTRO® 25 system, Single Zone, Small Scale Redundant/Non-Redundant System Architecture	L Zone Core

Table continued…

ASTRO® 25 System Architectures	Zone Core
ASTRO® 25 Conventional Integrated Voice & Data System Architecture	K Core

1.1.1
Console Site Device Capacities

The amount of the associated equipment supported in an ASTRO® 25 Console Site is limited.

Depending on your configuration, a Console Site can have:

- Up to 50 MCC 7500 VPM Dispatch Consoles
- Up to 50 MCC 7500E Dispatch Consoles
- Up to 50 MCC 7100 IP Dispatch Consoles
- Up to 4 MCC 7500 Archiving Interface Servers

  NOTICE: The total number of MCC 7500 VPM Dispatch Consoles, MCC 7500E Dispatch Consoles, MCC 7500 Archiving Interface Servers, and MCC 7100 IP Dispatch Consoles inside the console site, and remote MCC 7100 IP Dispatch Consoles and MCC 7500E Dispatch Consoles must be less than or equal to 50 per console site.
- Up to 5 PRX 7000 Proxy Servers
- Up to 4 Logging Recorders
- Up to 4 Replay Stations
- Up to 2 MKM 7000 Console Alias Managers (standalone)
- One MKM 7000 Console Alias Manager (collocated)
- Up to two Console Telephony Media Gateways

1.1.2
MCC 7500 VPM and MCC 7500E Aux I/O Capacities

The amount of associated equipment supported in an ASTRO® 25 Console Site is limited.

Depending on your configuration, a Console Site can have:

- Up to 16 Control Relay Outputs per MOSCAD Remote Terminal Unite (RTU)
- Up to 48 Inputs per MOSCAD RTU
- Up to 100 Dispatch Consoles supported by any MOSCAD RTU
- Up to 100 MOSCAD RTUs accessed by any MCC 7500 VPM Dispatch Console or any MCC 7500E Dispatch Console
- Up to 400 Aux I/Os simultaneously assigned to an MCC 7500 VPM Dispatch Console or an MCC 7500E Dispatch Console (does not include channel-related inputs and outputs such as Supervisor Takeover through Relay)
- Up to 8000 Aux I/Os per zone
- Up to 7 MOSCAD RTUs per Conventional-only RF Site *
- Up to 7 MOSCAD RTUs per Trunking Repeater Site *
- Up to 7 MOSCAD RTUs per Simulcast Prime Site *
- Up to 3 MOSCAD RTUs per Simulcast Subsite or Receive-Only Site *
- Up to 5 MOSCAD RTUs per Analog IR Site *
- Up to 5 MOSCAD RTUs per Console Site *

* – The RTUs located at this site may be used as an Aux I/O server for the console or for other purpose. An individual RTU may not be used for both purposes.

1.1.3
M-Series System Architecture

M-Series System Architecture Overview

The M-Series system architectures (supported by an M1/M2 or M3 zone core) support console sites in any one of the following site configurations:

- Console Site - colocated at a Master Site
- Remote Console Site - colocated at a Conventional RF Site
- Remote Console Site
- Remote Console Site at a Distributed Conventional Hub Site in a Conventional Subsystem

NOTICE:
MCC 7100 IP Dispatch Consoles and MCC 7500E Dispatch Consoles can be located inside the Radio Network Infrastructure (RNI) and outside the RNI. If you locate a console inside the RNI, you can deploy it in Console Sites in all the M-series site configurations. If you locate the console outside the RNI, you cannot deploy it in a console site colocated at a Master Site.

If deployed outside the RNI, the MCC 7100 IP Dispatch Consoles and the MCC 7500E Dispatch Consoles require a console site firewall interfacing between the PRX 7000 Console Proxy and the Customer Enterprise Network (CEN).

If your system implements the Dynamic System Resilience (DSR) feature, the dispatch console subsystem is designed to continue to function despite a failure of its primary zone core. In the event of a primary core failure, the dispatch console switches over to use the services provided by the backup zone core. For more information about the DSR feature and console behavior in the DSR scenarios, see the *Dynamic System Resilience Feature Guide*.

Console Site Capacity in M1/M2/M3 System Architecture

Console Site consists of 1 to 50 dispatch console devices (Dispatch Consoles and/or Archiving Interface Servers), of which up to four may be Archiving Interface Servers. The system configuration determines the number of Console Sites and associated equipment supported by an ASTRO® 25 system. Console site requirements must be balanced with RF site requirements when planning a new system or expanding an existing one. See the Motorola Solutions personnel to determine how to best address your communication system requirements.

1.1.3.1
Hybrid Site Links Overview

The Hybrid Site Links feature is a flexible way of connecting a redundant zone core to redundant remote sites in ASTRO® 25 systems. The feature allows the creation of redundant connections between the zone core and remote site by using different connection types.

The feature is available in the M2 system configuration, M3 system configuration with Dynamic System Resilience (DSR), and M3 system configuration without DSR. You can use the Hybrid T1/E1 and Ethernet Links feature to connect redundant zone cores to the following site types:

- ASTRO® 25 Repeater Site (ISR)
- IP Simulcast Prime Site
- NM/Dispatch Console Site (MCC 7100/MCC 7500E/MCC 7500 VPM Dispatch Consoles only)
- Conventional Only Site (Centralized Conventional Architecture)

The Trunking Subsystem (Tsub) prime site does not support the Hybrid Site Links feature.

The hybrid links support flexible transport types by employing transport devices such as redundant GGM 8000 site gateways and S6000 core routers. The transport between a primary core router and primary site gateway or a secondary core router and secondary site gateway within the same site must be either of the T1/E1-to-T1/E1 or Ethernet-to-Ethernet transport type. For sites that require more than one T1/E1 bandwidth, the Hybrid Site Links feature supports up to two T1/E1 links that are bundled together.

A site gateway supports one connection type; either redundant Ethernet or T1/E1 WAN terminations. A core router can support T1/E1 terminations for some sites and Ethernet terminations for other sites.

For more information about S6000 core routers and GGM 8000 site gateway transport devices, see the *S6000 and S2500 Routers Feature Guide* and *GGM 8000 System Gateway Feature Guide*.

1.1.4
L-Series System Architecture

L-Series System Architecture Overview

The following console site configurations are supported by the ASTRO® 25 system, Single Zone, Small Scale Redundant/Non-Redundant System Architecture employing the L zone core:

- Console Site - colocated at a Master Site
- Remote Console Site - colocated at a Conventional RF Site (for mutual aid channels)
- Remote Console Site

NOTICE:
MCC 7100 IP Dispatch Consoles and MCC 7500E Dispatch Consoles can be inside the Radio Network Infrastructure (RNI) and outside the RNI. If you locate a console inside the RNI, you can deploy it in Console Sites in all the L-series site configurations. If you locate the console outside the RNI, you cannot deploy it in a console site colocated at a Master Site.

If deployed outside the RNI, the MCC 7100 IP Dispatch Consoles and the MCC 7500E Dispatch Consoles require a console site firewall interfacing between the PRX 7000 Console Proxy and the Customer Enterprise Network (CEN).

The ASTRO® 25 system, Single Zone, Small Scale Redundant/Non-Redundant System Architecture employs Ethernet site links only from the zone core to the remote sites.

The ASTRO® 25 system, Single Zone, Small Scale Redundant/Non-Redundant System Architecture does not support the Distributed Conventional Architecture.

Console Site Capacity – L Core System Architecture

The number of console sites, and associated equipment, supported by an ASTRO® 25 system is determined by the system configuration. Console site requirements must be balanced with RF site requirements when planning a new system or expanding an existing one. See Motorola Solutions personnel to determine how to best address your communication system requirements.

1.1.5
K Series System Architecture

K Series System Architecture Overview

The console site configuration supported by the ASTRO® 25 Conventional System (K Core) system architecture are Remote Console Sites at Distributed Conventional Hub Sites in a Conventional Subsystem.

Console Site Capacity – K Core System Architecture

The number of console sites and associated equipment supported by an ASTRO® 25 Conventional System (K Core) system architecture is determined by the system configuration.

For Console Site implementation in an ASTRO® 25 Conventional System (K Core) supported by a Conventional Master Site (K core) and Distributed Conventional Hub Sites, see the *K Core Conventional Architecture Engineer Guide*.

1.1.6

Console Site Colocated at a Master Site

A colocated Console Site is a console site colocated with the zone core. A colocated Console Site communicates with the network through a subnet interface into a subnet associated with the gateway routers.

A colocated configuration supports redundancy. To interface with the core IP switch or switches, it requires a minimum of two and a maximum of three LAN switches to be part of the console site. Extra console site routers are not required at the colocated console site. A non-redundant colocated Console Site at the core is not supported.

For an example of how MCC 7500 VPM Dispatch Consoles, MCC 7500E Dispatch Consoles, and MCC 7100 IP Dispatch Consoles can be colocated at a Master Site, see Console Site with Conventional Channels - Colocated at the Master Site on page 32.

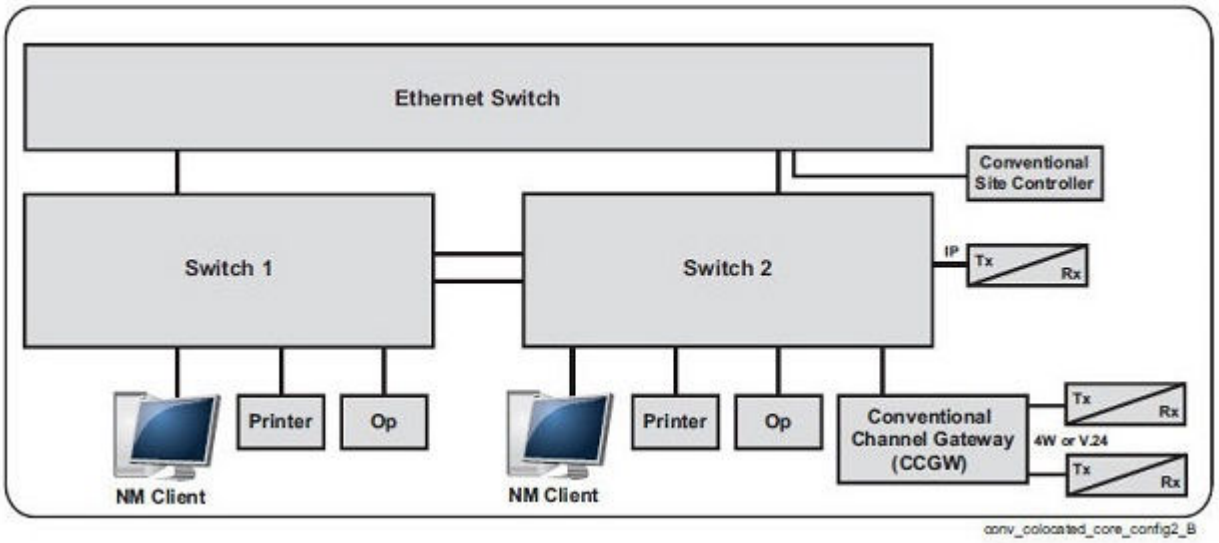
1.1.7

Console Site with Conventional Channels - Colocated at the Master Site

A console site with conventional channel resources can be colocated at the Master Site. Conventional Channels interface to the console through a Conventional Channel Gateway. The Conventional Channel Gateway can be standalone or reside on the Site Router/Gateway.

Figure 2: Console Site with Conventional Channels Colocated at the Master Site

See the figure for dispatch console operator positions colocated at the master site with conventional channel resources.



1.1.8

Remote Console Site Colocated at a Conventional RF Remote Site

A Remote Console Site can be colocated at an RF (Radio Frequency) remote site (remote site with base radio equipment) as shown in the following figures.

Figure 3: Remote Console Subsystem

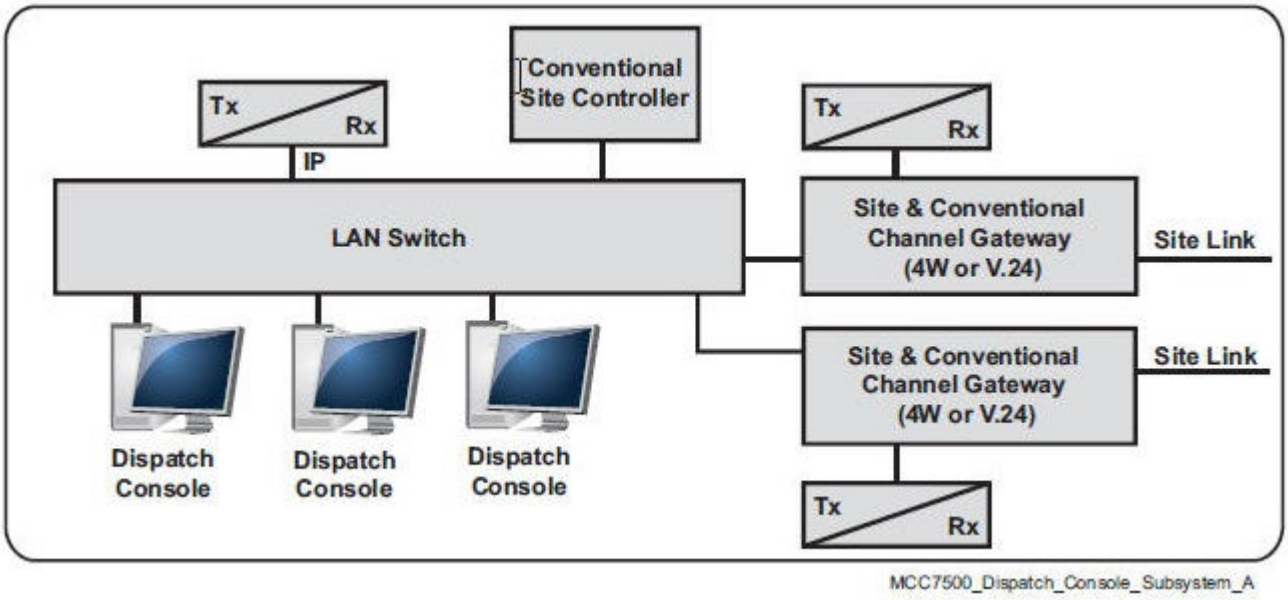
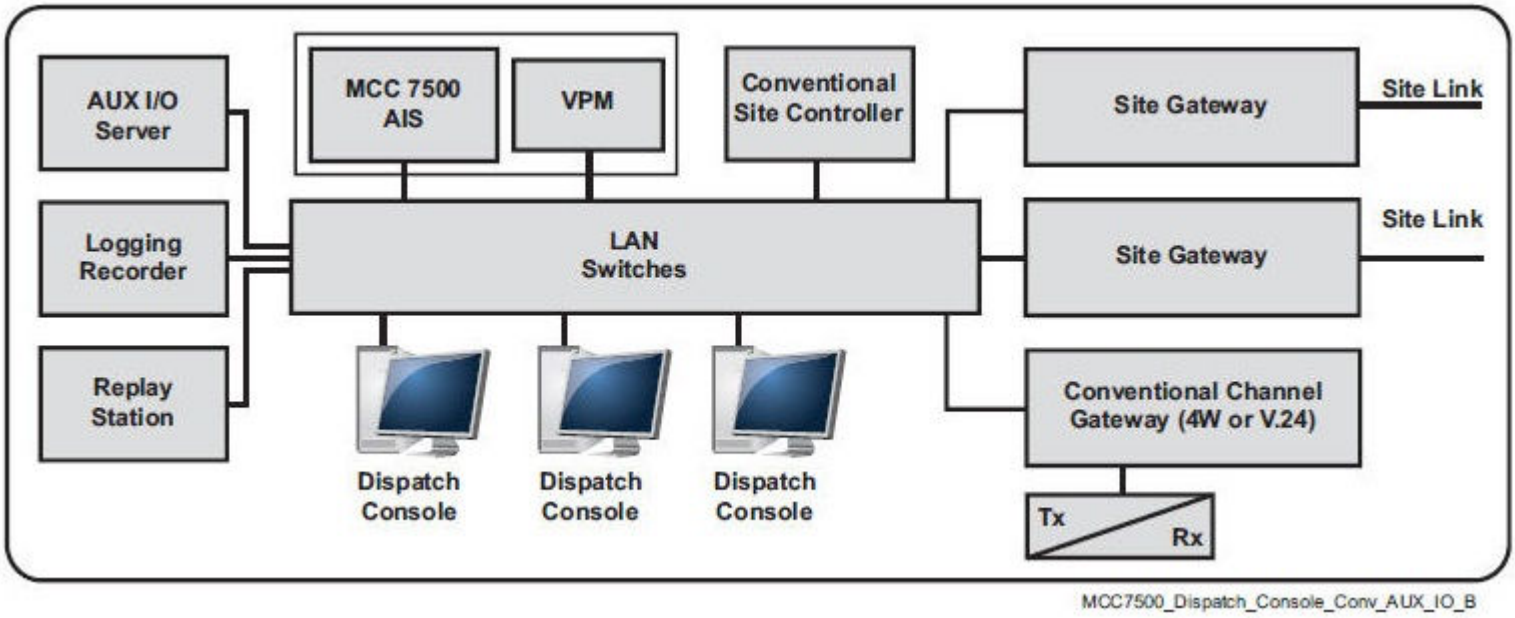


Figure 4: Remote Console Subsystem with Conventional and Aux I/O

See the figure for a Remote Console Site with audio logging devices and an MCC 7500 Aux I/O device colocated at a Conventional RF site.



Audio Logging devices provide for storing and logging audio presented to the console. A dispatch operator position at a Console Site is MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch

Console, or MCC 7100 IP Dispatch Console. The Archiving Interface Server relies on the MCC 7500 VPM platform to support archiving of audio and call control information to the logging system.

The MCC 7500 Aux I/O Server provides an interface between a Dispatch Console and Comparator to support voting display and control of conventional channel resources.

NOTICE:
MCC 7500 VPM Dispatch Console supports the local Aux I/O functionality with the Voice Processor Module (VPM). MCC 7100 IP Dispatch Console and the MCC 7500E Dispatch Console support the public Aux I/O functionality on the SDM3000 units and private Aux I/O functionality with the USB Audio Interface Module (USB AIM) which supports four local Aux I/Os. For the VPM Aux I/O support, see the *MCC 7500 Dispatch Console with VPM User Guide*. For global Aux I/O functionality support and the USB AIM Aux I/O support, see the *MCC 7100 IP Dispatch Console User Guide*.

The console site router can be an S2500 router with a Conventional Channel Gateway module or a Site Gateway device to provide a conventional channel interface to the console. For implementation of the S2500 site router at a console site, see the *S6000 and S2500 Routers Feature Guide*. For implementation of the Site Gateway at a console site, see the *GGM 8000 System Gateway Feature Guide*.

If hybrid redundant site links are employed, T1/E1 can be employed for one site link while Ethernet can be employed for the other site link. See Hybrid Site Links Overview on page 30.

1.1.9
Remote Console Site

Remote Console Sites are sites that are remote from the zone core. They interface to the core through the WAN switch/Cooperative WAN Routing (CWR). The possible configurations are a Console Site with a single path to the Master Site, and a Console Site with path diversity to the Master Site.

1.1.9.1
Remote Console Sites with Path Diversity

A remote console site with path diversity interfaces to the zone core through the WAN switch/ Cooperative WAN Routing (CWR) by using two remote console site routers. The remote console site with path diversity has two logical connections to the zone core. Each of these connections interfaces to a different site gateway or router transport device.

NOTICE: Console sites that need a single T1 or E1 of bandwidth or less can be installed with S2500 routers regardless of whether they have redundant site links. If the console site requires more bandwidth than a T1 or E1, use an S6000 router. Plan carefully to ensure that you use the proper router.

NOTICE: The console site transport device, which is a site gateway or router, can be a GGM 8000 device with or without a conventional channel gateway module or an S2500 router with or without a conventional channel gateway module. The S2500 site gateways are not sold for new systems but are supported in existing systems. For more information about the GGM 8000 as a site gateway at a console site, see the *GGM 8000 System Gateway Feature Guide*. For more information about site routers, see the *S6000 and S2500 Routers Feature Guide*.

1.1.9.2
Remote Console Sites without Path Diversity

A remote console site without path diversity interfaces to the core through the WAN switch/Cooperative WAN Routing (CWR) by using a single remote console site router.

NOTICE: The console site transport device, which is a site gateway or router, can be a GGM 8000 device with or without a conventional channel gateway module or an S2500 router with or without a conventional channel gateway module. The S2500 site gateways are not sold for new systems but are supported in existing systems. For more information about the GGM 8000 as a site gateway at a console site, see the *GGM 8000 System Gateway Feature Guide*. For more information about site routers, see the *S6000 and S2500 Routers Feature Guide*.

1.1.10

Console Site Distributed Conventional Hub Site in a Conventional Subsystem

Dispatch consoles can be located at Distributed Conventional Hub Sites in a Distributed Conventional Subsystem. One Conventional Hub Site in each conventional subsystem is designated as a “conduit” Conventional Hub Site which employs a site gateway device established to support the conventional subsystem interface to the zone core (master site).

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Chapter 2

Console Sites Theory of Operations

This chapter describes how Console Sites work in the context of your system.

2.1 Console Sites Theory of Operation Overview

Motorola Solutions Dispatch Console equipment connects directly to the IP transport network of the system. To pass call control data and call audio through the system, it uses the IP packet protocols. The following sections provide information about console site operations.

2.1.1 Console Sites Key Features

The key Console Site features are:

- End-to-End Encryption
- Archiving Interface Server (AIS)
- Audio Event Logging and Playback
- Permanent Patch/Standard Patch
- Site Conventional
- Main/Alternate
- Enhanced Console Telephony
- Remote MCC 7100 IP Dispatch Consoles
- Remote MCC 7500E Dispatch Consoles

NOTICE: For details regarding crosspatch functionality, auxiliary inputs and outputs, and channel marker, refer to the *MCC 7500 Dispatch Console with VPM User Guide*.

The Console Site is capable of the following functions in the site conventional mode:

- Affiliation management
- Channel in-service operations
- Conventional calls that are radio transmissions, non-console transmission, and console transmissions on the local or conventional subsystem conventional channels
- Station Control Commands on local or conventional subsystem conventional channels
- Logging of conventional resources at the site (locally connectivity to the Archiving Interface Server is required)
- Patched calls among local or conventional subsystem conventional channels
- Channel Marker, Alert Tones, Integrated Paging among local or conventional subsystem conventional channels
- Console Telephony functionality
- Remote MCC 7100 IP Dispatch Console operation
- Remote MCC 7500E Dispatch Console operation
- Conventional Talkgroup functionality

2.1.1.1
End-to-End Encryption

Secure capability in the MCC 7500 VPM Dispatch Console, MCC 7500 Archiving Interface Server (AIS), the MCC 7500E Dispatch Console, and MCC 7100 IP Dispatch Console allows true end-to-end encryption in the radio system. The dispatch consoles and archiving interface servers support multiple encryption algorithms and multiple secure keys to allow them to access and control talkgroups from different agencies, if necessary.

End-to-end encryption is available for secure operation of trunked and ASTRO® 25 conventional channels on the MCC 7500 VPM Dispatch Consoles, the MCC 7500E Dispatch Consoles, and the MCC 7100 IP Dispatch Consoles. The consoles can send and receive encrypted calls and have the ability to control various sub-features of the encrypted calls and channels.

Sending encryption keys from the Key Management Facility (KMF) to the MCC 7500 VPM consoles can be accomplished either by using the Key Variable Loader (KVL) or by sending it through the network with the Over-the-Ethernet-Keying (OTEK). For MCC 7100 Dispatch Consoles and 7500E Dispatch Consoles, the encryption keys can be transferred to the console using the KVL, sourced from the KMF through OTEK, or transferred through a USB flash drive from the KVL or the KeyfileGen.xlsm tool.

For details regarding the encryption algorithms supported and other details regarding end-to-end encryption, see the *MCC 7500 Dispatch Console with VPM User Guide* and the *MCC 7100 IP Dispatch Console User Guide*.

For Analog and MDC 1200 Conventional channels, the ASN Console Interface Unit (CIU) encryption/decryption device used for previous Advanced SECURENET analog systems provides secure voice. The ASN CIU is the secure endpoint for secure voice into a Conventional Channel Gateway. ASTRO® 25 MCC 7500 VPM Dispatch Consoles do not support ASN encryption/decryption, so all audio from ASN equipped channels is passed from the gateway to the consoles in the clear. MCC 7100 IP Dispatch Consoles support ASN. Secure voice is an overlay service. The End-to-End voice encryption service is a supplementary service which includes the following related features:

- ASTRO® 25 Conventional Voice Call
- Key Selection
- Keyset Selection
- Auto Key Receive and Talkback
- Momentary Override
- Trunked and Conventional Voice Services
- Key Index Selection (ASN channels only)

2.1.1.2
Advanced SECURENET Encryption

The following consoles support secure capable Advanced SECURENET (ASN) Analog and MDC 1200 conventional channels:

- MCC 7100 IP Dispatch Consoles
- MCC 7500E Dispatch Consoles
- MCC 7500 VPM Dispatch Consoles

These channels are encrypted/decrypted at the channel end-points (ASN Console Interface Unit (CIU) to radio) and deliver only clear audio to the MCC 7100 IP Dispatch Console, MCC 7500E Dispatch Console, or MCC 7500 VPM Dispatch Console using the Conventional Channel Gateway (CCGW). Therefore, only Over-The-Air (OTA) and 4-wire encryption (not end-to-end) is supported for these secure channel types.

For analog and MDC 1200 conventional channels, secure voice is provided through support of the ASN CIU encryption/decryption device used for previous Advanced SECURENET analog systems. The ASN CIU is the secure endpoint for secure voice into a CCGW. ASTRO® 25 MCC 7100 IP Dispatch Console, MCC 7500E Dispatch Console, and MCC 7500 VPM Dispatch Consoles do not support ASN encryption/decryption, so all audio from ASN equipped channels is passed from the gateway to the consoles in the clear.

For more information, see "Advanced SECURENET" in the *RF Site Technician Reference Guide*.

2.1.1.3
Archiving Interface Server

The Archiving Interface Server (AIS) provides an interface between the radio system and a third-party logging recorder. This interface allows calls on the radio system to be recorded together with information associated with the calls. The user can configure the third-party recorder to monitor and record a set of radio system resources (trunked or conventional).

The Archiving Interface Server supports Time Division Multiple Access (TDMA) (half-rate) audio logging. The logging subsystem must be equipped with the Advanced Multi Band Excitation (AMBE) vocoder to play back audio from TDMA calls. The AIS also supports audio logging for analog conventional and ASTRO® 25 Conventional calls.

2.1.1.4
Audio Event Logging and Playback

The system supports audio logging and logging of some signaling information. An Application Programming Interface (API) exists on the Archiving Interface Server (AIS) that allows for a third-party logging recorder to log the services as listed. The method to play back audio/view logged information is the third-party solution. The MCC 7500 AIS logs trunked group calls (audio from MCC 7500 VPM Dispatch Consoles, MCC 7500E Dispatch Consoles, MCC 7100 IP Dispatch Consoles, and non-IP based dispatch consoles, and subscriber audio for trunked group calls).

The MCC 7500 AIS also logs analog conventional calls associated with MCC 7500 VPM Dispatch Consoles, MCC 7500E Dispatch Consoles, and MCC 7100 IP Dispatch Consoles and subscriber audio from conventional channel gateways. Audio is sent to the logging subsystem and later retrieved and played out on an audio playback device. The audio playback device can exist on any Console Site. It means that the device can be at a core/colocated Console Site or a remote Console Site.

Items logged include:

- Call Alert
- Group Calls
- Emergency Alarms
- Tactical/Normal Priority
- Repeat Enable/Disable
- Emergency Acknowledge
- Emergency Knockdown events

Radio event logging also provides for coded/clear indication recording for secure trunked calls.

Conventional Station Control Commands that are logged include:

- Frequency and PL select
- Mute Secondary Receiver
- Repeat ON/OFF
- Wildcard I/II

NOTICE: For information about audio logging of conventional channels, see the *MCC 7500 Dispatch Console with VPM User Guide*.

2.1.1.5
Permanent Patch/Standard Patch

The Standard Patch feature allows a dispatch console user to set up a communication path between two or more resources that are normally unable to communicate with each other. These paths could be trunked resources, conventional resources, and/or phone resources. When a dispatch console detects call activity on one resource in a patchgroup, it automatically transmits that audio to all other resources in the patchgroup. A combination of the Standard Patch, the Patch Auto-Start, and the Patch Auto-Restore replaces the Permanent Patch feature.

2.1.1.6
Main/Alternate Channel Pair

The Main/Alternate feature provides a back-up station interface for a conventional channel.

The console provides a single channel control window for the Main/Alternate channel pair. It also provides an interface indicating which interface is active (Main/Alternate), and allows the user to request that the active interface be changed to the other interface. If the active interface fails (and the inactive has not failed), the system automatically switches to the inactive interface. The channels comprising the Main/Alternate pair may be at the same or different RF sites, but must be members of the same zone. The Main/Alternate conventional channel interfaces may be on the same conventional channel gateway or on different conventional channel gateways.

Conventional channel gateway configurations to support the Main/Alternate feature are as follows:

- Main and/or Alternate interfaces in different conventional channel gateways located in the same console site and connected to same station
- Main and/or Alternate interfaces in different conventional channel gateways located in the same console site and connected to different stations
- Main and/or Alternate interfaces in different conventional channel gateways located in different console sites and connected to same station
- Main and/or Alternate interfaces in different conventional channel gateways located in different console sites and connected to different stations

IMPORTANT: If the Main/Alternate conventional channel pairs are re-configured, the dispatch console must be restarted to ensure that the Elite Dispatch software can correctly display and operate the re-configured Main/Alternate channel pair.

2.1.1.7
Enhanced Console Telephony

The Enhanced Console Telephony feature available on Voice Processor Module (VPM)-based MCC 7500 VPM Dispatch Consoles and MCC 7500E Dispatch Consoles makes it possible for dispatchers to initiate and receive telephone calls on their dispatch positions. The Enhanced Console Telephony feature is not supported on MCC 7100 IP Dispatch Consoles.

The console VPM supports telephony audio sessions and communicates with the Console Telephony Media Gateway to interface with the public telephone network for telephony audio. To manage telephony calls, new telephony functionality is introduced to MCC 7500 Elite Admin and Dispatch GUIs. In addition to initiating and receiving telephone calls, the dispatcher can place calls on hold, transfer calls, forward calls, and patch phone calls to radio calls.

The number of telephony gateways cannot exceed the number of console sites in the system. System capacity for M1 and M2 cores is 55 console sites per zone; for M3 cores, the capacity per zone is 100 console sites per zone. In your system, you may have up to seven zones. It gives up to 385 console

sites and up to 385 telephony gateways per M1 or M2 system, and up to 700 console sites and up to 700 telephony gateways per M3 system.

One telephony gateway is in a single console site. The dispatch console interfaces to the console telephony media gateway in the same console site. If it is necessary for multiple console sites to share console telephony media gateway, the console sites are deployed within the same conventional subsystem by using the conventional subsystem architecture. The conventional subsystem architecture is not available in the L series.

NOTICE: When console sites share a telephony media gateway in a conventional subsystem architecture, the console sites must be physically colocated with adequate bandwidth provided between the sites. See the *MCC 7500 Dispatch Console with VPM User Guide* for more information.

2.1.1.8
Site Conventional

Conventional Site Controller (CSC) is an optional device installed at a console site. In case the link between a console site and the zone controller is lost, the CSC provides fallback capability for the console site and conventional channels colocated with this site, so that they can go in-service with the CSC and continue operation in the Site Conventional mode. The two main functional areas of the Conventional Site Controller are in controlling conventional call processing (including Channel Marker and Main/Alternate features), and providing the ability for conventional devices to switch to it from the zone controller when the link to the zone controller is lost.

2.1.1.9
ACIM Conventional Channel

For information on ASTRO® 25 Control Interface Module (ACIM) Conventional Channels, see the ACIM Conventional Channel for Console Sites on page 74 section.

2.1.1.10
Console Repeat

Console Repeat is a feature that enables the non-RF related infrastructure to perform the repeat function instead of the repeater or comparator.

The feature is available for analog conventional channels and MDC-1200 analog conventional channels, in systems with GGM 8000 Enhanced Conventional Channel Gateways, and on MCC 7100/MCC 7500E/MCC 7500 VPM Dispatch Consoles. It cannot be used or configured on the following channel types:

- Digital Conventional
- Conventional Mixed Mode
- ASTRO® 25 Control Interface Module (ACIM)
- Conventional Talkgroup

Console Repeat Variants

You can configure Console Repeat to operate in two different variants: Latched or Non-Latched.

Latched Console Repeat

This variant of the Console Repeat feature makes it possible for a dispatcher to use an analog conventional channel for coordination during an incident. After the dispatcher activates the feature for the channel by using the Elite Dispatch interface, the dispatch console automatically keys the station and any inbound audio is routed to the transmitter and repeated. The console leaves the station keyed even when there is no inbound radio audio on the channel. The continuous channel

carrier causes a set of scanners that monitor a number of channels to lock onto the channel. The people near the scanner hear all the activity on that channel without interruption due to scanning other channels. After the incident is over, the Console Repeat feature can be disabled from the dispatch position on which it was turned on, or from any other properly configured dispatch position.

Non-Latched Console Repeat

This variant of the Console Repeat feature makes it possible for a dispatcher to enable radio users on a certain analog conventional non-repeat capable channel to hear transmissions of one another. After the dispatcher activates the feature for the channel by using the Elite Dispatch interface, the dispatch console keys the channel and indicates to the Conventional Channel Gateway (CCGW) that it should retransmit incoming radio audio on that channel. The dispatch console keys the station whenever an inbound radio call is on the channel, and causes the inbound audio to be routed to the transmitter and repeated. In this way, the other radio users on that channel can hear the radio audio.

Console Repeat Deactivation

Both Console Repeat variants can be disabled from the dispatch position on which they were enabled or from any other properly configured dispatch position.

In the case of Latched Console Repeat, disabling the feature by a dispatcher causes the channel to dekey and the carrier is no longer present on the channel.

In the case of Non-Latched Repeat, disabling the feature by a dispatcher causes the console to stop keying the channel and instructing the CCGW to retransmit incoming radio audio on that channel, and the radio users can no longer hear transmissions of one another.

Both variants of the feature can be pre-configured so they are automatically disabled after a predefined time. Before it disables, a timeout warning appears in the status line at the bottom of the Elite Dispatch window. The automatic disablement is postponed if an inbound radio call is active when the feature is about to be disabled. In this case, the feature is disabled when the inbound radio call ends.

Console Repeat Calls Logging

The logging subsystem tracks when and on which dispatch console the Console Repeat function was turned on or turned off for the particular channel. The logging subsystem also indicates that the Console Repeat transmission does not have console sourced audio associated with it.

2.1.1.10.1
Console Repeat Interaction with Other Features

Console General Transmits and console Instant Transmits are of higher priority than Console Repeat which means that any console transmissions other than another Console Repeat are higher priority than the Console Repeat except for console Patch Transmit.

These priority settings force the Console Repeat to stop when a dispatcher console performs a higher priority transmit on the resource with the Console Repeat enabled. After the higher priority transmission ends, the dispatch console in control of the Console Repeat automatically re-starts the Console Repeat transmission. This re-start takes a while and results in a 500-800 milliseconds of break in the carrier and audio transmission.

RF Cross Busy Interaction

As console General Transmits and console Instant Transmits are of higher priority than Console Repeat, a console granted a higher priority transmit on another resource that is RF crossbusied with the resource doing Console Repeat causes the resource doing Console Repeat to go off the air.

Main/Alternate Interaction

The Console Repeat feature rides through the main/alt transitions. If the console is on the active resource with Console Repeat turned on and the Conventional Channel Gateway (CCGW) used by this active resource fails, the inactive resource in the pair becomes active with Console Repeat turned on. This change takes place automatically. No action on the part of the dispatcher is required in this event.

Patch Interaction

A channel can be a member of a patchgroup (Simplex or Duplex) and be in Console Repeat mode at the same time. As Patch Transmit is lower console transmit priority than Console Repeat transmit, a patch transmission cannot take over a channel transmitting in the Console Repeat mode. The Zone Controller denies attempts to start a Patch Transmit on a channel with an active Console Repeat. The Zone Controller allows for starting a Console Repeat transmission on a channel with an active patch transmission which means that the Console Repeat transmission takes over the patch transmission.

Outbound Console Repeat transmissions are never a patch audio source. Therefore, a latched console repeat transmission is never the patch audio source, but an inbound radio call on a channel in latched console repeat mode can be used as a patch audio source.

Emergency Alarm Interaction

When an Emergency Alarm is received on an MDC channel that has an active Console Repeat transmission, the Zone Controller requests that the CCGW send the Emergency Alarm Ack. The CCGW stops repeating received audio to transmit the Emergency Alarm Ack. In most cases, the channel remains keyed. The CCGW resumes the Console Repeat transmission as soon as the Emergency Alarm Ack is sent.

Non-Emergency Supplementary Data Feature Interaction

A console cannot send a supplementary data message, for example Call Alerts or Status Requests, on an MDC channel with an active Console Repeat transmission. The system rejects the request because of the active outbound voice transmission. The same restrictions apply to the non-emergency supplementary data acknowledgments sent by the system, for example Status Update Ack or Call Alert Ack.

2.1.1.10.2
Console Repeat Configuration

To configure an analog conventional channel or an MDC-1200 analog conventional channel for the Console Repeat feature, modify objects in the Provisioning Manager.

To enable the Console Repeat feature for an analog conventional channel, modify the console capabilities for the Analog Conventional Channel object.

To enable the Console Repeat feature for an MDC-1200 analog conventional channel, modify the console capabilities for the MDC Conventional Channel object.

To employ the Console Repeat deactivation timer, modify the console configuration for the Console User Capabilities Profile.

For detailed instructions on how to configure the Console Repeat feature, see the *Provisioning Manager User Guide*.

2.2
Dispatch Console Communications with the Zone Controller

Console Sites support trunking channel operations and conventional channel operations. Control paths are logical links created to facilitate reliable communications between a zone controller and various

system elements including Console Sites. For each system element listed, there are two control paths created for redundancy – an active path and a standby path.

NOTICE: This document focuses on console sites in the M-series and L-series architectures that are supported by a zone controller. For console site implementation in the K core conventional system architecture, see the *K Core Conventional Architecture Engineer Guide*. For details regarding conventional features, see the *RF Site Technician Reference Guide*.

A Console Site establishes up to two sessions with the Zone Controller for control. One is for primary communications, the other is for backup in case of a primary failure. The Console Site must be provisioned with both Zone Controller IP addresses to establish communications to the Zone Controller.

The Console Site uses multicast for receiving control messages from the Zone Controller.

In an operational system where a Console Site and Zone Controller are operational, control paths between the Console Site and the Zone Controller are created only after:

- An MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch Console or MCC 7100 IP Dispatch Console at the site registers with the system and a user logs on to that console and assigns a resource (either trunking or conventional), or
- An MCC 7500 Archiving Interface Server (AIS) registers with the system and that MCC 7500 AIS is assigned a resource (either trunking or conventional) by the logging system

After the registration with the system and the assigning of the resource takes place, control paths are set up and affiliation information for the console or AIS is sent to the Zone Controller. Control paths are tied to the consoles at the site.

When all console users log off at the site and every MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch Console, MCC 7100 IP Dispatch Console, and MCC 7500 AIS at the site has all resources de-assigned, the control paths are dropped.

NOTICE: An operational indication that control paths are not in use is a normal operation of the system, and it is reported to the fault management application of the system.

2.2.1 Trunking Communications Between the Dispatch Console and the Zone Controller

This section provides an overview of the types of requests sent between dispatch consoles and Zone Controllers in a trunked system.

2.2.1.1 Dispatch Console Trunked In-Service Requests

Before a dispatch console can perform any services on the system, it must be in-service with the Zone Controller (ZC).

A dispatch console goes in-service with the ZC for the following reasons:

- The dispatch console has a trunking resource to be registered or affiliated with the ZC and the dispatch console is not currently in-service with the ZC.
- The dispatch console has previously gone in-service with the ZC but, when the link to the console site recovers from a failure condition, database synchronization takes place before the ZC performs any trunking services.
- The dispatch console has previously gone in-service with the ZC but, when the link to the console site recovers from a failure condition, the ZC does not have the reported console identifier in its database as in-service because of a change to the configuration information of the console. The reason can be the deletion of the dispatch console ID from the Console Alias Manger or

Provisioning Manager. By going in-service with the ZC, the dispatch console registers its unit ID with the ZC to be able to participate in individual services (that is, private calls) and to affiliate to monitored talkgroups.

2.2.1.2
Dispatch Console Trunked Out-of-Service Requests

The dispatch console sends an out-of-service command to the Zone Controller (ZC) when there are no trunked resources to monitor, a dispatch console user logs out of the console application, or the dispatch console is shut down.

When the dispatch console user changes profiles, all talkgroups are deaffiliated and a new set of resources is affiliated. In this case, the dispatch console does not go out-of-service. The dispatch console waits one minute after the last talkgroup deaffiliation to allow the new profile to be loaded.

NOTICE: The dispatch console can be reported out-of-service if the console fails. This functionality is done by the Link Op at the site. The Link Op proxies the out-of-service function for the failed console.

After an MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch Console, MCC 7100 IP Dispatch Console, or MCC 7500 Archiving Interface Server (AIS) is reported as being “out-of-service” to the ZC, the ZC performs the following actions:

- Internally de-affiliates/de-registers the failed dispatch console
- Continues to grant calls without considering the console or AIS reported as being “out-of-service
- For trunking, removes the Console Site as a cause of a busy and can convert a busied call if no other dispatch consoles are affiliated with a group call at the Console site that has the console or AIS that failed (was reported as being “out-of-service”)
- Internally tears down any patches owned by the console that failed and sends patch unreserve commands to parallel consoles
- For trunking, changes any repeat disable state owned by the failed dispatch console to become repeat enabled on parallel dispatch consoles
- Internally dekeys a dispatch console that failed and proceeds with the call as if the dispatch console dekeyed upon being informed that the console has gone “out-of-service” (sends an end-of-call to parallel consoles)

If a failed MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch Console, MCC 7100 IP Dispatch Console, or MCC 7500 AIS is the only console or MCC 7500 AIS affiliated to a talkgroup or conventional channel at the Console Site, the ZC keeps the console site active in the call. The ZC leaves the Console Site in the active call and continues to leave the bandwidth for the console assigned to the call.

2.2.1.3
Dispatch Console Trunked Affiliation Requests

Dispatch Console Affiliation allows the Zone Controller (ZC) to track which talkgroups a dispatch console is monitoring so that the ZC can route talkgroup services to this dispatch console. The dispatch console must affiliate its monitored talkgroups to notify the ZC that it must receive service messages associated with a particular talkgroup. The console affiliates all of its monitored talkgroups to its one Unit ID.

The Console-Only Talkgroup Call allows creating talkgroups that operate with only console operators as members. Console-only group calls can occur within a single zone or across multiple zones. In a Time Division Multiple Access (TDMA) system, Console-Only Talkgroup Calls are supported. Consoles can affiliate with a Frequency Division Multiple Access (FDMA)-only or TDMA talkgroup.

2.2.1.4
Dispatch Console Trunked De-Affiliation Requests

Dispatch Console De-affiliation, along with Dispatch Console Affiliation, allows the Zone Controller (ZC) to track which talkgroups a dispatch console is monitoring so that the ZC can route talkgroup services to the dispatch console.

The dispatch console deaffiliates a talkgroup when it no longer monitors the talkgroup (TG). This deaffiliation occurs when the console user deassigns a talkgroup, changes their profile, or logs out of the console application. This deaffiliation also occurs when a user deletes one of the console user talkgroups and informs the dispatch console. The dispatch console notifies the zone controllerZC that it no longer monitors a talkgroup by sending the zone controller a deaffiliation command.

When the TG record is deleted from the Provisioning Manager or Console Alias Manager (CAM), the console receives the “TG record deletion” and sends the ZC a TG de-affiliation. When an individual record is deleted, the console receives the “Individual record deletion” and sends the ZC an out-of-service command.

2.2.1.5
Dispatch Console Site Trunked In-Service Requests

When a console site link is established between a Console Site and a Zone Controller (ZC), the Console Site and the ZC exchange information to determine the affiliation information for each console at the site.

When the console site link is established between the Console Site and the ZC, the Console Site passes affiliation information for each dispatch console considered to be in-service with the ZC. The affiliation information is the data passed between the ZC and the dispatch console before every affiliation transaction, and saved at each end for use when the console site link is established to the ZC.

By using this method, a Console Site can come on line and have its affiliation information in synchronization with the ZC in a short time. If the dispatch console changes any affiliation information while the console site link is down with the ZC, the dispatch console updates the ZC with this information after it has been determined that the ZC and console are in synchronization.

If the ZC determines that the ZC and dispatch console are not in synchronization, the ZC forces the console to go through the entire in-service/affiliation process to rebuild the ZC database for that console.

When a console site control link is established, the Console Site must report the dispatch consoles currently in the in-service state with the ZC, and send the corresponding synchronization keys for each of these in-service dispatch consoles. If the information on the ZC is the same as the key information for particular consoles, the consoles continue with the previously affiliated information. If not, the consoles must start the in-service process over again.

2.2.2
Conventional Communications Between the Dispatch Console and the Zone Controller

This section provides an overview of the types of requests sent that are between dispatch consoles and Zone Controllers (ZC) in a conventional system.

The Conventional Site Controller (CSC) supports site conventional operation for consoles when the link to the ZC is lost. The site controller uses the concept of Affiliation and Association to support operation for consoles when the link to the ZC is lost. Association allows a console to request receipt of control messages (without receipt of audio) so that the console knows whether a conventional channel (in a Cross Mute/Cross Busy group) is transmitting. Without association, the console must be affiliated with

every conventional channel in the Cross Mute/Cross Busy group to implement the Cross Mute/Cross Busy feature. With association, the console receives station control commands.

Association is a specialized attribute of affiliation. An affiliation request indicates whether the console must receive audio of the resource with which it is affiliating. If the console does not have to receive audio, it specifies the association attribute.

2.2.2.1
Dispatch Console Conventional In-Service Requests

Before a dispatch console can perform any services on the system, it must be in-service with the Zone Controller (ZC). The dispatch console must go in-service separately with the ZC for trunking and conventional services.

A console must go in-service for conventional with the ZC in the following situations:

- The dispatch console has a conventional resource to be affiliated with the ZC and the dispatch console is not in-service with the ZC for conventional
- The dispatch console has previously gone in-service with the ZC for conventional, but when the ZC to console site link recovers from a failure condition, database synchronization is required before the ZC performs any conventional services
- The dispatch console has previously gone in-service with the ZC for conventional, but when the ZC to console site link recovers from a failure condition, the ZC does not have the reported console identifier in its database as in-service for conventional because of a change to the configuration information of the console

2.2.2.2
Dispatch Console Conventional Out-of-Service Requests

The dispatch console sends an out-of-service command to the Zone Controller (ZC) when it no longer has any conventional resources that it is monitoring, the dispatch console user logs out of the console application, or the console is shut down.

When the console user changes profiles, all conventional channels are deaffiliated and a new set of conventional resources is affiliated. In this case, the dispatch console does not go out-of-service. It waits one minute after the last conventional channel deaffiliation to allow the new profile to load.

NOTICE: If the console fails, the dispatch console can be reported out-of-service. The Link Op at the site performs this functionality. The Link Op proxies the out-of-service function for the failed console.

2.2.2.3
Dispatch Console Conventional Affiliation Requests

A dispatch console affiliates conventional resources with the Zone Controller, so that the Zone Controller knows the consoles that are monitoring each specific conventional channel, and can route any call activities on the channels to these dispatch consoles.

2.2.2.4
Dispatch Console Conventional De-Affiliation Requests

Dispatch Console De-Affiliation, along with dispatch console affiliation, allows the Zone Controller (ZC) to track which conventional channels a console is monitoring, so that the ZC can route conventional services to this console. The dispatch console de-affiliates a conventional channel when the dispatch console user reassigns the conventional channel resource. It happens when the user changes the Elite Dispatch configuration or logs out of the console application.

2.2.2.5
Dispatch Console Site Conventional In-Service Requests

When a console site link is established between the Console Site and the Zone Controller (ZC), the ZC and the Console Site exchange information to determine the affiliation information for each dispatch console at the site.

When the console site link is established with the ZC, affiliation information is passed from the Console Site for each dispatch console considered in-service with the ZC. This affiliation information is data passed between the ZC and the console upon every affiliation transaction and saved at each end for use when the console site link is established to the ZC.

By using this method, a Console Site can come on line and have its affiliation information in synchronization with the ZC in a short time. If the dispatch console changes any affiliation information while the console site link is down with the ZC, the dispatch console updates the ZC with this information after it is determined that the ZC and dispatch console are in synchronization.

If the ZC determines that the ZC and dispatch console are not in synchronization with each other, the ZC forces the console to go through the entire in-service/affiliation process to rebuild the ZC database for that dispatch console.

This affiliations synchronization mechanism used for conventional resources is the same as the mechanism used for trunking resources.

When a console site control link is established, the Console Site must report the dispatch consoles in the in-service state with the ZC and send the corresponding conventional synchronization keys for each of these in-service dispatch consoles. If the information on the ZC is the same as the key information for particular consoles, the consoles continue with their previously affiliated information. If not, the dispatch consoles must start the in-service process over again.

2.3
Communication Between the Dispatch Console and Conventional Sites

Dispatch Consoles can access the following conventional channel resources:

- Conventional channel resources in the zone in which the console is located
- Conventional channel resources that reside at the ASTRO® 3.1 system conventional sites
- Conventional channel resources that reside in other zones in the system

Communication with the ASTRO 3.1 System

A Dispatch Console can use conventional channel resources that reside at an ASTRO® 3.1 system conventional site. The current ASTRO® 25 system supports the communication path between ASTRO® 3.1 system conventional subscribers and a Console Site.

When an ASTRO® 3.1 system site supports integrated voice and data communication employed by the Radio Network Controller (RNC) and Wireless Network Gateway (WNG), these services can affect the communication paths. For example, the ASTRO-TAC™ comparator console port priorities for voice also apply to data received on that port from the Digital Interface Unit (DIU) at an ASTRO® 3.1 system conventional site. If the ASTRO® 3.1 system data communication has a higher priority than another console port, data communication impacts priorities for voice communication. Consider the priority of voice and data. To insure datagram integrity, the site gateway (conventional channel gateway) ports must be configured to have a lower priority than the DIU ports used for data (Integrated Voice and Data or IV&D) on the ASTRO® 3.1 system side.

Data communication (Integrated Voice and Data feature) between the current ASTRO® 25 system and ASTRO® 3.1 conventional site is not supported.

Communication with Other Zones in the ASTRO 25 System

Conventional Voice Interzone is available only for MCC 7500 VPM Dispatch Consoles, MCC 7500E Dispatch Consoles, and MCC 7100 IP Dispatch Consoles. It makes it possible for the console dispatchers to access conventional channels in zones other than the zone in which their consoles are located.

NOTICE: For more information about console access to conventional channel resources in the system, see the *RF Site Technician Reference Guide*, the *L and M Core Conventional Architectures Engineer Guide*, or the *K Core Conventional Architecture Engineer Guide*.

NOTICE: The console site transport device, which is a site gateway or router, can be a GGM 8000 device with or without a conventional channel gateway module or an S2500 router with or without a conventional channel gateway module. For more information about the GGM 8000 as a site gateway at a console site, see the *GGM 8000 System Gateway Feature Guide*. For more information about site routers, see the *S6000 and S2500 Routers Feature Guide*. The L core system architecture uses the Site Gateway device exclusively.

2.4 Call Setup in Console Sites

A Console Site establishes a control session with the Zone Controller (ZC) for the process of setting up and tearing down calls. A dispatch console known as the Link Op handles the active Zone Controller-to-Console Site Control Path (ZC-CS CP). At a Console Site, the first console that registers with the system and assigns a resource becomes the Link Op. One Link Op handles each CP, and each call request message passes through the Link Op.

Upon a dispatch console Push-To-Talk (PTT), the unit generates a call request message (PTT request) and sends this uplink control message to the ZC through the Link Op. The ZC then sends a call grant (if resources are available) in the form of a downlink control message (PTT grant) to the initiating dispatch console, and other affiliated members of the same talkgroup at that site join the call. For call set-up, a processing delay in the Op initiates the call as well as in the Link Op and site LAN/Network equipment.

2.5 Telephone Calls in Console Sites

Console Telephony feature available on Voice Processor Module (VPM)-based MCC 7500 VPM Dispatch Consoles and MCC 7500E Dispatch Consoles makes it possible for dispatchers to initiate and receive telephone calls on their dispatch positions.

A dispatcher initiates telephone calls using the MCC 7500 Elite Dispatch GUI that provides a dispatcher with multiple dialing and customization options. The dispatch position sends call request commands to the console telephony media gateway. The gateway interfaces with Public Switched Telephone Network (PSTN) to connect the dispatcher to a landline user by using the dispatch position.

Up to twenty calls can have audio session active at a time between the VPM and the gateway on a console position. If you have more than five phone calls established on a console position at a time, only five of them can be active and the rest must be on hold.

A dispatcher can add phone calls to patch calls and patch groups. The console enforces a maximum of twenty telephone calls among all patch groups or twenty telephone calls per a patchgroup. A patchgroup can have twenty active calls between the dispatcher and a phone user.

For information about telephone calls processing, see the *MCC 7500 Dispatch Console with VPM User Guide*.

2.6 Private Calls in Console Sites

Because the dispatch console subsystem uses a packet-based solution for call processing, the Zone Controller-Console Site (ZC-CS) interface is redefined to mirror the private (individual) call signaling used for subscriber units.

- The Unit ID is still used for addressing calling and called parties, though User ID, Unit, and User Aliases are present in the ZC-CS interface.
- Only one active private call is supported in a console dispatch position.
- Private calls between two consoles are supported.
- Secure-voice private calls are supported.

The basic call flow is not changed from prior releases. From the console operators view, the general user operation of private calls is the same. From the perspective of the ZC, console-to-console calls are the same as unit-to-unit calls between a subscriber and a console or between two subscribers.

2.6.1 Dispatch Console-Initiated Private Calls in Console Sites

To initiate a private call to a subscriber unit or another console, the calling console sends a U2U Call Request (Unit-to-Unit Call) message to the Zone Controller (ZC).

The ZC responds with the U2U Answer Request message, followed by the U2U Ring Update message after the called party is ringing. This status is indicated to the user with a visual indication.

When the console user turns on the transmit switch to answer an incoming private call when the call is ringing, the called console sends a U2U Answer Response message to the ZC to indicate that the called user answered the call.

2.6.2 Private Calls in Console Sites for TDMA

Private calls can operate in Time Division Multiple Access (TDMA) or Frequency Division Multiple Access (FDMA) mode of operation in an ASTRO® 25 System.

For a private call to be made in TDMA mode, both radios must TDMA-capable and both radios must be affiliated to a TDMA-capable RF subsystem.

A private call occurs in FDMA mode if the radio involved is an FDMA-only radio, or the radio is affiliated at an FDMA-only RF subsystem.

2.7 Conventional Calls in Console Sites

A conventional call is set up as a result of one of the following conventional transmissions on a conventional channel:

Subscriber Conventional Transmission
A conventional subscriber transmits on a conventional channel.

Console Conventional Transmission
An MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch Console or MCC 7100 IP Dispatch Console transmits on a conventional channel.

Non-IP-based Dispatch Console Conventional Transmission
A non-IP-based dispatch console that is a third-party console transmits on a conventional channel.

Conventional Talkgroup Call Transmission

A call established to separate calls from multiple agencies on a single digital conventional talkgroup channel. For more information about the conventional talkgroup feature, see the *RF Site Technician Reference Guide*.

After set up, a conventional call can comprise a sequence of conventional transmissions on the same conventional channel during the lifetime of the call. A conventional call can also support simultaneous transmissions by a radio and by a console on the same conventional channel. For instance, a conventional subscriber and a dispatch console can transmit simultaneously. Similarly, conventional subscriber and non-IP-based dispatch console transmissions can occur in concurrence. But a common audio stream (carrying mixed audio from a conventional subscriber and a non-IP-based dispatch console) is routed to the system. A dispatch console is not allowed to transmit in a conventional call in concurrence with a non-IP-based dispatch console. A conventional call ends when no active conventional transmission is in the call.

The conventional subscriber audio is repeated over the RF interface by the conventional base station in the absence of the non-IP-based dispatch console or console audio. The default, wireline priority in the analog output of a conventional base station is set such that if a transmission is present on the wireline from the site gateway (conventional channel gateway), the station repeats the audio received on the wireline over the RF interface. The conventional base station can be a receive-only station. In such a situation, no audio can be repeated/transmitted.

A conventional channel operates in the wide-area conventional mode where an active control path for conventional resources between the conventional channel gateway and the Zone Controller is established. In a similar manner, the Console Site operates in wide-area conventional mode where an active control path for conventional resources is established between the Console Site and the Zone Controller.

NOTICE: The console site transport device, which is a site gateway or router, can be a GGM 8000 device with or without a conventional channel gateway module or an S2500 router with or without a conventional channel gateway module. For more information about the GGM 8000 as a site gateway at a console site, see the *GGM 8000 System Gateway Feature Guide*. For more information about site routers, see the *S6000 and S2500 Routers Feature Guide*. The L core system architecture uses the Site Gateway device exclusively.

2.8 Console Site Dekeying

The dispatch console dekeys upon receiving the End-of-Transmission (EOT) message, or upon receiving the End-of-Call (EOC) message. The rules for dekeying (for all voice services) are summarized as follows:

Table 2: Dekeying Rules for All Voice Services

	Event	Action
1	Receive EOT while currently transmitting (represents a console takeover/user dekey)	**1** Finish playing out the console audio buffer **2** End the audio stream
2	Receive EOC while currently transmitting (represents a preemption of the existing call/abrupt end of call)	**1** Immediately stop encoding audio, truncating if necessary. Do not finish playing out the microphone audio buffer **2** End the audio stream

2.9 Dispatch Console-Initiated Conventional Calls in Console Sites

A console operator uses the console Graphical User Interface (GUI) to invoke a dispatch console-initiated conventional call.

When a dispatch console receives an indication from an operator to initiate a conventional transmission, the console requests setup of the conventional call to the Zone Controller (ZC). The ZC performs required processing to set up the call and upon determining that the transmission can proceed, it informs all console sites with affiliated dispatch consoles and the conventional channel gateway associated with the conventional channel.

NOTICE: If the link to the ZC is lost, the Conventional Site Controller allows MCC 7500 VPM Dispatch Consoles, VPM 7500E Dispatch Consoles and MCC 7100 IP Dispatch Consoles to access channel resources.

Upon receiving the grant from the ZC, the conventional channel gateway keys the conventional base station and begins forwarding audio to the conventional base station where it is transmitted over the RF interface.

Upon detecting the Push-to-Talk (PTT) release from the operator, the console informs the ZC. The ZC terminates the call and communicates termination of the call to the involved dispatch consoles and the conventional channel gateway. The conventional channel gateway dekeys the station.

NOTICE: The console site transport device, which is a site gateway or router, can be a GGM 8000 device with or without a conventional channel gateway module or an S2500 router with or without a conventional channel gateway module. For more information about the GGM 8000 as a site gateway at a console site, see the *GGM 8000 System Gateway Feature Guide*. For more information about site routers, see the *S6000 and S2500 Routers Feature Guide*. The L core system architecture uses the Site Gateway device exclusively.

Conventional Talkgroup Calls can be established to separate calls from multiple agencies on a single digital conventional talkgroup channel. For more information about the conventional talkgroup feature, see the *RF Site Technician Reference Guide*.

The following diagrams represent a multi-zone capable system. They illustrate the call request and the call grant paths in a console site colocated at a master site.

Figure 5: Console Call Request in a Console Site Colocated at Master Site

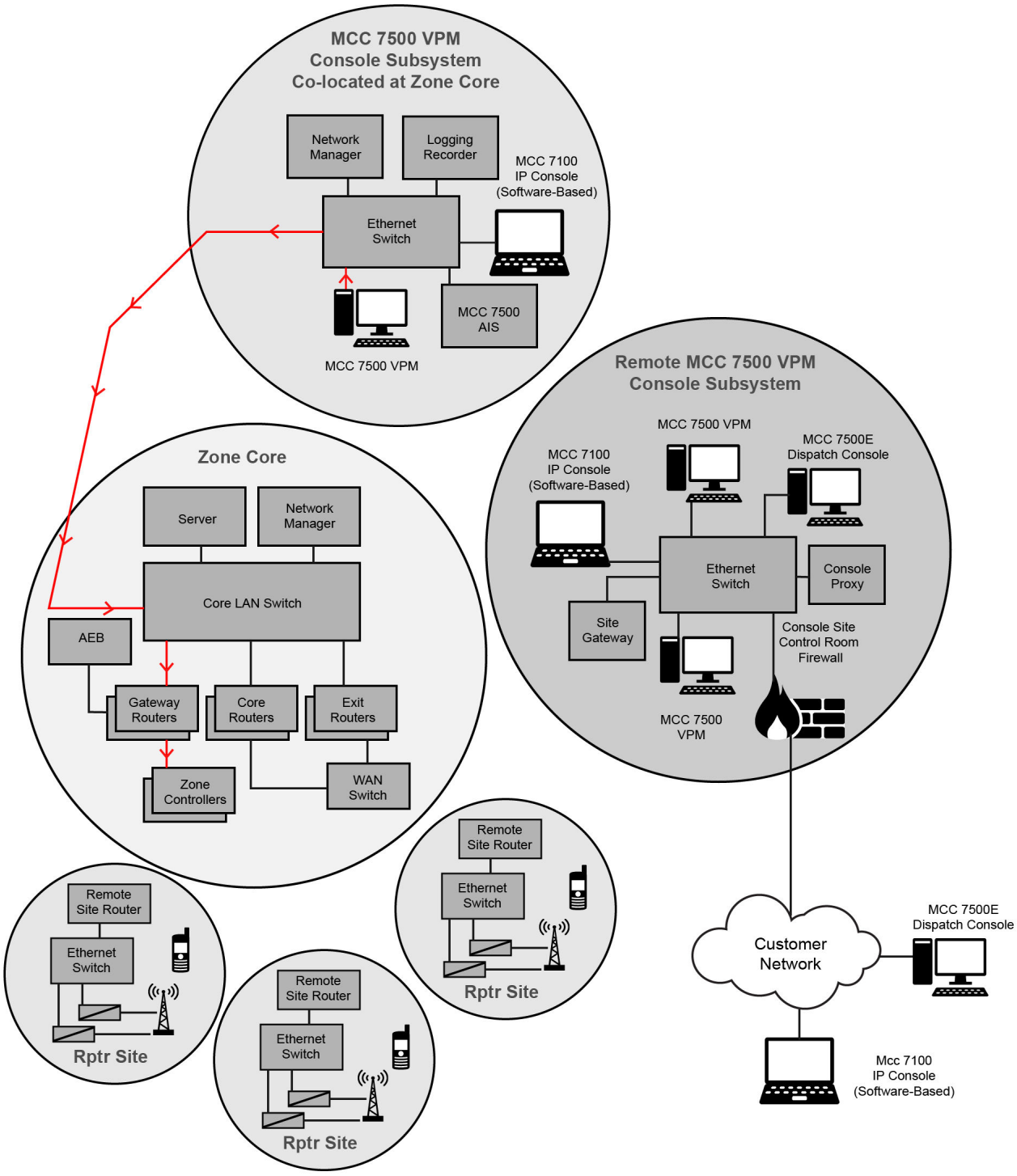


Figure 6: Console Call Grant in a Console Site Colocated at Master Site

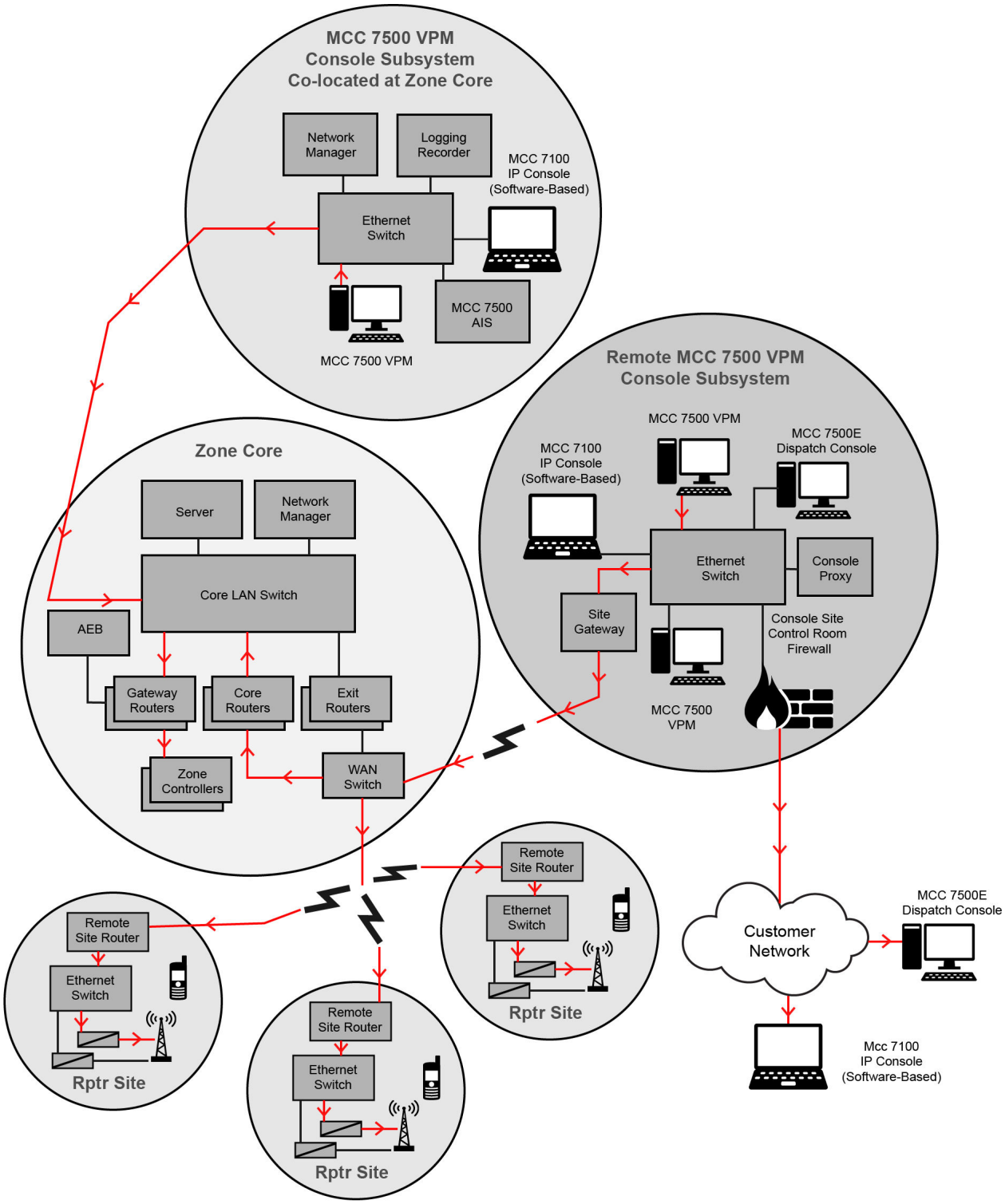


Table 3: Dispatch Console Actions Upon Call Grant Receipt

This table details the actions the console takes once it receives the call grant.

Event	Action
Receive PTT Grant for first transmission in a new console call	**1** Collect a sufficient amount of console audio before encoding packet voice **2** Send Multicast Hello messages **3** Send packet voice
Receive PTT Grant for re-access within an existing console call	**1** Collect a sufficient amount of console audio before encoding packet voice **2** Send Multicast Hello messages **3** Send packet voice
Receive PTT Grant with same requesting console identifier and same voice source ID while currently transmitting	Filter out and do not process the PTT Grant (assume it is a keep-alive message)
Receive PTT Grant with different requesting console identifier and/or different individual ID while currently transmitting. (This process is the console being taken over.)	Assume this process is a console to console takeover: End (truncate) the current voice stream
Receive PTT Grant with the requesting console identifier and/or individual ID while currently receiving. (This process is the console taking over.)	After sufficiently buffering for the new audio source, immediately start the new voice stream

These diagrams illustrate the call request and the call grant paths at a remote console site.

Figure 7: Console Call Request in a Remote Console Site

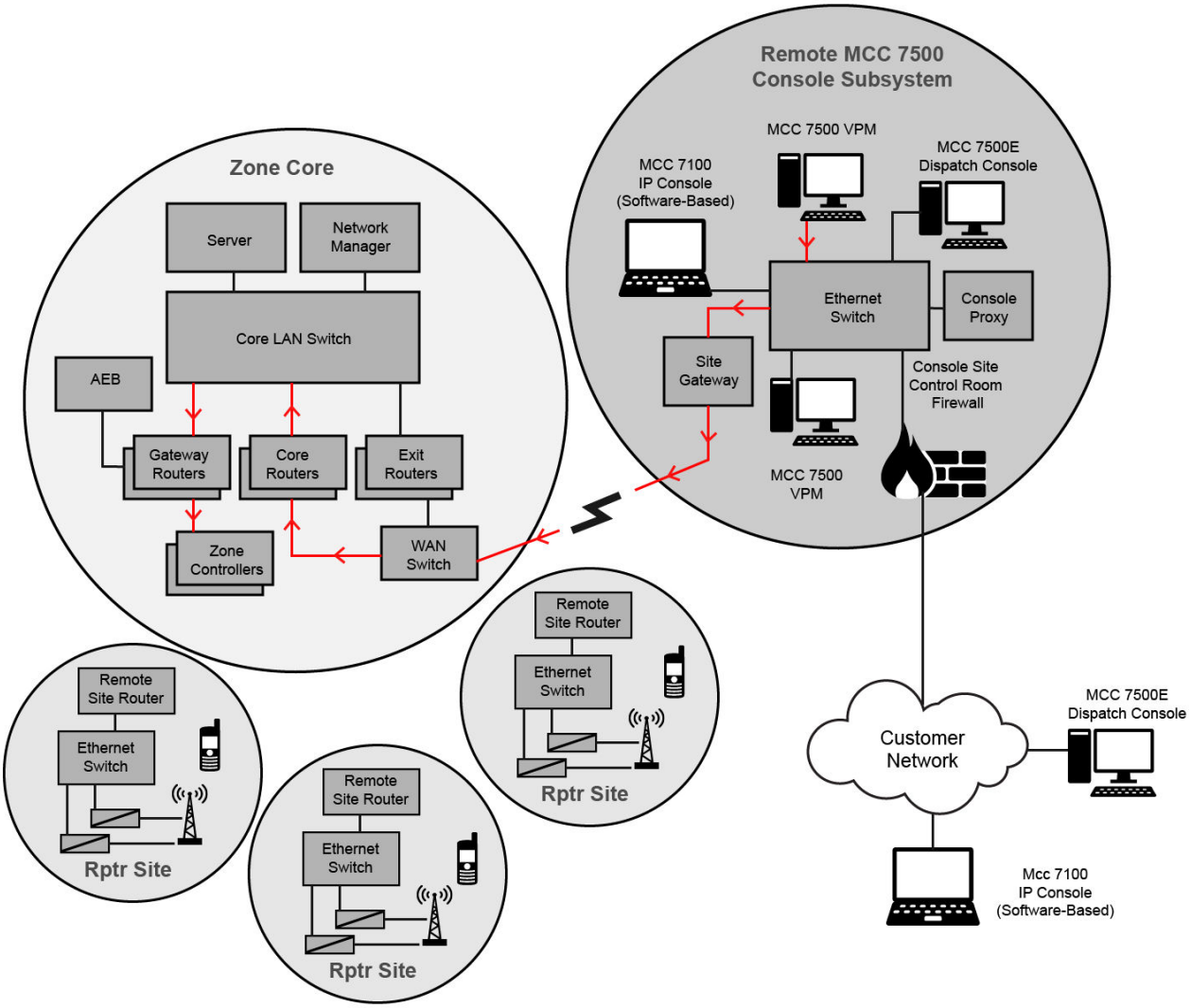
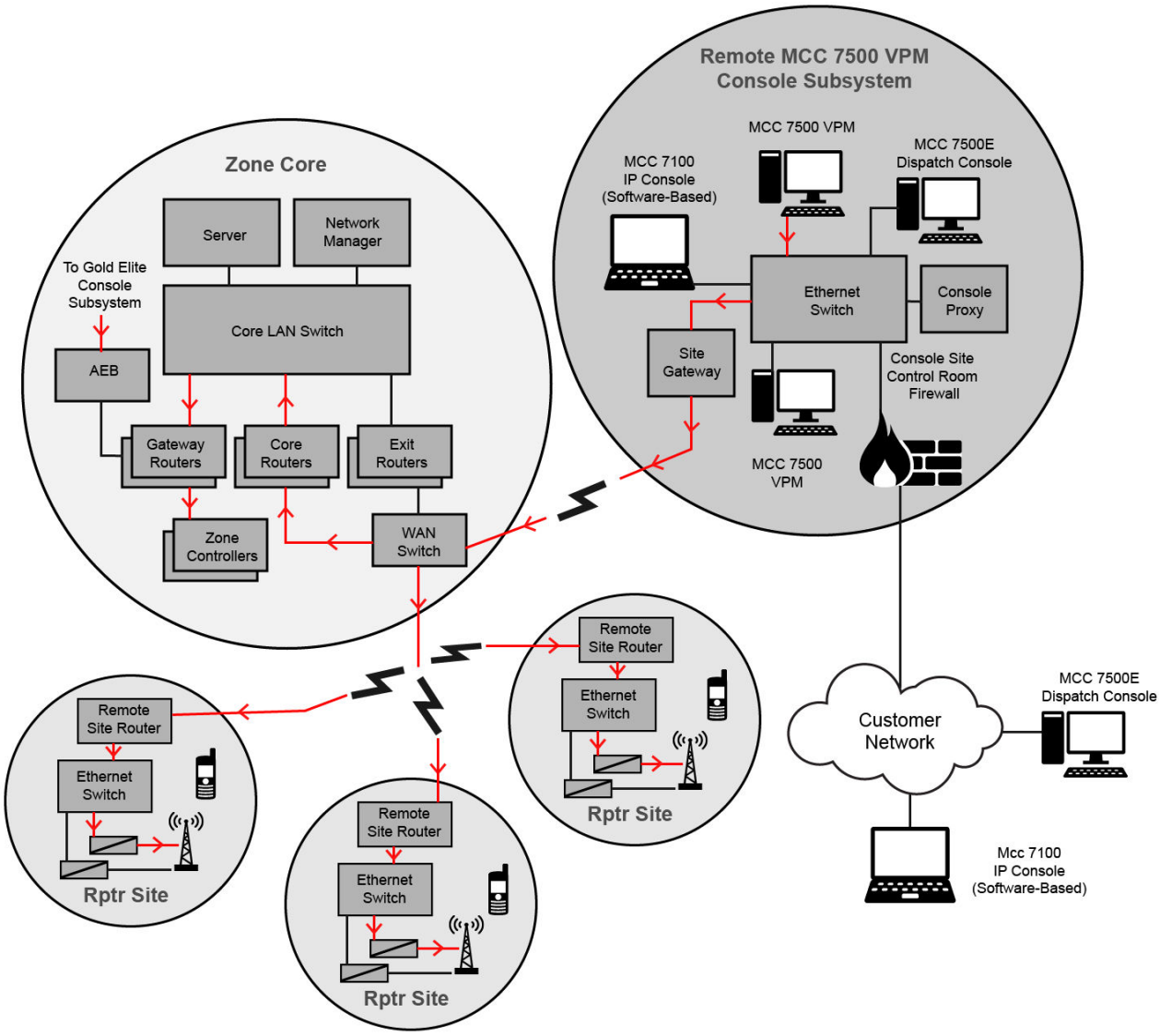


Figure 8: Console Call Grant in a Remote Console Site



2.10
Non-IP-based Console – Dispatch Console-Initiated Conventional Calls in Console Sites

Non-IP-based dispatch consoles are consoles other than the MCC 7500 VPM Dispatch Console, the MCC 7500E Dispatch Console, and the MCC 7100 IP Dispatch Console, such as consolettes. A Console Site (a dispatch console subsystem) can provide the capability to support conventional

transmissions from non-IP-based dispatch consoles connected to the console subsystem through an active bridge circuit. A dispatcher who operates on a non-IP-based dispatch console invokes transmission on a conventional channel by using the active bridge circuit.

2.11 Non-IP-based Dispatch Console Override of a Console Transmission in Console Sites

The dispatch console is not allowed to transmit on a conventional channel in concurrence with a non-IP-based dispatch console transmission. The console prevents the operator Push-to-Talk (PTT) whenever it can determine that the non-IP-based dispatch console transmission is active on the channel. In some cases, the console may not be able to determine if the non-IP-based dispatch console transmission is active on the channel and the Zone Controller (ZC) plays an arbiter and rejects the console request. The ZC ends the console transmission when the non-IP-based dispatch console transmission is detected on the channel.

Table 4: Non-IP-based Dispatch Console – MCC 7500 VPM Dispatch Console Interactions

		State	State
		Console TX Active	Non-IP-based Console TX Active
Event	Console TX Request		The ZC rejects the console transmission request and issues the ConventionalBeginLOBLTX to the requesting console site.
Event	Non-IP-based Console TX Request	The ZC ends the console transmission.	

2.12 Patch Calls in Console Sites

The audio patch feature allows for routing of a voice call from one patch group resource to other patch group resources. The audio patch operation is performed by using a dispatch console.

2.12.1 Audio Patched Calls in Console Sites

Patchgroup resources are either regrouped talkgroups (talkgroups combined into a common supergroup and only one RF channel are assigned for all regrouped talkgroups at one RF site), non-regrouped talkgroups (all talkgroups are assigned a separate RF resource, so it is more resource-consuming), conventional channels, private calls, phone calls, or a combination of any of these five. The “regroupable” capability is selectable if configured on a talkgroup basis.

When a secure-equipped console is setting up a patch, the Zone Controller (ZC) may need to form two supergroups to cover both clear and coded.

The dispatch console and the ZC each play a significant role in determining which patchgroup members receive audio. Generally, the functional breakdown is as follows:

- **Primary Dispatch Console functionality**

- Requesting patch reservation/unreservation of resources in a patchgroup
- Determining a patchgroup audio source based on audio source priority rules (see Table 5: Rules Enforced by the Patching Dispatch Console for the Audio Patch Source on page 59)
- Setting up the audio patch by requesting audio patch calls on patched resources

- **Primary Zone Controller functionality**
  - Arbitrating patch reserve requests from the dispatch console
  - Determining the audio source for a particular resource (talkgroup, conventional channel, private call, phone call)
  - Granting patch call requests if allowed based on priority of audio patch call request compared to current audio source for the patch resource

The dispatch console supports one audio patch source at any given time during a patch call. The audio patch source is selected from the patch members that belong to the same patchgroup.

The patching dispatch console selects the audio patch source in accordance with the patch source selection rules in Table 5: Rules Enforced by the Patching Dispatch Console for the Audio Patch Source on page 59.

Table 5: Rules Enforced by the Patching Dispatch Console for the Audio Patch Source

Rule	Audio Source Priority (Descending Order)
Non-IP-based console audio on selected conventional channel	Highest
Console Operator Audio on (selected Talkgroup/Conventional Channel or private call) - Instant Transmit, Supervisor 1	
Console Operator Audio on (selected Talkgroup/Conventional Channel or private call) - Instant Transmit, Supervisor 2	
Console Operator Audio on (selected Talkgroup/Conventional Channel or private call) - Instant Transmit, Non-Supervisor	
Console Operator Audio on (selected Talkgroup/Conventional Channel or private call) - General Transmit	
Console Operator Audio on (selected Talkgroup/Conventional Channel or private call) - Patch Transmit	
Radio Audio in an Emergency Call	
Radio Audio in a Normal Group/Conventional Call	
Radio Audio in a Private Call	
Chosen Telephone Audio	
Unchosen Telephone Audio	Lowest

2.12.2 Trunked Patch Reservation in Console Sites

Trunked Patch Reservation enables the dispatch console to add a talkgroup to the patchgroup.

Upon receiving the user indication to add a talkgroup to a patchgroup, the patching dispatch console sends a Talkgroup Patch Reserve Request to the Zone Controller (ZC). After the console makes a patch reservation request, it retries the patch reservation message until it receives a valid response to

guarantee its delivery to the ZC. The ZC responds with a Talkgroup Patch Reserve Grant to the patching dispatch console.

Upon receiving the Talkgroup Patch Reserve Grant from the ZC, the console marks the talkgroup as “patch reserved”. After the talkgroup is marked “patch reserved”, it is associated with the patchgroup.

2.12.3
Trunked Patch Unreservation in Console Sites

Trunked Patch Unreservation enables the console to remove a talkgroup from the patchgroup.

Upon receiving the user indication to remove a talkgroup from a patchgroup, the patching dispatch console sends a Talkgroup Patch Unreserve Request to the Zone Controller (ZC). After the console has made a patch unreservation request, it retries the patch unreservation message until it receives a valid response to guarantee its delivery to the ZC. The ZC responds with a Talkgroup Patch Unreserve Grant to the patching dispatch console.

Upon receiving the Talkgroup Patch Unreserve Grant from the ZC, the console marks the talkgroup as “patch unreserved”. After the talkgroup is marked “patch unreserved,” it is no longer associated with the patchgroup.

2.12.4
Conventional Patch Reservation in Console Sites

Conventional Patch Reservation enables the dispatch console to identify the conventional channels that must receive the patch audio.

The patching console performs validation checks upon receiving the user indication to patch reserve a conventional channel:

- It ensures that the requested conventional channel is in-service. If the conventional channel is not in-service, the dispatch console alerts the user and sends the patch command until the channel becomes in-service.
- It ensures that it is affiliated to the requested conventional channel. If the console is not affiliated to the requested conventional channel, the dispatch console alerts the user and sends the patch command until the channel becomes affiliated.

If the dispatch console user patch request has passed all of the necessary validation checks, the patching console sends a Conventional Patch Reserve Request message to the Zone Controller (ZC).

Upon receiving the Conventional Patch Reserve Grant from the ZC, the console marks the conventional channel “patch reserved” if the controlling console identifier in the Conventional Patch Reserve Grant message matches the patching console identifier. After the conventional channel is marked “patch reserved”, it is associated with the patchgroup.

2.12.5
Conventional Patch Unreservation in Console Sites

Conventional Patch Unreservation enables the dispatch console to remove a conventional channel from a patchgroup.

Upon receiving a user indication to remove the conventional channel from the patchgroup, the patching dispatch console sends a Conventional Patch Unreserve Request to the Zone Controller (ZC) to patch unreserve a conventional channel.

Upon receiving the Conventional Patch Unreserve Grant from the ZC, the console marks the conventional channel “patch unreserved”. after the conventional channel is marked “patch unreserved” it is no longer associated with the patchgroup.

2.12.6
Trunked Patch Calls in Console Sites

The patching dispatch console can initiate an audio patched talkgroup call request. One of the following occurrences triggers the audio patched talkgroup call setup:

- Call activity on a talkgroup or a supergroup in a patch
- A talkgroup is patch reserved to a patchgroup

The audio patched talkgroup call setup is similar to a group call setup, but it carries additional information regarding the voice source not available in the talkgroup Push-to-Talk (PTT) request. This information includes relevant voice source IDs, indication if the voice source is a dispatch console or a subscriber unit, and if the subscriber source is transmitting in an emergency call. This information is required to process the audio patched talkgroup call request in some cases where the Zone Controller (ZC) must determine the relative audio source priority of the voice source.

To initiate the audio patched talkgroup or supergroup call request, the patching console sends a Talkgroup Audio Patch PTT Request message to the ZC. When the ZC responds with a Talkgroup Audio Patch PTT Grant, and an audio source is present in the patch, the dispatch console initiates the audio patched talkgroup call setup on the patch reserved talkgroup. This action routes patched audio when no audio is being transmitted for the patch reserved talkgroup (that is, no call activity or call is in a hangtime). If no audio is transmitted on the talkgroup at the time the talkgroup is patch reserved, the patching dispatch console routes patched audio to the talkgroup that has been patch reserved. If only one audio source is in the patch, by default, this source becomes the audio patch source.

Upon receiving a Talkgroup Patch Reserve Grant message for a talkgroup with an active call, the console initiates the audio patched call setup for each talkgroup and supergroup in the patch when no audio source is present (that is, no call activity or the calls in a hangtime) on the patchgroup. The audio patch source is the patch reserved talkgroup.

2.12.7
Conventional Patch Calls in Console Sites

The patching dispatch console can initiate an audio patched conventional call request. One of these occurrences triggers the audio patched conventional call setup:

- Call activity on a resource (talkgroup, conventional channel, private call, phone call) in a patch
- A conventional channel is patch reserved to a patchgroup

An audio patched conventional call setup is similar to a normal conventional call setup, but it carries additional information regarding the voice source not available in a conventional Push-to-Talk (PTT) request. This information includes relevant voice source IDs, indication if the voice source is a dispatch console (MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch Console, MCC 7100 IP Dispatch Console, or third-party console) or a subscriber, and if the subscriber source is transmitting in an emergency call. This information is required to process the audio patched conventional call request in the cases where the Zone Controller (ZC) must determine the relative audio source priority of a call.

To request an audio patched conventional call setup on a conventional channel, the patching console sends a Conventional Audio Patch PTT Request message to the ZC.

Upon receiving a Conventional Patch Reserve Grant message when an audio source is present on a patch resource in the patchgroup, the dispatch console initiates an audio patched conventional call setup on the patch reserved conventional channel to route patched audio on the reserved conventional channel. If no audio is transmitted on the conventional channel at the time the conventional channel is patch reserved, the patching console routes patched audio to the conventional channel that has been patch reserved. If only one audio source is on the patchgroup, by default, this source becomes the audio patch source.

Upon receiving a Conventional Patch Reserve Grant message for a conventional channel with an active call, the dispatch console initiates an audio patched call setup for each talkgroup, supergroup,

and/or conventional channel in the patchgroup when no audio source is present (that is, no call activity or the calls in a hangtime) on the patchgroup and the console. The audio patch source is the patch-reserved conventional channel.

2.12.8
Patch Transmit in Console Sites

Only a patching dispatch console operator on a patchgroup can invoke a Patch Transmit. Patch Transmit provides the console operator with the ability to simultaneously communicate with multiple talkgroups and/or conventional channels. When the operator makes a patch transmit request, dispatch console initiates a conventional call request for each conventional channel and a talkgroup call request for each talkgroup or supergroup that is a member of the patchgroup. The difference between a regular group/conventional call and a patch transmit is that multiple simultaneous talkgroup/conventional call requests are made by the operator. The Patch Transmit feature in all other respects is identical to a group/conventional call, except that the Patch Transmit call has a lower priority.

When the dispatch console operator initiates the patch transmit request, the patching console sends a Talkgroup Push-to-Talk (PTT) Request message for each talkgroup and supergroup in a patchgroup, and/or a Conventional PTT Request message for each conventional channel in a patchgroup.

2.12.9
Grouping and Regrouping Mechanisms in Console Sites

Talkgroups in a patch/Multiselect (MSEL) group are either regrouped or not regrouped. Group regrouping is performed when the talkgroups are grouped into a larger talkgroup or a supergroup to save resources.

NOTICE: Conventional channels cannot be regrouped. The dispatch console makes a standard conventional PTT request when a conventional channel is in an MSEL and the dispatch console user initiates PTT.

The unregrouping removes the regrouped talkgroup from the supergroup. The entire supergroup may also be dissolved using the unregrouping mechanism.

Group regrouping enables the system to combine talkgroups belonging to the patch or the MSEL group into one larger talkgroup known as the supergroup. The supergroup formed by regrouping members of the patch or MSEL group is also known as patch or MSEL supergroup, respectively. The supergroup has its own group ID used to address all talkgroups that have been combined into the supergroup. When a secure equipped console is setting up a patch, the Zone Controller may need to form two supergroups, to cover both clear and coded.

The advantage of group regrouping is to efficiently use network and RF resources. The call on a supergroup is treated as a single group call, thus a single RF channel per site and a single multicast group for the call are required to route voice.

If both the clear-only supergroup and a coded supergroup are formed, two RF channels per site may be needed. In MSEL, the regrouping remains for the duration of the MSEL call and the resulting supergroup may have a single member talkgroup.

In patch, the talkgroup is not unregrouped unless the talkgroup is removed from the patch or one of the several regroupability criteria fails to hold. In addition, the patch supergroup must have at least two members.

2.12.10
Grouping and Regrouping Mechanisms in Console Sites - TDMA

Supergroups used for Patch and Multiselect (MSEL) from a dispatch console allow multiple talkgroups to be merged together to talk on one voice channel per site. The system treats each supergroup in a

dynamic manner, regarding whether a supergroup call is made in Frequency Division Multiple Access (FDMA) or Time Division Multiple Access (TDMA) mode.

Supergroup talkgroups are updated based on the dynamic mode of the talkgroups presented in the supergroup. For example, an ongoing call on the talkgroup/supergroup is not affected by the configuration change. The next call uses the new mode (FDMA or TDMA) of the supergroup.

- If a talkgroup operation mode changes due to radio/console affiliation, then the supergroup mode must be evaluated. After evaluation, a subsequent supergroup call may be setup in a different mode (FDMA or TDMA).
- If the configuration of a talkgroup is changed, and the talkgroup is a member of the supergroup, then the supergroup mode must be evaluated.

NOTICE: The ASTRO® 25 Single Zone, Small Scale system supported by the L core (redundant/non-redundant zone core) does not support X2–TDMA operation. It does however support Phase 2–TDMA operation.

NOTICE: The ASTRO® 25 Single Zone, Small Scale system supported by the L core (redundant/non-redundant zone core) supports Phase 2–TDMA operation.

2.12.11
Private Patch Calls in Console Sites

Dispatch consoles support simplex private calls between a console and a subscriber unit and a console and a phone call. A dispatch console can also add a private call to a patchgroup. However, once patched, the call is no longer a private call.

One of the following occurrences triggers the audio patched private call setup:

- The console operator adds a private call trunking resource with an active private call to a patchgroup. The private call is patched in much the same manner as patch reserving a talkgroup, that is, from the dispatch console GUI.
- A talkgroup or conventional channel is patch reserved to a patchgroup that includes a private call trunking resource with an active private call, resulting in a change to the audio patch source.
- Patch call dynamics cause a change to the audio patch source, for example, audio patch source dekey.

To add a private call to a patchgroup, the patching dispatch console initiates the audio patched U2U Call Request. When a private call trunking resource is added to a patchgroup, formal patch reservation, which is required for patch-reserving a talkgroup, is not needed. The patching dispatch console only implements the patch on a private call trunking resource when a private call is active (either active in hangtime or active in transmit) on the trunking resource. Other members of the patch hear the private call audio if its audio has the highest relative audio source priority in the patchgroup to become the audio patch source. On the other hand, if the private call is not an audio patch source, the dispatch console routes the audio patch source audio to the private call by setting up an audio patched private call.

One exception case is that, if the patching dispatch console itself is transmitting on the private call and the current audio patch source is not from the private call, the console does not attempt to patch the current patch audio to the private call. When no audio patch source is in the patch, the audio patched private call is ended with normal private call termination.

2.12.12
Multiselect Calls in Console Sites

The Multiselect (MSEL) feature provides console operators with the ability to communicate with multiple talkgroups or conventional channels. The talkgroups and/or conventional channels in the MSEL group are either regroupable talkgroups (talkgroups in MSEL can be regrouped into a common

supergroup), non-regroupable talkgroups (all talkgroups are assigned a separate RF resource), or conventional channels or a combination of the three.

NOTICE: The “regroupable” capability is selectable on a talkgroup basis and does not apply to conventional channels.

The dispatch console supports up to three MSEL groups per console and twenty talkgroups/ conventional channels per MSEL group.

The console operator can invoke the MSEL feature only on talkgroups and conventional channels which have been collected in an MSEL group at the dispatch console. Unlike patch, a talkgroup or conventional channel can reside in multiple MSEL groups.

When the operator invokes MSEL service, dispatch console initiates an MSEL request, simultaneously, for each talkgroup that is the member of the MSEL group. For talkgroups that the dispatch console determines that cannot be regrouped, a talkgroup call request is made. For conventional channels, the dispatch console makes a standard conventional PTT request. For MSEL, regrouping of the talkgroup occurs after the MSEL service is invoked and remains so for the duration of the MSEL call. The time that the console transmits determines the duration of the MSEL call, since transmission trunking is the only transmission method allowed for MSEL calls.

The MSEL call, collectively, appears as one or more talkgroup, supergroup, and/or conventional calls. The MSEL feature in all other respects is identical to the talkgroup/conventional call. The private call trunking resource cannot be added to an MSEL group, as the MSEL feature supports only talkgroup and/or conventional calls.

When a secure equipped console is multi-selecting talkgroups, the Zone Controller may need to form two supergroups, to cover both clear and coded.

The advantage of group regrouping is to efficiently use network and RF resources. The call on a supergroup is treated as a single group call, thus a single RF channel per site and a single multicast group for the call are required to route voice. If both the clear only supergroup and a coded supergroup are formed, two RF channels per site may be needed.

2.12.13
Resource Group Lock

This feature enables the dispatch console administrator to lock the contents of one or more of the resource groups. Locking of the resource groups prevents the dispatcher from adding members to or removing them from a given Multiselect, Patch, or Primary Resources group. This process can be done only through the MCC 7500/7100 Elite Admin application. In the Elite Dispatch application, appropriate indication displays when a group is locked. For more information, see the *Elite Admin User Guide*.

2.12.14
Duplex Patch

Duplex Patch makes it possible to configure analog conventional channels and MDC 1200 analog conventional channels so that they can operate in a duplex mode when patched together or with a console telephone resource.

The standard operation is that when a dispatcher patches two analog conventional channels, they switch to the simplex mode which means that the radio users in the patch can hear only one radio transmitting at a time. With the Duplex Patch, all non-transmitting radio users on both patched channels can hear the sum of the audio from the transmitting radio users on both resources.

Duplex Patch Combinations

The maximum number of parties in a duplex is two analog conventional channels or one analog conventional channel and a telephone call. See the list of all the possible combinations in a Duplex Patch:

- Two Duplex-Patch-capable analog conventional channels
- Two Duplex-Patch-capable MDC 1200 analog conventional channels
- One Duplex-Patch-capable analog conventional channel and one Duplex-Patch-capable MDC 1200 analog conventional channel
- One Duplex-Patch-capable analog conventional channel and one telephone call
- One Duplex-Patch-capable MDC 1200 analog conventional channel and one telephone call

NOTICE: It is not possible to set up a Duplex Patch between two channels when one of them is not Duplex-Patch enabled. The limit of parties in a Duplex Patch is two.

2.12.14.1

Duplex Patch Operation

This section provides information on how to set up and knock down a Duplex Patch, and other details about the Duplex Patch operation.

Duplex Patch Setup

Usually, two Duplex-Patch-capable channels or one Duplex-Patch-capable channel and one telephone call start operating in the Duplex Patch mode as soon as a dispatcher patches them together. The exception is when one of patched channels is not functioning or the patched phone call is on hold. As soon as the channel or phone call state changes to being available, the patched parties start hearing all audio.

Duplex Patch Knockdown

The channels or the channel with phone call stop operating in the Duplex Patch mode under the following circumstances:

- When the dispatcher adds a third member to the patch that is any radio or phone resource. As soon as the dispatcher reduces the number of patch members to two Duplex-Patch-capable radios or one Duplex-Patch-capable radio and one telephone call, the patch stops operating in simplex mode and changes to duplex operation.
- When the dispatcher who created the patchgroup, or any other parallel dispatcher, begins transmitting on one of the channels in the Duplex Patch. The Duplex Patch is no longer active and the radio users on the patched channels now hear only the dispatch transmission. When the dispatcher ends their transmission, the duplex patch is brought up again and the radio users on the patched channels hear all audio on both channels.
- When the dispatcher puts the telephone call on hold which causes the console to stop the Duplex Patch outbound transmissions on the patched channel until the dispatcher disables the put on hold option.
- When the dispatcher knocks down the Duplex Patch by removing the patched parties from it. The channels revert to their normal non-patched mode of operation.
- Both radio users stop transmitting long enough that the Duplex Patch Timeout timer expires. After the timer expires, the controlling console stops the Duplex Patch outbound transmissions on both patched channels.

Subscriber-Sourced MDC 1200 Signaling in Duplex Patch

When a radio user on one of the channels in a Duplex Patch sends the MDC-1200 signaling with their transmission, the MDC-1200 signaling is not repeated on the channel on which the user transmits. Therefore, during an active Duplex Patch when both channels are transmitting due to the Duplex Patch, no MDC-1200 signaling is repeated. The MDC-1200 signaling includes among others PTTID, Call Alerts, and Emergency Alarms.

Console Initiated Duplex Patch Calls

The console controls the following:

- Patch type
- Changing from duplex to simplex
- Changing from simplex to duplex

The dispatch console controls the patch type through which resources it places in its patchgroups. When two Duplex Patch-capable resources are placed in a patchgroup, that patchgroup operates in Duplex Patch mode.

Changing from duplex to simplex and simplex to duplex is based on patchgroups changing from two Duplex Patch capable members to three members or three members to two Duplex Patch-capable members. The console indicates Duplex Patch in its patch transmit request, and that information gets forwarded to the Conventional Channel Gateway (CCGW).

The Duplex Patch starts when at least one active audio source is available on either of the two resources in the patchgroup. The console keys both channels when Duplex Patch starts.

When Duplex Patch is active, the CCGW creates transmit audio by summing its receive audio with the console patch audio. Received MDC control tones are not summed.

When a parallel, Motorola Solutions or Line Operated Busy Light (LOBL), or local dispatcher transmits on a channel in a Duplex Patch, the Duplex Patch is no longer active and the radio users hear only the transmitting console audio. The Duplex Patch is re-established when the parallel/local dispatcher transmission ends.

Both Duplex Patch transmissions can end upon:

- Expiration of the console Duplex Patch drop out delay timer
- Change in patchgroup membership
- Console transmit upon a resource in the patchgroup

2.12.14.2

Duplex Patch Configuration

To configure an analog conventional channel or an MDC-1200 analog conventional channel for the Duplex Patch feature, modify objects in Provisioning Manager.

To enable the Duplex Patch feature for an analog conventional channel, modify the console capabilities for the Analog Conventional Channel object.

To enable the Duplex Patch feature for an MDC-1200 analog conventional channel, modify the console capabilities for the MDC Conventional Channel object.

To customize the Duplex Patch Timeout timer, modify the console configuration for the Console User Capabilities Profile.

For detailed instructions on how to configure the Duplex Patch feature, see the *Provisioning Manager User Guide*.

2.12.15

Patch Rules for Local Radio Audio Compared to Patch Transmission

Typically, local radio audio on a resource (talkgroup/channel) has a higher priority over a console patch transmission (on the same talkgroup/channel resource) when the voice source is a radio from a different talkgroup or channel.

However, if the audio source for the patch transmission is a console, the console patch transmission has priority over local radio audio. This priority assumes that the channel resource has Repeat enabled. Repeat enabled is accomplished when the High Priority (HP) bit (C/R bit) used by the console informs the Zone Controller (ZC) which type of audio source (local radio audio or console patch transmission) it is patching.

When a consolette channel is patched to a trunked talkgroup for Tone Remote Control (TRC)-controlled consolettes where the Talk Permit Tone is enabled, the inbound Talk Permit Tone is treated as Local Radio Audio (which is higher priority than Patch audio). This situation causes the zone controller to end the patch transmit on the consolette channel and terminate the Talk Permit Tone. But a solution can be put in place to ensure that a patch transmission on a conventional channel is considered HP over Local Radio Audio so when the console brings the patch back up, the process does not keep repeating.

To ensure that a patch transmission on a conventional channel is always considered HP over Local Radio Audio, the **Console Patch Local Transmit Priority** parameter for a Conventional Channel can be changed from **Normal**to **High**so that an outbound patch transmission has a higher priority than inbound radio transmission. This technique applies to all analog, Mobile Data Communications (MDC), digital, and mixed mode conventional channel, but does not apply to conventional talkgroup channels and ASTRO® 25 Control Interface Module (ACIM) channels (ACIM automatically operates with the HP bit).

To ensure that a patch transmission on a conventional channel is considered as HP over Local Radio Audio, a locally stored configuration file containing the channel names of the Conventional channels must be established on the console so that the HP bit is asserted in patch transmit sent to ZC. This file allows an outbound patch transmission to have a higher priority than inbound radio transmission. This priority applies to all analog, Mobile Data Communications (MDC), digital, and mixed mode conventional channels, but does not apply to Conventional Talkgoup channels and ASTRO® 25 Control Interface Module (ACIM) channels (ACIM automatically operates with the HP bit).

2.13 Trunking System Status and Events in Console Sites

This section describes system status and events in console sites in trunking system.

2.13.1 Trunking Repeat Disable in Console Sites

Upon receiving a console operator request for a trunking repeat disable of a particular talkgroup audio, the dispatch console sends a Talkgroup Repeat Disable Request command to the Zone Controller (ZC) to disable the trunking repeat audio path.

The console verifies that the talkgroup is affiliated with the ZC before sending the Repeat Disable command to the ZC. The dispatch console does not send Repeat Disable commands to the ZC if it knows that the talkgroup is not affiliated with the ZC.

Upon receiving the Talkgroup Repeat Disable Grant command from the ZC, the dispatch console indicates to the operator that the talkgroup has been repeat disabled.

2.13.2 Trunking Repeat Enable in Console Sites

Upon receiving a console operator request for a trunking repeat enable of a particular talkgroup audio, the dispatch console sends a Talkgroup Repeat Enable Request command to the Zone Controller (ZC) to enable the trunking repeat audio path.

The dispatch console verifies that the talkgroup is affiliated with the ZC before sending the Repeat Enable command to the ZC. The console does not send Repeat Enable commands to the ZC if it knows that the talkgroup is not affiliated with the ZC.

Upon receiving the Talkgroup Repeat Enable Grant command from the ZC, the dispatch console indicates to the operator that the talkgroup has been repeat enabled.

2.13.3
Call Alerts in Console Sites

A console user configured with outbound Call Alert capability can alert any other unit ID in the system. The console user can select from a list of user aliases that the console user has rights to access.

Upon the user indication of a Call Alert, the originating console initiates the Call Alert by sending a Call Alert Request to the Zone Controller (ZC), which is forwarded to the target. After the target acknowledges, the ZC notifies the originating console through a Call Alert Acknowledgment, and the console indicates this situation to the user.

2.13.4
Emergency Events in Console Sites

Four types of emergency events are in a dispatch console subsystem:

- Emergency alarm
- Emergency call
- Emergency acknowledge/recognize
- Emergency knockdown

2.13.4.1
Emergency Alarm

A subscriber unit uses an emergency alarm to notify all affiliated consoles that an emergency state on that subscriber is occurring.

A subscriber initiates emergency alarms when the user presses the Emergency Button (if the subscriber unit is so configured). When this alarm occurs, all consoles affiliated with this talkgroup or ASTRO® 25 Conventional channel receive an alarm indication and displays the subscriber ID and Alias (if available) to the console operator. These indications notify the operators of the subscriber emergency state so that the appropriate action is taken.

An emergency call may follow the emergency alarm.

NOTICE: To individually configure whether emergency alarm tones are established for each talkgroup or conventional channel that can be assigned on a dispatch position, see the *Elite Admin User Guide* which permits enabling or disabling the audible tone on a per-dispatch-position basis.

2.13.4.2
Emergency Call

Both subscribers and consoles initiate emergency calls, in trunking signaling only. When an emergency call is started, if RF channels and console site bandwidth resources are available, the RF channel and console site resources are immediately assigned to the call (with preemption performed if necessary).

One difference emergency calls have from group calls is that the resources are assigned to the emergency calls longer than normal group calls. Console-initiated emergency calls have infinite hang time and are not ended until the emergency call is knocked down (ended). For subscriber-initiated emergency calls, the call is allowed an extended emergency hang time after all transmissions have ended (as compared to a shorter duration normal group call hang time).

2.13.4.3

Emergency Acknowledge/Recognize

When a subscriber initiates an emergency alarm/call, all affiliated consoles receive an emergency alarm or call indication. The subscriber unit that issued the emergency alarm then waits (if configured) for an emergency acknowledge message from the infrastructure.

For console systems, a console operator is then able to 'Recognize' the emergency situation by having the console route an emergency acknowledge message to the Zone Controller (ZC). It is also possible for your organization Computer-Aided Dispatch (CAD) system to be the source of the emergency acknowledge message.

When the ZC receives an emergency Acknowledge Request Message from a console, it sends an Acknowledge response message to all console sites containing affiliated OP positions indicating that the emergency has been acknowledged (recognized). The ZC also sends a message to the Air Traffic Router (ATR) indicating that the emergency has been acknowledged (recognized) when the emergency alarm Ack configuration parameter indicates console acknowledgment.

Each talkgroup and ASTRO® 25 Conventional channel must be configured with a parameter that the ZC uses to determine if the emergency alarm Ack is sourced from an MCC 7500 VPM Dispatch Console, an MCC 7500E Dispatch Console or an MCC 7100 IP Dispatch Console, or the RCM. If the emergency alarm parameter indicates that the emergency is to be acknowledged by the RCM, the ZC uses the RCM acknowledgment. If the emergency alarm parameter indicates that the emergency is to be acknowledged by the console, the zone controller uses the console acknowledgment. The ZC also uses this parameter to determine if an emergency alarm acknowledgment is sent to the subscriber ID.

NOTICE: When a console sets up an emergency call, the emergency is considered recognized. Therefore, affiliated consoles do not send an acknowledgment for console-initiated emergency calls.

2.13.4.4

Emergency Knockdown

Emergency alarms and calls sent from subscribers are routed to all affiliated consoles monitoring the subscribers talkgroup or ASTRO® 25 Conventional channel. After an emergency alarm/call is acknowledged, the alarm/call can be knocked down (cleared) if desired. The console sends the Zone Controller (ZC) an Emergency Knockdown Request.

The ZC then sends the Emergency Knockdown Grant to all console sites with affiliated consoles. Console operators must initiate a “knockdown” to end a console-initiated emergency call (due to the infinite hangtime of console initiated calls).

Consoles may also knock down subscriber-initiated emergency calls. The ZC also sends a radio status traffic message that includes the talkgroup or ASTRO® 25 Conventional channel being knocked down and the ID of the console knocking down the emergency.

When a console knocks down a subscriber-initiated emergency, however, only the alerts heard at the console are turned off. The emergency state remains active at the console until the initiating subscriber unit cancels the emergency.

2.13.5

TDMA Emergency Events in Console Sites

While consoles do support Time Division Multiple Access (TDMA) Emergency Calls, be aware of the following TDMA mode talkgroup operation regarding Emergency Calls when a Frequency Division Multiple Access (FDMA)-only subscriber radio or console affiliates to the talkgroup.

All call types are transmission trunked when an FDMA-only radio/console affiliates to talkgroup active in a TDMA talkgroup call (assuming talkgroup configured as dynamic) or a TDMA radio roams to an FDMA-only site including emergency calls. Therefore, if an emergency call is active when the current

transmitter (radio or console) dekeys, the emergency call is ended and must be re-established or restart the call. This action is necessary so that the all members of the talkgroup can receive audio on the talkgroup. If this action is not done, it is possible that the emergency radio could roam to an FDMA-only site and not be able to communicate on the talkgroup.

By ending the emergency call, the next PTT results in an FDMA talkgroup call, possibly in emergency mode. Ending of emergency calls applies to both radio and console-initiated emergency calls. Therefore, if you want to be sure that an emergency call setup by a console dispatcher is to remain up indefinitely, do not use a TDMA talkgroup/multigroup.

NOTICE: The ASTRO® 25 Single Zone, Small Scale system supported by the L core (redundant/non-redundant zone core) does not support X2–TDMA operation. It does however support Phase 2–TDMA operation.

NOTICE: The ASTRO® 25 Single Zone, Small Scale system supported by the L core (redundant/non-redundant zone core) supports Phase 2–TDMA operation.

2.13.6
Station Control Commands in the Console Sites

Station control capability allows the dispatch console to command an entity (for example, base station) attached to a conventional channel to perform some function (for example, turn repeat on). A dispatch console user may wish to perform a station control command on an active conventional channel. However, because the active call has higher priority than station control commands, the station control command is not allowed.

Analog Conventional Stations

The dispatch console supports the following station control commands:

- Repeat ON/OFF
- Mute Secondary Receiver Enable/Disable
- Monitor Enable
- Select Frequency
- Select PL
- Wildcard I and II Enable/Disable

The command is carried out by the conventional channel gateway through Tone Remote Control over the 4 wire analog interface for the conventional channel.

ASTRO 25 Conventional Stations

Station Control commands which can be used to control ASTRO® 25 Conventional stations include:

- Repeat On/Off
- Monitor Enable
- Frequency Select

For information about the features supported for conventional talkgroup channels, see the *RF Site Technician Reference Guide*.

IP Conventional Stations

Station Control commands which can be used to control IP Conventional stations include:

- Repeat On/Off
- Frequency Select

- Monitor Enable

ACIM Conventional Channels

Station Control commands which can be used to control stations equipped with Consolettes include:

- Monitor Enable
- Select Frequency

2.14 Console Events in Console Sites

Console events in a dispatch console subsystem include parallel console interrupt, console takeover, and normal/tactical priority.

2.14.1 Parallel Console Interrupt in Console Sites

The system allows a console to interrupt the audio transmission of a currently transmitting console. When a console interrupts another console, the interrupted console dekeys. When dekeying occurs, the Zone Controller (ZC) configures the audio devices in the call to receive audio from the interrupting console.

Because only one dispatch console can transmit on the channel at a given time, the ZC determines which console is allowed to transmit based upon the transmit priority of the console.

Table 6: Parallel Dispatch Console Interactions

		State
		MCC VPM 7500/MCC 7500E/MCC 7100 Console TX Active
Event	Console TX Request with higher transmit priority	The ZC grants the transmission to the requesting console.
Event	Console TX Request with equal/lower transmit priority	The ZC issues the grant to the requesting console site indicating the current controlling console.

The parallel console taking over the transmission from another console could have requested transmission on a different frequency.

2.14.2 Normal/Tactical Priority in Console Sites

A tactical priority call is a high-priority call, second only to emergency in priority. A talkgroup call with tactical priority gains access to system resources faster than a normal priority call as the Zone Controller (ZC) looks at the relative priority of other call requests and finds a call with tactical priority to be of higher access priority than a normal priority talkgroup call.

The dispatcher console invokes the normal priority function to downgrade a tactical priority talkgroup back to normal priority. Normal priority is the pre-configured priority level.

Upon a console operator request of the tactical priority talkgroup service, the dispatch console sends a Talkgroup Tactical Priority Request command to the ZC to change the talkgroup priority to tactical priority.

The dispatch console indicates to the operator that the normal/tactical priority of the talkgroup has changed when the Talkgroup Tactical/Normal Priority Grant command is received from the ZC.

2.14.3
Console Takeover in Console Sites

If a subscriber unit is transmitting, and a console user initiates a transmission on the same resource, the console audio has higher priority and overrides the existing subscriber audio. This scheme is referred to as a console takeover. The subscribers now hear the console transmission instead of the original transmission. The parallel consoles, assuming they have sufficient bandwidth available, are able to hear both the radio transmission and the console transmission.

NOTICE: Consoles communicating through an ASTRO® 25 Control Interface Module (ACIM) Conventional Channel can takeover subscriber calls. However Consolettes used to deploy the ACIM Conventional Channels do not support full-duplex communication. Parallel consoles are only able to hear the audio from the console performing the takeover, and not the subscribers audio.

If a console is initially transmitting and a subscriber initiates a transmission during the active console transmission, the radio is allowed to transmit. The other radios in the system do not hear the subscriber transmission because the console has higher priority. However, the radio transmission is heard at the console position.

The routing of the audio for the transmissions is managed by controlling the multicast addresses that destination devices use to obtain receive audio.

In a takeover scenario in which two valid audio streams are present (console and subscriber), the system allocates two separate multicast addresses to route the two valid audio streams. Two separate multicast addresses are needed since the destinations that receive audio are different based on the type of audio (that is, RF sites only receive console audio, all consoles receive subscriber audio and console audio, bandwidth permitting). By using two multicast addresses, bandwidth to the destinations is saved since only the audio necessary for the destination is routed to the destination.

In situations where two valid audio streams exist in the same group call (that is, the audio from the currently transmitting subscriber and the audio from the console taking over the subscriber call), monitoring consoles at console sites other than the transmitting console require two units of bandwidth. When the monitoring console has only one unit of bandwidth available, the higher priority audio stream (the console) is received. In effect, the console with limited bandwidth behaves like an RF site, in that it is only able to receive one audio stream at a time. The zone controller decides which audio stream is to be received, and the console responds by listening to the appropriate audio stream.

The zone controller is responsible for determining the particular audio takeover/resumption case and distributing the appropriate multicast address to the receiving devices. The console is responsible for obtaining and routing the audio appropriately, based on the multicast ID it receives from the zone controller. Destination devices for console or radio audio must be flexible enough to have their receive multicast address changed in the middle of the call to allow for takeover and resumption cases. In the system, the console is always able to take over the audio of the call, whether the subscriber is transmitting at regular priority or emergency priority on the normal or emergency call.

2.15
Group Calls in Console Sites

Four types of group calls are used in Console Sites:

- Talkgroup calls
- Announcement group calls
- Supergroup calls
- Agency Group Calls

2.15.1
Group Call Sequence of Events in Console Sites

For MCC 7500 VPM Dispatch Consoles, MCC 7500E Dispatch Consoles, and MCC 7100 IP Dispatch Consoles, the core transport of voice services is packet-based. Therefore, audio is transported over the packet network to reach the consoles.

Group Call Example:

1. Originating subscriber in their “home zone” requests group call to talkgroup A.
2. Zone Controllers assign a common IP group address as part of the call grant to affiliated consoles and base sites that are members of the requested talkgroup.
3. Base site IP proxies and consoles send “join” messages through their local IP routers/switches to the core router to become members of the assigned IP multicast group.
4. A multicast routing protocol works quickly within the IP network to create routing table entries to support a multicast distribution to all group members.
5. When subscriber voice arrives at base site, IP bearer client wraps it in IP packets addressed to assigned IP multicast group and sends packets into network.
6. IP network replicates the sourced packets and distributes them efficiently along spanning tree to all group members.
7. When originating subscriber finishes, the IP proxy at a comeback subscriber site can use same multicast tree immediately for their return transmission to group.
8. When talkgroup activity times out, the Zone Controller releases call and consoles, and base site IP proxies send a “leave” message to tear down multicast tree.

2.15.1.1
Talkgroup Calls in Console Sites

For talkgroup calls, a dispatch console interfaces to the packet network. The dispatch console performs the vocoding and devocoding for console audio while the console site router performs the necessary routing to allow the console to participate in voice services.

For a console-initiated call, the dispatch console sends the talkgroup Push-to-Talk (PTT) request and, upon receiving the grant message from the zone controller, becomes the audio sourcing device on the packet network side of the system. The console issues the vocoded audio frames on the assigned multicast address.

For secure equipped consoles, the dispatch console performs the encrypting/decrypting of IMBE™ and AMBE™ vocoded audio.

Conventional Talkgroup Calls can be established to separate calls from multiple agencies on a single digital conventional talkgroup channel. For more information about the conventional talkgroup feature, see the *RF Site Technician Reference Guide*.

2.15.1.2
Announcement Calls in Console Sites

Announcement calls are supported both within a user group and across user groups. The operation of announcement group call is such that all radios in the announcement group and associated talkgroups that would participate in the call – before the introduction of channel partitioning – still participate.

However, not every radio is always included in every announcement group call. For example, a radio in announcement call mode and scanning for a member talkgroup call may be excluded from the talkgroup call. The scanning radio would be excluded when a member talkgroup call is in progress and a radio sources audio against that member talkgroup user group, rather than the multigroup user

group, and the RF site at which the scanning radio is located does not permit the sourcing talkgroup user group.

2.15.1.3
Supergroup Calls in Console Sites

For a discussion of supergroups, see Grouping and Regrouping Mechanisms in Console Sites on page 62 and Multiselect Calls in Console Sites on page 63.

2.15.1.4
Agency Group Calls in Console Sites

Agency Group Calls are used to group multigroups and can be configured in Provisioning Manager. Generally, Agency Group calls have higher priority than multigroup calls and talkgroup calls. For more information, see the *Provisioning Manager User Guide* for configuration details and the *Radio Features Reference Guide*.

2.16
Secure Calls in Console Sites

For details on secure call processing in the console subsystem, see the *Secure Communications Feature Guide* manual.

2.17
ACIM Conventional Channel for Console Sites

The following sections describe the ASTRO® 25 Control Interface Module (ACIM) conventional channel for console sites.

2.17.1
ACIM Conventional Channel Description

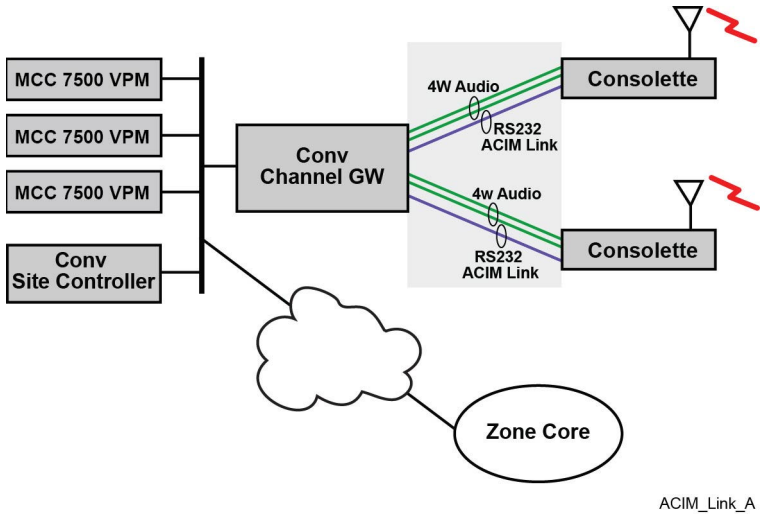
The ASTRO® 25 Control Interface Module (ACIM) serial control protocol is a conventional channel feature for GGM 8000 based platforms. It allows exchanging control information between the Conventional Channel Gateway (CCGW) and Motorola Consolettes.

The Motorola Solutions Consolette enables a console site to have access to trunking resources when its link to the zone core has failed. The consolette also enables wireless connection to systems using a variety of over-the-air protocols (such as analog, analog with MDC-1200, ASTRO® 25 conventional, and 3600 trunking).

Motorola Solutions Consolettes are controlled either with Tone Remote Control (TRC) or through the ACIM link. However, the ACIM protocol provides more features compared to TRC. Additional functionality includes Unit ID transmission and the ability to use supplementary data features such as Call Alert and Emergency Alarm.

ACIM conventional channel can be deployed by using either an XTL 5000 Millennium or APX 7500 Multi-Band Consolette. This figure shows how a consolette connects to a Console Site.

Figure 9: ACIM Link



However, the XTL 5000 Millennium Consolette supports a limited feature set compared to the APX 7500 Multi-Band Consolette. For a complete set of features, it is necessary to use an APX 7500 Consolette. Features supported by the APX 7500 Multi-Band Consolette are:

- Inbound Call Indication
- Inbound PTTID
- Transmit Control (no console PTT-ID)
- Monitor Control
- Coded/Clear indication and Control
- Encryption Key (CKR) Selection
- Emergency Alarm
- Emergency Call
- Call Alert
- Status Update
- Status Request
- Message Update
- Remote Monitor
- Radio Check
- Radio Enable/Disable
- Frequency Select

For a list of features supported on each consolette, see "ACIM Channel Features" in the *RF Site Technician Reference Guide*.

The difference between a conventional channel and ACIM conventional channel is that ACIM always uses the G.728 vocoder regardless of the mode of the transmission.

ACIM Conventional Channel provides Unit IDs to the console but not the aliasing information. Based on the Unit ID, the console can have a radio alias displayed instead.

For more information related to the ACIM conventional channel, see “ACIM Interface – Functional Description” in the *GGM 8000 System Gateway Feature Guide*.

For more information related to the consolettes, see the particular consolette *XTL 5000 Detailed Service Manual* or the *APX 7500 Multi-Band Consolette Detailed Service Manual*.

WARNING: Ensure that the configuration of radio resources which control a consolette or control station using Frequency Select, Transmit Mode Select, or any other console function matches the mode configuration of the attached consolette.

2.17.2
ACIM Conventional Channel Configuration

Provisioning Manager considers ASTRO® 25 Control Interface Module (ACIM) Link channels to be a new type of conventional channels and allows the operator to configure the capability.

For creating an ACIM conventional channel, see the configuration information in the *Provisioning Manager User Guide*.

For configuration procedures carried out on consolettes, see the particular product manual in the *XTL 5000 Detailed Service Manual* or the *APX 7500 Multi-Band Consolette Detailed Service Manual*.

NOTICE: If your organization uses Unit IDs limited to the decimal range, ACIM Links enabled with the MDC-1200 Signaling Capability can be configured for the "Limited ID Space" capability.

2.17.3
ACIM Conventional Channel Operation

The difference between a conventional channel and ASTRO® 25 Control Interface Module (ACIM) conventional channel is that ACIM always use the G.728 vocoder regardless of the mode of the transmission.

Your organization may connect consolettes to the dispatch consoles within their systems. The two typical operational scenarios are:

- Trunking Fall Back Operation where the consolette provides communications in the event the main trunking system is no longer accessible to the console
- Wireless Access to Different System Types where the consolette provides access to different system types that the main system of your organization does not have access to

The user may initiate the following commands to a consolette from a console using the ACIM interface (or Conventional Channel Gateway (CCGW):

- Channel Select
- Secure On/Off
- PTT Press/Release
- Monitor On
- Monitor Off (based on PTT release)
- Encryption Key (CKR) Select
- Outbound Call Alerts
- Extended Console Operation

Additionally the following information is made available to the console from a consolette via the ACIM interface (or CCGW):

- Encryption Key (CKR) Reporting
- ID Reporting

NOTICE: Enabling and disabling Scan operation is not supported via the ACIM interface. Do not use scan operation enabled in the consolette when used with a remote console using the ACIM interface. Scan operation in the radio can cause the radio to unmute to audio on an unselected channel. The console user received no indication of the radio scanned-to-channel information. Any resulting dispatch communications including ACKs could unintentionally get transmitted on an unselected channel.

For operation information, see “GGM 8000 Introduction and Common Procedures” in the *GGM 8000 System Gateway Feature Guide*.

For more operation descriptions relating to consolettes, see the particular product manual in the *XTL 5000 Detailed Service Manual* or the *APX 7500 Multi-Band Consolette Detailed Service Manual*.

2.17.4 ACIM Conventional Channel Troubleshooting and Maintenance

For maintenance and troubleshooting information, see “GGM 8000 Introduction and Common Procedures” in the *GGM 8000 System Gateway Feature Guide*.

2.18 Console Sites and the Trunking Subsystem

The Edge Availability with Wireline Console feature in an ASTRO® 25 radio system provides a Trunking subsystem (Tsub) architecture. For detailed information about Tsub feature, see the *Edge Availability Feature Guide*.

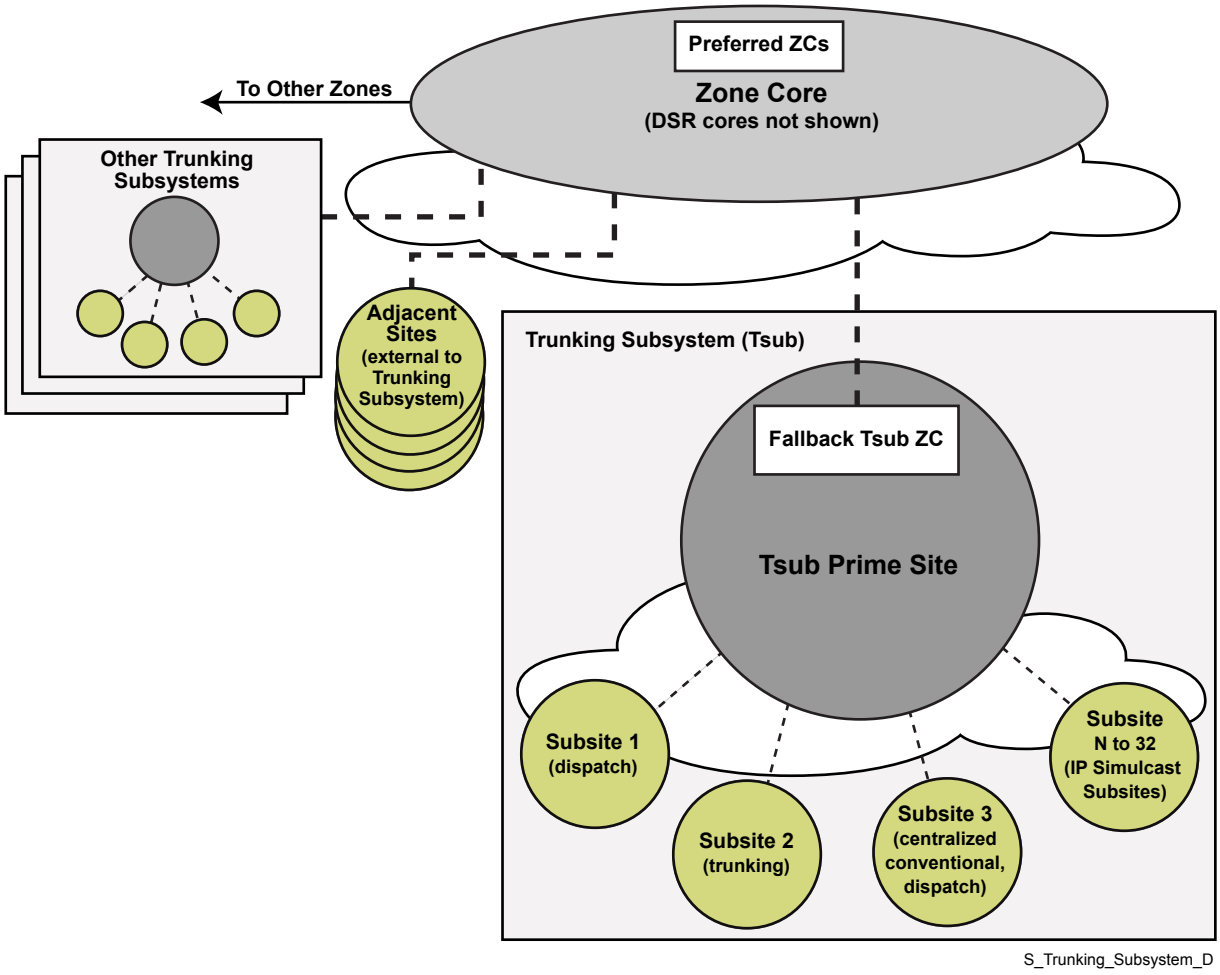
Trunking Subsystem Overview

The purpose of the Trunking subsystem is to provide dispatch and mobility services within a local area when normal system-wide area communication is not possible. Local area in this case means a group of trunked sites that work together with one or more dispatch sites or centralized conventional sites and resources. Under normal operation, all calls are processed under Zone Controller (ZC) control from the zone core. The remote site devices (trunking site controllers, consoles, conventional channel gateways) utilize the ZCs in the zone core. When connectivity to the zone core is lost, a fallback ZC located in the Trunking Subsystem (the Tsub ZC) automatically provides the necessary call control for voice services.

Edge Availability with Wireline Console provides failover operation rather than long-term operation in Tsub mode. Motorola Solutions recommends Tsub local area operation of two days or less.

This feature benefits ASTRO® 25 system users who do not have Dynamic System Resilience (DSR) or who want to minimize their reliance on zone cores managed by other regional entities.

Figure 10: Trunking Subsystem Overview



Trunking Subsystem Limitations

During Tsub local area operation, voice services (for example, group call and private call) are supported between radio users and dispatchers that reside within the Tsub. Communication with users external to the Tsub is not possible. In general, radio users and dispatchers have the same capabilities and services that are normally available during system wide area and that are not dependent on the zone core. Services that require the zone core or access to the Customer Enterprise Network (CEN) through the zone core are lost during Tsub local area operation.

For detailed information about Tsub limitations, see the *Edge Availability Feature Guide*.

Conventional Site Controller (CSC) is not supported within a Tsub. Local conventional operation is not possible for NM/Dispatch sites that lose transport connectivity with the Tsub prime site, which means that dispatchers are isolated for this failure scenario.

Equip these sites with diverse path redundant site links to minimize the likelihood of this failure scenario occurring.

Tsub Indication

Upon entering the Tsub mode, the dispatcher receives the following indications:

- The dispatch console emits a short beep.
- Assigned resources are briefly shown as non-operational.

- The System Status indicator appears in the status line at the bottom of the Elite Dispatch window.
- When you check the **System Status**, the status of **Console System Connection** is **Backup Mode**.

NOTICE: Radio users do not receive any indication that the system is in Tsub mode. The dispatcher should manually inform radio users that the system has limited capabilites.

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Chapter 3

Console Sites Installation

The chapter provides installation procedures relating to console sites.

3.1 Console Site Software Installation and Configuration

This sections describes how to install and configure a Console Site.

3.1.1 MCC 7500 VPM Console Site Component Mounting

Several factors determine where components in a console site are installed. Three factors that play a large role are physical location of the dispatchers, access to the equipment, and cable length requirements. The LAN switch, site router, Archiving Interface Server (AIS), and its Voice Processor Module (VPM), can be installed in an equipment room away from the dispatchers since they do not require continued access after they are installed and operating. Equipment access and usability require that the monitor, keyboard, mouse, speakers, footswitch, and microphone be near the dispatcher. Cable length restrictions require that the last three devices be near the VPM. Ethernet interfaces and cabling used in ASTRO® 25 system allow the VPM to be up to 100 meters away from the LAN switch.

3.1.2 Installing Console Sites

Prerequisites: Review and adhere to all safety requirements and considerations listed as console site installation prerequisites.

Process:

1 Depending on your ASTRO® 25 system configuration, perform the following actions:

If…	Then…
For the ASTRO® 25 Conventional System (K core),	perform the following actions: **a** Install the Ethernet LAN switch at the console site. See “HP Switches – Common Installation” and “HP Switches – Initial Configuration/Cabling" in the *System LAN Switches Feature Guide*. **b** If it is not pre-installed, install the site gateway. See “Site Gateway (Console Site) – Installation” and “Site Gateway (Console Site) – Configuration” in the *GGM 8000 System Gateway Feature Guide*.
For the ASTRO® 25 M and L core,	perform the following actions: **a** Install the site switch. See Installing Site Switches on page 82. **b** Install the site router. See Installing Site Routers on page 84.

2 Depending on the type of your console site, install all dispatch consoles required for that site:

If…	Then…
If you want to install the MCC 7500 Dispatch Console with Voice Processor Module (VPM),	perform the following actions: **a** Install the operator position. See “Installing the Dispatch Console/AIS Software” and “Setting Up a Dispatch Console/Archiving Interface Server” in the *MCC 7500 Dispatch Console with VPM User Guide*. **b** Install the VPM. See “VPM Installation” in the *MCC 7500 Dispatch Console with VPM User Guide*. **c** **Optional:** Install Enhanced Console Telephony. See "MCC 7500 Enhanced Console Telephony" and "Installing and Configuring Enhanced Console Telephony" in the *MCC 7500 Dispatch Console with VPM User Guide* manual.
If you want to install MCC 7100 IP Dispatch Console,	see the *MCC 7100 IP Dispatch Console User Guide*.
If you want to install MCC 7500E IP Dispatch Console,	see the *MCC 7500E Dispatch Console User Guide*.

3 Install the Aux I/O option.

See “Installing MCC 7500 Auxiliary Inputs and Outputs” in the *MCC 7500 Dispatch Console with VPM User Guide*.

4 Install Audio Logging.

See "Audio Logging Solution" in the *MCC 7500 Dispatch Console with VPM User Guide*.

5 Install CAM Server.

See "Launching the MKM 7000 CAM Server" in the *MKM 7000 Console Alias Manager User Guide*.

6 Configure a dispatch console for pre-configured patch operation.

See “Configuring a Dispatch Console for Preconfigured Patch Operation" in *MCC 7500 Dispatch Console with VPM User Guide*.

7 Install conventional features.

See the *RF Site Technician Guide*.

3.1.3
Installing Site Switches

Follow the process to install the site switch and perform additional switch configuration.

When and where to use:

NOTICE: This process is not applicable for ASTRO® 25 Conventional System (K core).

Process:

1 Install the hardware:

a See the “HP Switches – Installing in a Rack” procedure in the *System LAN Switches Feature Guide*.

b See the “HP Switches – Additional Grounding” procedure in the *System LAN Switches Feature Guide*.

NOTICE: All switches within the Console Site must be of the same type. As such, switching to the HP 2620, HP 3500/HP 3800-48, or Aruba 2930F causes downtime while the existing switches are removed and the new switches are brought online.

2 Configure the switch:

a Prepare the HP 2620, HP 3500/HP 3800-48, or Aruba 2930F switch for configuration. See the "Preparing an HP Switch for Configuration" procedure in the *System LAN Switches Feature Guide*.

b Define the IP Parameters for the switch. See the "Setting the ASTRO 25 System IP Address and Subnet Mask for an HP Switch" procedure in the *System LAN Switches Feature Guide*.

c Verify that the correct version of the OS is installed. See the "Verifying the OS for an HP Switch" procedure in the *System LAN Switches Feature Guide*.

d Load the configuration file. See the "HP Switches – Backing Up and Restoring the Configuration Using the UNC" section in the *System LAN Switches Feature Guide*. After loading the configuration file, you can configure the switch for any of the security features such as SNMPv3, MAC Port Lockdown, and 802.1x.

e Configure the passwords for the switch. For the information about the access levels and security setup for the switch, see the "Setting Passwords for the HP Switch Manager and Operator" section in the *System LAN Switches Feature Guide*.

f Disable the factory reset and password clear functionality of the switch. See the "Disabling Factory Reset and Password Clear Functionality on an HP Switch" section in the *System LAN Switches Feature Guide*.

3 Configure the switch for SNMPv3. See the "Configuring Ethernet LAN Switches for SNMPv3" section in the *SNMPv3 Feature Guide*.

4 Discover the Device in Unified Event Manger (UEM).

See “Discovering the Device in the UEM” procedure in the *MCC 7500 Dispatch Console with VPM User Guide*.

NOTICE: The following steps are for additional switch configuration. They are not applicable for ASTRO® 25 Conventional System (K core).

5 Configure the Switch for Secure SHell (SSH). For the information, see the *Securing Protocols with SSH Feature Guide*.

6 Configure 802.1x. See "Enabling/Disabling 802.1x on HP Switches Using a Template in VoyenceControl" in the *802.1x for Service Ports on Switches Feature Guide*.

NOTICE: The names EMC Smarts™ Network Configuration Manager and VoyenceControl are used interchangeably for this product.

7 Configure Authentication Services. See the RADIUS client configuration information for HP switches in the *Authentication Services Feature Guide*.

8 Configure Centralized Event Logging. See "Enabling Centralized Event Logging on HP Switches Using the Command Line" or "Enabling/Disabling Centralized Event Logging on HP Switches Using Templates in VoyenceControl" in the *Centralized Event Logging Feature Guide*.

9 Configure MAC Port Lockdown. See "MAC Port Lockdown Procedures for HP Switches" and "Performing MAC Port Lockdown on HP Switches" in the *MAC Port Lockdown Feature Guide*.

3.1.4
Installing Site Routers

When and where to use:
Follow the process to install the site router and perform the additional configuration.

NOTICE:
This process is not applicable for ASTRO® 25 Conventional system (K core).

If hybrid redundant site links are employed, T1/E1 can be employed for one site link while Ethernet can be employed for the other site link. See Hybrid Site Links Overview on page 30

Process:

1. To install the hardware, see the “S6000 Introduction, Installation, and Configuration” or “S2500 Introduction, Installation, and Configuration” chapter in the *S6000 and S2500 Routers Feature Guide* and perform the following actions:
   - **a** Verify that the router has the correct interfaces.
   - **b** Install the router.
   - **c** Ground the router.
2. Configure the router:
   - **a** Power up and configure the router. See the “S6000 Introduction, Installation, and Configuration” or “S2500 Introduction, Installation, and Configuration” chapter in the *S6000 and S2500 Routers Feature Guide*.
   - **b** Upload OS to the device from the Unified Network Configurator (UNC). See the "Uploading OS Images to the UNC Server" procedure in the *Unified Network Configurator User Guide*. See "Updating OS Images" in *Voyence Control Online User Guide*.
   - **c** Upload the configuration to the device from UNC. See the "Changing and Downloading a Full Configuration Change" procedure in the *Unified Network Configurator User Guide*.
   - **d** Reboot the router. See the "Rebooting Routers, Gateways, Site Controllers, Comparators, Base Radios, SmartX Site Converters, and MCC 7500 Voice Processor Modules (VPM)" section in the *Unified Network Configurator User Guide*.
3. Configure SNMPv3. See the following procedures in the *SNMPv3 Feature Guide*:
   - **a** “Opening the User Manager Menu with Administrative Privileges”
   - **b** “Changing the Authentication Passphrase for MNR Routers and GGM 8000 Gateways”
   - **c** “Maintaining the MotoMaster User for MNR Routers and GGM 8000 Gateways“
   - **d** “Creating the Initial MotoInformA (NoAuthNoPriv) User for MNR Routers and GGM 8000 Gateways Manually”
   - **e** “Changing the Credentials for the MotoInformA/B User for MNR Routers and GGM 8000 Gateways”
4. Discover the device in UNC. See the “Discovering the VPM Device in UNC” procedure in the *MCC 7500 Dispatch Console with VPM User Guide*.

   NOTICE: The following steps are for additional router configuration. They are not applicable for ASTRO® 25 Conventional system (K core).
5. Enable/Disable Centralized Event Logging Using UNC. See the "Enabling/Disabling Centralized Event Logging on Motorola Routers and Gateways Using VoyenceControl" section in the *Centralized Event Logging Feature Guide*.
6. Configure Authentication Services. See the *Authentication Services Feature Guide*.
7. Configure SSH. See the *Securing Protocols with SSH Feature Guide*.

8 Configuring Router Encryption. See the following process and procedures in the *Link Encryption and Authentication Feature Guide*:

- **a** “Preparing Link Encryption Configuration Process”
- **b** "Ensuring that Transport Devices are Encryption-Capable and Operable in Clear State"
- **c** “Configuring Link Encryption for Remote Site with One Site Transport Device and One Core Router”

3.2 ACIM Conventional Channel Installation

To install an ASTRO® 25 Control Interface Module (ACIM) Conventional Channel on an existing GGM 8000, see the “ACIM Interface – Installation” section in the *GGM 8000 System Gateway Feature Guide*.

For additional installation procedures for consolettes, se the particular product manual in the *XTL 5000 Detailed Service Manual* or the *APX 7500 Multi-Band Consolette Detailed Service Manual*.

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Chapter 4

Console Sites Configuration

The chapter provides configuration procedures relating to console sites.

4.1 Console Site Fleetmapping

A fleetmap is a chart that outlines the organization plan for your system of radio users, talkgroups, multigroups, and dispatch consoles. Use this section to configure your console ID assignments and your alias assignments in the subsystem. For more information on fleetmapping, see the *Fleetmapping and Band Plan Management Feature Guide*.

4.1.1 Console ID Assignments in Console Sites

NOTICE: For information on local management of unit IDs and aliases, including consoles, mobile, and portable units, see the *MKM 7000 Console Alias Manager User Guide*.

Each dispatch console in the dispatch console subsystem is identified within the system through two unique IDs assigned in the Provisioning Manager:

Application Platform ID
This ID, used by network management configuration and fault reporting applications, uniquely identifies the physical dispatch console. It is also used to identify the dispatch console when the dispatch console performs an operation on a conventional radio channel. One, and only one, Platform ID is associated with a dispatch console.

Trunking System Unit ID
This ID, used by the trunking system, uniquely identifies the physical dispatch console when the dispatch console performs an operation on a trunked talkgroup or private call. The Trunking System Unit ID is associated with the physical operator position, not with the user using it. One, and only one, Trunking System Unit ID is associated with a dispatch console.

NOTICE:

- This method is different from the method used with existing dispatch consoles, in which every trunking resource on every dispatch console requires a unique Trunking System Unit ID.
- Trunking System Unit IDs are also used, among other functions, to uniquely identify the radios used in the trunking system when they perform an operation on a trunked talkgroup or private call.

Every Platform ID and Trunking System Unit ID also has an alias associated with it. Aliases are typically names or words that describe the user or the physical unit, and they are used in the radio system to make the various interactions more user-friendly. For example, when a radio user transmits on a trunked talkgroup, the alias associated with the radio Trunking System Unit ID (rather than the Trunking System Unit ID itself) is displayed on the dispatch console so the dispatcher can see who is transmitting.

When a Platform ID or Trunking System Unit ID is created, a default alias is automatically created for it. The user can edit the default aliases to make them more meaningful. For example, the user may change a Platform ID alias to "Fire Dispatch 1" or a radio Trunking System Unit ID alias to "Lt. Vasquez".

Because two IDs are associated with a dispatch console, it is possible for the two aliases to be different. Depending on how the user wishes to use the dispatch console, it may be advantageous to make the two aliases identical. For example, the Platform ID alias and Trunking System Unit ID alias for a particular dispatch console may both be changed to "Fire Dispatch 1". This system allows parallel dispatch consoles to see the same alias whether the dispatcher transmits on a conventional resource or on a trunking resource. Both aliases must be changed to do this operation. Changing only one of the aliases does not automatically change the other.

Each console logging recorder also requires a unique ID, so the resources that must be recorded may be programmed.

4.1.2
Alias Assignments in Console Sites

To establish alias information (the user and hardware alias information) used by the dispatch console subsystem in the Provisioning Manager, see the *Provisioning Manager User Guide* and the *Unified Network Configurator User Guide*.

NOTICE: For information on how to manage unit IDs and aliases, including consoles, mobile, and portable units locally, see the *MKM 7000 Console Alias Manager User Guide*.

4.2
Console Sites - Resource and Device Configuration

This section includes configuration procedures for the hardware in the dispatch console subsystem.

4.2.1
Console Sites – Console Operator Position Configuration

Configure the console subsystem by using the Provisioning Manager, Unified Network Configurator (UNC), and Elite Admin applications. These applications define the parameters and values for the features and functions available.

Use the Provisioning Manager and UNC applications to define what is potentially available at each console subsystem element. When you change the configuration information for the console subsystem, the changes are automatically distributed to the console subsystem elements that require this information.

Use the Elite Admin application to create profiles that define which of the available resources are usable by a specific dispatch console user, and how they are presented to the user in the Elite Dispatch application GUI. It is possible to create multiple profiles for each dispatch console user. The user can switch between profiles, but can use only one profile at a time.

4.2.2
Provisioning Manager – Console Site System Resource Configuration

To support the Dispatch Consoles and Archiving Interface Servers, several system-level configuration objects can be configured.

Table 7: New and Modified System-Level Configuration Management Objects in Console Sites

This table provides a list of the configuration objects for the dispatch console subsystem.

Configuration Object Name
Console User

Table continued…

Configuration Object Name
Console User Capabilities Profile
Console Private Call Resource
Console TG/MG Capabilities Profile
IVD Radio
Radio Capabilities Profile
Application to Unit ID Map
Conventional Application to Unit ID Map
Console System
Conventional System
TG/MG Capabilities Profile
Talkgroup

System-level entities in the MCC 7500 VPM Dispatch Console Subsystem must be configured in the Provisioning Manager. For Analog Conventional, these subsidiary entities must be configured:

- Tone Remote Control Command
- Tone Remote Control Segment
- Tone Remote Control Sequence
- Tone Remote Control Table

For the full list of system-level configuration objects, see Configuration Objects in Console Sites on page 117, and for procedures and further details, see the *Provisioning Manager User Guide*.

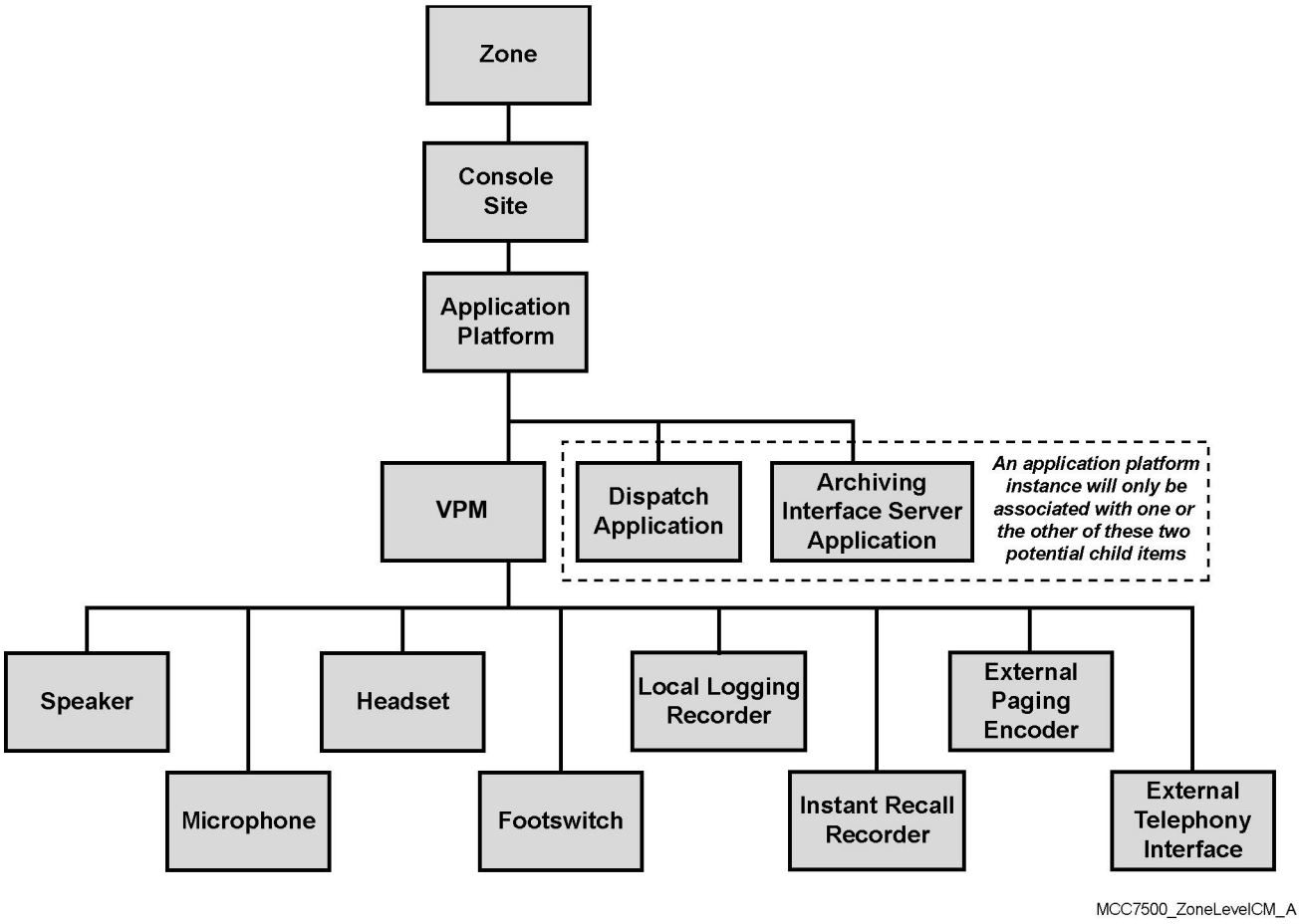
4.2.3
Provisioning Manager – Other Console Site Devices Configuration

MCC 7500 VPM Dispatch Consoles, MCC 7500E Dispatch Consoles, MCC 7100 IP Dispatch Consoles, and Archiving Interface Servers (AISs) are contained within logical entities called Console Sites. Each Console Site is associated with a particular zone within the system.

Configuration of third-party devices within the dispatch console subsystem, such as the logging recorder, is required but is supported directly by the third-party device manufacturer in some format, and is not supported by the network management subsystem.

A dispatch console consists of an application platform, the dispatch console application (software), and related components, for example, Voice Processor Module (VPM). Similarly, an MCC 7500 AIS consists of an application platform, the MCC 7500 AIS application (software), and related components.

Figure 11: Hierarchy of Zone-Level Configuration Management Objects in Console Sites



For procedures and further details, see Configuration Objects in Console Sites on page 117, and the *Provisioning Manager User Guide*.

4.2.3.1 ACIM Conventional Channel Configuration

The network management considers ASTRO® 25 Control Interface Module (ACIM) Link channels as a new type of conventional channels, and allows the operator to configure the capability.

NOTICE: ACIM Links enabled with the MDC-1200 Signaling Capability can be configured for the "Limited ID Space" capability, if your organization uses Unit IDs that are limited to the decimal range.

4.2.4 Console Sites – Auxiliary Inputs/Outputs Configuration

Dispatch Consoles support Global Auxiliary Inputs/Outputs (Aux I/Os) for remote status indications or remote control through dispatch consoles. Global Aux I/Os are typically implemented by hardware independent of the dispatch console positions in a system, and can be accessible to multiple dispatch consoles.

For dispatch consoles, Aux I/O functionality/support is provided by:

- Configuration of the dispatch console Aux I/O parameters through the Provisioning Manager
- Dispatch console display of status inputs/control outputs

The MCC 7500 Aux I/O Servers provide the Aux I/O feature for the dispatch consoles. The consoles communicate to the Aux I/O Servers to perform the Aux I/O function. The Aux I/O Servers reside on the same subnet as the colocated site. The individual Aux I/O Servers are assigned an IP address on the subnet.

The console connects to the MCC 7500 Aux I/O Server by using the TCP/IP over the IP network. The console obtains the IP information of the Aux I/O Server by using the configuration information established for the subsystem. Because the Aux I/O Servers reside on the subnet of the colocated site, the network part of the IP address is the same as the colocated site. The host part of the IP address of an Aux I/O Server is determined based on a uniquely assigned Server ID.

For configuration procedures for Aux I/Os and the Aux I/O Server in the dispatch console subsystem, see the *MCC 7500 Dispatch Console with VPM User Guide*.

4.2.5
Console Sites – Archiving Interface Server and Logging System Configuration

For more information, see the *MCC 7500 Dispatch Console with VPM User Guide*.

4.2.6
Console Sites – Site Gateway (Conventional Channel Gateway) Configuration

The analog conventional equipment, that is GCP 8000 Conventional Site Controller and site gateways (conventional channel gateways, is located as part of the Console Site and resides on the subnet for the site. Individual site gateways are assigned an IP address on the subnet, and the host part of the IP address is determined through the uniquely assigned Conventional Channel Gateway (CCGW) ID configured from the Provisioning Manager.

The site gateway (CCGW) ID has a valid range of 1–10 and must be uniquely assigned to the site gateways for each console site to avoid the same IP address assigned to two or more site gateways. This system implies that system administrators must enforce the following rules.

Initial device setup by Motorola Solutions Support Center (SSC) precedes configuration through the Provisioning Manager. To add a site gateway (CCGW) to a new or existing site, your organization must contact Motorola Solutions field personnel to initiate the request to have SSC perform the system configuration. After the SSC has completed the initial device setup, the site gateway (CCGW) IDs are provided to your organization so that you can configure the site gateway (CCGW) in the Provisioning Manager. Upon the initial configuration, the SSC assigns an instance ID to the site gateway (CCGW). This ID must match the site gateway (CCGW) ID configured through the Provisioning Manager, and your organization must obtain or be provided with this information before the configuration through the Provisioning Manager can occur.

NOTICE: If the device ID and the ID configured in the Provisioning Manager do not match, conventional is inoperable.

For site gateways colocated at the trunked RF sites (ASTRO® Repeater or Simulcast Prime), the host part of the IP address remains the same except that up to two site gateways can be colocated at the trunked RF sites, so the site gateway (CCGW) ID should be chosen to be unique in the range of 1–2.

4.2.7
Console Sites – Active Directory Server and Domain Name Server Configuration

Dispatch console subsystems require zone-level domain controllers, whereas existing console systems use local domain controllers. Thus, the radio system network management subsystem for a dispatch

console subsystem contains Domain Name Services (DNS) and Active Directory domain controller servers capable of providing DNS and domain controller services to the entire zone.

Some situations, however, might warrant having local Domain Name Server/Domain Controller servers for a dispatch console site. These situations include:

- The user wishes to manage the Microsoft Windows domain locally which allows the user to manage the accounts used by their personnel locally to log on to the Windows operating system on the dispatch console computers as well as various other aspects of their network.
- The Domain Name Server traffic going across the Dispatch Console site WAN link consumes a significant amount of bandwidth. Having a local Domain Name Server/Domain Controller server minimizes this traffic.

For additional information, see the *Authentication Services Feature Guide* and the *MCC 7500 Dispatch Console with VPM User Guide*.

4.2.8
Console Sites – Optimal Acoustic Quality Configuration

The acoustic cross-muting feature guards against undesirable effects resulting from the acoustic feedback due to physical console proximity.

4.2.8.1
Scenarios Requiring RF Cross-Mute in Console Sites

Monitoring analog conventional voice channels that are RF coupled, meaning the transmit frequency of a channel is the same as the receive frequency of another channel and RF coverage of the channels overlap, may result in a transmitting dispatch console user to hear him/herself repeated on the speaker. This condition would occur when a console user is transmitting on an analog conventional voice channel and at the same time monitoring an analog conventional voice channel which is RF coupled with the transmitting channel.

To avoid such audio problems:

- When monitoring the RF coupled channels, reduce the volume of the monitored channel
- Where feasible, minimize the number of channels that are RF coupled
- Where feasible, minimize monitoring of RF coupled channels simultaneously

NOTICE: Cross busy/Cross mute is not supported with call alert or emergency alarm signaling.

4.2.8.2
Echo Cancellation - Conventional, Simplex Channels

Use the Echo Cancellation parameter to provide delay echo cancellation for up to 2 s (in 10 ms increments) on transmitting consoles for conventional operation which eliminates feedback at the console speaker when transmitting on simplex channels. For more information on Echo Cancellation, see the *RF Site Technician Reference Guide*.

4.3
Configuration Management in Console Sites

The configuration management system generates documentation to assist with verification of the configuration information established for the console subsystem. This information can also assist with installation and troubleshooting activities.

The following information is contained in the documentation generated by the configuration management system:

Console site information
A listing of which operator positions and servers have been created in the console site.

Operator position information
A listing of the peripherals, peripheral port assignments, capabilities, audio destination assignments, and supervisor designation for each operator position.

CCGW information
A listing of the channels, channel capabilities, channel connection information, and main/alternate designation for each Conventional Channel Gateway (CCGW).

NOTICE: The Site Gateway (CCGW) based on the GGM 8000 platform and MNR routers based on the S2500 platform provide a conventional channel interface to conventional base radios in the system. This conventional channel gateway may be shown in the Provisioning Manager as “CCGW” or Conventional Channel Gateway.

Archiving Interface Server information
A listing of the capabilities for each MCC 7500 Archiving Interface Server (AIS).

Talkgroup/multigroup information
A listing of the type of and capabilities for each trunked resource controlled by the console subsystem.

Conventional resource information
A listing of the type of and capabilities for each conventional resource in the console subsystem.

Aux I/O information
A listing of the type of and capabilities for each auxiliary input or output in the console subsystem.

Patchgroup information
A listing of the capabilities and members of each patchgroup on each operator position.

Crossmuting information
A listing of the acoustic crossmute associations in the console subsystem.

MGEG information
A listing of the type of MGEG vocoder available to support TDMA operation to allow X2-TDMA signaling which provide two calls per channel.

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Chapter 5

Console Sites Optimization

The chapter contains optimization procedures and recommended settings relating to Console Sites.

5.1 Network Bandwidth Optimization in Console Sites

Providing the proper amount of bandwidth in the link from the core to the console site is crucial. If the bandwidth is insufficient, an excessive number of busies could result on the trunking system, or audio could be blocked from reaching the dispatch consoles.

Redundant site links, routers, and LAN switches are used to increase the availability of a console site. Console site links which require multiple T1s or E1s for bandwidth purposes (not for redundancy purposes) require more powerful routers which cannot be used as site gateways. If conventional base stations are at such a console site, additional routers capable of being used as site gateways must be installed.

Locate MCC 7500 Archiving Interface Servers (AISs) and their associated recorders such that excess bandwidth is not required to get the audio recorded to them. If recording audio for a console site, locate them in that console site. Avoid having to transport trunking audio between zones so it is recorded.

For more details on bandwidth management, see the *Console Site Bandwidth Management Feature Guide*.

5.2 Audio Level Settings for Console Sites and Base Radios

Use the audio level settings described in this section to control the volume level transmitting both inbound and outbound in your subsystem.

The audio level settings described do not apply to ASTRO® 25 Conventional System (K core).

NOTICE: The Site Gateway (Conventional Channel Gateway (CCGW)), based on the GGM 8000 platform, and MNR routers based on the S2500 platform, provide a CCGW to conventional base radios in the system. This CCGW may be shown in the Provisioning Manager as “CCGW” or Conventional Channel Gateway.

Audio levels can be configured using Dispatch Application parameters in the Provisioning Manager application for systems with L or M cores, or the Configuration Manager application for systems with K cores. This way, it is possible to set levels differently for each agency within a shared system.

NOTICE: The console dispatch application object is part of Group Commit. The Group Commit function applies configuration changes to site equipment after configuration changes to console object records have been saved. Changes to the console system audio level parameters do not take effect on the console until Group Commit is done. This arrangement is different from the CCGW parameters – changes to these take effect immediately after they are saved.

Console audio level parameters are listed in this table and defined in the following sections.

Table 8: Console Outbound Audio Level Setting

Parameter	Value
Outbound Vocoded Audio Level	-26 dBm0
AGC Type	DLM

Outbound Vocoded Audio Level – This level is configured to any integer value from -26 dBm0 to -20 dBm0. The value shown in the table is the default value and considers the audio level settings of trunked digital subscribers, other consoles, and analog conventional channels.

IMPORTANT: The system is designed to work properly with the default level setting, and this setting should not be changed without guidance from Motorola Solutions. Improperly adjusting this parameter could cause unmatched audio levels and degraded audio quality in some scenarios.

AGC Type – This type is configured as either DLM or Pure AGC. DLM means that the AGC gain adjustment is active only when the AGC detects voice activity. When no voice activity is detected, the AGC freezes its gain. Pure AGC means that even when no voice is detected, the AGC adjusts the gain (which increases the responsiveness of the AGC to low signal levels, but can create the phenomenon of "noise-pumping").

The analog links in hybrid topologies require the same types of audio level settings as in the corresponding analog-only topologies.

5.2.1
Audio Levels for the Analog Conventional Channel Gateway

Conventional Channel Gateway (CCGW) analog conventional channel audio level parameters are listed in this table, and illustrated in Figure 12: Audio Level Settings for Analog Channel with Unity-Gain Wireline Media on page 101 and Figure 13: Audio Level Settings for Analog Channel with Lossy Wireline Media on page 101. Use the Provisioning Manager to configure the audio level parameters separately for each analog channel in the CCGW.

Table 9: CCGW Audio Level Settings for Analog Conventional Channel

Parameter	Value	
	Unity Gain 4-Wire Analog Media	Lossy 4-Wire Analog Media
Outbound Path (from console, to station)		
Outbound Alignment Tone Level	-10 dBm	-5 dBm
Average Outbound G.728 G.728 is an International Telecommunications Union (ITU) standard for coding telephone-bandwidth speech designed to provide speech quality equivalent to or better than that of previous standards. G.728 coding is suited for a wide range of applications, including both voice storage and voice communications, and performs well in the presence of multiple speakers and background noise. Audio Level	-26 dBm0	-26 dBm0
Inbound Path (from station, to console)		
Average Inbound G.728 Audio Level	-26 dBm0	-26 dBm0
Inbound AGC Knee Setting	-25 dBm	-20 dBm

Table continued…

Parameter	Value	
	Unity Gain 4-Wire Analog Media	Lossy 4-Wire Analog Media
		(minus line loss in dB. Example: For a line loss of 16 dB, the Inbound AGC Knee Setting would be -36 dBm.)
Inbound AGC Type	ACG Off	AGC On

The default values of these parameters correspond to the unity-gain column in the table. If lossy media are used to connect the station to the CCGW, the “outbound alignment tone level” must be adjusted as shown in the table lossy media column.

5.2.1.1
CCGW Outbound Path

Outbound Alignment Tone Level

This parameter controls the analog output level from the Conventional Channel Gateway (CCGW) channel. Set it to the value of the 60% deviation alignment tone that was used to align the base station transmitter. Reference the setting to the CCGW analog output point, factoring in any wireline loss. The average audio level at the station is targeted to be 4 dB below the 60% deviation alignment tone level.

Average Outbound G.728 Audio Level

This parameter tells the CCGW the average audio level coming from the consoles. The system is designed to operate correctly with this parameter set to its default value. Coordinate this setting with the outbound vocoded audio level settings of any consoles using the channel, considering the subscriber audio level settings of any digital talkgroups (for example, P25 IMBE™ talkgroups) which the consoles are monitoring or which may be patched over to the analog channel.

IMPORTANT: Because of the complex interactions of audio level settings in the system, leave the CCGW G.728 audio level parameters at their default settings. Do not change this value except under the guidance and direction of a service technician.

After decoding an outbound G.728 audio signal received from a console, the CCGW applies gain which adjusts the signal level according to the difference between the channel outbound alignment tone level setting and the channel average outbound G.728 audio level setting.

Example: The channel configured average outbound G.728 audio level is -26 dBm0 and its configured outbound alignment tone level is -10 dBm. In this case, the CCGW calculates that the average outbound path analog audio level should be -14 dBm (that is, 4 dB below the alignment tone level). So, the CCGW applies 12 dB of gain to the outbound audio signal after it performs G.728 decoding.

Continuing the example, if the actual audio signal from the console has an active speech level of -26 dBm0, the analog audio output from the CCGW has an average audio level of -14 dBm. Alternatively, if the audio signal from the console has an active speech level of -30 dBm0, the corresponding analog audio output has an active speech level of -18 dBm.

As the average outbound G.728 audio level setting of the CCGW channel is adjusted, the CCGW channel internal gain/attenuation is also adjusted to maintain the configured audio output level on the analog wireline side. In other words, increasing the configured nominal G.728 audio level does not

increase the level at which analog audio is sent out. Instead, if the nominal G.728 level is increased then the CCGW channel internal gain is decreased accordingly.

5.2.1.2
CCGW Inbound Path

The Conventional Channel Gateway (CCGW) inbound path has an Automatic Gain Control (AGC). These parameters control AGC operation.

Average Inbound G.728 Audio Level
This parameter tells the CCGW the target audio level going to the consoles. This level is the target output level of the CCGW inbound AGC. This level setting must match the average outbound G.728 audio level or else there is a difference between subscriber audio level and console audio level in the system. Do not change this value except under the guidance and direction of a Motorola Solutions service technician.

Inbound AGC Knee Setting
The knee setting of the CCGW channel inbound AGC controls the channel receive sensitivity. An incoming signal whose level is at or above the knee setting is given an output level equal to the AGC target output level (the Average Inbound G.728 Audio Level setting.) In configurations where increased receive sensitivity is required due to larger-than-usual receive wireline line losses, the Inbound AGC Knee Setting can be lowered. This action increases the gain of the AGC to compensate for the line loss. (This setting is analogous to the “sensitivity” setting on the BIM in console subsystems).

Inbound AGC Type
This parameter is configured as AGC Off (default), AGC (AGC on), or DLM (Dynamic Level Memory). With AGC (AGC on), even when no voice is detected, the AGC adjusts the gain which increases the responsiveness of the AGC to low signal levels, but can create the phenomenon of "noise-pumping". With DLM, the AGC gain adjustment is active only when the AGC detects voice activity.

5.2.1.3
Comparing the CCGW Inbound Call Unknown Start Count to Console Unknowns (Digital Conventional Channels)

This procedure compares the Unknowns displayed on the MCC 7500/7100 Dispatch Console to the inbound call unknown start count on a Conventional Channel Gateway (CCGW) (MNR S2500 router or GGM 8000 gateway).

Prerequisites:

CAUTION: Consult a Motorola Solutions field service engineer before performing the following procedure. The procedure was developed for system fine-tuning and troubleshooting purposes only and should not be performed as a part of normal system operation.

When following the procedure, consider the following:

- The inbound call Unknown start count does not wrap and may be high if it has not been reset recently, so flush the counts before beginning the data collection.
- Mixed mode and IP conventional channels are supported only on the GGM 8000 gateway; the MNR S2500 router supports only V.24 digital channels.
- In a properly installed system, statistically accurate data requires days of data collection at average call rates. Heavily used channels require hours to days of data collection; lightly used channels require weeks of data collection.

Procedure:

1. From the MNR S2500 router or GGM 8000 gateway command-line interface, issue the following command to reset the inbound call Unknown start count for the channel in question:
   `FLush !c<channel_ID>-CCGW UnkCallStartCnt`

   Where ***<channel_ID>*** is the channel identifier (1-4 for V.24 digital or mixed mode channels; 21-30 for IP conventional channels) of the channel for which you want to view the inbound call unknown start count. If you do not know the channel identifier for a channel, issue the `SHow -CCGW ChID` command to display a list of channel identifiers for all conventional channels configured on the device.

   For example:

   - To reset the inbound call Unknown start count for V.24 digital conventional channel 2, enter the following command:
     `FLush !c2 -CCGW UnkCallStartCnt`
   - To reset the inbound call Unknown start count for IP conventional channel 23, enter the following command:
     `FLush !c23 -CCGW UnkCallStartCnt`
2. Allow time for data collection, then issue the following command to view the inbound call uUnknown start count for the channel in question:
   `SHow !c<channel_ID>-CCGW UnkCallStartCnt`

   The “where” definition from step 1 applies to this step.
3. Compare the inbound call Unknown start count to the number of Unknowns displayed on the MCC 7500/7100 Dispatch Console since the inbound call unknown start count was reset.
4. If necessary, repeat through for any other channels you wish to investigate.

5.2.1.4

Comparing the CCGW Inbound Call Start Event Counts To Console Unknowns (MDC 1200 Conventional Channels)

Perform this procedure to compare the Unknowns displayed on the MCC 7500/7100 Dispatch Console to the MDC 1200 inbound call event counts on a Conventional Channel Gateway (CCGW).

Prerequisites:

CAUTION: Consult a Motorola Solutions field service engineer before performing the following procedure. The procedure was developed for system fine-tuning and troubleshooting purposes only and should not be performed as a part of normal system operation.

Consider the following:

- The inbound call event counts may be high if they have not been reset recently, so flush the counts before beginning the data collection.
- In a properly installed system, statistically accurate data requires days of data collection at average call rates. Heavily used channels require hours to days of data collection; lightly used channels require weeks of data collection.

Procedure:

1. From the GGM 8000 gateway command-line interface, issue the following command to reset the call manager statistics: `FLush -CCGW StatisticsCM`
2. Allow time for data collection, then issue the following command to view the call manager statistics: `SHow -CCGW StatisticsCM`
3. The MDC 1200 inbound call event counts are listed at the end of the call manager statistics display, in a format like the following:

```
INBOUND CALL EVENTS
LOBL CallStart Cnt0 0 0 0
UnkID CallStart Cnt0 0 0 0
Decode Error Cnt0 0 0 0
```

NOTICE: The four columns provide the counts for channel IDs 1, 2, 3, and 4, respectively.

4 Compare the inbound call event counts on the channel you are investigating to the number of Unknowns displayed on the MCC 7500/7100 Dispatch Console for that channel since the call manager statistics were reset.

- A high **LOBL CallStart Cnt** may indicate an unusually high number of calls with a Line Operated Busy Light (LOBL) signal.
- A high **UnkID CallStart Cnt** or **Decode Error Cnt** may indicate analog calls without MDC 1200 signaling; trailing MDC 1200 calls; RF site problems that are reducing coverage or signal strength; or unexpected interference on the channel.

NOTICE: The **Decode Error Cnt** statistic counts both MDC 1200 voice calls for which MDC 1200 signaling was detected but the Push-to-Talk (PTT) ID failed to decode and undecodable supplementary signaling messages. MDC 1200 voice calls for which the PTT ID fails to decode are logged as Unknowns on the MCC 7500/7100 Dispatch Console. Undecodable supplementary signaling messages, on the other hand, are not logged on the console since they are not passed up to the zone core by the Conventional Channel Gateway. Consider this situation when you are comparing the **Decode Error Cnt** with the console Unknowns. The MCC 7500/7100 Dispatch Console logs an Unknown for each voice call initiated by a radio subscriber that does not have PTT ID enabled. However, these calls are not included in the **Decode Error Cnt** because the radio transmits no MDC 1200 signaling in these cases.

5.2.2
Audio Levels for Analog Base Radios

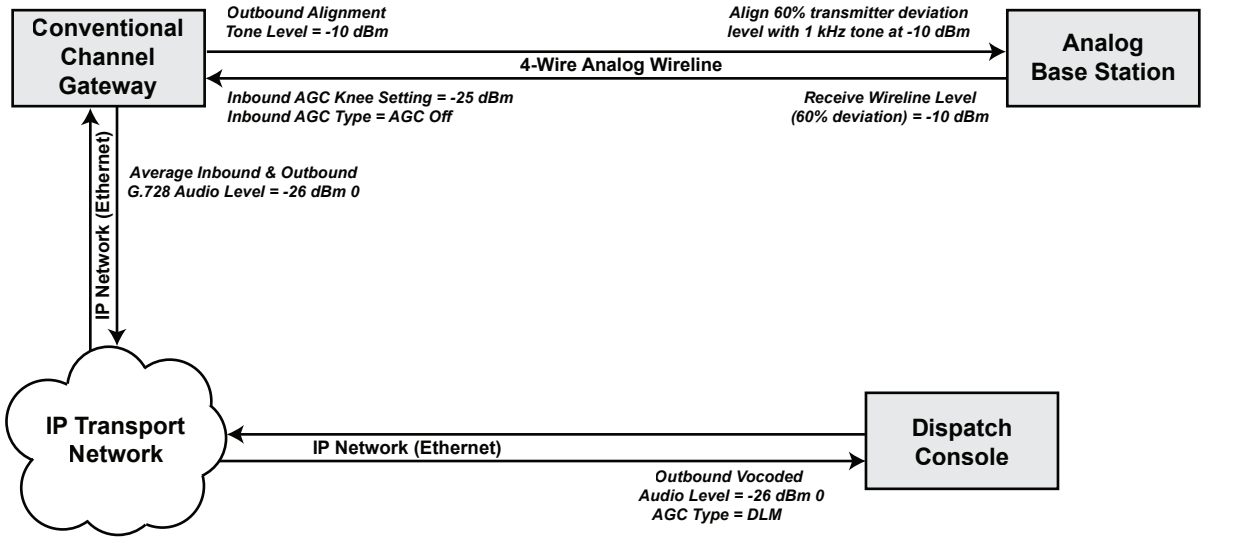
Table 10: Recommended Base Radio Audio Level Settings for Analog–Only Conventional Channels

This table is an example of how to configure analog base radios when they interface to the Conventional Channel Gateway (CCGW). The table shows audio level parameter settings for GTR 8000, QUANTAR® stations, MTR 3000, and MTR2000 base radios.

CSS Parameter	Value	
	Unity Gain 4-Wire Analog Media	Lossy 4-Wire Analog Media
Rx Wireline Level (on RX Wireline Alignment tab of Alignment Screen window)	-10 dBm	-5 dBm
Status Tone Status Tone (on Common tab of Infrastructure Interface window)	Disabled	Disabled
Tx Wireline Level (on TX Wireline Alignment tab of Alignment Screen window)	-10 dBm	-21 dBm

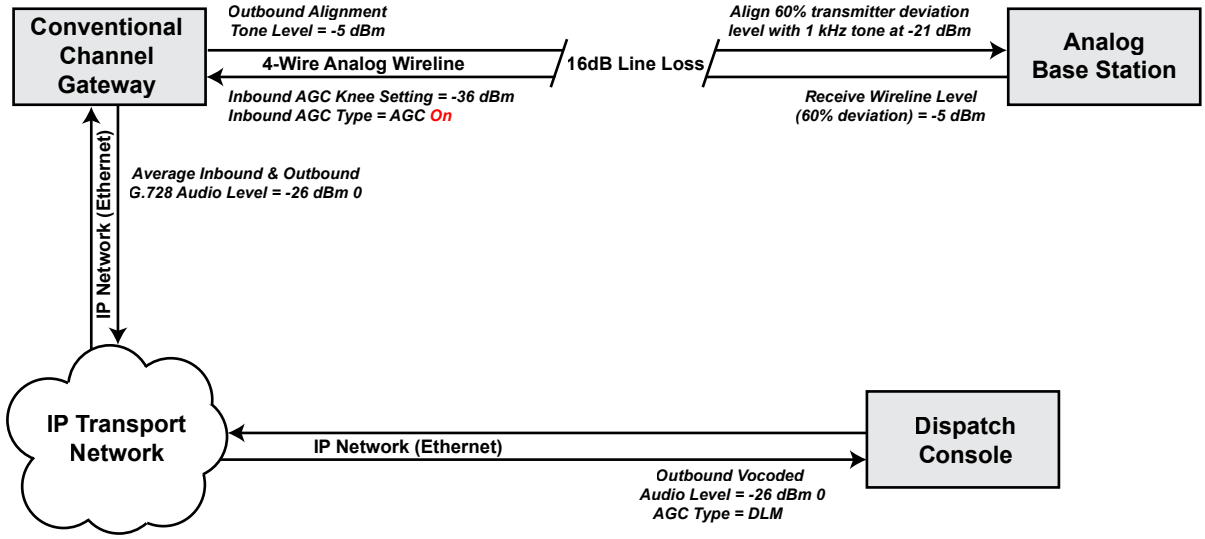
The CCGW supports a command-line command to generate a station alignment tone. The syntax for this command is explained in the CCGW product manual. This command may be used to provide the signal input for aligning the base station transmitter deviation.

Figure 12: Audio Level Settings for Analog Channel with Unity-Gain Wireline Media



MCC7500_Audio_Level_Settings_Analog_Channel_Unity_Gain_Wireline_Media_C

Figure 13: Audio Level Settings for Analog Channel with Lossy Wireline Media



MCC_7500_Audio_Level_Settings_Analog_Channel_Lossy_Wireline_Media_D

5.2.3
Audio Levels for V.24 Base Radios

Table 11: Base Radio Audio Level Settings for V.24 Digital Channels

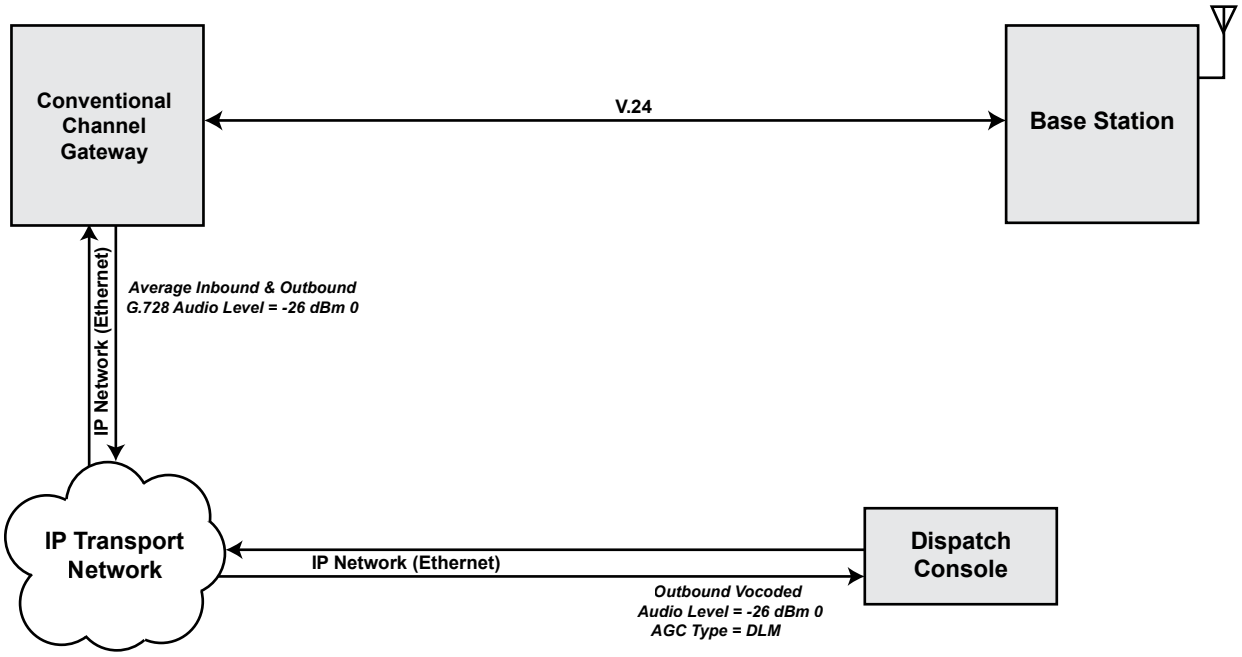
CSS Parameter	Value[2]	
	Unity Gain Media	Lossy Media
Infrastructure Interface (on Common tab of Infrastructure Interface window)	**V.24–Only**	**V.24–Only**
Analog Idle Link Check (on ASTRO Configuration tab of Infrastructure Interface window)	DISABLED	DISABLED
Status Tone/ALMT Level Below Peak Audio (on RX Wireline Alignment tab of Alignment Screen window)	N/A	N/A
Rx Wireline Level (on RX Wireline Alignment tab of Alignment Screen window)	N/A	N/A
Tx Wireline Level (on TX Wireline Alignment tab of Alignment Screen window)	N/A	N/A
Digital Idle Link Check (on ASTRO Configuration tab of Infrastructure Interface window)	ENABLED	ENABLED
V.24 Transmit Clock (on ASTRO Configuration tab of Infrastructure Interface window)	Depends on your system.[1]	Depends on your system.[1]

[1] – For connections which use microwave links, set to ENABLED for QUANTAR® stations and EXTERNAL for GTR 8000. Ensure that the external device generates a 9600 Hz clock for the station.

[2] – All Values ± 0.5 dBm

These diagrams illustrate audio level settings for V.24 with Unity-Gain and Lossy Wireline Media.

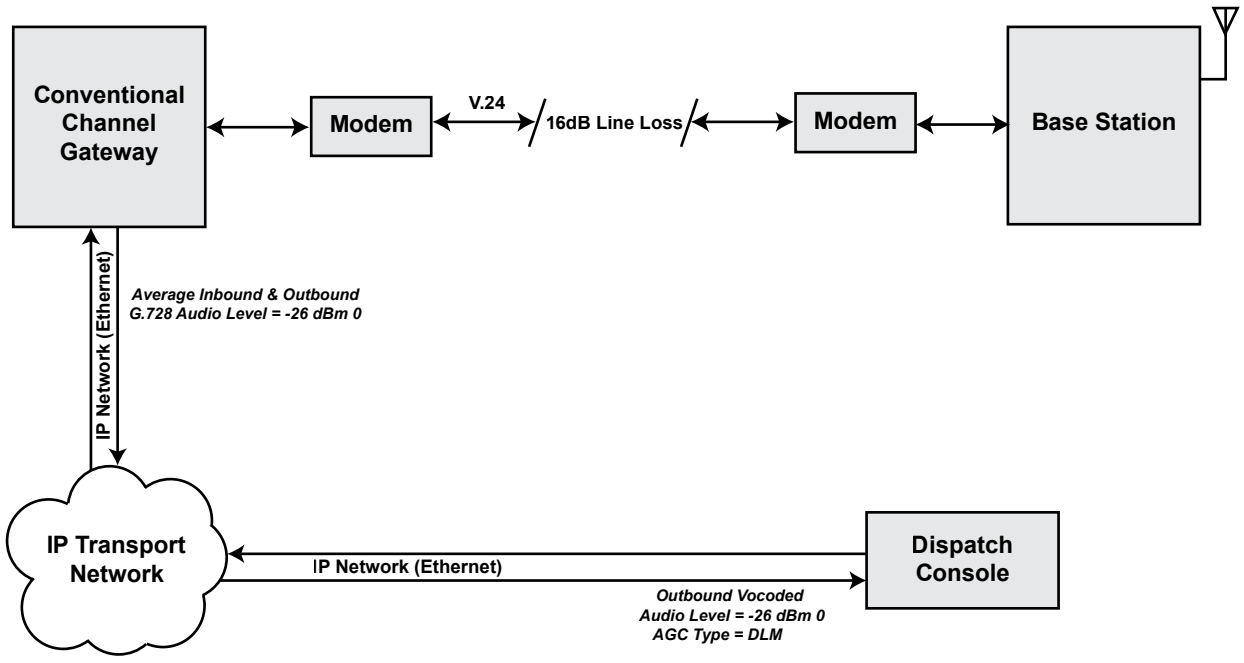
Figure 14: Audio Level Settings for V.24 with Unity-Gain Wireline Media



MCC7500_Audio_Level_Settings_V24_Unity_Gain_Wireline_Media_C

NOTICE: For V.24 only links over lossy media, there is a difference in Tx Wireline Alignment compared to the lossy media topologies above. In that case, the Tx Wireline Alignment value should be -5 dBm. See Figure 13: Audio Level Settings for Analog Channel with Lossy Wireline Media on page 101.

Figure 15: Audio Level Settings for V.24 with Lossy Wireline Media



MCC_7500_Audio_Level_Settings_V24_Lossy_Media_C

5.2.4
Audio Levels for Mixed Mode Base Radios

Table 12: Base Radio Audio Level Settings for Mixed Mode Channels

CSS Parameter	Value[2]	
	Unity Gain Media	Lossy Media
Infrastructure Interface (on Common tab of Infrastructure Interface window)	**V.24 HYBRID**	**V.24 HYBRID**
Analog Idle Link Check (on ASTRO Configuration tab of Infrastructure Interface window)	ENABLED	ENABLED
Status Tone/ALMT Level Below Peak Audio (on RX Wireline Alignment tab of Alignment Screen window)	-4.4 dB (-10 dBm)	-4.4 dB (-5 dBm) [3]
Rx Wireline Level (on RX Wireline Alignment tab of Alignment Screen window)	-10 dBm	-5 dBm
Tx Wireline Level (on TX Wireline Alignment tab of Alignment Screen window)	-10 dBm	***<xx>*** dBm level [4]
Digital Idle Link Check (on ASTRO Configuration tab of Infrastructure Interface window)	ENABLED	ENABLED
V.24 Transmit Clock (on ASTRO Configuration tab of Infrastructure Interface window)	Depends on your system.[1]	Depends on your system.[1]

[1] – For connections which use microwave links, set to ENABLED for QUANTAR® stations and EXTERNAL for GTR 8000. Make sure that the external device generates a 9600 Hz clock for the station.

[2] – All Values ± 0.5 dBm

[3] – Entering this value makes Status Tone equal Rx Wireline Level.

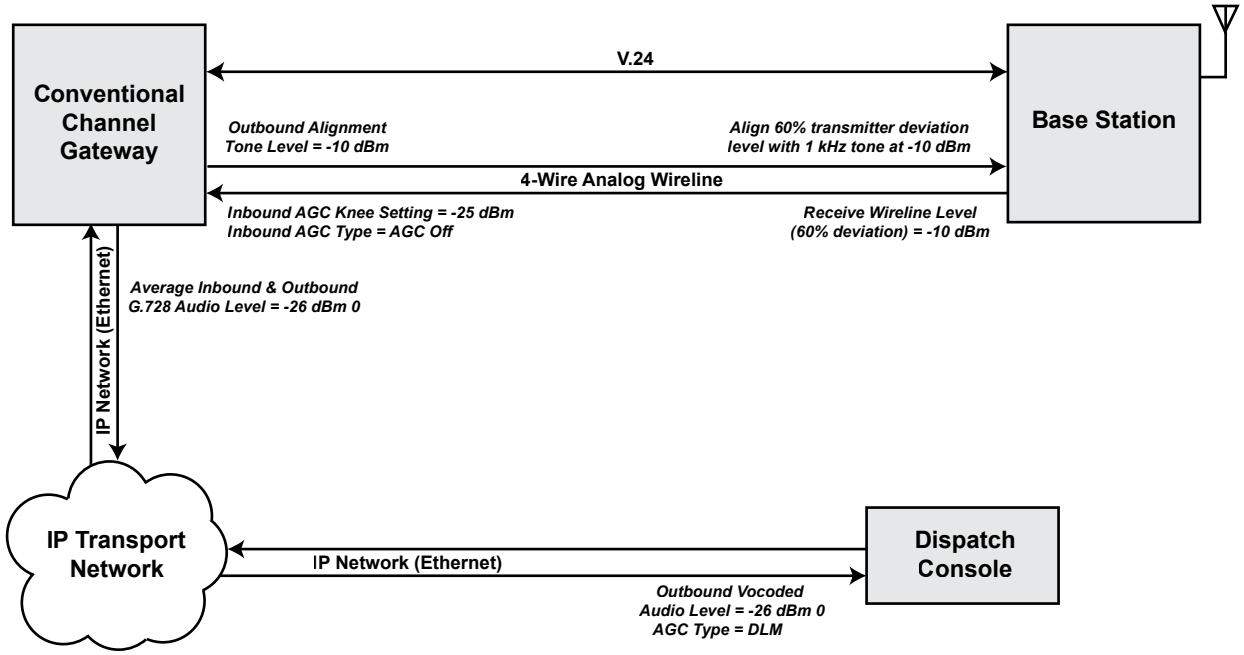
[4] – The ***<xx>*** level is determined by generating the 1 kHz tone from the console. measuring the level at the input to the station and entering that level in the wireline alignment screen

NOTICE:
When MLC 8000s are implemented, the Input Level Differential setting on the MLC 8000 must be based on the difference between GTR 8000 status tone level, or ALMT (Analog Link Monitor Tone) and peak analog voice input signal level. The difference is 4.4 plus the value in the Status Tone/ALMT Level Below Peak Audio field on the RX Wireline Alignment tab of the Alignment Screen window in CSS.

Setting the Status Tone differential to -4.4 dB using the CSS, makes Status Tone follow the level set for the Rx Wireline level. Status Tone cannot be set directly; the level can only be specified as a differential to Rx Wireline level for maximum deviation received signal. The Rx wireline level is 4.4 dB below the level for maximum deviation received signal level.

The following figure adds a V.24 connection to the topology from Figure 12: Audio Level Settings for Analog Channel with Unity-Gain Wireline Media on page 101, to show the hybrid version of the diagram.

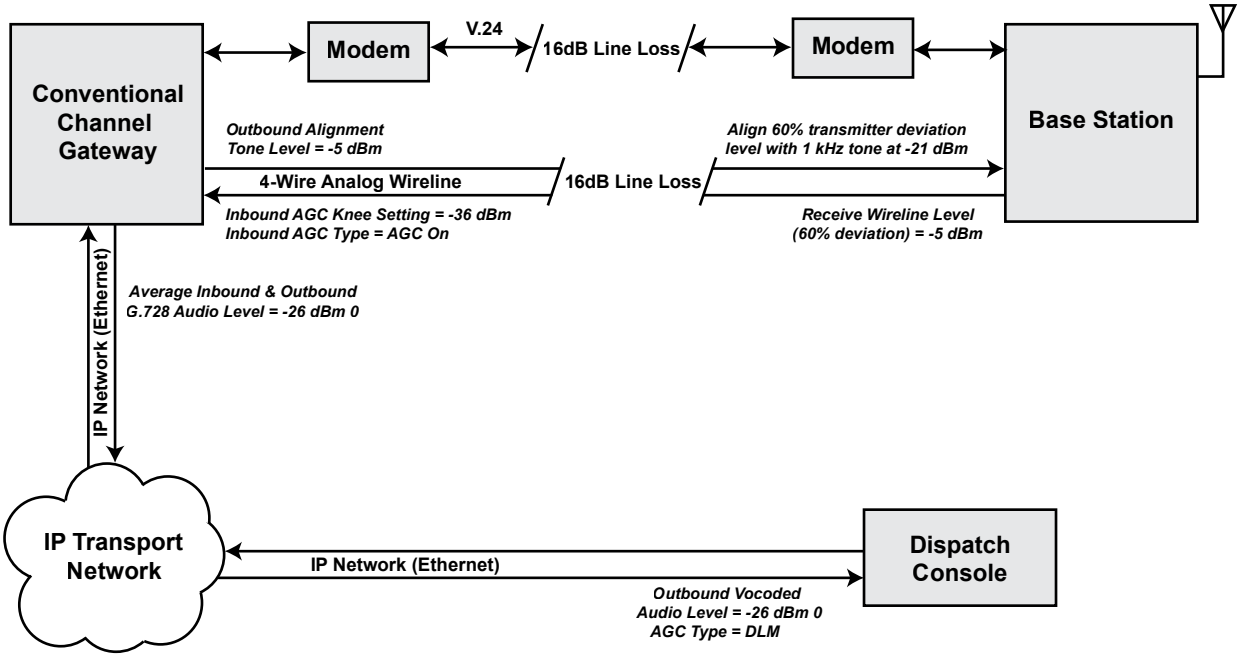
Figure 16: Audio Level Settings for Hybrid Link with Unity-Gain Media



MCC7500_Audio_Level_Settings_Hybrid_Unity_Gain_Wireline_Media_C

The following figure adds a V.24 connection to the topology from Figure 13: Audio Level Settings for Analog Channel with Lossy Wireline Media on page 101, to show the hybrid version of the diagram.

Figure 17: Audio Level Settings for Hybrid Link Over Lossy Media



MCC_7500_Audio_Level_Settings_Hybrid_Lossy_Media_C

The analog links in these hybrid topologies require the same types of audio level settings as in the corresponding analog-only topologies.

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Chapter 6

Console Sites Operation

This chapter describes tasks to perform after the console sites is installed and operational on your system.

6.1 System-Level Operation of the Dispatch Console

For information on operating the dispatch console, see the *Elite Dispatch User Guide*.

6.2 Configuration Changes to the Console System

When you make configuration changes in the Provisioning Manager or the Configuration Manager that affect the console system, especially the dispatch consoles, or the Archiving Interface Server (AIS), it can be necessary to perform additional actions on the affected dispatch console positions. These are the types of configuration changes and the additional actions to take after you make them.

Dynamic Configuration Updates

Dynamic configuration updates take place for configuration types that have a system-wide impact. Consoles must apply these configuration changes dynamically to remain in synchronization with the rest of the system. This category also includes configuration changes necessary for AIS to continue call processing. The dynamic configuration updates take place in the case of the following configuration changes:

- Adding or removing the talkgroup regrouping option.
- Mapping talkgroups to CKRs (Encryption Keys)
- Removing audio resources

Console-Centric Configuration Updates

This category includes configuration changes to data that are console-centric and have no impact on any other devices in the system. These changes take effect after you restart the Elite application on a dispatch console or the NICE Admin application on the AIS. The configuration updates that require the application restart are changes to all provisioned and non-provisioned data.

This list provides non-provisioned data that requires Elite application restart or accepting changes in the NICE Admin application:

- Audio Resource Attributes - both conventional and trunking channels. It also includes Main/Alt
- Audio Resource Capabilities
- Trunking System Types
- Zone ID and Site ID
- Aux I/O
- Operator Position
- Peripheral configuration data such as headset/speakers
- Vocoder configuration data
- Configuration data related to tones. For example, Alert/Channel Marker/Paging tones and formats

- Acoustic Cross Mute configuration data
- Site Conventional configuration data
- Cross Busy Cross Mute configuration data
- Unit Aliases
- Keyset Aliases
- All Console timing-related data. For example, Patch Idle Delay, Talk Extend, Signaling Retry Timer, All Mute Timeout

Configuration Updates That Require the Operating System Reboot

Changing between non-Dynamic System Resilience (DSR) and DSR is a major system-wide configuration change. This change requires a reboot of the operating system.

6.3

Backup and Restore of the Dispatch Console

Back up the dispatch console operator position locally by using the Provisioning Manager. Archiving Interface Server (AIS) and Voice Processor Module (VPM) configurations are available from the Zone Database Server (ZDS). Back up and restore the VPM configuration information using the Configuration/Service Software application (CSS). For more information, see *CSS Online Help*. If the system includes the Centralized Event Logging feature, the event and error logs can be stored on this server.

The console configuration objects are automatically replicated to the Zone Database Server (ZDS) application. Depending on your backup procedures, you can also archive the ZDS to a tape. For the list of the console configuration objects, see Configuration Objects in Console Sites on page 117.

NOTICE: For information on how to back up the SNMPv3 configuration information, see the *SNMPv3 Feature Guide*.

NOTICE: See the *MCC 7100 IP Dispatch Console User Guide* for backup and restore of an MCC 7100 IP Dispatch Console position.

6.4

System-Level Operation of the Archiving Interface Server and Logging System

The logging system interface enables the recording of native vocoded audio, which provides better audio quality and requires less storage space. The single logging interface supplies detailed information pertaining to events as well as call data and audio.

NOTICE: MCC 7100 IP Dispatch Console position supports recording of console audio by Archiving Interface Server (AIS)/Logging Recorder. MCC 7100 IP Dispatch Console position does not support VPM-based audio logging and Aux I/O operations.

See the sequence of events for the interface of the logging system in the IP network:.

1. The Logging Administrator configures the recording system with information about which Logging Interface to access, and how to authenticate with it.
2. The Logging System authenticates in the system.
3. The Logging System retrieves information about relevant system resources (based on Security Group access).
4. The Logging Administrator chooses recording resources and options.
5. The Logging System requests resource monitoring, causing interface affiliation.

6 When calls occur in the system, the zone controller notifies the affiliated nodes, who join the call (IP multicast).

7 Call audio is routed to affiliated endpoints (including the Logging Interface).

8 The interface sends call information/data and a copy of the vocoded audio to the recording system.

6.5 Backup and Restore of the Archiving Interface Server and Logging System

The logging recorder is equipped with both DVD-ROM and magnetic tape drives for system backups.

For information on how to back up the SNMPv3 configuration information, see the *SNMPv3 Feature Guide*.

NOTICE: MCC 7100 IP Dispatch Console position supports recording of console audio by Archiving Interface Server (AIS)/Logging Recorder. MCC 7100 IP Dispatch Console position does not support Voice Processor Module (VPM)-based audio logging and Aux I/O operations.

6.6 Backup and Restore of the Active Directory Server and Domain Name Server

All Active Directory and DNS configuration and data must be backed up. It is no longer sufficient to re-install the default setup and go from there in the event of a failure.

Since it contains information specific to your organization (for example, user accounts or console hostnames), your organization-specific information must be restored if a server fails. One of the items stored on the Active Directory Domain Controllers (ADDC) is the console user configuration information. This action allows the same console user to go from one console to another and re-use the same login, and get the same setup. This configuration information is stored on the Domain Controller (DC) in the user roaming profile.

The Active Directory data is backed up by performing a standard system backup. This backup collects the necessary binary files and other system configuration information necessary to restore Active Directory on a machine.

The backups are stored on the Network Transport Management Server (NTMS), which is the system-level DC. The backups for the system-level DC are stored on the first DC setup for each zone-level ADDC domain. This disk-to-disk copy facilitates access to the backups in case a restore is needed.

For disaster recovery purposes, the backed up data can be written to removable media (for example, CD-RW). This removable media can then be sent offsite to prevent both the source and the backup from being lost in the event of a catastrophic failure.

Restoration of Active Directory data ID is done through the Active Directory Restore Mode.

The DNS data is backed up using the same functionality currently used to back up the Zone Database Server (ZDS). The backup of the DNS data is tied in with backing up the databases on the ZDS. The restore of the DNS data is also tied in with restoring the database on the ZDS.

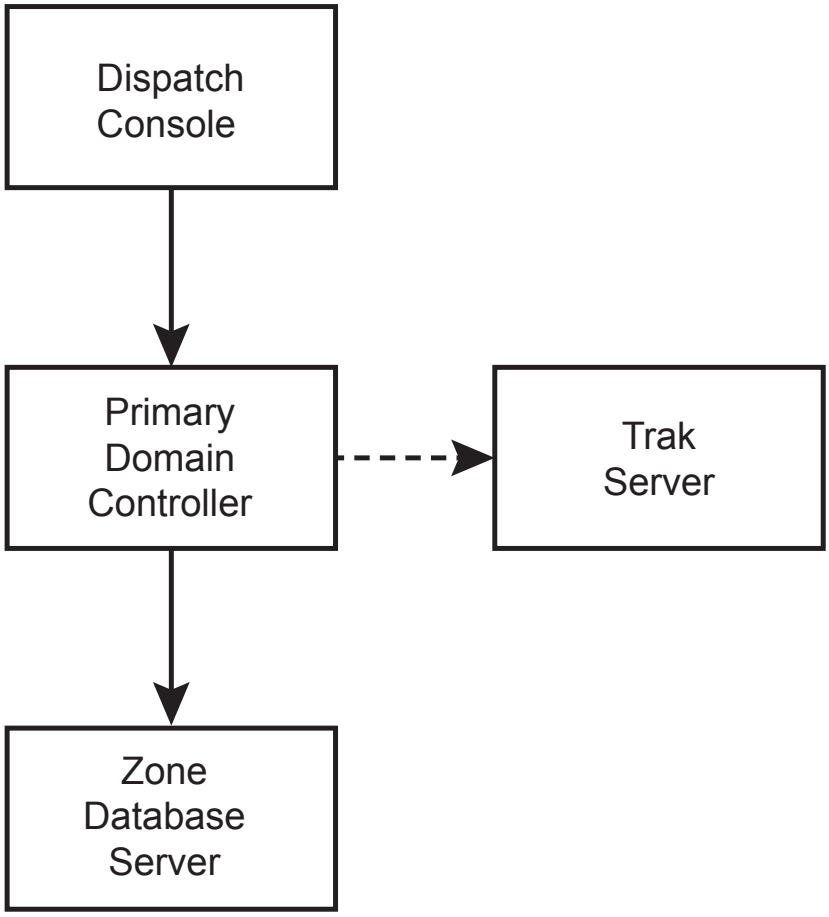
The User Configuration Server (UCS) DNS data does not need to be backed up. It can be re-created by updates from the ZDSs.

6.7 Dispatch Console Time Synchronization

The dispatch console synchronizes with the primary domain controller for the system time. The domain controllers are time sources for any computer joined to the Active Directory domain. The domain

controllers get their time primarily from the Zone Database Server (ZDS) application. If the domain controllers are unable to get the time from the ZDS, they are configured to get their time from the TRAK servers as a backup.

Figure 18: Dispatch Console Time Synchronization



MC75_time_sync.jpg

Chapter 7

Console Sites Troubleshooting

This chapter provides fault management and troubleshooting information for console sites.

7.1 Subsystem Failure and Recovery in Console Sites

The system can operate under failure conditions for the dispatch subsystem, and automatically recover from those failure conditions.

7.1.1 Loss of Dispatch Console or MCC 7500 AIS in Console Sites

The Console Site detects the loss of a dispatch console or MCC 7500 Archiving Interface Server (AIS).

Any dispatch console or MCC 7500 AIS that has an active Zone Contoller-CS Site Control Path (ZC-CS CP) reports the dispatch consoles or MCC 7500 AISs that fail to the ZC. Out-of-service messages are sent separately for trunked and analog conventional.

Another in-service MCC 7100 IP Dispatch Console, MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch Console, or MCC 7500 AIS at a Console Site with a trunked or conventional resource tries to establish a ZC-CS CP with the ZC when either one of the two ZC-CS CPs goes out-of-service or fails.

If only one console device (MCC 7100 IP Dispatch Console, MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch Console, or MCC 7500 AIS) has a trunked or conventional affiliation at a Console Site, that dispatch console device tries to establish both ZC-CS CPs with the ZC.

The loss of the voice card in an MCC 7500 console device (MCC 7500 VPM Dispatch Console or MCC 7500 AIS) causes the console device to go out-of-service.

7.1.2 Report of Failed Dispatch Console in Console Sites

After an MCC 7100 IP Dispatch Console, MCC 7500 VPM Dispatch Console, MCC 7500E Dispatch Console, or MCC 7500 Archiving Interface Server (AIS) is reported as out-of-service to the Zone Controller (ZC), the ZC:

- Internally de-affiliates/de-registers the failed dispatch console
- Continues to grant calls without considering a dispatch console or MCC 7500 AIS that is reported as being out-of-service
- For trunked, removes the Console Site as a cause of a busy and may convert a busied call if no other dispatch consoles are affiliated with a group call at the Console Site that had a dispatch console or MCC 7500 AIS that had failed (reported as being out-of-service)
- Internally tears down any patches that were owned by a dispatch console that fails (reported as being out-of-service) and sends patch unreserve commands to parallel dispatch consoles
- For trunked, changes any repeat disable state owned by a failed dispatch console to become repeat enabled on parallel dispatch consoles
- Internally dekeys a dispatch console that fails and proceed with the call as if the dispatch console had dekeyed upon being informed that the dispatch console has gone out-of-service (sends an end of call to parallel MCC 7100 IP Dispatch Consoles MCC 7500 VPM Dispatch Consoles, or MCC 7500E Dispatch Consoles)

If a failed dispatch console or MCC 7500 AIS is the only dispatch console or MCC 7500 AIS affiliated to a talkgroup or conventional channel at the Console Site, the ZC keeps the console site active in the call. The ZC leaves the console site in the active call and the bandwidth for this console assigned to the call.

7.1.3
Loss of Network Connectivity in Console Sites

If the domain controllers become unreachable for any reason, there may be limited access to the dispatch console. This situation can be caused by a failure of the domain controller or of some point in between. Anyone who previously logged in to the client with an Active Directory domain account can log on to the dispatch console using the data stored locally on the dispatch console from when the user last logged in through cached credentials. The password used may be an old password, but the user is able to log in. The information stored in that user profile may be out-of-date, but the user can bring up the applications available on that device and manually re-configure to suit their needs. In other words, some work can be done.

Cached credentials are used only if an Active Directory client cannot connect to any domain controller for that Active Directory domain. Cached credentials are available to anyone who had previously logged on to the computer. If the client can communicate with even a single domain controller, it uses the information stored for that user from that domain controller instead of the locally stored information.

For configuration data, dispatch consoles connect to the network management subsystem, that is, to the server applications supporting the subsystem configuration. If a dispatch console cannot connect to the network management subsystem to obtain the configuration data and the dispatch console has cached configuration data, certain system constraints occur:

- The console dispatches on the stored dispatch console user profile, either from the domain controller (if available) or the local dispatch console cache. The dispatch console affiliates with monitored talkgroups and participate in both talkgroup and private calls.
- The console operator does not receive any configuration updates, such as capability. For example, if an update to a talkgroup is on a dispatch console, the console may have access to talkgroups that could be restricted for use.
- Dispatch consoles with users who are able to log on while the network management subsystem is down continually attempt to authenticate with the system. The dispatch console tries to authenticate at the following increments: first retry is 15 seconds after initial attempt; subsequent attempts are at double the previous time. The time doubles until it reaches 64 minutes, and then retries are performed every 64 minutes until the system is available or the user logs out.

7.1.4
Loss of Domain Controller in Console Sites

Loss of a single system-level or a single zone-level domain controller does not affect the ability of dispatch console users or a service technician to be able to log in and access configuration information.

Loss of a single site level domain controller, in the case where two domain controllers exist for the associated active directory domain, does not affect the ability of dispatch console users or a service technician to be able to log in and access configuration information.

If all of the domain controllers for a given domain fail, the user accounts, groups, security policies, and other stored in that Active Directory domain are lost. This loss is true for any Active Directory domain. Since the system-level Active Directory domain is to house the user accounts, the devices using that domain would be operating in a degraded state. Users like technicians would only be able to log on to devices they have previously logged on to. If they have never logged on to a particular device, they are not able to until the user accounts and two-way trusts have been restored.

The dispatch console user could not log on to just any computer at the Console Site. The dispatch console user must have been logged on to the physical computer through which access is being attempted (not just in the local console site/domain) before the loss of the domain controllers, even if roaming profiles were enabled.

If a dispatch console user is able to log on and configuration changes are downloaded to the Console Site from the network management subsystem when the domain controller were failed, the domain controller would NOT be updated. If a domain controller recovers and then a user logs out, the domain controller would be updated.

If configuration changes are made through the network management subsystem while the MCC 7500 VPM Dispatch Console site domain controller is down, a newer console profile could exist for a dispatch console user. If a dispatch console user logs out: 1) roaming profile is enabled and 2) the domain controller is not in-service, only the specific dispatch console would be able to cache changes sent to it by the network management subsystem. So if roaming profiles are being used and the user logs in to a different computer after the recovery of the domain controller, the user is prompted as to what profile to use (older domain controller profile or newer network management subsystem profile).

7.1.5
Recovery of Dispatch Console or AIS in Console Sites

When a dispatch console or MCC 7500 Archiving Interface Server (AIS) comes back in-service, it must announce itself to the Zone Controller (ZC) before it can begin sending information to the ZC.

For trunked operation, after the dispatch console or MCC 7500 AIS has gone in-service with the ZC, the dispatch console or MCC 7500 AIS has registered its identification information. The dispatch console or MCC 7500 AIS also begins affiliating all of its talkgroups. The ZC, upon receiving the affiliation information, returns affiliation responses and current talkgroup activity (repeat disable, normal tactical, patch, regrouping, and call) to dispatch consoles.

For conventional operation, the dispatch console and MCC 7500 AIS go in-service with the ZC separately from trunking. There is no “unit ID” for conventional, but the console sends a separate conventional synchronization key for conventional affiliation purposes.

Three scenarios in which the ZC requires that all dispatch consoles in the Console Site re-affiliate are:

Console Site initiation
The ZC has no prior knowledge of the Console Site and requests a full affiliation upload. This upload could be significant if a large number of dispatch console users log in before the console site link is established. In the expected console site initiation scenario, the console site link is established with the first user registration, and the affiliations for each subsequent user are completed in turn. Fifty throttled user registrations, while possible, are not expected.

Shift change while the console site link is down
All dispatch console changes that occur during console site link outages must be communicated to the active ZC after the link is reestablished. The most severe case to consider is a shift change at a console site while the link is down. If 50 dispatch console users log out, and 50 different dispatch console users log in while the link is down, the console site has to upload all of the new affiliation information after the link is operational.

Double Zone Controller switch-over
A single ZC switch-over does not result in wholesale affiliation updates at the console site because the two ZCs share affiliation information. A double switch-over scenario results in a ZC becoming active without any current data for the system. The ZC has to reload infrastructure information, subscriber access, and subscriber mobility information, as well as all of the affiliation information from all console sites in the zone.

7.1.6
Dispatch Console Site Recovery

Assuming the following, each console site could recover in less than 10 minutes:

- A console site is configured for the maximum number of dispatch consoles
- Each dispatch console at that site is configured for 50% of the maximum available resources per dispatch console
- No other factors impede the recovery

Console site recovery means that all dispatch consoles at the site have access to the talkgroup and other resource audio for which they are configured to receive audio when those resources become active. It does not mean that each dispatch console has to be affiliated to all its talkgroups and resources, only that all the unique talkgroups and resources for that console site must be affiliated to at least one Dispatch Console at that console site.

If a console site is configured for fewer than the maximum number of dispatch consoles, console site recovery could occur faster.

7.1.7
Dispatch Console Redundancy in Console Sites

A system is normally equipped with multiple dispatch consoles at a single dispatch site or distributed across multiple dispatch sites. A system with multiple dispatch sites is considered to have a redundant backup, in that another dispatch console site or two can assume responsibility for the channels that were at the failed dispatch console site. This scheme provides system reliability against failures that affect the whole site (for example, major catastrophes or complete power failure at the site). Equipping each dispatch site with multiple dispatch consoles provides protection against failure of a single dispatch console and results in-service being available at the site, but to a reduced number of dispatchers.

7.1.8
Dispatch Console Reliability in Console Sites

After a dispatch console is configured and made active in the system, the console can restart, using cached configuration information regardless of whether the network management subsystem, that is server applications supporting subsystem configuration, is available. The restarted console retains its previous capabilities, although the system-dependent capabilities, such as user authentication at logon or alias lookup, can be unavailable.

7.1.9
Dispatch Console Fault Tolerance in Console Sites

The MCC 7500E Dispatch Console supports a redundant connection to the Console Site Switch through a set of two Network Interface Cards (NIC).

The dispatch console has no way of reporting a misconfigured or broken NIC team. In the event of an MCC 7500E NIC team misconfiguration, a console site switch malfunction can disconnect a MCC 7500E Console.

In order to provide a redundant link, NIC teaming has to be recreated. A team always consist of two member NICs plugged into different console site switches.

7.1.10
Console Sites Availability

Console site availability is predicated on the connection to the call processing subsystem being available when needed. The connection is needed only when a dispatch console or an MCC 7500 Archiving Interface Server (AIS) is active at the Console Site. A dispatch console is active if it is registered, or is attempting to register, with the Zone Controller (ZC).

An MCC 7500 AIS is active if it is affiliated, or is attempting to affiliate, to one or more talkgroups.

A Console Site is considered unavailable if it does not have a logical connection to the call processing subsystem while one or more dispatch consoles or MCC 7500 AISs at the console site are active.

When no dispatch consoles and no MCC 7500 AISs are active at a console site, the console site logical connection to the call processing subsystem is purposely terminated. The time when the console site connection to the call processing subsystem is intentionally down is not included in the total possible available time. During those times, the console site is neither available nor unavailable.

Monitoring the links between the console sites and the rest of the system is the primary method the Motorola Solutions Support Center (SSC) uses to calculate console subsystem availability. So that the SSC can compute the availability of console sites, the system reports when the link to the console site fails and when the link is purposely terminated. The SSC uses the system fault event log to determine what fault events occurred and when they occurred.

7.2
Serviceability of Console Sites

You can service a dispatch console site either locally or remotely.

Local Serviceability of Console Sites

A system containing MCC 7100 IP Dispatch Consoles, MCC 7500 VPM Dispatch Consoles, and MCC 7500E Dispatch Consoles enables the user or field technician to reconfigure system devices and to enable/disable system/device options through a local configuration management terminal.

A system containing MCC 7100 IP Dispatch Consoles, MCC 7500 VPM Dispatch Consoles, and MCC 7500E Dispatch Consoles provides the following critical information for access by the user or field technician:

- Configuration
- Diagnostics
- Event log reporting

The system provides a method to determine the current operations of the console subsystem network, including:

- Historical network load, increasing network load, and network congestion points
- Network utilization level under idle, average, and maximum usage
- Inventory of all network devices in the system
- A method to procure device and link utilization reports

Remote Serviceability of the Console Sites

A system containing dispatch consoles provides a method to allow for remote access and monitoring the system.

A system containing dispatch consoles provides both digital and analog means of access into each MSO (zone) for remote serviceability/maintainability by the Motorola Solutions Support Center (SSC).

The method of remote serviceability access allows the SSC to have network access to elements of the infrastructure, dispatch consoles included, for the following:

- Configuration
- Diagnostics
- Event log reporting

7.3 Dispatch Console Name Changes in Console Sites

By changing the name of a configured dispatch console, you can create operational issues. The console user must resolve these issues manually.

Chapter 8

Console Sites Reference

This chapter contains supplemental reference information relating to console sites.

8.1 Configuration Objects in Console Sites

Table 13: System-Level Configuration Objects

Configure the following entities in the Provisioning Manager for a console site.

Category	Subcategory	Object
System		
	Radio System	
		System
		Console System
		Conventional System
	Conventional	
		Tone Command
		Tone Segment
		Tone Sequence
		Tone Table
Consoles		
	Application	
		RF Cross Busy Cross Mute
		Console Acoustic Cross Mute
		Application to Unit ID Map
		Console TG/MG Capabilities Profile
		Console User Capabilities Profile
		Console Private Call Resource
		Console User
	Integrated Paging	
	Site	
		Console Site
		MCC 7500 VPM Dispatch Console/MCC 7500E Dispatch

Table continued…

Category	Subcategory	Object
		Console/MCC 7100 Dispatch Console
		MCC 7500 AIS (VPM Based)
Subscribers		
	Maps	
		Home Zone Map
		Conventional Home Zone Map
		Sub-Band Restricted Map
	Profiles	
		User Group
		TG/MG Capability Profile
		TG/MG Site Access Profile
		Status Set
		Radio Capabilities Profile
		Radio Site Access Profile
		Radio Interconnect Profile
	Group	
		Talkgroup
		Multigroup
	Radio	
		IVD Radio
		HPD Radio
Applications		
	RCM/CAD	
		Storm Plan
Zone		
	Zone Core	
		Zone
	Auxiliary I/O	
		Interlocked Group
		AuxIO Server
	Conventional	
		Conventional Channel Gateway*
		CCGW-HD
		Analog Conventional Channel
		Digital Conventional Channel

NOTICE: * The Site Gateway (Conventional Channel Gateway), based on the GGM 8000 platform and MNR routers based on the S2500 platform, provides a conventional channel interface to conventional base radios in the system. This conventional channel interface may be shown in the Provisioning Manager as “CCGW” or Conventional Channel Gateway.

8.2 Dispatch Console Logon Process

The dispatch console logon process consists of two logons: the user must first log on to Windows, and then log on to the console software application.

Before the user is allowed to log on to the console software, however, a valid user ID and password must be entered. The dispatch console validates the user ID and password with the Domain Controller (DC) and allows the user to access only the resources for which the user has access rights. This system also applies to third-party applications that use the dispatch console API.

If the DC is unreachable, and a console user (who had previously logged on) logs on a console in the same domain as the user had previously logged on to, the dispatch console uses locally cached information, allowing the user to log on even when network services are unavailable. The dispatch console saves to disk downloaded DC subsystem information associated with each logon instance of a dispatch console user.

8.2.1 Dispatch Console Software Application Logon

When a user logs on to the MCC 7500 VPM/MCC 7500E/MCC 7100 application for the first time, the system must download configuration information. The information downloaded is stored in the following files:

- User config file
- Radio user table file
- Elite profile

The user config file contains all of the information about the system resources that the user is allowed to access. It includes all of the talkgroups and conventional channels that this user is allowed to access, along with all of the capabilities that apply to those talkgroups/channels. It also includes all of the Aux I/Os available for user by this user, and the associated information for each Aux I/O (for example, input/output, latched/momentary). This file contains any data downloaded from the system for this particular user and is restricted by that user security group settings.

The radio user table file contains the list of all outbound radios that this user is allowed to target on an outbound service (for example, private call). This data is used by the console to display the "target list" for any directed radio service. It could include many thousands of IDs and aliases, depending on how the security groups are set up in the system, and what groups this user is provided access to by the network administrator.

In addition to the config files downloaded from the system, configuration information is stored locally in the Elite profile. The Elite profile determines how the console user interface is configured. The Elite Dispatch program uses the Elite profile created by the Elite Admin program. It defines which channels appear on the screen, where they are on the screen, which options are shown in each window, the order of the buttons, and so on. It contains all adjustable properties of the Elite Dispatch user program.

The config files are stored in a convenient location on the dispatch console computer or elsewhere on the radio system network (for example, another dispatch console computer or a domain controller). Different files may be stored in different locations if that best suits the needs of the users. Although one user may have access to multiple configuration files, the user can use only one configuration file at a time.

On subsequent logons to the MCC 7500 VPM/MCC 7500E/MCC 7100 application, the configuration data downloaded from the system is checked against the data stored in the system to ensure that the cached data matches the stored data. If the two sets of config data match (determined by using timestamps), the application launches. If the data does not match, the new config data is downloaded from the system.

When the user exits the MCC 7500 VPM/MCC 7500E/MCC 7100 application, any updated configuration information is pushed to the domain controller when the user logs off the Windows computer, provided the Windows account is configured to use a roaming profile.

8.3 Agency Partitioning in Console Sites

The access rights given to user accounts manages access to the various parts of the console subsystem.

- A dispatch console checks with the Domain Controller (DC) for the access rights assigned to the user and allows access to only the resources for which they have access rights. This access also applies to third-party applications which use the dispatch console Access Point Name (API).
- An MCC 7500 Archiving Interface Server (AIS) checks with the DC for the access rights assigned to the logging subsystem and allows access to only the resources for which it has access rights.
- The radio system network manager checks the access rights assigned to the user wishing to configure the console subsystem and allows access to only the portions of the console subsystem for which they have access rights.

To allow for agency partitioning, each Radio Network Infrastructure (RNI) zone Active Directory Domain Controller (ADDC) domain contains Organizational Units (OUs) for your organization. These OUs are given authority for the particular sites “owned” by that agency. If a site is delegated to its own ADDC domain from the parent RNI zone ADDC domain, the OUs for that agency or agencies are created in the site ADDC domain as well.

For greater security, a Console Site could be delegated from the zone-level ADDC domain for a particular agency. The delegation hides the information stored in the parent. Agency partitioning through OUs does not provide storage. However, delegation from the zone-level ADDC domain is done on a per-site basis. Thus, if a single agency has multiple console sites, administration is easier using OUs.

Some of the differences between using Organizational Units (OUs) to separate out a Console Site and delegating an Active Directory domain lie in the areas of administration, account management, availability, client setup, server setup, and security.

One advantage to using OUs to separately administer a console site is that existing objects in the zone-level AD domain can be reused. For example, if scripts are used to help create user accounts, that same script can be used since the users still belong to the same AD domain. This reuse may not be possible in a delegated site-level AD domain. There is less duplication of effort in administering since you can use the same administration techniques to handle multiple OUs.

The biggest disadvantage from an administration standpoint to using OUs to partition out an agency is that any domain administrator can administer the OU. A domain administrator in the zone-level AD domain cannot be prevented from gaining access to the devices in the site OU.

One the other hand, administration of a site-level AD domain can be done in a finer control method, or better align with the administration practices used by that agency, which may not be possible in the zone-level AD domain.

The biggest disadvantage to administering site-level AD domains is that each site must be separately administered. If any changes made to one site-level AD domain must be applied to other site-level AD domains, those changes must be duplicated in each site-level AD domain.

Along with administration, account management is different between OU and delegated AD domain. In an OU, if an account is created, it applies to the entire zone-level AD domain, or to the entire system since user accounts are normally created at the system level. This system allows the account to be used in each OU. It still provides a single user account that can be used across all of the sites.

If the site is delegated out in a site-level AD domain, these accounts can also be used. In addition, if accounts are needed only by this agency at this site, the accounts can be created in the site-level AD domain. This creation cannot be done if the OU method is used. Even if the user is created for use in the OU, it is still a zone-level or system-level user account.

Availability means how and what kinds of failures can the AD domain survive. For an OU, the availability is the availability of the zone-level AD domain. No additional hardware is required since the OU is part of the zone-level AD domain.

For a delegated site-level AD domain, the Console Site requires two new ADDC servers. Since a single piece of hardware cannot handle more than a single AD domain, new hardware is required for the new site-level AD domain. To make the site-level AD domain more available, two ADDC servers are needed. In addition, these servers are required for each delegated site-level AD domain.

Not much changes on the client. For an OU setup, nothing changes on the client. The client is still part of the zone-level AD domain. For a delegated domain, the computer is joining a new AD domain. That new name must be used when joining the domain. If the zone-level AD domain name is used, the computer is attached to the wrong AD domain. In addition, if this site already has computers in the zone-level AD domain, these devices must be removed from the zone-level AD domain and joined to the new site-level AD domain.

If they are not removed, a mixture of devices in both the zone-level AD and site-level AD domains occurs. This mixture could make administration of the consoles difficult and time consuming. In terms of the server setup, a new OU must be set up in the zone-level AD domain to administer the Console Site. This new OU must have its permissions changed and such to restrict access to this site.

When a new site-level AD domain is set up, the new hardware must be built and configured. If it is to be isolated, any existing information in the zone-level or system-level AD domain must be copied into the new site-level AD domain. The correct policies must be applied. The amount of work needed is on par with setting up a new zone-level AD domain. Probably the main reason for setting up a site-level AD domain is to have greater security at a Console Site. With a site-level AD domain, the security settings for the devices in that domain can be better controlled. The site-level AD domain administers can restrict who can and cannot access the devices, what are the exact security settings on a given device or group of devices, what the auditing level is, and so on. These settings can be done in a well-defined scope.

Something similar can be done with OUs, but the main issue is that they are still part of the zone-level AD domain. So changes can be made at the zone-level that affects the devices at the Console Site. These changes may be made without knowledge or approval by the site administrators. If so, this situation could have unintended consequences.

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